DECEMBER 1986 £1·10

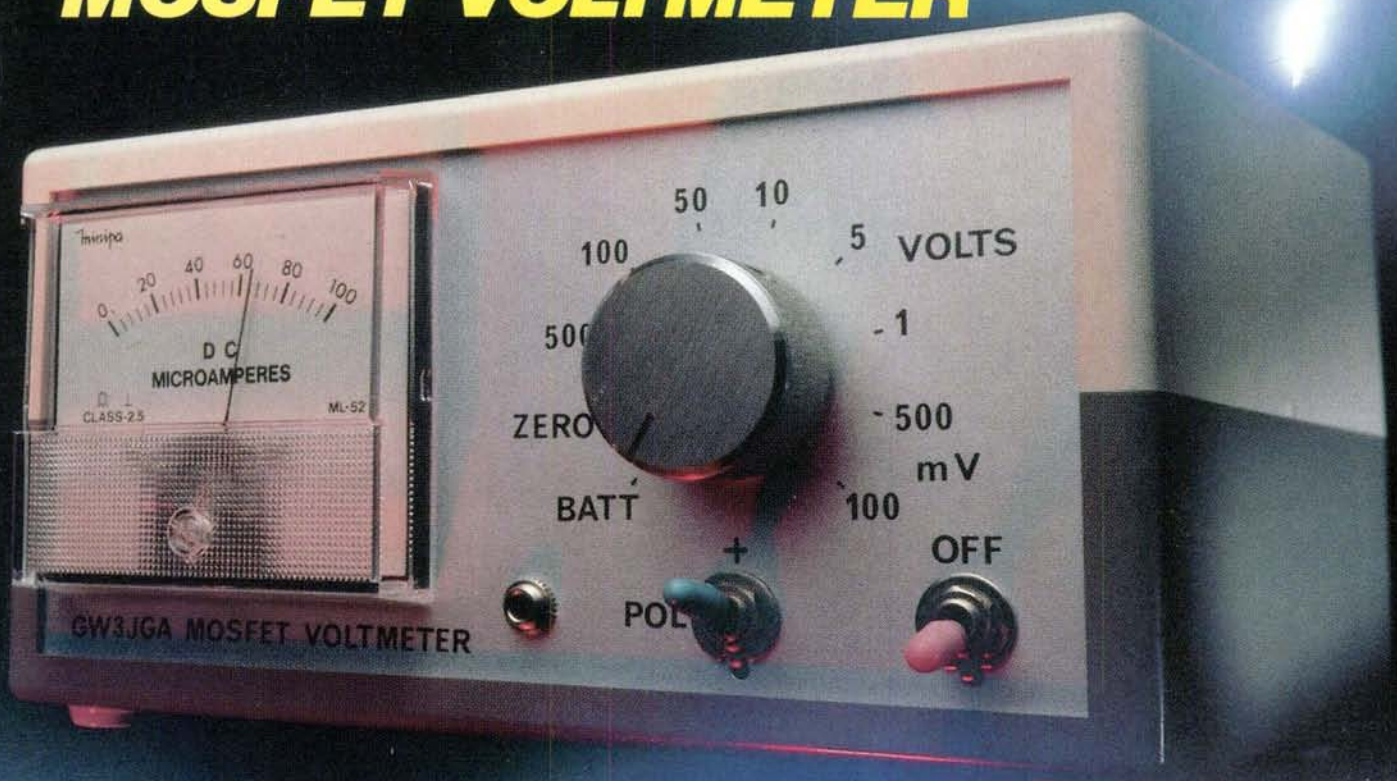
Practical Wireless

The Radio Magazine

Inside This Issue

PLANNING DIFFICULTIES
Amateurs & Planners Can Work Together

MOSFET VOLTMETER



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PLUS - 1986 Index & All The Regular Features

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MANAGEMENT AND STAFF WOULD LIKE TO WISH EVERYONE A VERY MERRY CHRISTMAS

Yaesu

FT1	HF Transceiver	P.O.A.	(—)
FT980	HF Transceiver	1750.00	(—)
SP980	Speaker	110.00	(2.50)
FT757GX	HF Transceiver	969.00	(—)
FC757	Auto A.T.U.	349.00	(2.50)
FP757HD	Heavy Duty PSU	239.00	(2.50)
FP757GX	Switched Mode PSU	199.00	(2.50)
FT290	2m M/Mode Port/Transceiver	379.00	(—)
FT290	With Mutek front end fitted	409.00	(—)
MMB11	Mobile Bracket	37.50	(1.50)
NC11	Charger	10.50	(1.50)
CSC1	Carrying Case	6.50	(1.50)
YHA15	2m Helical	7.50	(1.50)
YHA44D	70cm ½wave	12.50	(1.50)
YM49	Speaker Mike	22.00	(1.50)
MMB15	Mobile Bracket	14.55	(1.50)
FT203R	NEW 2m H/Held/C/W FNB3	255.00	(—)
FT209R	NEW 2m H/Held/C/W FNB3	299.00	(—)
FT703R	70cm H/Held	289.00	(—)
FT709R	70cm H/Held	319.00	(—)
FT270R	2m 25W F.M.	399.00	(—)
FT270RH	2m 45W F.M.	469.00	(—)
FT2700R	2m/70cm/25W/25W	499.00	(—)
FRG 9600	60-905MHz Scanning RX	525.00	(—)
MMB10	Mobile Bracket	10.00	(1.50)
NC9C	Charger	10.35	(1.50)
PA3	Car Adaptor/Charger	20.50	(1.50)
FNB2	Spare Battery Pack	25.00	(1.50)
YM24A	Speaker Mike	27.00	(1.50)
FT726R	2m Base Station	999.00	(—)
430/726	70cm Module for above	349.00	(3.00)
FRG8800	HF Receiver	639.00	(—)
FRV8800	Convertor 118-175 for above	100.00	(2.00)
FRT7700RX	A.T.U.	59.00	(2.00)
MH1B8	Hand 600 8pin mic	20.00	(1.50)
MD1B8	Desk 600 8pin mic	79.00	(1.50)
MF1A3B	Boom mobile mic	25.00	(1.50)
YH77	Lightweight phones	19.50	(1.50)
YH55	Padded phones	19.95	(1.50)
YH1	L/weight Mobile H/set-Boom mic	19.00	(1.50)
SB1	PTT Switch Box 208/708	21.00	(1.50)
SB2	PTT Switch Box 290/790	18.00	(1.50)
SB10	PTT Switch Box 270/2700	21.00	(1.50)
FF501DX	Low Pass Filter	37.50	(1.50)
NEW			
FT767GX	HF TXCR	1550.00	(—)
FT727	2M/70CM H/H	425.00	(—)
FL7000	HF Linear	1600.00	(—)
FT290 MkII	Surer 290	429.00	(—)

Linear Amps

TOKYO HI POWER			
HL 160V	2m, 10W in, 160W out	244.52	(2.50)
HL 82V	2m, 10W in, 85W out	144.50	(2.50)
HL 110V	2m, 10W in, 110W out	249.00	(2.50)
HL 35V	2m, 3W in, 30W out	76.00	(2.50)
HL 30	2m, 3W in, 30W out	54.00	(2.50)
HL 20U	70cms, 3W in, 20W out	122.50	(2.50)
MICROWAVE MODULES			
MML144/30-LS	inc preamp (1/3 w i/p)	94.30	(2.50)
MML144/50-S	inc preamp, switchable	106.95	(2.50)
ML144/100-S	inc preamp (10w i/p)	149.95	(3.00)
MML144/100-HS	inc preamp (25w i/p)	159.95	(3.00)
MML144/100-LS	inc preamp (1/3w i/p)	169.95	(3.00)
MML144/200S	inc preamp (3/10/25 i/p)	334.65	(3.00)
MML432/30L	inc preamp (1/3w i/p)	169.05	(2.50)
MML432/50	inc preamp (10w i/p)	149.50	(2.50)
MML432/100	linear (10w i/p)	334.65	(3.00)
B.N.O.S.			
LPM 144-1-100	2m, 1W in, 100W out, preamp	197.50	(3.00)
LPM 144-3-100	2m, 3W in, 100W out, preamp	197.50	(3.00)
LPM 144-10-100	2m, 10W in, 100W out, preamp	175.00	(3.00)
LPM 144-25-160	2m, 25W in, 160W out, preamp	255.00	(3.00)
LPM 144-3-180	2m, 3W in, 180W out, preamp	295.00	(3.00)
LPM 144-10-180	2m, 10W in, 180W out, preamp	295.00	(3.00)
LP 144-3-50	2MN 50W out, preamp	125.00	(3.00)
LP 144-10-50	2M 10W in, preamp	125.00	(3.00)
LPM 432-1-50	70cm, 1W in, 50W out, preamp	235.00	(3.00)
LPM 432-3-50	70cm, 3W in, 50W out, preamp	235.00	(3.00)
LPM 432-10-50	70cm, 10W in, 50W out, preamp	195.00	(3.00)
LPM 432-10-100	70cm, 10W in, 100W out, preamp	335.00	(3.00)

SWR/PWR Meters

HANSEN			
FS50VP	50-150MHz 20/200 Interval PEP/SWR	106.70	(2.50)
FS300V	50-150MHz 20/200 PWR/SWR	53.50	(2.50)
FS300H	1.8-60MHz 20/200/10W	53.50	(2.50)
FS210	1.8-150MHz 20/200 Auto SWR	63.50	(2.50)
W720	140-430MHz 20/200W	41.50	(2.50)
WELZ			
SP10X	1.8-150MHz PWR/SWR	39.95	(2.50)
SP122	1.8-60MHz PWR/SWR/PEP	79.95	(2.50)
SP220	1.8-200MHz PWR/SWR/PEP	67.95	(2.50)
SP225	1.8-200MHz PWR/SWR/PEP	119.95	(2.50)
SP420	140-525MHz PWR/SWR/PEP	74.95	(2.50)
SP425	140-525MHz PWR/SWR/PEP	119.95	(2.50)
SP825	1.8-200-430-800-1240MHz	179.00	(2.50)
TOYO			
T430	144/432 120 W	52.50	(2.50)
T435	144/432 200 W	58.00	(2.50)

AERIALS BY:- JAYBEAM – MINIBEAM – HYGAIN – G. WHIP – TET – MET – TONNA

Icom Products

IC751	HF Transceiver	P.O.A.	(—)
IC745	HF Transceiver	P.O.A.	(—)
IC735	New HF Transceiver	P.O.A.	(—)
PS15	P.S. Unit	158.00	(4.50)
PS30	Systems p.s.u. 25A	343.85	(—)
SM6	Base microphone for 751/745	46.00	(2.00)
IC505	50MHz multi-mode portable	459.00	(—)
IC290D	2m 25w M/Mode	542.00	(—)
IC271E	2m 25w M/Mode Base Stn.	835.00	(—)
IC271H	100W version of above	1029.00	(—)
IC27E	25W FM mobile	399.00	(—)
IC28E	25W FM	325.00	(—)
IC47E	25w 70cm FM mobile	495.00	(—)
ICBU1	B/U Supply for 25/45/290	32.00	(2.00)
ICR71	General Coverage Receiver	825.00	(—)
IC02E	2m H/Held	299.00	(—)
IC2E	2m H/Held	225.00	(—)
ML1	2m 10w Linear	79.35	(2.50)
IC4E	70cm H/Held	285.00	(—)
IC04E	70cm handheld	299.00	(—)
BC35	Base Charger	70.15	(2.00)
HM9	Speaker mic	21.85	(2.00)
LC3	Carry Case	6.90	(2.00)
ICBP3	Std Battery Pack	29.00	(2.00)
BP5	High Power Battery Pack	60.95	(2.00)
CP1	Car Charging Lead	6.90	(2.00)
DC1	12v Adaptor	17.25	(2.00)
R7000	VHF/UHF Scanning Receiver	957.00	(—)
IC3200	2M/70cm Mobile Transceiver	556.00	(—)
IC12	23cm H/H	428.00	(—)
GC4	World Clock	39.00	(2.00)

Scanning Receivers

SMC8400	VHF/UHF Scanner	249.00	(3.00)
SX200	VHF/UHF Scanner	325.00	(3.00)
SX400	VHF/UHF Continuous Coverage	625.00	(3.00)
AOR2002	VHF/UHF Continuous Coverage	487.30	(3.00)

Mutek Products

SLNA 50	50MHz Switched preamp	49.50	(2.00)
SLNA 144s	144MHz Low noise switched preamp	41.95	(2.00)
SLNA 145sb	Preamp intended for 290	31.90	(2.00)
GLNA 432e	70cm Mast head preamp	159.90	(3.00)
RPCB 144ub	Front end FT221/225	84.90	(2.00)
RPCB 251ub	Front end IC251/211	89.90	(2.00)
BBBA 500u	20-500MHz Preamp	34.90	(2.00)
GFBA 144e	2m Mast head preamp	149.90	(2.50)
SBLA 144e	2m Mast head preamp	89.90	(3.00)
RPCB 271ub	Front end for IC271	94.90	(2.00)
TVHF 230c	2M-FM Transverter	299.90	(5.50)
LBPF 144v	Bandpass Filter	24.90	(2.00)
LBPF 432u	Bandpass Filter	24.90	(2.00)
TVVF 50c	6M Transverter	209.90	(3.00)
GLNA 433e	70cm Pre-amp	89.90	(3.00)
TVVF 144a	2M Transverter	249.90	(3.00)

Datong Products

PC1	Gen. Cov. Con.	137.40	(2.00)
VLF	Very low frequency conv.	34.90	(2.00)
FL2	Multi-mode audio filter	89.70	(2.00)
FL3	Audio filter for receivers	129.00	(2.00)
ASP/B	r.f. speech clipper for Trio	82.80	(2.00)
ASP/A	r.f. speech clipper for Yaesu	82.80	(2.00)
ASP	As above with 8 pin conn	89.70	(2.00)
D75	Manual RF speech clipper	56.35	(2.00)
D70	Morse Tutor	56.35	(2.00)
MK	Keyboard morse sender	137.40	(2.00)
RFA	RF switched pre-amp	36.00	(2.00)
AD270-MPU	Active dipole with mains p.s.u.	51.75	(2.00)
AD370-MPU	Active dipole with mains p.s.u.	69.00	(2.00)
MPU	Mains power unit	6.90	(2.00)
DC144/28	2m converter	39.67	(2.00)
PTS1	Tone squelch unit	46.00	(2.00)
ANF	Automatic notch filter	67.85	(2.00)
SRB2	Auto Woodpecker blanker	86.25	(2.00)

CW/RTTY Equipment

Tono 550	Reader	329.00	(3.00)
ICS/AEA			
PK64	Complete Packet Amtor/RHa etc.	239.00	(3.00)
BENCHER			
BY1	Squeeze Key, Black base	67.42	(2.50)
BY2	Squeeze Key, Chrome base	76.97	(2.50)
HI-MOUND MORSE KEYS			
HK703	Up down keyer	38.35	(2.00)
HK704	Up down keyer	26.35	(2.00)
HK706	Up down keyer	21.80	(2.00)
HK707	Up down keyer	20.15	(2.00)
HK710	Up down keyer	39.95	(2.50)
HK802	Up down solid brass	109.00	(2.50)
HK803	Up down solid brass	104.50	(2.50)
HK808	Up down keyer	39.95	(2.00)
MK703	Twin paddle keyer metal base	34.50	(2.00)
MK705	Twin paddle keyer marble base	32.78	(2.00)
MK706		30.48	(2.00)
KENPRO			
KP100	Squeeze CMOS 230/13.8v	109.25	(3.00)
KP200	Memory 4096 Multi Channel	234.55	(3.00)

Trio

TS940S	9 Band TX General Cov RX	1895.00	
TS930S	9 Band TX General Cov RX	1595.00	(—)
TS440	**NEW** 9 Band TX General Cov RX	998.00	(—)
TS830S	160-10m Transceiver 9 Bands	981.59	(—)
AT230	All Band ATU/Power Meter	185.90	(2.50)
SP230	External Speaker Unit	56.03	(—)
TS530SP	160m-10m Transceiver	849.82	(—)
TS430S	160m-10m Transceiver	876.68	(—)
PS430	Matching Power Supply	151.48	(3.50)
SP430	Matching Speaker	39.50	(2.50)
MB430	Mobile Mounting Bracket	14.78	(2.50)
FM430	FM Board for TS430	45.00	(2.50)
SP120	Base Station External Speaker	36.33	(2.50)
MC50	Dual Impedance Desk Microphone	43.10	(2.50)
MC35S	Fist Microphone 50K ohm IMP	20.33	(2.00)
LF30A	HF Low Pass Filter 1kW	30.18	(2.00)
TR9130	2M Multimode	593.64	(—)
TM201A	2M 25W mobile	322.68	(—)
TM401A	7cms FM 12W	392.82	(—)
TH21E	2M Mini-Handhelds	199.00	(—)
TH41E	70cm Mini-Handhelds	240.99	(—)
TM211E	2M FM Mobiles	444.60	(—)
TM411E	70cm FM Mobiles	498.00	(—)
TS711E	2M Base Stations	839.96	(—)
TS811E	70cm Base Stations	999.00	(—)
TR3600	70cm Handheld	353.48	(—)
TR2600	New 2M FM Synthesised Handheld	328.00	(—)
ST2	Base Stand	72.09	(—)
SC4	Soft Case	18.48	(2.00)
SMC25	Speaker Mike	21.55	(2.00)
PB25	Spare Battery Pack	35.11	(2.00)
MS1	Mobile Stand	41.88	(2.00)
R2000	Synthesiser 200KHz-30MHz Receiver	565.32	(—)
HS5	Deluxe Headphones	32.02	(2.00)
SP40	Mobile External Speaker	19.70	(—)
TL922	160/10M 2kW Linear	1359.00	(7.50)
TS780	2M/70cm M/M Transceiver	998.00	(5.50)
TS670	6, 10, 15, 40M 10W M/M Transceiver	843.66	(5.50)
TR9300	6M M/M Transceiver	575.16	(5.50)
TR751	**NEW** 2M 25W Multimode	580.70	(—)

Power Supplies

DRAE				**BNOS**			
4 amp	43.40	(2.50)		6 amp	69.00	(3.00)	
6 amp	63.00	(3.00)		12 amp	115.00	(3.50)	
12 amp	86.50	(3.50)		25 amp	169.00	(4.50)	
24 amp	125.00	(4.50)		40 amp	345.00	(4.50)	
SMC							
RU120406	4 amp Power Supply				14.95	(3.00)	

Aerial Rotators

KR250	Light Duty	75.00	(3.00)
FU200	Light Duty	69.00	(2.50)
AR40	5 core Medium Duty	119.00	(2.50)
KR400	Med/H Duty	129.95	(3.00)
KR500	6 core Elevation	139.95	(3.00)
KR400RC	6 core Medium Duty	159.95	(3.00)
KR600RC	8 core Heavy Duty	209.00	(3.00)
HAM1V	8 core Heavier Duty	359.00	(4.50)
T2X	8 core Very Heavy Duty	419.00	(—)
KR5400	Elevation/Azimuth	245.00	(3.00)
KR5600	Elevation/Azimuth	357.00	(3.50)

Switches

SMCS 2U	2N 50239	18.95	(2.00)
SMCS 2N	2 way 'n' Skts	23.50	(2.00)
Welz	2 way SO239	29.95	(2.00)
Welz	2 way 'n' Skts	49.00	(2.00)
Drae	3 way SO239	15.40	(2.00)
Drae	3 way 'n' Skts	19.90	(2.00)
Kenpro KP21N	2 way Switch	27.00	(2.00)

Miscellaneous

DRAE	Wavemeter	27.50	(2.00)
T30	30W Dummy load	8.50	(2.00)
T100	100W Dummy load	38.00	(2.00)
T200	200W Dummy load	56.00	(2.00)
CT20A	20W Dummy Load PL259	15.95	(2.00)
CT20N	20W Dummy Load N. Plugs	22.95	(2.00)
CT530	100W Dummy Load (500WHmin)	79.00	(2.50)
DRAE	2m Pre-set A.T.U.	14.50	(2.00)
TOKYO HI-POWER			
HC200	10-80 HF Tuner	115.00	(2.50)
HC400	10-160 HF Tuner	199.00	(3.50)
CAP CO. AERIAL TUNERS			
SPC300D	1kW PEP	225.00	(6.00)
SPC3000D	3kW PEP	325.00	(6.00)

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The Radio Magazine

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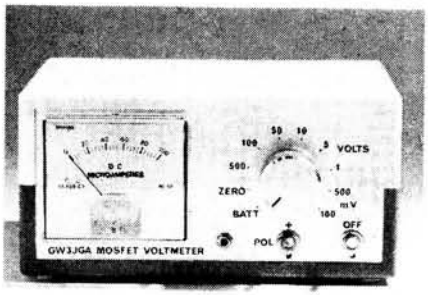

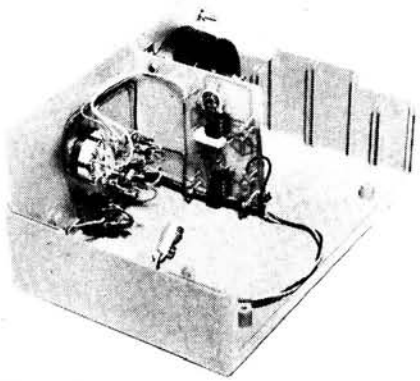

THIS MONTH'S COVER

Our featured project this month, the versatile High Impedance MOSFET Voltmeter designed by John Thornton-Lawrence GW3JGA.

THIS MONTH

Regular Features

NEXT MONTH

A Basic Wobbulator
A Small Isolated Power Supply
The ICS RM-1 Modem Reviewed

On sale December 11

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ICOM

2 NEW Exciting ICOM
to give you that movi

NEW! IC-12E, 1200MHz FM Handportable.

ICOM technology is on the move again, continuing to explore the Amateur Radio field, as a result ICOM present the IC-12E, 23cm. Amateur band, handheld transceiver.

The IC-12E has a 16 button keypad allowing direct access to frequencies, memories and scanning facilities. Ten memory channels store operating frequency as well as simplex/duplex and duplex offset frequency. A priority function allows another frequency such as a repeater or calling frequency to be monitored for activity. The memory scan function continuously scans all ten memories in sequence whilst a programmed scan searches between two limits.

The IC-12E is equipped with a 1750Hz tone generator for initial access to a repeater. Frequency coverage 1260-1299.9875Mhz with 5 frequency step rates. An internal power module provides 1 watt or LOW 100mw. as standard. This handheld is supplied complete with an IC-BP3 nicad battery pack, flexible antenna, A.C. wall charger, belt clip, wrist strap, personal earpiece and full operating instructions.

Also available for the IC-12E and other ICOM Handportables are a large range of optional extras including a variety of rechargeable nicad power packs, dry cell battery pack, desk charger, headset and boom mic, speaker mic, leatherette cases and mobile mounting brackets.

For more information on this handportable and other ICOM Amateur Equipment contact your local ICOM dealer or Thanet Electronics Limited.

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ICOM

Handportable Transceivers
ng experience.

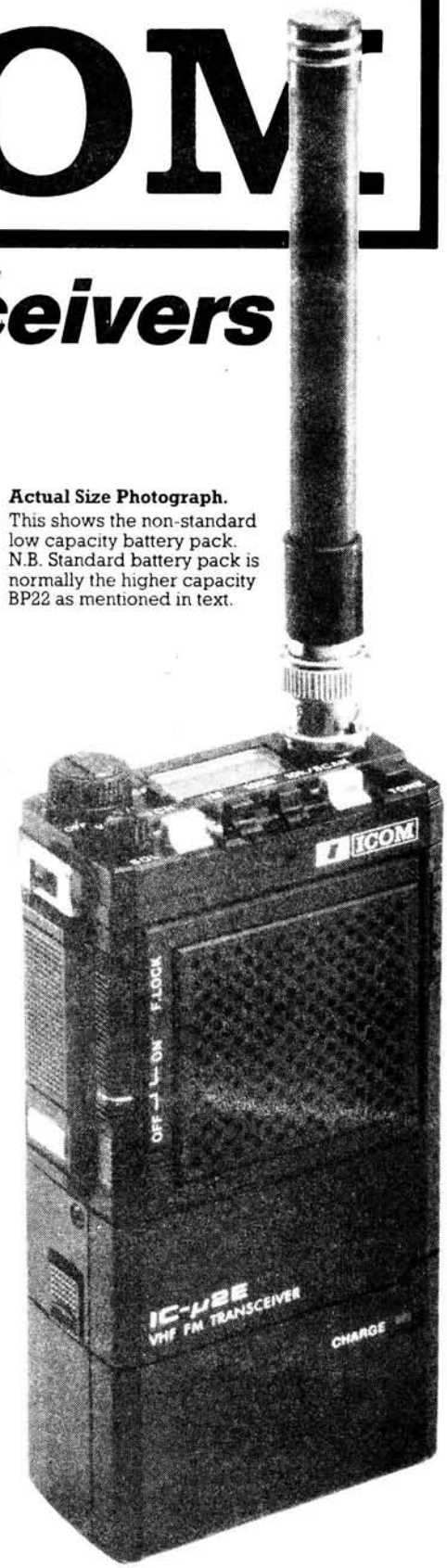
NEW! IC-MICRO TWO, Mini-handportable.

This is the smallest handportable transceiver from ICOM. The MICRO-TWO, 2 metre FM measures only 148 x 61 x 31mm. with BP22 battery pack (not shown here). The MICRO-TWO is a hand-size transceiver which will equally fit most pockets.

On the top panel a clear LCD readout gives frequency and memory channel number. Tuning is made easy using up/down toggle switches to select 1MHz, 100kHz or 12.5kHz steps as well as the 10 memory channels. Full repeater and reverse duplex operation facilities are featured including repeater access tone. An automatic power saving function reduces battery power consumption when in receive mode. Output power is 1 watt or 100 milliwatts (low) with the BP22 nicad pack.

The ICOM MICRO-TWO is the ultimate in 2 metre miniature handheld transceivers, yet despite it's small size the receiver sensitivity and performance has not been compromised. This handy transceiver comes complete with the BP22 nicad pack (not shown here), A.C. wall charger, helical antenna. Most existing ICOM accessories can also be used.

An optional extra, the BC50 desk charger will rapidly charge the BP22 battery in just one hour. Other options include the BP23 long-life, low-power and BP24 medium-life, high-power nicad battery packs. Contact us or your local ICOM dealer for more details on this exciting new product.



Actual Size Photograph. This shows the non-standard low capacity battery pack. N.B. Standard battery pack is normally the higher capacity BP22 as mentioned in text.

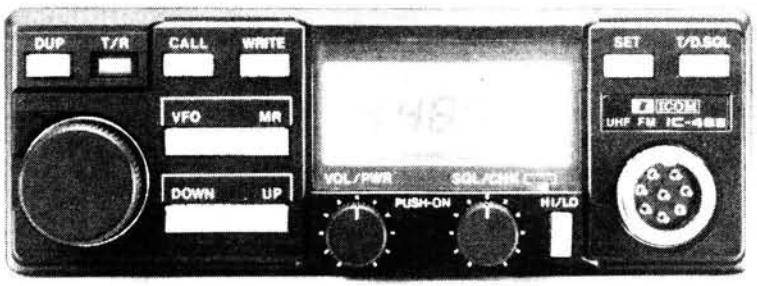
ICOM

IC-3200E, Dual-band transceiver.

If you are a newly licensed or just undecided about which band to first operate, then the ICOM IC-3200E is just the answer. This is a dual-band (144-146/430-440MHz) F.M. transceiver ideally suited for the mobile operator. The IC-3200E has a built in duplexer and can operate on one antenna for both VHF and UHF, and with 25 watts of output power on both bands (the low power can be adjusted from 1 to 10 watts) you can never be far from a contact whether simplex or 2m/70cm repeater.

The IC-3200E employs a function key for low priority operations to simplify the front panel and a new LCD display which is easy to read in bright sunlight, 10 memory channels will show operating frequencies simplex or duplex, and four scanning systems memory, band, program and priority scan.

NEW! IC-48E, 70cm. FM Mini-mobile.



This NEW 70cm. band transceiver is so small that it will fit almost anywhere in your vehicle or shack. Power output is 25 watts or 5 watts low, the IC-48E is supplied complete with an internal loud-speaker. The large front panel LCD readout is designed for wide-angle viewing with an automatic dimmer circuit to control the back lighting of the display for day or night operating. The front panel of the IC-48E is straightforward to make mobile operation safe and easy. The IC-48E contains 21 memory channels with duplex and memory skip functions. All memories and frequencies can be scanned by using the HM15 hand mic provided.

IC-48E options include the PS45 13.8V. 8 amp power supply, SP8 and SP10 external loudspeakers, HS15/SB mobile flexible microphone and PTT switchbox.

Why not try 70 cms as a serious alternative to the 2 metre band, you might be amazed at what can be achieved. For more information contact us or your local ICOM dealer.

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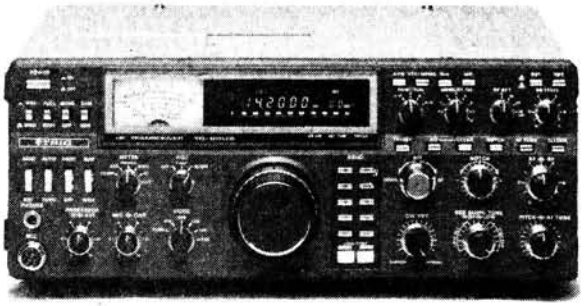
NEW FM BOARD FOR THE TS-930S



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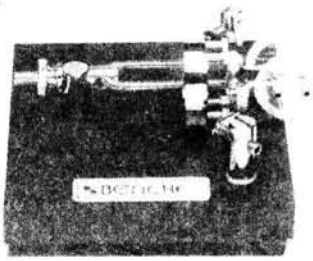

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THE NEW TX-3

RTTY/CW/ASCII TRANSCEIVE PROGRAM

RTTY has selectable auto CR/LF with user-defined line length, LTRS/FIGS force and selectable Unshift-on-Space.

ASCII has data bits/stop bits/parity/text or binary mode options.

Both have selectable baud rates and shifts, high or low tones, frequency scale for really easy, accurate tuning and keyboard fine-tune.

CW has selectable software filters and TX tone, autotrack fully controllable to 250 wpm or can be locked, auto or fixed speed sending.

All modes have:
Receive screen unwrap – no more split words.
Displayed real-time clock can be transmitted or inserted into review store.
Large review store with fully selectable readout to screen or printer.
24 large memories for your standard information.
Pre-programmed RYRY and QBF test messages.
Callsign capture.
Character or word mode sending from type-ahead buffer or keyboard direct.
Re-transmittable receive buffer.
CW ident.
Memories and review store transferable to/from tape or disc.
TX buffer can be loaded from tape or disc to send a pre-prepared file.
Saveable status file contains your current settings for each mode so that the program automatically starts each mode the way you want it.
Ability to use either a T.U. or a simple interface.

All this and more available for **BBC-B** and **CBM64** now. Other versions coming soon.

To go with it we have the **NEW TIF1 INTERFACE,** specially designed to reduce computer noise. Receive has RTTY and CW 2-stage filters, transmit has outputs for MIC, PTT and key.

TX-3 and TIF1 are compatible with our existing products.

TX-3 on tape £20, disc £22 (BBC: state 40/80 track). If you already have our RTTY/CW transceive program, return it with your order for a £10 discount.

TIF1 kit (assembled and tested PCB + connectors & cables but not MIC connector or box) £15. Complete assembled, boxed with all connections £25 (state rig), for more than 1 rig state extra rig(s) and add £3 for each.

For the listener we have the RX-4 MULTIMODE RECEIVE PROGRAM

Lots of features and performance for receiving **RTTY, CW, SSTV, AMTOR. Spectrum** needs no hardware, **BBC-B, CBM64** and **VIC20** use TIF1 or a T.U. on RTTY or CW. Tape £25, disc £27 (not Spectrum, BBC state 40/80 track).

As an alternative to a T.U., excellent results are obtained by the GW Morse Keys filter unit, available fully assembled and boxed for the same price as TIF1.

Prices include VAT and p&p, 1st Class inland, airmail overseas, normally by return. Eire, C.I., BFPO deduct 13%.

technical software (PW)
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RTTY TUNING MADE EASY

Now you can easily tune in RTTY signals using the latest kit from Kimaski. This unit will enable you to quickly and easily tune into RTTY transmissions using the 16 LED bargraph.

The TUNICATOR is adjustable so that it can be used to display most common forms of audio type signal and as there is adjustment for the base reference frequency as well as a frequency span control the TUNICATOR can be made to readout narrow (170Hz) as well as wide (850Hz) RTTY shifts all in one go.

The TUNICATOR may be used either horizontally or vertically because of its novel display mode.

The TUNICATOR accepts audio signals straight into the convertor PCB and can therefore be used with any existing terminal unit or even with 'no-interface' computer programs.

The TUNICATOR is available in kit form and costs £29.95 + 50p P&P.

Other Kimaski kits include a CW filter which is ideal for use with direct conversion type receivers and a 555 timer tester, ideal for testing all those 555s lying in the junk box, this project also includes a tested 555!

Kimaski Kits are available from . . .

Kimaski
TECHNOLOGY
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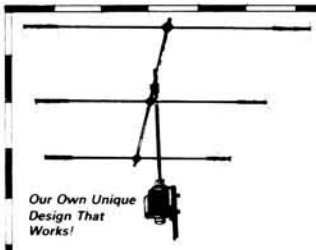
Tel: Medway (0634) 570441



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4 BAND. 6, 10, 15, 20 M
AQ40, 2 Ele. 40 M! NEW

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- Selectively detuned for optimum performance and gain. (No gimmick quad. needed).
- Easy trim spokes with lock nuts and spares.
- Minimized wind load and weight.
- Double insulated elements.

Typical Performance

ANTENNA MODEL	AQ6-20/2E	AQ6-20/3E	AQ40/2E
Forward Gain Dbd	3.8 to 4.8	5.5 to 7.5	3.8
Front to Back Db	13 to 15	16 to 18	12
Side Null Db	25	25	20
VSWR (Typical)	1·1:1	1·1:1	1·1:1
Weight	7·5 lb	12 lb	12 lb
Wind Load	$2ft^2/0.18M^2$	$3ft^2/0.27M^2$	$3ft^2/0.27M^2$
Turning Radius	76"/1930mm	96"/2438mm	114"/2895mm

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150KHz-2194KHz

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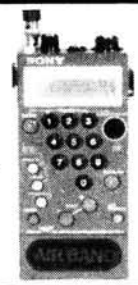
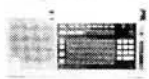


SONY ICF 200ID

76-108 MHz
116-136 AIRBAND
160KHz-29995MHz
FM - AM - SSB 32 MEMORIES
INC PSU

£325



SONY ICF 7600D

76-108MHz
162kHz-29995MHz
MEMORIES, FM, AM, SSB.

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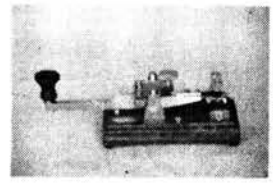
SWEDISH BRASS MORSE KEY



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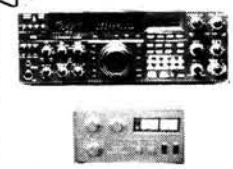

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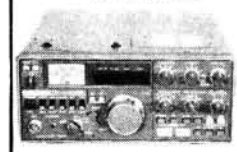

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TRIO KENWOOD TR751E

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TRIO KENWOOD TR2550

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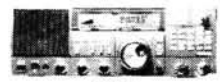
FRG 8800



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Professional electronic circuitry with very wide dynamic range. Meets professional demands both in electronics and mechanical ruggedness. 120 cm long glass fibre rod. Circuit is built into waterproof 2,5 mm thick aluminium tube. Ideal for commercial and swl-receiving systems. £120. See Review in August Issue p.15

DRESSLER ARA 500 ACTIVE ANTENNA

50MHz to 1300MHz
Gain 17dB Typical

TECHNICAL SPECIFICATIONS FOR ARA 500

Gain	17dB Typical (14-17dB)
Frequency Range	50-1300MHz
Noise Figure	1dB at 50-180MHz 1.5dB below 300MHz 2.0dB below 350MHz 2.7dB below 400MHz 3.0dB below 500MHz 3.8dB below 650MHz

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Operation is possible up to 1300MHz with gain of 10dB
Noise 4-6dB
Intercept Point 3rd Order: +18dbm at Input
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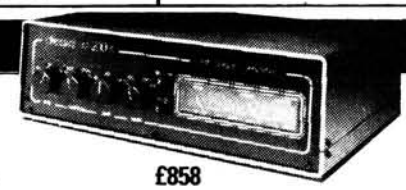
LINEARS



D200	2 MTR 500W SSB	**£858**
D200S	2 MTR 750W SSB	**£1018**
D70	70 CMS 550W SSB	**£1030**

PRE-AMPS – NEW MODELS

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EVV700SMD	430-440MHz	0.5-0.9	15-18dB	500W PEP	**£117**
EVV2000SMD	144-146	0.6-0.9	16-18dB	1KW PEP	**£117**
EVV200VOX	144-146	0.6-0.9	16-18dB	700W PEP	**£107**
EV2GAAS	144-146	0.6-0.9	15-18dB	100W PEP	**£75**
VV INTERFACE FOR ABOVE PRE-AMPS					**£31**

RECEIVE PRE-AMPS

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EWPA 560(N)	50-600-1GHz		16.5dB-1dB	**£89**
IP3 order	+18dBM			
ERPA 1296	1.25-1.30	0.8	17-18dB	**£114**
ERPA 435	430-440	0.5	15-18dB	**£65**
ERPA 144	144-146	0.7	16-18dB	**£60**
ASA 12	0-1GHz	Masthead Antenna Switch		**£59**

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YAESU FT 203R with FBA 5 battery case	225.00
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YAESU FT 209R with FBA 5 battery case 1.8w	269.00
YAESU FT 209R with FNB 3 nicad 2.7w	299.00
YAESU FT 209R with FNB 4 nicad 3.7w	305.00
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ICOM IC 4E synthesised 1.5w 70cm	275.00
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FT 703R and FT 709R available same output spec as FT 203/209.

RECEIVERS

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ICOM IC R71 100 Hz to 30Mhz passband tuning/notch filter, variable tuning rate	789.00
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RTTY/CW

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YAESU FT 2700RH 2m/70cms 25w each band full duplex	399.00
ICOM IC 290D 25w all mode	515.00
ICOM IC 27E 25w FM 9 mem	379.00
ICOM IC 27H 45w FM 9 mem	419.00
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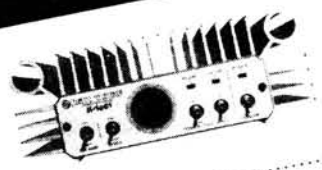

VHF LINEAR AMPLIFERS

TOKYO

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HL 30U 70cms. Gaasfet preamp 2w in 30w out	126.00
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HL 120U 7ocms Gaasfet preamp 12w in 100w out	418.95
HRA 2 2m mast preamp, Gaasfet	105.00
HRA 7 70cms mast preamp, Gaasfet	105.00

BNOS

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LPM 144-10-180 2m c/w preamp 10w for 180w out	290.00
LPM 144-3-50 2m c/w preamp 3w for 50w out	125.00
LPM 144-10-50 2m c/w preamp 10w for 50w out	125.00
LPM 432-1-50 70cm c/w preamp 1w for 50w out	230.00
LPM 432-3-50 70cm c/w preamp 3w for 50w out	235.00
LPM 432-10-50 70cm c/w preamp 10w for 50w out	195.00
LPM 432-10-100 70cm c/w preamp 10w for 100w out	329.00

MICROWAVE MODULES range also available, call for details or literature on above.

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CAPCO SPC 3000C 3Kw antenna coupler	279.42
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CAPCO SPC 3000M 3Kw module only	132.18
TOKYO HC 200 8 band 200w pep with SWR/power meter	115.00
TOKYO HC 400 9 band 350w pep with SWR/power meter	199.00
TOKYO HC 2000 9 band 2Kw pep	399.00
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ICOM AT 100 100w auto antenna coupler	345.00
ICOM AT 500 500w auto antenna coupler	485.00
YAESU FC 757GX auto antenna coupler	339.00
YAESU FRT 7700 receiver antenna tuner	59.0

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HEIL HC3 Mic element Yaesu/Trio	22.85
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HEIL HM5 Desk Mic (300Hx-3Khz) cardiod	65.00
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YAESU FP 757 GX 20A	169.00
YAESU FP 700 20A	195.00
BNOS 12/16 amp	69.00
BNOS 12/12 amp	115.00
BNOS 12/25 amp	169.00
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DRAE 4 amp	40.50
DRAE 6 amp	63.00
DRAE 12 amp	86.50
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HI-MOUND MORSE KEYS

HK 702 manual with marble base	42.50
HK 704 manual	28.50
HK 705 manual	22.50
HK 706 manual	23.00
HK 707 manual	22.25
HK 708 manual	21.50
HK 802 manual solid brass	99.00
HK 803 manual solid brass	99.00
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MK 703 twin paddle squeeze heavy base	37.15
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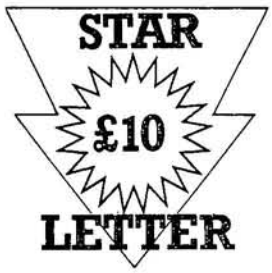


The Way Forward?

Following publication back in December 1982 *PW* of my letter scolding David Evans for rudely criticising an RSGB member, I received a follow-up from an RSBG committee member admonishing me. Reading between the lines, it seemed that he was in effect saying "Unless you are prepared to actively support the Society, pay up and shut up".

I've lost count of the letters which have since been printed either criticising or praising the RSGB. From the tone of the "official" replies to many of these, one gets the impression that the secretariat object to journals other than *RadCom* publishing criticisms of the Society. They should not forget that those journals, some long-established, some quite new, also represent the amateur radio movement.

Some letters slate the critics for their failure to put forward concrete suggestions on how to remedy the alleged shortcomings, but my file of past letters reveals a number of suggestions that have not been followed up, or so it would appear. Other letters ask why the critics do not take a more active and direct part in the affairs of the Society.

Many of us lead a very active business life—I for one have to travel extensively, and whilst I would no doubt find it a challenge to become involved in Society affairs more directly, I have to draw the line somewhere. I do not, however, consider that this lack of direct involvement disentitles me, or many others similarly placed, from having opinions which are worthy of consideration. It is quite unjust to imply that we are apathetic.

There are, of course, the agitators who perhaps have nothing better to do. These we do not need among our membership. Nonetheless, the Society has to wake up to the fact that there is a growing tide of discontent.

It appears that *RadCom* will not publish letters from members which oppose the views or preconceived "Offical policy" of the Society hierarchy. The long delay in the appearance of the suggestions of Les Moxon G6XN, regarding the 10MHz band (see *Technical Topics, RadCom* August 1986) is a case in point.

The apparently poor liaison between the RSGB and the DTI, particularly regarding the changes to the way in which interference complaints are handled, is very much a sore point with members. What Peter Crosland G6JNS said in his letter in September *PW* about Roy Stevens is an historical fact. If ever the Society needed a man of stature in the corridors of power it is now. Surely there must be some-one suitably qualified among the membership.

Membership costs me 4½p per day—say £1.37 a month. The majority of members could afford double and would be prepared to pay double if they were confident that HQ was totally in tune with their needs and was effectively protecting their rights and privileges. One can always allow reduced subscriptions for youngsters, students and senior citizens.

The problems faced by the Society will not go away if they are simply ignored by HQ. It is clear from letters and from comments heard on the air that a number of members have either resigned or indicated their intention to do so, and many more are dissatisfied with the Society as it exists today. Although a majority of the members may be

PW COMMENT

VFM

ONE OF OUR MAIN AIMS in producing *Practical Wireless* each month is to give readers value for money. One side of that value is in what you pay for *PW* each month—and at £1.10 we are certainly the least expensive radio hobbyist magazine on the newsagents' shelves in the UK. The other side is what appears in each issue, and here the answer is not so clear-cut. The problem is that our readers' interests are so wide and varied, and what some see as among the best bits each month will be just so much waste paper to others. Trying to balance the coverage of the various topics issue by issue is, I am sure, what has made me prematurely bald!

In recent months, some of our regular features have been developing and filling more pages, and we've reached the point where something has to be done to maintain elbow-room for others. What we've decided to do, initially for a six-month trial period, is to drop the *Club News* feature from the magazine. In the last reader survey we did, it rated lowest in popularity of anything in *PW*, and that's not really surprising. After all, not all our readers are "club types", and of those that are, each will usually be interested in meetings at only a handful of clubs in their immediate area. And if you're a member of a local club, you should be getting regular newsletters from them anyway.

As far as we can see, there are two exceptions to this. Newcomers to the hobby, who would like to join a club in their district, but don't know where to find one, or radio enthusiasts who are working or holidaying away from home and want to drop in somewhere for a friendly natter or an interesting lecture. To cater for this demand, we shall compile a regularly updated *Radio Club Newsletter*, which can be yours in return for a stamped addressed envelope, sent to our Editorial offices. Please mark your envelope "Club Newsletter".

Club secretaries, please, please carry on sending in details of your club's programme for incorporation into the newsletter. And if you've got any special events coming up, outside the normal run of meetings and lectures, point those out to us for a mention in our *News* pages.

Morse Tests

The RSGB does seem to be coming in for some flak over its Morse Test Service, and apparently with some justification. To take a local example, there are as I write this at the beginning of October, three people in the Poole area ready to take the test, all willing to travel to an adjacent county for testing. Unfortunately, although the map in the latest issue of *RadCom* shows that there are considered to be sufficient examiners throughout southern and southwest England, the accompanying list shows no test dates available this side of Christmas for Devon, Dorset, Wiltshire or Hampshire. The only possibility was Burnham-on-Sea, Somerset, on October 5. In this part of the country, it appears that the service has actually deteriorated since the RSGB took over—under the previous arrangements, the test could be taken at the Marine Survey Offices in Southampton.

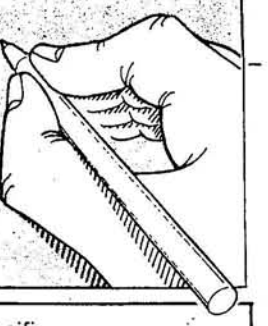
Also, why is it that when there are unfilled booking times for Morse tests at rallies or conventions, these cannot be taken up by casual candidates, as they could when BTI were running the tests? All that is now allowed is for any aspiring Class A who happens to be around to take a "dummy run" test. Even if they do reach the necessary standard, they won't get a "Pass" certificate. It might be argued that the practice run is helpful to the candidate's nerves, but I'm not so sure. They're just as likely to say: "Wow, I couldn't go through that again!"

So come on, RSGB, pull your socks up—otherwise I might begin to believe the rumours going round that it's all a ploy to keep down the number of Class A licensees on the bands.

Geoff Arnold

Send your letter to the Editorial Offices in Poole, the address is on our Contents page. Writer of the Star Letter each month will receive a voucher worth £10, to spend on items from our PCB or Book Services, or on *PW* back numbers, binders, reprints or computer program cassettes. And there's a £5 voucher for every other letter published.

Letters must be original, and not duplicated to other magazines. We reserve the right to edit or shorten any letter. Brief letters may be filed via our Prestel Mailbox number 202671191. The views expressed in letters are not necessarily those of *Practical Wireless*.



satisfied with things as they are, it is likely that most of them are above the average age of the membership as a whole. The future of amateur radio, and of the Society, lies with the up and coming youngsters. The first priority of the RSGB must be to win back the "malcontents", demonstrating by its deeds that it really does listen to the members and have their interests at heart.

I suggest that, without further ado, the Society should set up a Select Committee whose terms of reference would include the examination of all the past and present criticisms. The Committee's draft report to be published in *RadCom*. This report would invite an input from the membership, allowing sufficient time for discussions at regional and local levels by all affiliated societies and clubs.

Whilst volunteers could be called upon to serve on the Select Committee, its actual composition must be seen to have been democratically elected. Perhaps the only fair way would be for the affiliated societies and clubs to nominate locally respected candidates of standing and stature from among their volunteers, who are not already members of RSGB Council. The Select Committee's expenses would be charged to the Society as a whole.

Having examined all the input arising from publication of its draft report, the Select Committee would then draw up a final report to be published in *RadCom* accompanied by a questionnaire to be completed by members and returned to HQ. The Select Committee would then be in a position to lay down the specific measures which need to be taken by way of reorganisation to satisfy the majority.

Although I hesitate to adopt the mantle of prophet, it does occur to me that among the questions which the Select Committee will find it necessary to put to the membership will be:

1. Do you agree with the present practice whereby the President of the Society can use proxy votes to influence the outcome of decisions taken at Annual and Extraordinary General Meetings? If not, what alternatives do you suggest?
2. Do you wish the Society to appoint a qualified Public Relations Officer to improve the image that the amateur radio movement has with the general public?
3. Does the Society need to appoint an experienced negotiator, someone of stature who invites respect, to represent the Society as a liaison officer with the DTI?
4. Are there any clauses in the Constitution of the Society or procedural rules which you consider inhibit its democratic representation of members? Be specific.
5. To implement changes which your Select Committee determine to be necessary, are you prepared to accept an increase in the annual membership fee?
6. Will you be prepared to accept the findings of your democratically chosen Select Committee and give your whole-hearted support to your representative body once the changes which they recommend have been implemented?

The procedure proposed is elaborate and time-consuming, but the benefits to be enjoyed by all members of the amateur radio movement by presenting a united front will be worth all the effort involved.

Vic Copley-May G3AAG
Petersfield, Hants

The Bread-board Revisited

I quite agree with the points made by Alan Jones regarding boxes for kits (*PW Write-On* Sept. 1986) and your reply. Fortunately, there is a half-way house between metal-bashing and the simple but inelegant baseboard and front panel solution. Rather than to start off by purchasing a seemingly suitable metal box, which may well turn out later not to be so, a midway cautious approach commends itself. First build a working mock-up model of the apparatus on a wooden baseboard with a wooden front panel. When everything is in its right place, transfer the design to a metal case.

As an example of what I mean, I had recently bought one of C. M. Howes' first-class Direct Conversion 20m Receiver p.c.b.s, in order to introduce a young grandson to ham s.w.l. We were faced with Mr Jones' problem, as will anyone who constructs anything that differs from a complete grey-box kit of parts.

We nailed together a piece of whitewood about 60 × 240mm, and a piece of thin plywood 290 × 90mm, to form the baseboard and front panel respectively. Aluminium kitchen foil was glued to the inner surfaces to reduce hand-capacity effects when tuning. The foil was connected to battery negative/earth line at three or four points along its length, but it should not be used as a negative line conductor. Stout gauge connecting wire was used to join up those components that need to have one element coupled to –ve. Thin wooden strips were glued underneath the front and back edges of the baseboard, so that any long interconnecting wires can be hidden beneath it.

Happily, we got the front panel layout almost right first time, but where we had indeed boobed, it proved easy to rework the plywood panel. A similar error on an expensive metal case could well have meant, at best, an unsightly messed up presentation. At worst, the whole box might have been thrown away. In either case, a discouraging introduction to home construction.

Having created a tried and proven mechanical/electrical mock-up model, the whole works can then be carefully dismantled and transferred into a more elegant and interference-reducing metal housing with much diminished risk of error. The wooden board and panel unit can be used as a form of reference for marking out the metal container, making allowance, where necessary, for the differences in the wood and metal thicknesses.

This practice is not new, nor is it scorned by the electronics industry. Many prototype labs use some kind of "dummy-run" approach. The saving in red faces later on makes it very worth while!

Ken Jones
Varmo, Udine
Italy

LAUGH WITH BARTHES

Design Against Crime

This competition is being sponsored by the British Security Industry Association Ltd.

You're invited to submit a design of your own anti-crime device or invention. It can be something to deter a burglary, or to prevent an assault, or to protect a car from being broken into. Anything, in fact, that helps stop a crime from being committed. The only qualification is that your design must be original.

Your entry can be a detailed drawing, plans, photograph or just an outline description or sketch of the idea. The description must be no longer than 1,000 words.

The winning design receives a special award plus £500, 2nd prize is £250, 3rd prize is £100.

There are other categories for educational establishments and manufacturers. For any further details, contact: ***Design Against Crime Competition, FREEPOST, 107–109 High Street, Brentford, Middlesex TN8 8BR.***

Special Event Stations

GB4PRS

Poole Radio Amateur Society are running the station from the Brownsea Room, The Haven Hotel, Sandbanks, Poole on November 16. It is part of the Society's tenth anniversary celebrations. They will be mainly operating on 3·5MHz and other h.f. bands according to conditions as well as 144MHz. Special QSL cards will be available. More details from Dave G0EQV on Poole 674802.

GB2WGG

Dunstable Portable Amateur Radio Group with Dunstable Downs Radio Club will be operating this station during the Watford Grammar School for Girls Annual Fete on November 15. They are being privately sponsored on the number of contacts and all proceeds will go to the school. Operation will be on 1·8, 3·5, 14 and 144MHz s.s.b. and c.w. More details from Tony G0COQ on Luton 508259.

GB4RC

On November 24, Rush Common Primary School, Abingdon, will be running a special event station. They are making it an educational event, by linking it to Geography, Science, etc. lessons. H. N. Rutt G0DHR and his daughter Sarah ARC3644 are running the show—more on Sarah later!

Rally Calendar

25 January 1987

The Oldham RC will be holding its second mobile rally at a new and larger venue. This is to be the Queen Elizabeth Hall, Civic Centre, Oldham. All the usual attractions will be there. Doors open at 11am and talk-in will be on S22 from 9am.

More details from ***Kathy Catlow G4ZEP.***

7 March 1987

The Blue Star Rally is being organised by the Tyneside ARS in association with the Newcastle Breweries Ltd. All the usual trade stands will be there, the bring and buy stand, Morse tests, spacious free parking and a licensed bar and refreshments.

For more details: ***G6VEG, QTHR or Tel: 091 286 6908*** (after working hours).

8 March 1987

The second annual Wythall Radio Club Rally will be held at Wythall Park, Silver Street, Wythall (south of Birmingham on the A435). It opens at 12 noon and there will be trade and club stands, bring and buy, bar and snack, as well as ample free parking. Admission will be 50p, OAPs and accompanied children free.

More details from ***Chris G0EYO on 021-430 7267.***

15 March 1987

The Belle Vue Radio Rally will be held in Redgate Lane, off Hyde Road, Manchester, starting at 11am.

RSGB Morse tests will be available, big traders and lesser known specialists will all be there. Ample car parking is available and talk-in on S22 and SU8.

More details from ***Peter Denton G6CGF on 051-630 5790.***

"BT Liberalised"

From 1 December 1986 telephone users and independent contractors will be permitted to install extension telephone sockets and their cabling, and plug them into the public telephone networks.

To take advantage of the new arrangement, a user must have a master socket installed by BT, Hull Telephone Department, or Mercury, as the case may be.

User instructions will be available with every extension kit sold, or with any of the components necessary—so you should have all the information you require.

Penpal Wanted

Menace P. Nditi has written to the magazine asking for pen pals. He would like them to be interested in radio, electronics and music.

If you are interested, write to ***PO Box 1418, Morogoro, Tanzania, East Africa.***

GB3SA

This is a new 144MHz repeater, which became operational on September 6. The planned coverage area was the urban districts around Swansea, however, they have received good reports from further afield.

The QTH is IO81AP and the repeater is made up of Wood & Douglas kit TX and RX. The antennas are an isopole about 160m a.s.l. for receive and a half-wave dipole for transmit.

If you want to learn more about the repeater, why not join the repeater group? As you know, all amateur repeaters are funded by contributions from users. The Swansea Repeater Group would be pleased to hear from you, ***c/o Peter Alexander GW4RXO, 80 Yr Aran, Dunvant, Swansea SA2 7PX.***

Golden Jubilee

I was reading the October 1986 copy of the IRTS Newsletter and one item caught my eye.

To qualify for the award celebrating the golden jubilee of the DXCC Award you must work 100 different countries on the ARRL Countries List during 1987.

An official application form must be used to facilitate processing. These are available for a self-addressed envelope with one IRC sent to ***Golden Jubilee of DXCC, American Radio Relay League, 225 Main Street, Newington, CT 06111, USA.***

AKD Have Moved

No, they haven't disappeared, they've just moved. They are now in Stevenage, with larger premises, which allows them to carry larger stocks of the existing product range. They will be adding to their present range with some exciting new products over the coming months.

Look out for their advertisements in the near future for details.

AKD can now be found at: ***Unit 5, Parsons Green Estate, Boulton Road, Stevenage, Herts SG1 4QG.***

MAXPAK News

The September copy of DIGI-COM is full of all sorts of news. The group name means The Midlands AX-25 Packet Radio Users Group.

They have now set-up two mailbox/bulletin boards in the area and these are:

MAXPAK BBS (Wolverhampton)—a telephone style bulletin board, running on a BBC micro. It offers news and up-to-date information on radio in general. It also has full store and forward public or private message handling facilities, and free programs to download.

G0BSX Mailbox (Nottingham)—a full specification message handling mailbox system running on Apple Macintosh with 21 Mbyte storage. It offers the user facilities to not only download information and messages, but to upload and edit storage as well.

For more information about the group, contact ***Andy Witts G1DIL, 56 Stephenson Drive, Perton, Wolverhampton, West Midlands WV6 7YB.***

AMRAC User

I received my latest copy of AMRAC User this week; for those of you who haven't heard of the group yet, I'll explain. They are a self-help user group dedicated to the use of computers in amateur radio, particularly with digital communications techniques —their words.

The group was founded in April 1985, and since that time has grown rapidly. It now has members throughout the UK as well as Europe and the Middle East.

They produce a bi-monthly newsletter and a "hot news sheet" in the interval months. In addition, the club has arranged special members' discounts with some companies, as well as importing Packet Radio TNCs at advantageous prices.

Membership is just £5 per annum and further details may be obtained from the secretary: ***Phil Bridges G6DLJ, 9 Hollydene Villas, Southampton Road, Hythe, Hants SO4 5HU,*** or Prestel mailbox 703847754.

St. Dunstans ARS

Here we see Ted John, Chairman of St. Dunstans ARS, receiving a plaque from Mick Puttick G3LIK, Secretary of the RNARS. It was to commemorate the 10th Anniversary of the Radio Society.

For those St. Dunstan ARS members and friends, the date of the AGM is 28 March 1987—so no excuses.

Microwave Dinner

For those readers interested in the microwave bands a forthcoming dinner may be just for you. It is to be held at the Dunstall Suite, Wolverhampton Racecourse Banqueting Centre, Wolverhampton on 18 July 1987.

There will be eight or nine stands, covering the updated techniques of equipment in the range 1·5 to 23cm, with leading amateurs with technical experience as presenters of the range of equipment.

Tickets for day entry, including light afternoon tea are £3 and all day tickets including afternoon tea and dinner are £10.

For more details contact ***Fredrick Smith, 5 Pinfold Crescent, Penn, Wolverhampton.***

HF Convention

The 1986 RSGB HF Convention took place on Sunday, September 28, at the Belfry Hotel, Milton Common, near Oxford. It was well attended, and was blessed (particularly from the point of view of participants in the Car Boot Sale) with excellent weather.

There was just one lecture stream this year, kicking off with Don Field G3XTT talking on the subject of *HF Antennas for Small Gardens*. Don has worked 299 of the current DXCC countries; 200 of them from a suburban garden less than 10 metres square, and this wealth of practical experience certainly came across in his presentation.

The RSGB Question and Answer Forum, which followed, was less well attended. Topics of discussion included an item on the *Jimmy Young Programme* on BBC Radio 2 the previous Friday, in which a telephone caller asked for legal advice on dealing with severe TVI, alleged to be caused by a radio amateur neighbour. From the reply given, it was apparent that much remains to be done in educating both the mass media and the general public in what Amateur Radio is, how it is organised and controlled, and what means exist to overcome problems of interference. The BBC's switchboard was apparently totally jammed by irate radio amateurs, trying to put the record straight!

It was agreed at the Forum that this education process is something in which all amateurs can take part. In particular, radio clubs should think about giving talks to local organisations, writing features for local newspapers, perhaps even getting one of their most articulate members invited to give an interview about the hobby on local radio. Back-up information for this sort of enterprise is available from RSGB HQ.

Following the presentation of a number of RSGB Contest trophies, we were treated to a most thought-provoking lecture on h.f. receiver parameters, presented in his usual inimitable style by Peter Chadwick G3RZP. Had there been any traditional valved communications receivers left in the car boot sale at the end of his talk, their price would surely have doubled at least. The afternoon's programme was rounded off by slide shows of DX operations in various parts of the Pacific.

A variety of exhibitions and activities were staged throughout the day, with much to interest both newcomers and old hands. There is unfortunately not space to mention them all, but one happening of note took place in the QRQ Morse receiving test runs conducted by the RNARS. One YL, Sarah Rutt by name, added a pass with flying colours at 15 w.p.m. to her Amateur Radio Certificate and Amateur Radio Morse Test qualification. Nothing unusual in that, you may say—but Sarah is just 10 years old! *G3GSR*

Gremlins Again!

Yes, the ever popular gremlins have struck. This time Technical Info Services were the victims. Their telephone number was printed wrongly in recent advertisements. To put the record straight the **correct** telephone numbers are: Before 5pm 0698 884585 and after 4pm it is 0698 883334.

We hope this hasn't caused too much inconvenience all round.

NEWS . . . compiled by G4LFM

934MHz CB

Telecomms in Portsmouth now offer a comprehensive repair and service facility for any brand of 934MHz transceiver or handheld. They have obtained a sizeable number of spares for all the radios that are now out of production.

The photograph shows their Service Manager, Kevin O'Brien in their workshops.

New Engineering Details

Woodingdean: Improvements have been made to the antenna system at the Ovingdean TV relay. This means that horizontal group E antennas are needed. The channels in use at Ovingdean are:
Channel 42—BBC 2
Channel 44—ITV TVS
Channel 65—BBC 1 South
Channel 68—Channel 4

East Quantoxhead: A new relay station has been built south-east of Kilve and should serve viewers in that area. The channels are:
Channel 39—HTV West
Channel 49—BBC 1
Channel 66—BBC 2
Channel 68—Channel 4
Viewers need horizontal group E antennas.

Durness: A new relay has been built about 1km south-east of Durness. The channels are:
Channel 53—Grampian
Channel 57—BBC 1
Channel 60—Channel 4
Channel 63—BBC 2
Viewers will need vertical group C/D antennas.

Crediton: The jointly built relay is sited at Long Plantation, Stonewall Lane, Crediton. The channels used are:
Channel 40—BBC 1
Channel 43—TSW
Channel 46—BBC 2
Channel 50—Channel 4
Viewers will need vertical group B antennas.

Minehead: The area around Exford should benefit from the relay sited at Furzemoor in the Exmoor National Park. The channels used are:
Channel 41—HTV
Channel 44—BBC 2
Channel 47—Channel 4
Channel 51—BBC 1
Viewers will need vertical group B antennas.

Radio Bristol: A new v.h.f. f.m. transmitting station is located at Bathampton Down. It is designed to serve listeners in Bath. The frequency for Radio Bristol is 94·9MHz.

BBC Essex: A new station, BBC Essex, opened its doors on November 5 from a main studio in Chelmsford. It will begin broadcasting from five transmitters, three on m.w. and two on v.h.f. f.m. The frequencies are:
Great Braxted—103·5MHz
South Benfleet—95·3MHz
Manningtree—729kHz
Chelmsford—765kHz
Southend—1530kHz
For further information you should contact John Lettice, BBC Essex, 198 New London Road, Chelmsford, Essex.

OUR SERVICES

QUERIES

We will always try to help readers having difficulties with a *Practical Wireless* project, but please observe the following simple rules:

1. We cannot give advice on modifications to our designs, nor on commercial radio, TV or electronic equipment.
2. We cannot deal with technical queries over the telephone.
3. All letters asking for advice **must** be accompanied by a stamped, self-addressed envelope (or envelope plus International Reply Coupons for overseas readers).
4. Write to the **Editor, "Practical Wireless", Enefco House, The Quay, Poole, Dorset BH15 1PP,** giving a clear description of your problem.
5. Only one project per letter, please.

COMPONENTS, KITS AND PCB'S

Components for our projects are usually available from advertisers. For more difficult items, a source will be suggested in the article. **Kits** for most of our more recent projects are available from **CPL Electronics,** 8 Southdean Close, Hemlington, Middlesbrough, Cleveland TS8 9HE, telephone Middlesbrough (0642) 591157. The **printed circuit boards** are available from our **PCB SERVICE** (see page 1 of this issue).

CONSTRUCTION RATING

Each constructional project is given a rating, to guide readers as to its complexity:

Beginner
A project that can be tackled by a beginner who is able to identify components and handle a soldering iron fairly competently.

Intermediate
A fair degree of experience in building electronic or radio projects is assumed, but only basic test equipment is needed to complete any tests and adjustments.

Advanced
A project likely to appeal to an experienced constructor, and often requiring access to workshop facilities and test equipment for construction, testing and alignment. Definitely not recommended for a beginner to tackle on his own.

BACK NUMBERS AND BINDERS

Limited stocks of most issues of *PW* for the past 18 years (plus a few from earlier years) are available at £1.25 each, including post and packing to addresses at home and overseas (by surface mail).

Binders, each taking one volume of *PW,* are available price £5.50 to UK addresses, £5.75 overseas, including post and packing. Please state the year and volume number for which the binder is required. Prices include VAT where appropriate.

ORDERING

Orders for p.c.b.s, back numbers and binders, *PW* computer program cassettes and items from our Book Service, should be sent to **Post Sales Department, "Practical Wireless", Enefco House, The Quay, Poole, Dorset BH15 1PP,** with details of your credit card or a cheque or postal order payable to Practical Wireless. Cheques with overseas orders **must** be drawn on a London Clearing Bank.

Credit card orders (Access, Mastercard, Eurocard or Visa) are also welcome by telephone to Poole (0202) 678558. An answering machine will accept your order out of office hours.

SUBSCRIPTIONS

Subscriptions are available at £13 per annum to UK addresses and £15 overseas, from **"Practical Wireless" Subscription Department, Competition House, Farndon Road, Market Harborough, Leicestershire LE16 9NR. Tel: (0858) 34567.** Airmail rates for overseas subscriptions can be quoted on request.

Why wait two Years?

That's probably how long you'll wait before another manufacturer can offer you the quality, performance and UNIQUE features available in the FT 767 GX.

If we tell you this radio is magnificent — you wouldn't take **our** word for it. Take the good old-fashioned approach and listen around the bands; in no time at all you'll learn why this transceiver is being described by users in glowing terms. 'Wonderful', 'Unbelievable', etc.
What's in this FT 767 GX that places it **so far ahead** of its rivals? YAESU's total dedication and patience in harnessing of advanced technology to produce literally the finest piece of equipment to appear on the Amateur Market.

Here are 6 features unique in amateur radio which you don't have to wait two years for:

1) **TX Shift** — Enabling custom setting of the transmit IF bandpass in the SSB modes.
2) **Tone Encoder** — To activate the tone-burst or the sub-audible tone generator for FM transmissions.
3) **Twin VFOs** — with auto-tracking.
4) **RF Amplifier** — Cascading pairs of JFETs for both amplifier and balanced first mixer with up-converting triple superhet.
5) **160m-70cm** — First all band (HF VHF & UHF coverage) 6) **Auto SWR/Power Meter** — digitally read out.

These SIX combined items plus:

● Integral Auto antenna tuner, keyer and power supply. ● Four internal CPUs ● Superb general coverage receiver.

You'll note that transceivers currently available with none of **these** 6 features are available at higher prices — which is entirely due to YAESU's new production methods that guarantee lower cost, higher **reliability** and longer life.
By the way, it provides 100 watts at HF (25 watts AM) and 10 watts VHF/UHF (2½ watts AM) — as we asked originally, 'Why wait 2 years?' — its here, **now** from YAESU!

YAESU's super portable twins

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. . . destined for even greater success — **AVAILABLE NOW!**

- 'New look' front panel
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- Super new additions and changes to the world's biggest ever selling amateur transceiver.

FL 7000 — The Shape of Things to Come

- 1.2kW P.E.P. HF Solid State QSK Linear
- Weight only 30kg (66lbs)
- Auto tuning and band changing
- 160m through 10m
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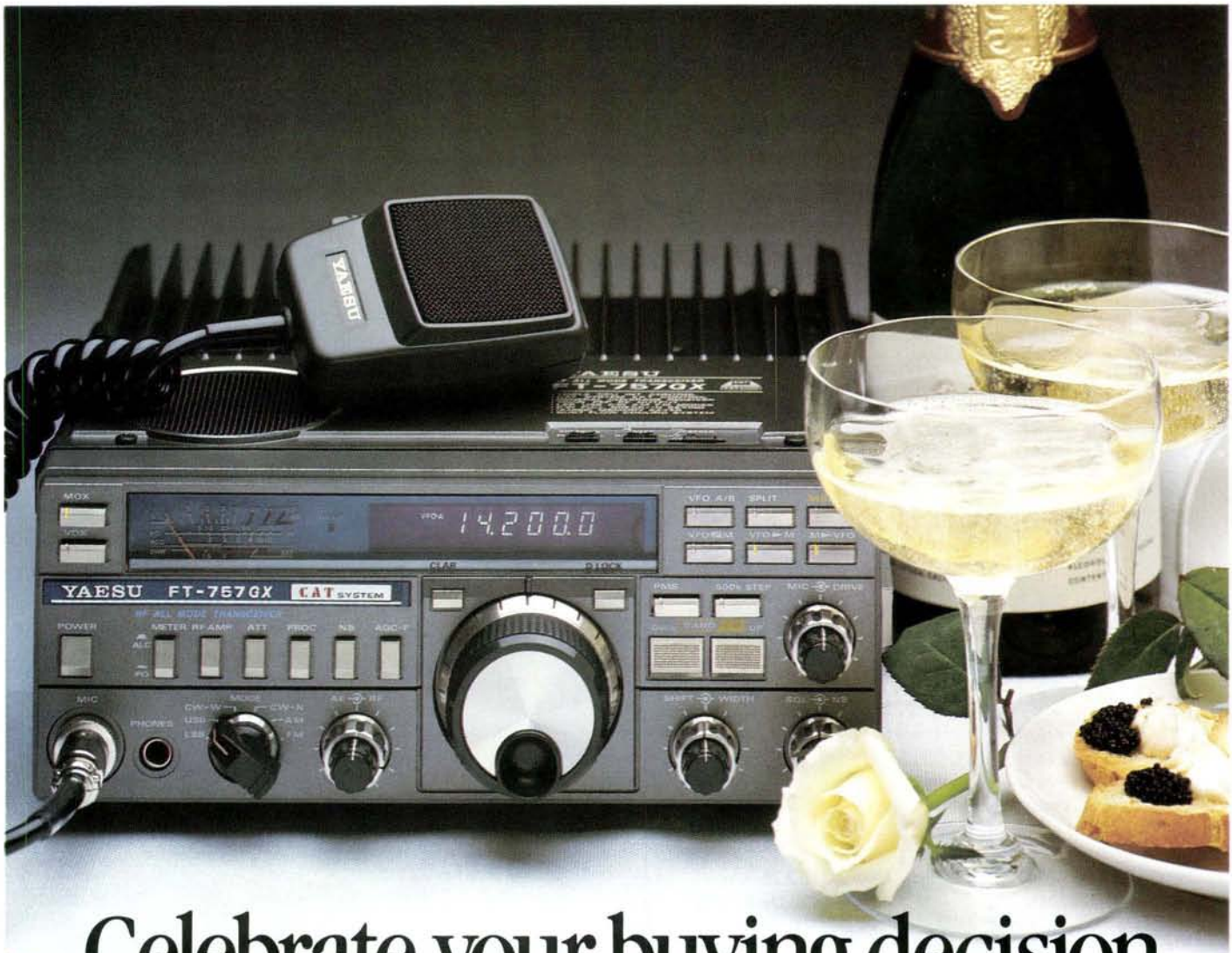

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Aquarigging

If you are one of those gluttons for punishment and want to try to operate while sailboarding on the local gravel pit then Aquaman have just the thing you need.

The Aquaman AQ2 waterproof casing for hand-held radios will keep your rig bone dry. It will also make it float—just in case you happen to fall off the board! So that you don't lose it in the ensuing panic, however, a security line is firmly attached.

Simply by snapping the Aquaclip into place the rig is hermetically sealed in a tough but flexible pvc casing, waterproof down to a depth of five metres.

The radio is ready for use inside its cocoon; all the controls can be operated through the transparent casing and sound transmission is unimpaired.

The temperature range of the casing is −25 to +90 degrees Celsius, it is resistant to sea water and doesn't deteriorate in sunlight—better than the operator!

There is a range of AQ2s with differing shapes and sizes and the manufacturers can supply a list of rigs known to fit inside each model, or tell you which one fits your rig.

Prices are around £15 incl. VAT and postage and you can order direct from ***Aquaman (UK) Ltd., 1A Broughton Street, London SW8 3QJ. Tel: 01-627 4787.*** Access or Visa are acceptable by phone.

Cambridge QRP Components

Following the QRP philosophy of KISS—"Keep It Simple Stupid"—and cheap, G4KJJ has started a small business supplying a range of selected components.

He has chosen his range carefully to meet the needs of the QRP constructor. No order is too small and he is looking to producing QRP designs and kits at reasonable prices for amateur use.

A stamped addressed envelope to: ***J. S. Smith G4KJJ, 30 Rookery Close, St. Ives, Cambs. PE17 4FX. Tel: (0480) 68330*** will bring you his lists and order form.

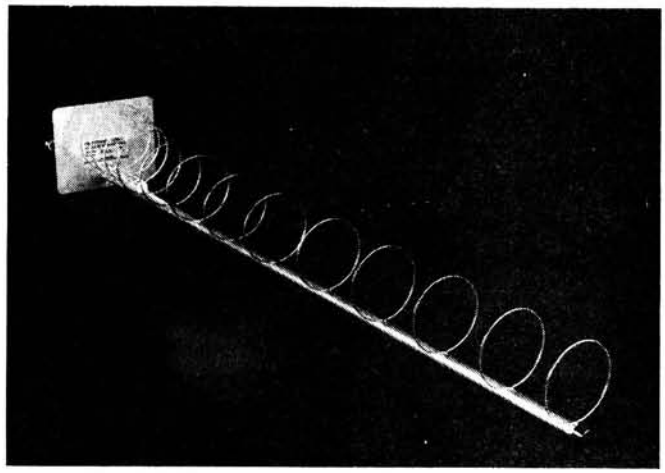
Cellular Radio Beam

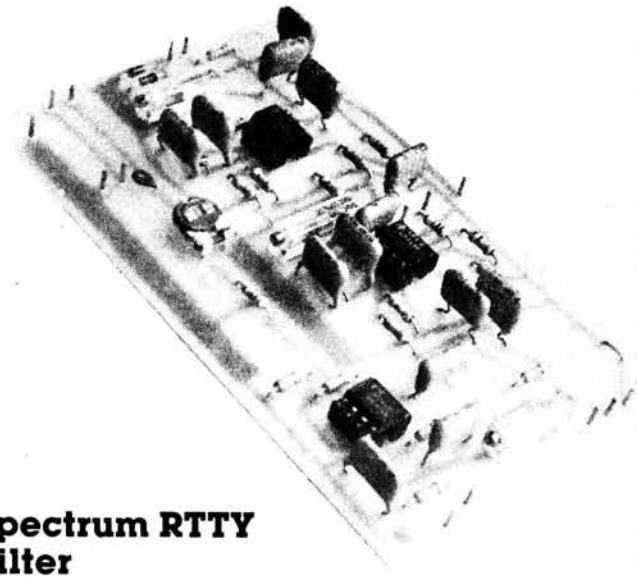
This wide-band beam antenna has been developed by Telecomms to allow users to access the UK cellular system from outside the cells. This could be of use in areas such as Wales or the English Channel, say Telecomms.

Initial trials have shown that the beam can increase the range of the cellular system dramatically. They tell me that a sample has been bought by BT for evaluation.

The antenna has a claimed gain of 18dBi, a frequency coverage of 855 to 955MHz and costs £65.00 plus VAT.

Further details from ***Telecomms, 189 London Road, North End, Portsmouth, Hants PO2 9AE. Tel: (0329) 221751.***





Spectrum RTTY Filter

If you use your ZX Spectrum to run RTTY then this little unit will be of interest.

Designed to enhance the G1FTU Spectrum RTTY Program, especially when used on h.f., the SPR52 is a receive buffer amplifier, double filter section and audio amplifier on one ready built p.c.b.

The unit operates from 9 to 13·8V d.c. and gives a 5V output for a 500mV audio input with a bandwidth of 340Hz.

On the receive side there is a four-stage signal processor which takes the output from the receiver, buffers and filters it to give the Spectrum EAR socket a suitable, clean high-level audio signal.

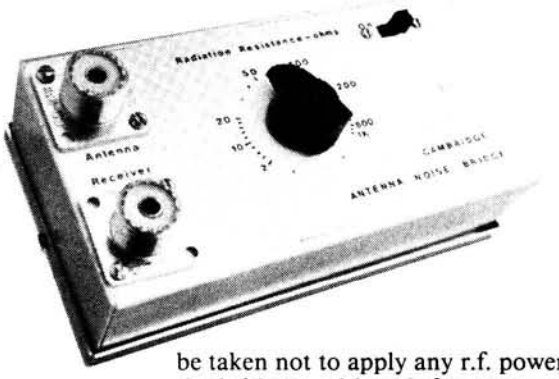
For signals of wider shift than the usual 170Hz the filter sections can be switched out leaving just the input buffer and output amplifier.

On the transmit side the SPR52 has a single stage active filter to turn the output from the computer into a reasonable approximation to a sine wave as well as allowing you to preset the level to match your transceiver input needs.

The unit is supplied built and tested but uncased at a price of £23.00 including postage and it is available direct from the manufacturers, ***B & J Communications, 9 Queens Walk, Thornbury, Nr. Bristol BS12 1SR. Tel: (0454) 416381.***

Kit Construction—It's Easy

A noise bridge is a very important piece of test equipment for the radio amateur, this month Elaine Richards G4LFM looks at the noise bridge kit from Cambridge Kits.



The kit was received well packaged and in good condition and a check of the components list showed that all items were present. The p.c.b. was good quality glass fibre and the resistors were all 5 per cent and the capacitors were of good quality. The toroidal transformer was supplied ready wound, a boon to those who hate winding toroids!

One novel feature of this kit is the front panel, an adhesive backed paper panel is provided, this is stuck down on the panel and takes care of the calibration!

Construction

No particular problems were encountered during construction of the p.c.b. All the holes were correctly spaced and of the right size, enabling all the components to fit neatly.

We did encounter one rather unfortunate problem with the potentiometer. The item supplied was marked-up as 100Ω lin. which was as per the components list, but some nasty little gremlin had put a log track in ours which meant that the calibration was totally wrong on completion!! Still it was nothing that couldn't be sorted out with a bit of theory and imagination.

When the time arrived to box the project we found that all items were supplied. i.e. box, screws, nuts, spacers and a knob. The instruction sheet also contained a template. By using this template you could be sure that the adjustment potentiometer and the sockets, etc., all aligned with the supplied front panel markings.

One thing I would recommend you do is that, after marking the holes, the components should be presented up to check the spacings—following the old saying "measure twice, drill once".

Having drilled the box the next step was to mount the p.c.b. with a single counter-sunk screw. The front panel markings were then applied. Care is required here as the adhesive backing is a contact adhesive and the markings cannot be slid into the correct position.

The next stage is to finish mounting the p.c.b. and fit the sockets and switch. A small amount of wiring now completes the project.

Testing

The noise bridge can be powered by an internal PP3 battery (not supplied) or by an external power source connected to the miniature jack socket on the side of the box. The current consumption of the review kit was 4·5mA, this is rather less than the 15mA quoted in the instructions but is dependent on the Zener current.

Alignment

Alignment was the next task. It involved setting the Zener current for optimum noise output. This is achieved by setting your receiver to the highest frequency of interest and adjusting the pre-set potentiometer for maximum noise output. Thanks to the ready printed front panel any further calibration is unnecessary. The scale accuracy can be confirmed by connecting a 50Ω dummy load to the antenna socket and checking that the null is at 50Ω.

The first practical use of the bridge was to help find the optimum settings for an a.t.u. To achieve this, the transceiver output was connected to the receiver socket and the a.t.u. to the antenna socket. The antenna was then connected to the a.t.u. in the normal way.

To optimise the a.t.u. settings the pointer on the bridge is set to 50Ω and the a.t.u. controls adjusted for a null in the noise as received by the transceiver. The null was found to be very sharp and well defined, the review bridge showed a noise reduction from S9+20dB to an inaudible level.

Having adjusted the a.t.u., the transceiver was reconnected directly to the a.t.u. and power applied. The match obtained was excellent and the s.w.r. was below measurement.

A word of warning here, when using the bridge to set up an a.t.u., care must be taken not to apply any r.f. power to the bridge as although fuse protection is provided within the bridge damage may still occur.

The bridge was tested on all the amateur bands from Top Band to 144MHz and operation was satisfactory with accurate results obtainable up to about 50MHz, above this frequency an indication is given but the null was rather too broad for accurate measurements.

There are a multitude of other uses for an r.f. bridge from adjusting resonant lines to setting up receiver front-ends and the test equipment section of any amateur radio handbook will usually describe the methods in detail.

Circuit Description

The circuit is fairly conventional and uses a reverse biased Zener diode as the noise source. The noise spectrum and amplitude can be optimised by adjusting the Zener current. The resultant noise is coupled to a three-stage common-emitter amplifier which boosts the noise level to about 1V p-p.

The output of the noise generator is coupled to a Wheatstone Bridge comprising the potentiometer P1 as two of the legs, resistor R1 as the third leg and the device connected to the antenna socket as the fourth leg.

The receiver socket is coupled to the centre point of the bridge by a toroidal transformer. When a receiver is connected to the receiver socket it is used as a narrow-band null detector. As transceivers are likely to be connected to the receiver socket, fuse protection has been provided to give limited protection against r.f. power being inadvertently applied.

Summary

Despite the potentiometer problem with the review sample, the kit is very good value for money and is an essential tool for the h.f. antenna experimenter.

The noise bridge kit is available for £24.20 from *Cambridge Kits, 45 (PK) Old School Lane, Milton, Cambridge.*

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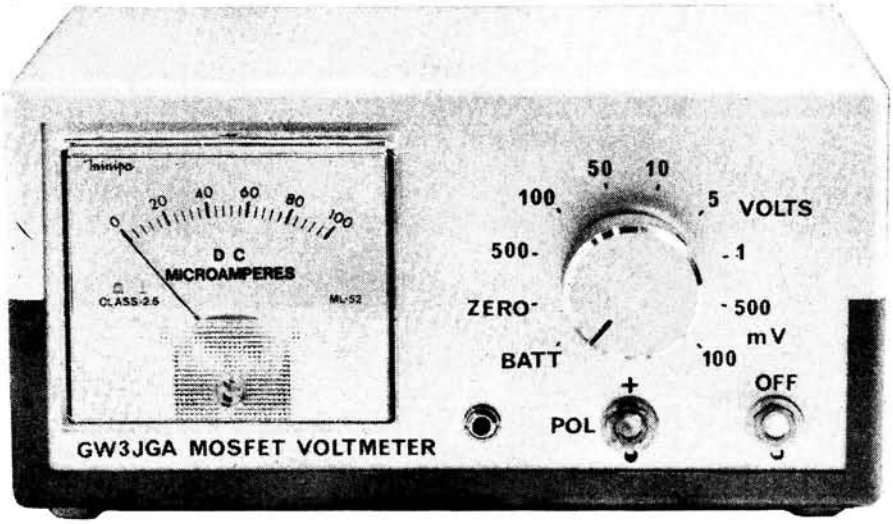
High Impedance MOSFET Voltmeter

Following the success of the PW FET Dip Oscillator John Thornton Lawrence GW3JGA has produced another equally useful piece of test equipment in this High Impedance MOSFET Voltmeter.



One of the major causes of errors when making electrical measurements on radio and electronic equipment is the loading effect on the circuit caused by the measuring instrument. Voltage measurements suffer from the loading effects of the voltmeter resistance, current measurements from the voltage drop across the ammeter and oscilloscope measurements from capacitive effects introduced by the scope leads or probe.

For instance, when you measure the voltage in a d.c. circuit, the internal resistance of the voltmeter will load the circuit and cause the voltage to fall to some extent. The error between the actual voltage and the measured voltage increases as the loading effect increases.

To give a practical example, take a simple potential divider circuit consisting of two 100kΩ resistors connected in series across a 12 volt supply as shown in Fig. 1. We know instinctively that the voltage at the centre point will be 6 volts. Calculate it if you wish,

$$V2 = V1 \times \frac{R2}{R1+R2} = 12 \times \frac{100k}{200k} = 6 \text{ volts}$$

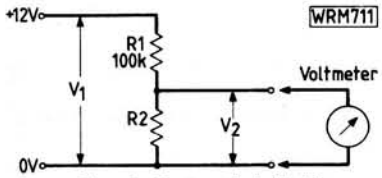


Fig. 1: Potential divider

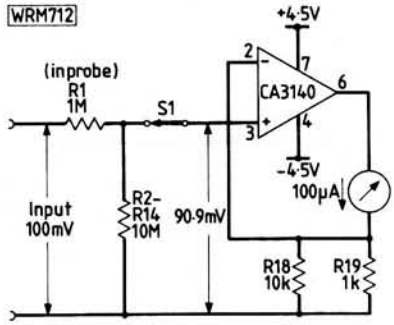


Fig. 2: Basic circuit (shown on 100mV Range)

Now see what happens when you make a practical measurement using a voltmeter, (10V range)

Calculated Voltage	6V
1kΩ/V meter (10kΩ)	1V
20kΩ/V meter (200kΩ)	4·8V
MOSFET Voltmeter (11MΩ)	5·97V

For many years the Avometer Model 8 (20kΩ/V) has been widely used in radio, television and electronics servicing. As a result, most service manuals quote the voltages in various parts of the circuit when measured using such a meter, and in practice this has worked very well.

However, for experimental purposes there is much to be said for knowing the voltage that is actually present and this is where the MOSFET Voltmeter comes into its own.

The instrument to be described has an input resistance of 11MΩ on all ranges and will cause negligible loading when making measurements on virtually all electronics circuits in common use. The voltmeter covers from 100mV to 500V (full scale) in 8 ranges arranged in a 5:1 sequence. Positive and negative voltage are catered for by means of a reversal switch. The voltmeter draws 5·5mA and is powered by a 9 volt transistor radio battery, 6-F22 (PP3) or similar. An a.c. voltage probe is provided for measurements in the radio frequency range.

Circuit Description

The heart of the voltmeter is the CA3140, IC1. This is an op-amp which has a gate-protected m.o.s.f.e.t. device in the input stage giving it an input impedance 1·5TΩ (1 500 000MΩ). The output of the device has a bipolar transistor to provide adequate current sourcing capability. One might think of it as a super high impedance version of the well known 741 op-amp.

In the simplified circuit shown in Fig. 2, the 100µA meter is connected in a feedback circuit where the incoming voltage to pin 3 causes IC1 to drive current through the meter and R18 and R19 until the voltage drop across these resistors equals the incoming voltage.

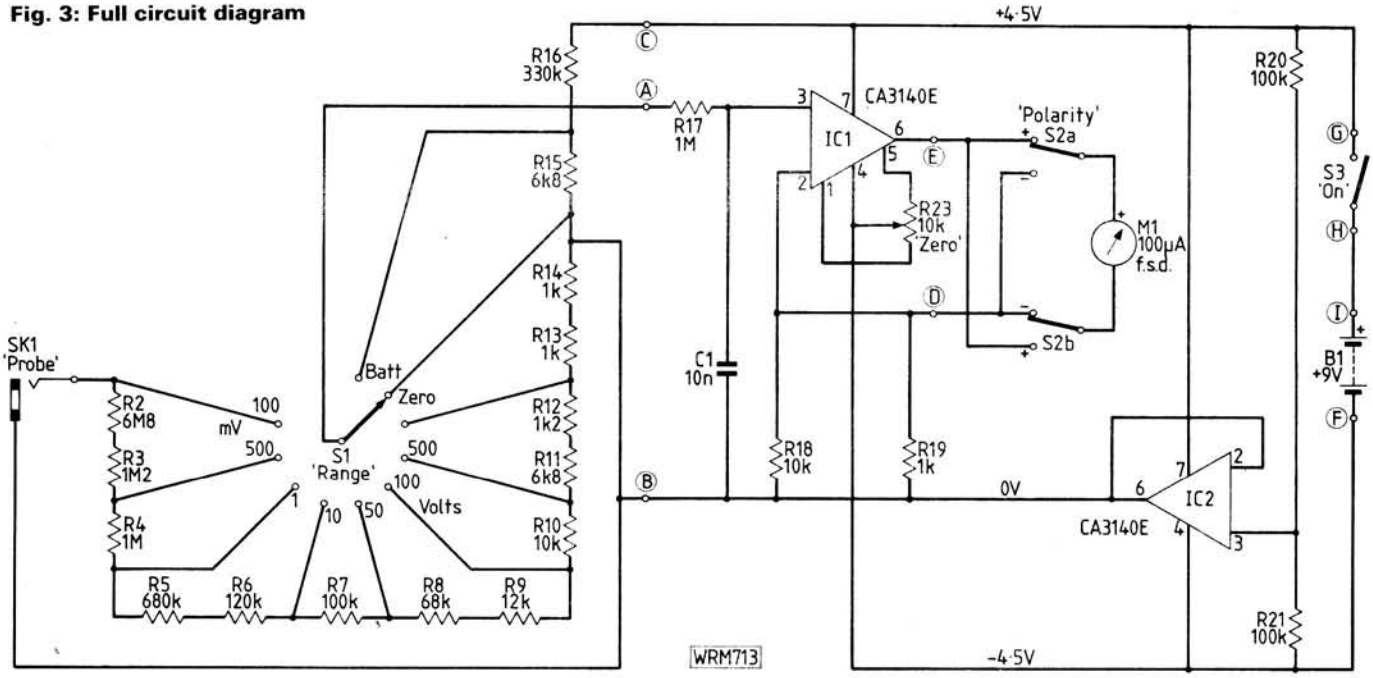
Because the probe has a 1MΩ resistor, R1, built in it, the actual voltage across R2–R14 is less than the input voltage. For example, on the 100mV range, an input voltage of 100mV causes a voltage of 90·9mV to appear at pin 3 of IC1. The value of R18 and R19 are chosen so that with 100µA through the meter, the voltage appearing at pin 2 of IC1 is also 90·9mV thus the meter is indicating full scale deflection (f.s.d.) of "100" for a 100mV input.

In the full circuit as shown in Fig. 3, the input voltage is always applied across R1–R14. Range switch S1 selects the appropriate tapping point for the range in use. A "zero" check position and battery voltage check are included. Resistor R17 and C1 form a low-pass filter to prevent a.c. voltages and pick-up from overloading IC1. Switch S2 is the meter reversing switch which allows the measurement of negative voltages without the inconvenience of having to cross over the test leads. Resistor R23 is the "zero" control which corrects any off-set existing in IC1. Integrated circuit IC2, also a CA3140, has the mundane job of centre tapping the single 9 volt supply and providing equal positive and negative supply voltages to IC1.

DC Voltage Probe

The d.c. voltage probe must always be used when measuring d.c. as it is part of the input network, the input resistance is then 11MΩ on all ranges. As the 1MΩ resistor, R1, is built into the tip of the probe, this allows d.c. voltage measurements to be made in the presence of a.c. signals with very little capacitive loading, just a few picofarads, on the circuit under test.

Fig. 3: Full circuit diagram



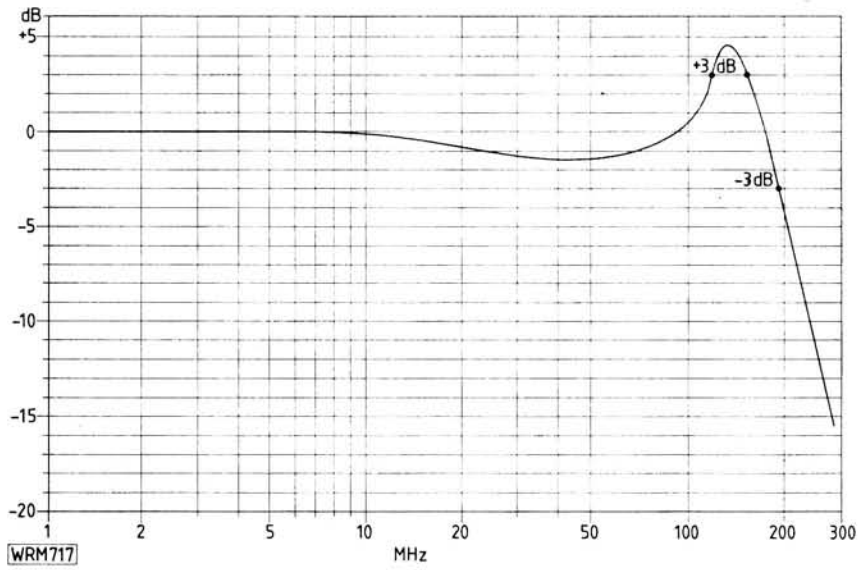


Fig. 4: Frequency response of a.c. diode probe

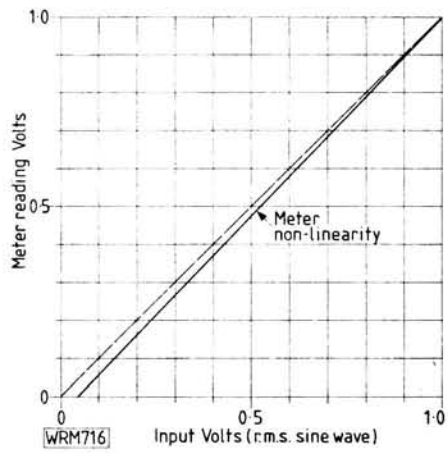


Fig. 5: Non-linearity of a.c. diode probe below 1V r.m.s.

AC Voltage Probe

The a.c. voltage probe is intended for measuring voltages up to 10V r.m.s. (28V peak-to-peak) in the frequency range 50Hz to about 200MHz, covering the audio, video and radio frequencies and part of the v.h.f. spectrum. Voltages greater than 10V r.m.s. cannot be accommodated because of the reverse voltage rating of D1, the BAT85 silicon Schottky barrier diode. The frequency response of the prototype probe is shown in Fig. 4. It has a reasonably level response ±1dB (±10%) up to about 100MHz, a rising response to 150MHz and falling away at 200MHz. As with all simple diode rectifying circuits there is some non-linearity at very low signal levels due to the curvature of the diode characteristic and this non-linearity is shown in Fig. 5. For a.c. voltages above 1V r.m.s. it can, for all practical purposes, be ignored.

SHOPPING LIST

Resistors

0·25W 1% Metal Film

1kΩ	3	R13,14,19
1·2kΩ	1	R12
6·8kΩ	2	R11,15
10kΩ	2	R10,18
12kΩ	1	R9
68kΩ	1	R8
100kΩ	3	R7,20,21
120kΩ	1	R6
330kΩ	1	R16
680kΩ	1	R5
1MΩ	3	R1,4,17

0·5W 5% Carbon Film

1·2MΩ	1	R3
4·7MΩ	1	R22
6·8MΩ	1	R2

Miniature Pre-set

10kΩ	1	R23

Semiconductors

BAT85	1	D1
CA3140	1	IC1,2

Capacitors

Lead-through Ceramic

1nF	1	C2

160V 20% Polyester

10nF	*1*	*C1*

Miscellaneous

Case (Vero 202-21039); meter 100µA (Cirkit 37-00520); rotary switch 1p.12w. (1); miniature toggle switches d.p.c.o. (1), s.p.s.t. (1); 3·5mm jack socket; 3·5mm jack plugs (2); miniature insulated crocodile clips (2); miniature coaxial cable; pen cases; battery connector; p.c.b.

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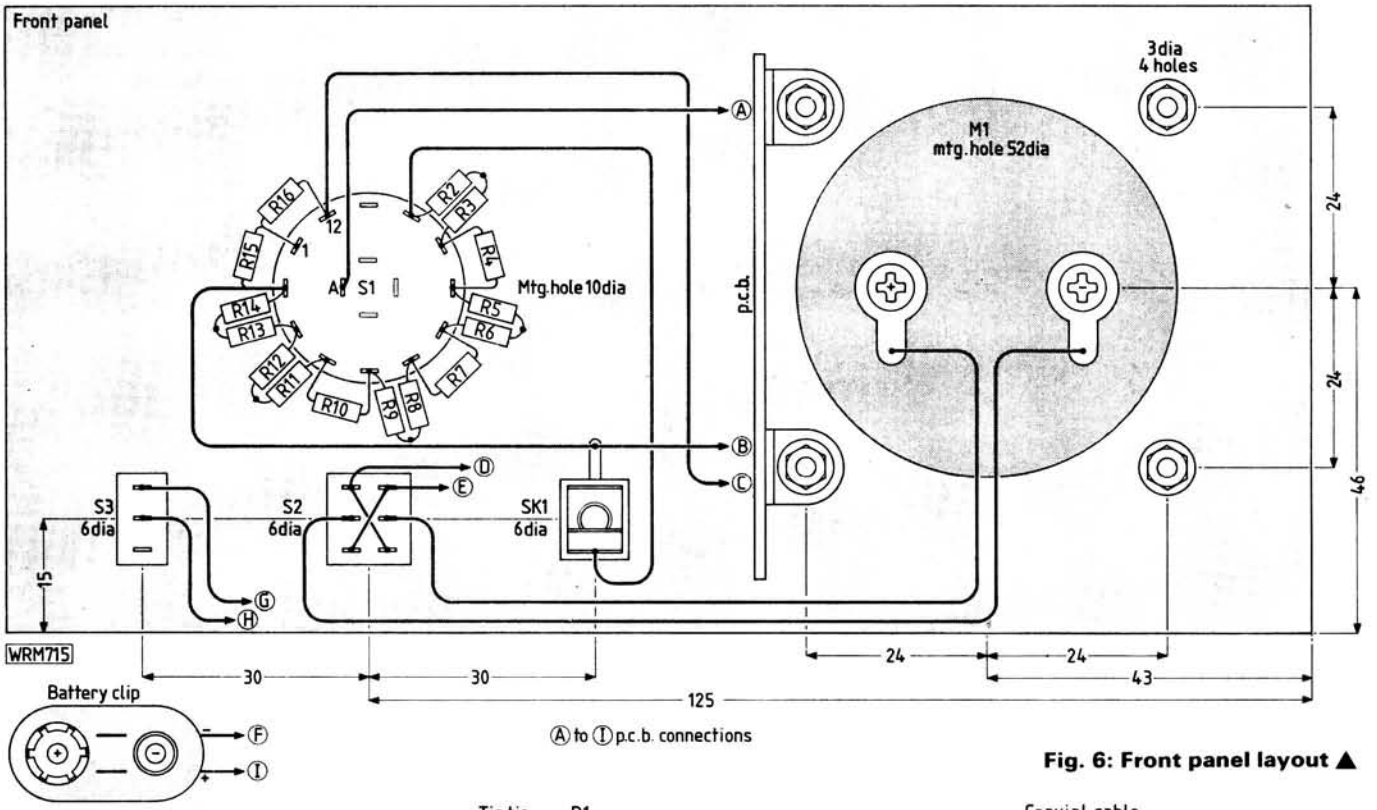
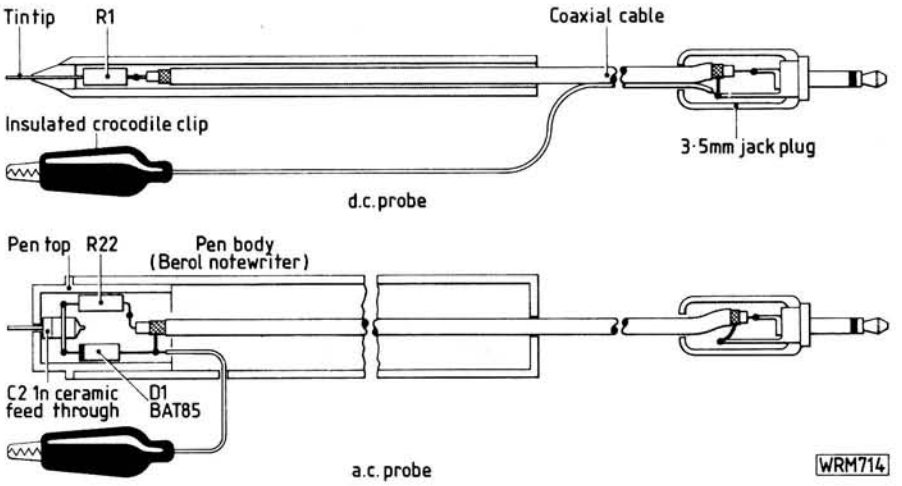


Fig. 6: Front panel layout ▲

Construction

The MOSFET Voltmeter is housed in an abs plastics case, size 160 × 12 × 90mm, with aluminium front and rear panels. The meter and controls are mounted on the front panel with small right angle brackets secured under the meter fixing nuts. The d.c. probe houses R1, and the a.c. probe D1, C2 and R22. The resistors R2 to R16 are mounted directly on the range switch, S1, and all the remaining components including IC1 and IC2 are mounted on the p.c.board, as shown in Fig. 7. The panel may be lettered using press-on lettering.

Both probes are made using discarded pen cases, almost any type will suit the d.c. probe where the resistor is mounted right at the end with the axial lead-out wire forming the tip. The a.c. probe requires a case with an internal diameter of approximately 9mm and a Berol Notewriter case, when used the reversed way round, is ideal. The coloured top is removed and drilled to suit the centre pin of the lead-through capacitor C2.



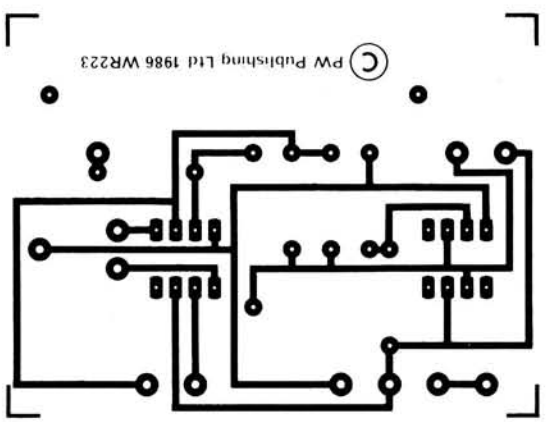
In Use

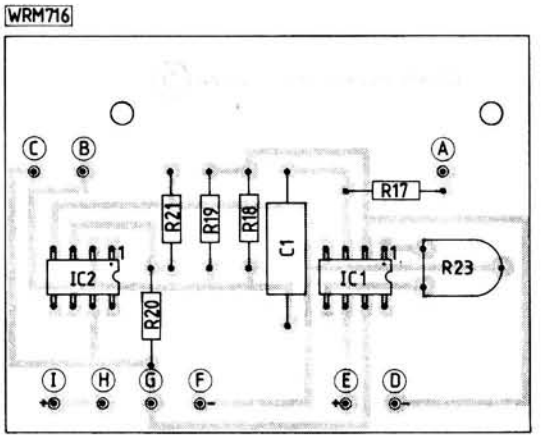
Initially, the MOSFET Voltmeter will require the "zero" adjusting. This is done by rotating the range switch to the ZERO position and with the supply on, adjusting R23 for zero reading.

With the d.c. probe connected, the MOSFET Voltmeter can be used in the same way as a conventional multi-range d.c. voltmeter.

With the a.c. probe connected and the polarity switch set to positive (+), voltages up to 10V r.m.s. can be measured in audio and video equipment, in low power transmitters. However, do not attempt to measure a.c. signals greater than 10V r.m.s. and avoid transients greater than 30V peak-to-peak or damage to D1 may occur. In the BATTERY CHECK position the meter reads 10V full scale. ***PW***

Fig. 7: Copper track pattern and component layout





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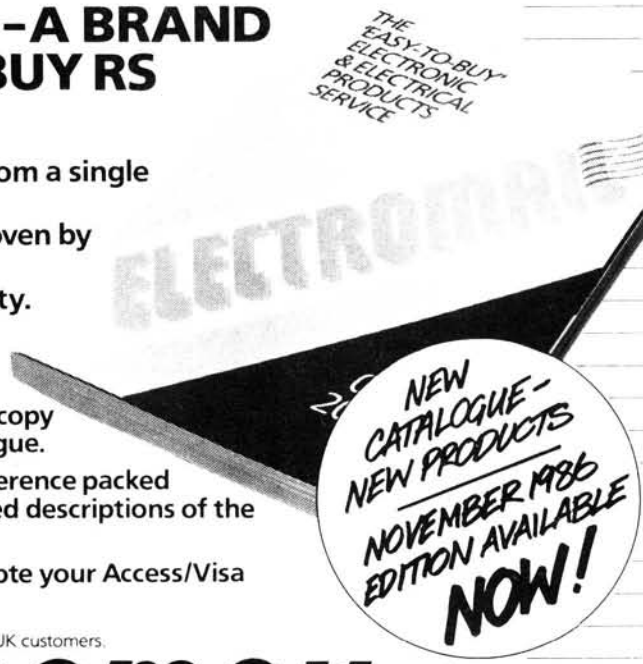

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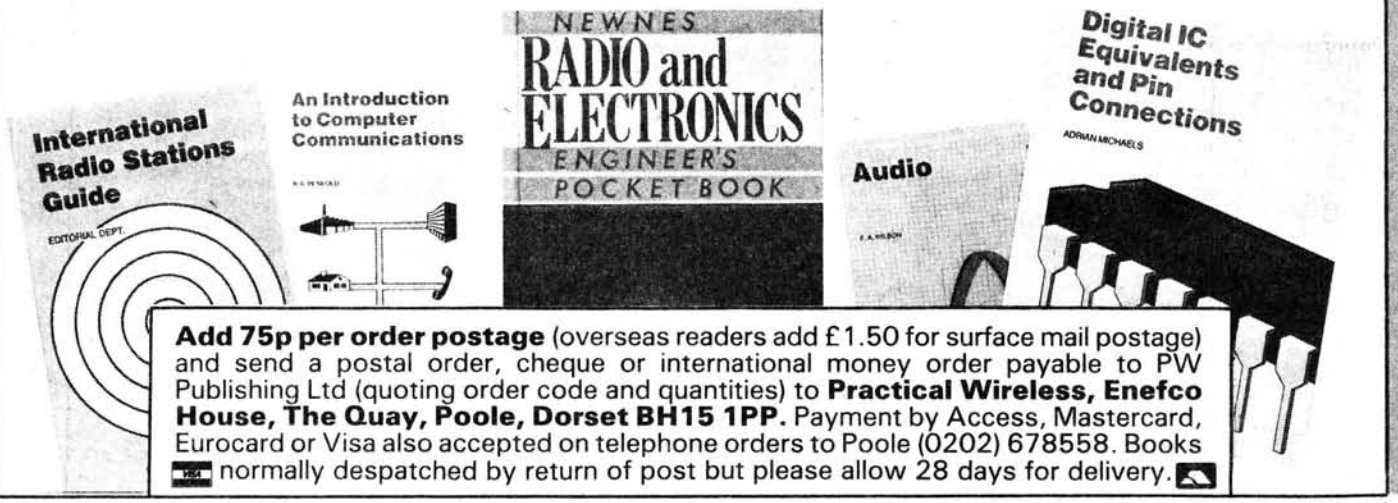

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The Effective TVI Filter

Having trouble with TVI? Well so was Basil Spencer G4YNM until he designed and built this seven branch Chebyshev high-pass filter.

In 1985 the author moved south from his former northern location and purchased a commercial 144MHz transceiver over the festive period of the same year.

His neighbour received an unwanted Christmas present in the form of television interference, as a direct result, and it was decided to design and construct an effective TVI filter to cure this problem.

Description

The design uses a seven branch C-in C-out Chebyshev high-pass filter (Fig. 1), in which the capacitors are formed by copper areas on the double-sided p.c.b. laminate. By using an odd number of branches the input and output terminations have an equal impedance which simplifies construction and enables the filter to be connected either way around in the TV downlead.

A well designed and constructed seven branch Chebyshev filter provides about 42dB of attenuation one octave from the cut-off frequency, as well as providing a relatively high slope in the transition band[1].

As the UK 625-line television channels 21 to 68 cover the frequency band 470MHz to 854MHz it seemed appropriate for the cut-off frequency to be approximately that of the amateur 430MHz band.

Construction

The double-sided s.r.b.p. (Synthetic Resin Bonded Paper), printed circuit board should be cut to size, see Fig. 2. Then the unwanted copper is removed by carefully scoring through the copper to the substrate with a sharp craft knife. Next carefully lift one corner of each unwanted strip of copper, then peel them off with the aid of a hot soldering iron and pair of pliers. This completes the p.c.b. preparation. You should now be left with a p.c.b. that has four pads one side and three pads the other, hopefully all to the dimensions of the tinted areas shown in Fig. 2. Note the two long unbroken pads form a common ground plane. **It is essential to cut accurately if the correct response is to be obtained.**

The three identical coils should be wound next as shown in Fig. 3, the coils are made from 26 s.w.g. tinned copper wire. It is suggested that a 3mm twist drill shank be used as a mandrel. Solder the coils and earth links to the p.c.b. at exactly the points shown in Fig. 2. Remember accuracy is the watchword here and sloppy work will only result in a sloppy filter response.

Mount the two Belling Lee coaxial sockets to the die-cast box (using four 6BA screws, nuts and washers plus two solder tags, one for each socket). Now fit the completed p.c.b. into the die-cast box, with the earth plane uppermost and soldered to the solder tags, with the coaxial connector centre pins soldered to points B, C as shown in Fig. 4. Fit the lid to the box and delight a neighbour by curing their TVI.

Conclusions

The author is fortunate enough to have access, through his employers, to a Hewlett Packard Network Analyser[2] capable of giving both Cartesian and Polar plots on a cathode ray tube, thereby considerably easing the assessment of any particular filter design in progress.

The performance of this filter is satisfactory as can be seen from the Cartesian plot showing forward response in Fig. 5. The author has constructed three of these filters to confirm consistency of results.

Finally if, after fitting this filter, the TVI remains (and the transmissions from the station are "clean"), the responsibility to resolve the problem must now rest with the person suffering the TVI. The amateur having done his or her "bit" to cure it and maintain good public relations for the amateur radio hobby as a whole. ***PW***

Acknowledgments

The author wishes to express his thanks to Phil Aldworth, the Test

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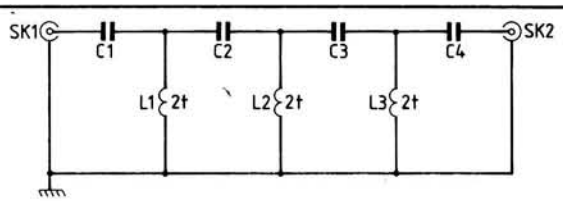

Fig. 1: Seven Branch C-in C-out Chebychev high-pass filter

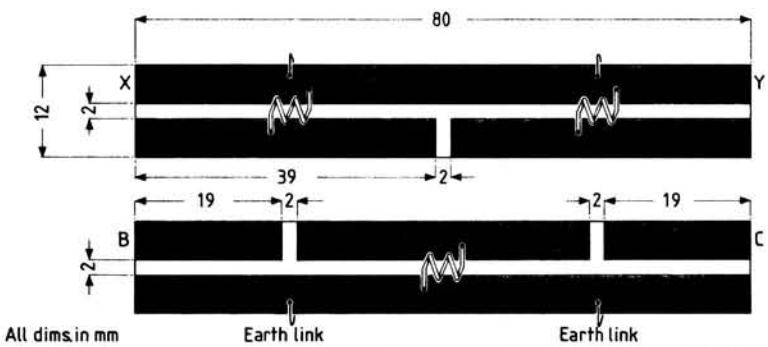

Fig. 2: Track patterns for the filter p.c.b. As the filter capacitors C1, 2, 3, 4 are formed by the two track patterns accuracy is vital

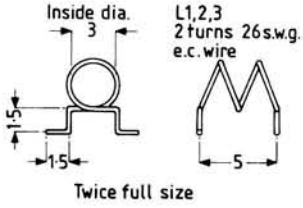

Fig. 3: Winding details of the three identical coils

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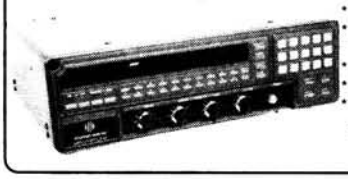

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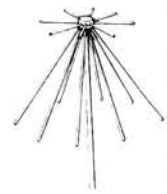

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A frequency list in numerical order covers 346 frequencies from VLF or UHF of FAX stations which were monitored in 1985 and 1986. Frequency, call sign, name of station, ITU country geographical symbol, technical parameters of emission, and details, are listed. The alphabetical call sign list covers 233 call signs, with name of the station, ITU country/geographical symbol, and corresponding frequencies. Schedules of 94 FAX stations on 340 frequencies are listed alphabetically.
The book (128 pages) is illustrated throughout, and other subjects covered include radio amateur FAX activities, abbreviations used in transmissions, station addresses in 35 countries, sample charts, and a wealth of other information. **Price £8.60** + 65p post & packing in UK and Eire. Overseas £1.00 sea mail, £2.60 airmail.

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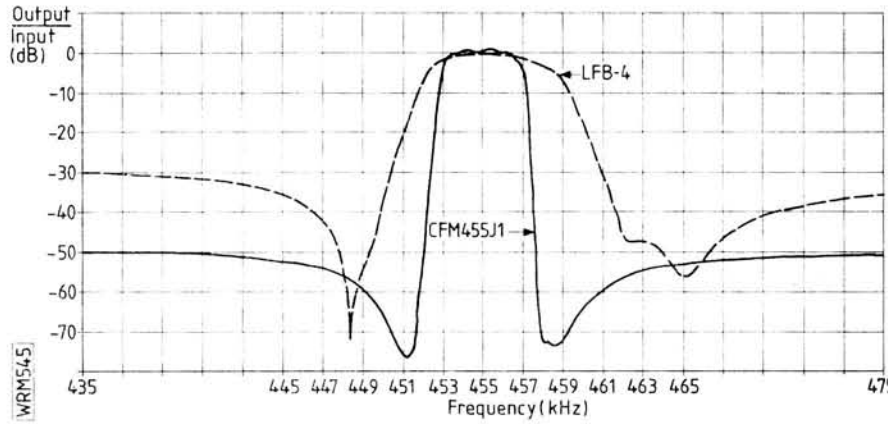
Modifying the SRX-30D

S. Niewiadomski describes some modifications to the SRX-30D receiver which improve the performance. To allay fears, the mods involve no front panel changes and so the set can be returned to its original condition quickly and easily.

Fig. 1: Comparison of LFB4 and CFM455J1 i.f. filter responses



The SRX-30D, which is also sold under the guise of the Century-21D, was introduced in 1982 as a re-engineered version of the SRX-30. The main improvements were the introduction of digital frequency readout and reduced fine tuning (CLARIFY) coverage, which was rather excessive in the original receiver.

A review of the SRX-30D was published in the April 1982 issue of *PW* and its operation is similar to the Yaesu FRG-7, which was comparable in price at that time. General coverage from 500kHz–30MHz is achieved by use of the Wadley drift cancelling loop principle (see *PW* July 1979), which gives a very stable receiver even at the highest frequencies of operation. The main tuning rate, when used in conjunction with the CLARIFY control, is sufficiently slow to make s.s.b. signals in the amateur bands easy to resolve. All modes of modulation (including f.m.) are catered for and in my opinion, this receiver offers very good value for money as a receiver for a new s.w.l.

It is a shame that when the receiver was being up-dated, the opportunity was not taken to fit a better s.s.b. filter. The one fitted is a MTK LFB4, which is a 4kHz bandwidth ceramic filter with only about 30dB of stopband attenuation. For only a slight cost increase, a much better s.s.b. filter could have been fitted at the design stage which would have considerably improved the s.s.b. performance.

Another criticism of the receiver is the rather poor manual supplied with it. It contains only the barest essentials of information about performance and use of the receiver; circuit diagrams are also included, but no component placement diagrams or components list.

This article describes the fitting of a better s.s.b. filter into the i.f. stages as well as a switchable audio bandpass filter into the audio output path. The SRX-30D uses one i.f. filter for s.s.b. and another one for a.m. and f.m., and so changing the s.s.b. filter does not affect performance in these modes. No modifications to the front panel are necessary and the receiver can easily be returned to its original condition if required.

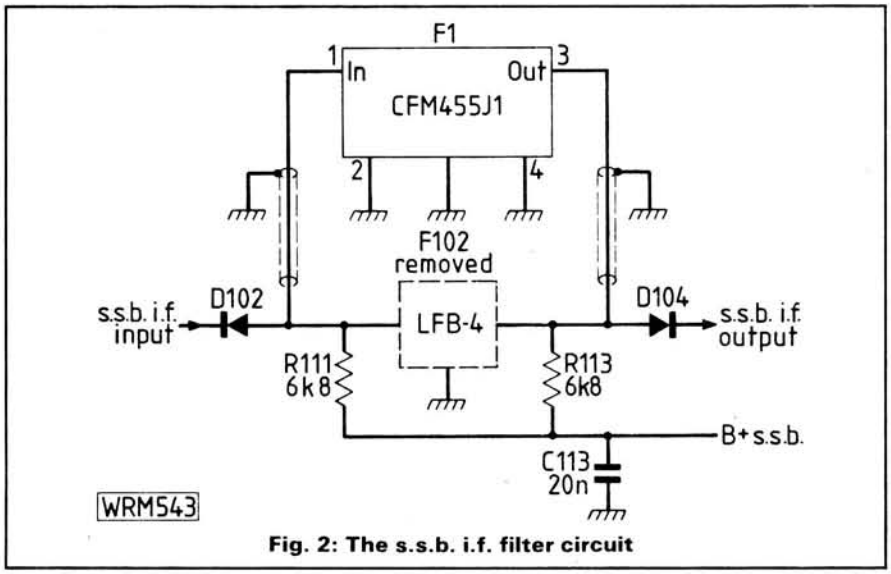


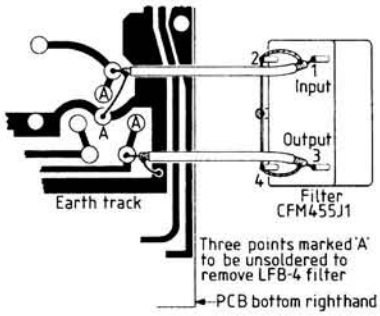
Fig. 2: The s.s.b. i.f. filter circuit

Fitting the SSB Filter

A reasonable quality s.s.b. filter, the CFM455J1, is available for about £9 + VAT, which neatly replaces the LFB4. The change is very simple because the input and output impedances of the two filters are identical (2kΩ) and so no adjustments in driving and termination impedances have to be made. A comparison of the performances of these two filters is shown in Fig. 1. The CRM455J1 has a passband bandwidth better suited to s.s.b. reception and steep sides to achieve its stopband attenuation as quickly as possible. Further away from the passband, the ultimate stopband attenuation is about 50dB. The broadness of the LFB4 response can be seen, giving poor adjacent channel rejection. This can be heard as unintelligible, shifted-frequency signals on top of the signal you are trying to listen to.

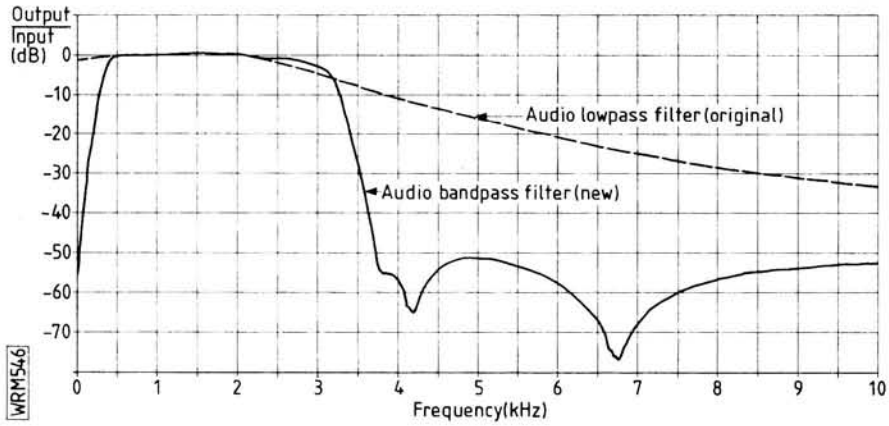
The circuit of the receiver in the s.s.b. i.f. filter area is shown in Fig. 2. The new filter can be seen directly replacing the LFB4.

The first job in fitting the new filter is to remove the old one. First of all, remove the top cover of the receiver by unscrewing the four screws (two at each side) which attach the cover to the chassis. Then slide the cover backwards clear of the chassis. Turn the



◀ **Fig. 3: Fitting the CFM455J1 s.s.b. filter**

Fig. 4: The responses of (a) the original audio lowpass filter and (b) the new audio bandpass filter ▼



receiver over and unscrew the six small cross-point screws which hold the bottom cover onto the chassis.

Turn the receiver the right way up again and locate the LFB4 filter, which is on the righthand p.c.b. (when viewing the receiver from the front) under the display module. The LFB4 is a small grey block, 7 × 8 × 8mm. It is next to the a.m./f.m. filter, an LFB8. When the LFB4 has been located on the topside of its p.c.b., turn the receiver over and locate its 3 pins on the underside of the p.c.b. The track of the p.c.b. in this area is shown in Fig. 3, and will help to locate the 3 pins to be unsoldered. They should be unsoldered using a "solder sucker" or desoldering braid. The filter will drop out when the last pin is unsoldered.

The new filter is fitted on the underside of the p.c.b. using two short lengths of miniature coaxial cable, such as RG174. The position of the new filter is also shown in Fig. 3. It is easier to strip and trim both ends of each length of coaxial cable before fitting to either the filter or the p.c.b. as this puts least strain on the components. The case of the filter is earthed by soldering a length of wire between the protruding lug of the case of the filter and the earth pins, 2 and 4. The lengths of coaxial cable which electrically connect the filter into circuit are rigid enough, so that no other mechanical fixing is necessary. After making the modification, carefully examine the area of the p.c.b. where the coaxial cable has been attached to ensure that no short circuits have been created by solder splashes. Because the centre frequency of the CFM455J1 is the same as the LFB4, no adjustments of the receiver, such as trimming the b.f.o. frequency, are necessary.

A considerable improvement in performance should now be noticed. Adjacent channel interference should be much reduced, resulting in greater intelligibility of the desired signal.

The New Audio Filter

A three pole *LC* lowpass filter is fitted to the SRX-30D, following the s.s.b. product detector. This filter has been simulated using a circuit simulation program and the response is plotted in Fig. 4. The cut-off frequency is approximately 2·5kHz, and as would be expected with such a simple filter, the roll-off rate is quite slow. It was thought that this lowpass response could be improved upon, both in the roll-off rate and by incorporating a highpass filter to reduce the level of hum in the audio output which is noticeable when listening on headphones. So the fewest modifications would need to be made to the receiver, it was decided to place the new filter in the output of the audio power amplifier, in the lead to the loudspeaker and headphones as shown in Fig. 5.

To optimise a filter for communications use, frequencies from about 300Hz to 3kHz should be passed without attenuation and all other frequencies attenuated as much as possible. Such a filter would not be suitable for listening to broadcast stations where the quality of music, for example, would be seriously degraded. Fitting a filter in the audio output means therefore that it must be capable of being switched in and out of circuit.

The circuit of the new audio filter board used here is shown in Fig. 6. The filter itself consists of C1–9 and L1–4. Capacitors C1, C2 and inductor L1 form a 3-pole Chebyshev highpass filter with a cut-off frequency of 300Hz and input and output impedances of 600Ω. Capacitors C3–9 and inductors L2–4 form a 7-branch elliptic lowpass filter with a cut-off frequency of 3kHz and input and output impedances again of 600Ω. When a highpass and a lowpass filer have cut-off frequencies which are widely separated and have the same input and output impedances, they can be cascaded together. The combined network will have a response which is the sum of the two responses. As 3kHz is more than 3 octaves above 300Hz (an octave represents a doubling in frequency) the two filters here can be connected together

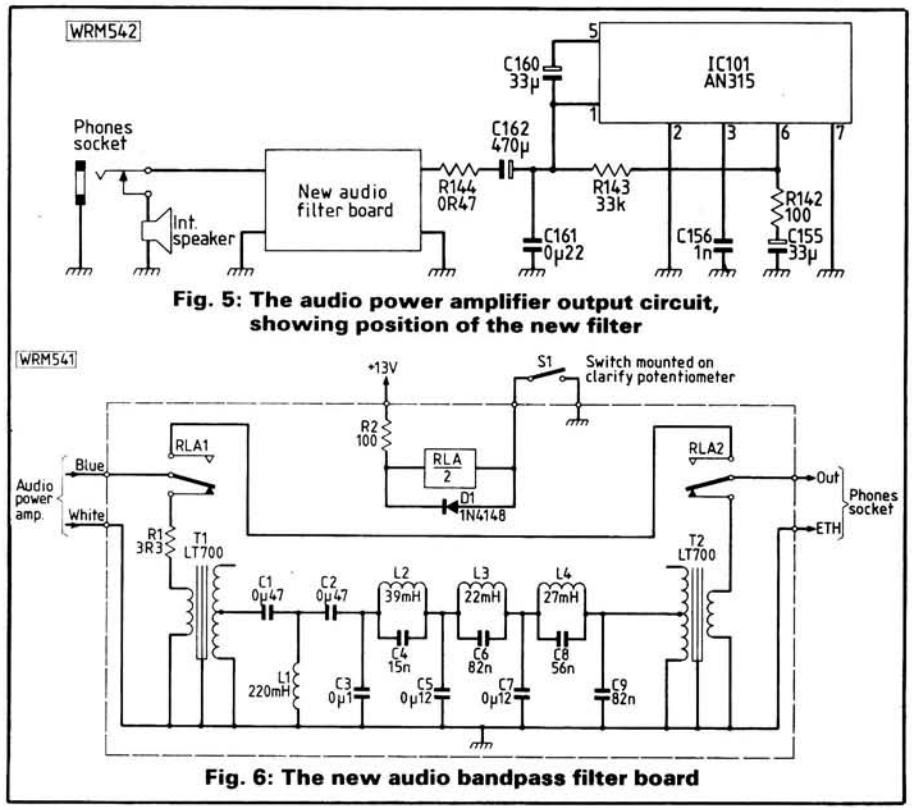


Fig. 5: The audio power amplifier output circuit, showing position of the new filter

Fig. 6: The new audio bandpass filter board

safely to form a bandpass filter. The response of this filter is also plotted on Fig. 4 for comparison with the original filter.

Because the inductors used for L2–4 have a comparatively low *Q* at audio frequencies, rounding off the passband edge close to the cut-off frequency can be seen. A minimum stopband attenuation of 50dB is achieved at approximately 3·75kHz, and the attenuation remains greater than this up to several MHz. The shape of the response in the stopband is characteristic of elliptic filters which achieve a minimum stopband attenuation rapidly, but do not have continually increasing attenuation as frequency increases. The high-pass section gives greater than 50dB attenuation at 50Hz and 40dB at 100Hz.

To match the 600Ω input and output impedances of the bandpass filter to the low impedance output of the audio power amplifier and the speaker or headphones, transformers T1 and T2 are used. These transformers are type LT700 which are designed for use as push-pull transistor output stage transformers. They have 1·2kΩ centre-tapped primary and 3Ω secondary winding. In this application the centre tap on the primary is used to match the filter input and output impedances of 600Ω. Resistor R1, in series with the low impedance winding of T1, gives a better match for the filter than direct drive from the audio amplifier. This is because the output impedance of such an amplifier is very low, typically less than 1Ω, and this would not provide the correct drive impedance to the filter when transformed through T1. Resistor R1 increases the attenuation in the audio output path, and also greatly increases the smoothness of the passband response because of the better match. The increase in attenuation can easily be compensated for by increasing the volume level, and plenty of spare output power is available from the receiver.

On the output side of the filter, the centre tap of T2 is again used. The output of T2 has been tested with loads between 3 and 16Ω and a smooth passband response was obtained over this range.

The audio filter, as well as R1, T1 and T2 can be by-passed by the contacts of a double-pole change-over relay RLA 2. A relay was used rather than a switch because I wanted the filter to be switchable from the front panel, without having to modify the panel. This is achieved by changing the CLARIFY potentiometer for one with a pull-to-operate switch. The switch on such a potentiometer has two single make contacts, one of which is used to operate the relay. Resistor R2, in series with the relay coil, reduces the current through the relay coil slightly, so that only the minimum extra load possible is imposed on the receiver power supply. Diode D1 absorbs the back e.m.f. produced by the relay coil, reducing sparking across the switch contacts.

Audio Filter Board Construction

The p.c.b. track pattern and component layout for the audio filter board is shown in Fig. 7. The inductors used for L1–4 are Toko type 10RB and 10RBH which are very compact and eliminate the need for any coil winding.

The author's prototype p.c.b. was made by sketching the circuit layout at life-size on graph paper, cutting it out and sticking it on to a piece of single-sided p.c.b. material cut to the correct size. Each hole was then marked onto the board by punching through the paper with a centre-punch. The paper was then removed and the board thoroughly cleaned. Using an etch-resist pen, the tracking was drawn using the holes to indicate the position of the components. Most of the rest of the board was then inked-in, leaving only a thin strip of exposed copper around the component interconnections. This serves two purposes: first, a continuous earth plane is left on the board after etching which eliminates signal leakage round the filter when in operation, and secondly, the amount of etchant used up when etching the board is considerably reduced because so little copper is exposed.

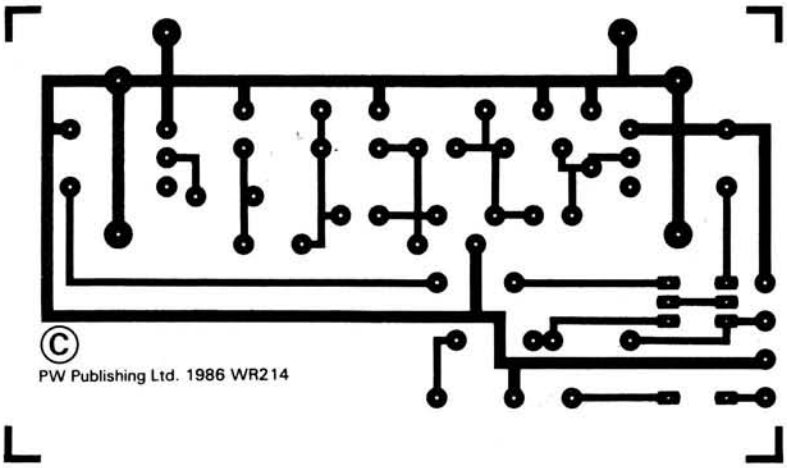
When the etch-resist ink is dry (after about 15 minutes), the board is immersed in ferric chloride solution, taking the normal precautions with this poisonous and corrosive chemical. The etching bath should be gently agitated until all the exposed copper has been etched away. Lift the p.c.b. out of the bath, rinse it under running water and clean off the etch-resist with a suitable solvent. Then drill the board. Use a 0·7mm drill for all the component leads, 2mm for the transformer lugs and 3mm for the fixing holes.

If the p.c.b. construction technique does not appeal to you, Veroboard can be used or p.c.b.s can be purchased from the *PW* PCB Service. If you opt for Veroboard, lay the transformers and filter components out as they are drawn in the circuit diagram, keeping the output away from the input.

Fitting the Filter Board

The prototype p.c.b. was fixed in the receiver using the aluminium bracket shown in Fig. 8. The bracket was screwed to the topside of the rear runner to the right of the large 2200μF smoothing capacitor using 6BA screws and nuts. This requires the temporary removal of the f.m. board.

If you do not want to drill any holes in the receiver at all, the board can be stuck to the inside of the rear panel using double-sided sticky pads.



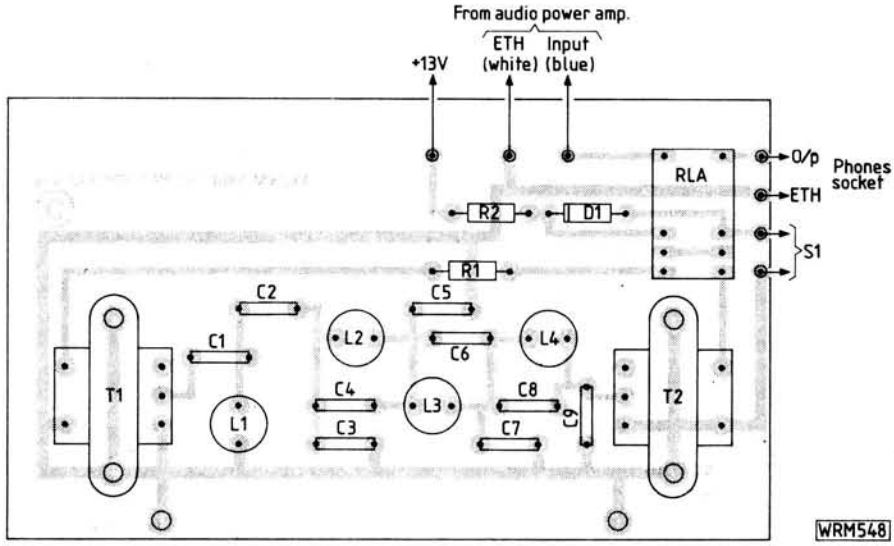
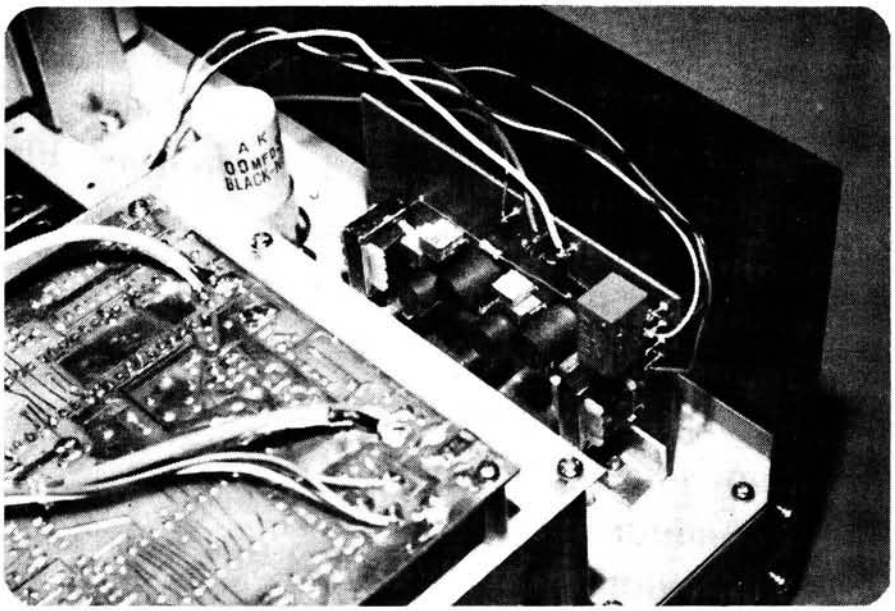
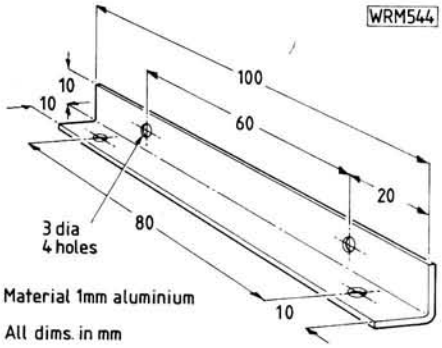


Fig. 7: The audio board full-size track and component layout. Minimum etch technique has not been used here



▲ **The photograph shows the author's board mounted, using the bracket in Fig. 8, inside the SRX-30D**



◀ **Fig. 8: The audio filter mounting bracket**

Fitting the New Clarify Potentiometer

The next job is to change the CLARIFY potentiometer for one with a switch.

Remove the knob from the control using a 1·5mm Allen key and remove the nut holding the potentiometer to the panel behind the front panel. Unsolder the three leads to the potentiometer, being careful to make a note of which contact they are connected to. The potentiometer can now be withdrawn from the panel.

The new potentiometer is now inserted into the panel and the fixing nut replaced. Re-solder the connections to the potentiometer and replace the knob.

Wiring in the Audio Filter Board

The audio filter board can now be wired into circuit. Cut two lengths of wire (they can be the same colour) to about 500mm and twist them together. Solder one end of each wire to one end of the sets of contacts on the new CLARIFY potentiometer. Solder a 500mm length of wire onto the point where the red wire from the bulb which illuminates the S-meter is attached to the main receiver p.c.b. This is a convenient point to pick up the +13V supply rail to operate the new relay. It will be found near the bandswitch at the front of the board. Locate the blue and white wires which connect the audio power amplifier to the headphones socket. These wires run from the left-hand receiver p.c.b. (when the receiver is upside-down) around next to the back panel and alongside the mains wiring, to the headphones socket. Unsolder the wires at the socket, leaving the blue wire which goes to the loudspeaker in position.

Solder two new twisted wires (500mm long again, but different colours) to the headphones socket to where the blue and white wires originally went. Now take all these wires, seven in all, through the hole in the rear runner between the 2200µF capacitor and the mains transformer.

Cut each wire to the correct length and solder to the audio filter p.c.b. as shown in Fig. 7.

Testing the Audio Filter

Before replacing the receiver covers, test the modification by tuning to an s.s.b. signal, say on the 3·5MHz band. The audio filter is in circuit when the CLARIFY knob is pushed in, and out of circuit when pulled out. Try operating the knob and see that background hiss and hum (especially when listening on headphones) are greatly reduced when the filter is in circuit. The filter should normally be left in circuit when listening to the amateur bands and switched out when stations with a broader audio spectrum, such as m.w. broadcast stations, are being received.

When you are satisfied that the modifications have been successfully carried out, replace the receiver covers.

Other Receivers

The audio filter described here can be fitted to other receivers if required. It can either be mounted internally, as for the SRX-30D, or externally in a box with a lead terminated by a jackplug to be plugged into the headphones socket. The filter itself can be used in receivers without the transformers if the correct driving and terminating impedances of 600Ω can be provided. It would, for example, make an excellent post-detector filter for a direct conversion receiver. ***PW***

SHOPPING LIST

Resistors

¼W 5% Carbon Film

3·3Ω	1	R1
100Ω	1	R2

Capacitors

Miniature Polyester Layer

15nF	1	C4
56nF	1	C8
82nF	2	C6,9
0·1µF	1	C3
0·12µF	2	C5,7
0·47µF	2	C1,2

Inductors

Toko 10RB

22mH	1	L3
27mH	1	L4
39mH	1	L2

Toko 10RBH

220mH	1	L1

Semiconductors

Diodes

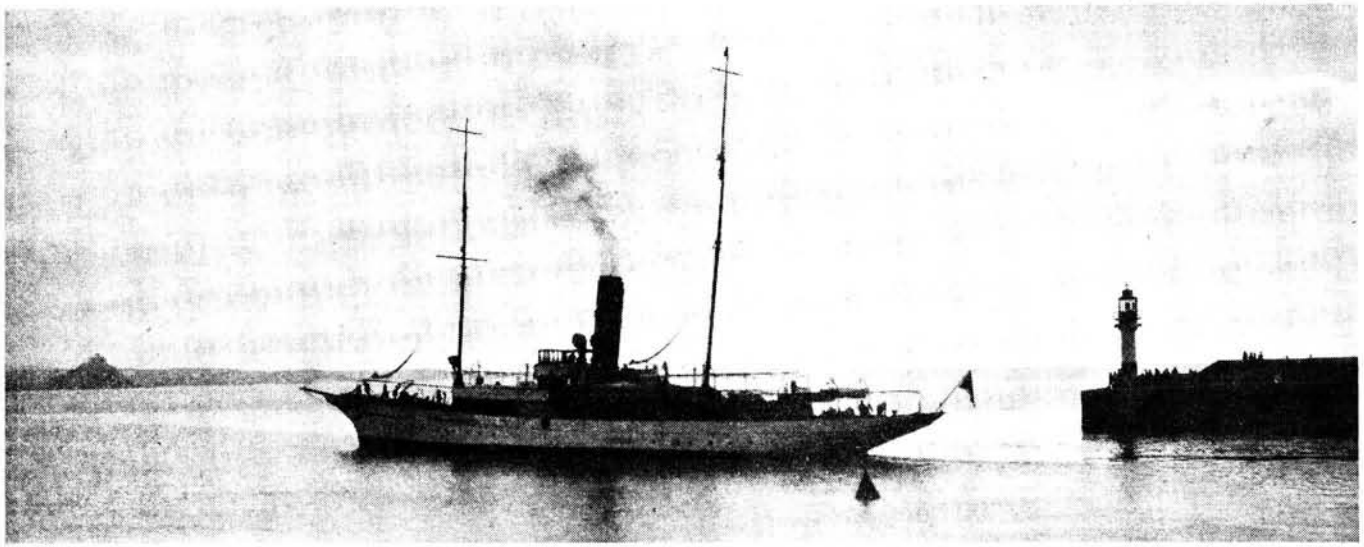
1N4148	1	D1

Miscellaneous

CFM455J1 filter (Cirkit); LT700 1·2kΩCT/3·2Ω output transformer (Electrovalue) (2 off); d.p.c.o. relay 12V coil Cirkit 48-50219; d.p.s.t. switch mounted on 5kΩ linear potentiometer; p.c.b.; mounting bracket; 6BA nuts and screws; RG174; wire.

Calling the Elettra

Photos courtesy The Marconi Company Limited



Steam-yacht *Elettra* in Mount's Bay, Cornwall

A diary for 1920 was recently discovered among family papers, it belonged to a young man living in the West of Ireland and E. M. Fairburn recounts the story.

January 6. James and I set off early for Connemara. Wanted to see place where Alcock and Brown finished Atlantic crossing last June. But region bigger and wilder than expected—got lost. Asked help at remote cottage. Woman there said she knew nothing about any Vickers-Vimy, but there was a Marconi station four miles beyond Tully Cross so why didn't we go there instead?

Travelling the sandy road she'd directed us along, we saw only desolate bogland on each side and the Atlantic ocean before us. Then suddenly a cluster of low buildings. We pulled up. They were made of timber and roofed with iron sheets. Only one had a stove-pipe but no smoke from it. We thought entire place deserted.

Walked about, opened doors (nothing locked). Looked inside. Saw no one. Puzzled by equipment in huts.

Tried last door, hut with stove-pipe. Unlocked like others. Stood on threshold, peering into gloom. Same as other sheds, had coils of wire suspended from roof and what appeared large alarm clocks lying on backs all around wall-benches. Only then noticed human figure.

Sitting with back to us. Had half circular band on head and big black covers over ears.

We coughed but he didn't turn. Then we stamped feet. Vibration through wooden floor must have reached him because he swung around. Snatched equipment from head and leapt from stool, very startled.

Asked us, in American accent, "What do you want?" Seemed frightened but trying to hide it. Maybe thinking us Irish gun-men. The times are dangerous.

We apologised, explained our intrusion. He laughed, invited us in. Said, "Sure glad to meet you gentlemen. Haven't seen a human being in six weeks." Then told us he was a scientist employed by the Marconi Company. His job to try to make contact with the ship *Elettra* anchored off Newfoundland, straight line westward from this part of Ireland.

He let us try his head-pieces. We heard nothing except crackling sound like bacon frying.

Then showed us what he called "a wireless receiving set". He was making it in his spare time, he said. It was about the size of a one-pound jam-jar and all wrapped in a criss-cross of copper wire. When we asked what it was for, he said, "the time is coming when folk will put on a pair of headphones like these in their own homes, anywhere, and be able to listen to a concert of music in New York".

James and I think the poor fellow has gone crazy from living like a hermit . . . **PW**

Marconi on board his yacht *Elettra*

from J.R.C. the NRD525.

The enthusiastic short wave listener knows all too well the excellent performance of the NRD505 and NRD515 general coverage receivers from the JAPAN RADIO COMPANY. Building on the experience gained from the production of these outstanding receivers, JRC introduce a new model, the NRD525 combining advanced performance with the first class construction of the NRD505.

The NRD525 is a double superheterodyne receiver having a first IF of 70.45399/70.453 MHz and a second of 455 kHz. The receiver covers frequencies from 90 kHz to 34 MHZ. An optional internally fitted converter (CMK165) will be available adding the following frequency ranges, 34 to 60 MHz, 114 to 174 MHz and 423 to 456 MHz.

Modes of operation for the JRC NRD525 are USB, LSB, CW, AM, FM and RTTY. An optional RTTY demodulator (CMH530) will be available enabling a printer to be directly connected to the receiver. The receiver also has a squelch control which operates on all modes.

The NRD525 has been designed to perform when conditions for reception are far from perfect. To help copy weak signals on a crowded band both notch filter and pass band tuning controls are included. The receiver has, as standard, a 3 kHz filter for USB and LSB (INTER), a 6 kHz filter for AM (WIDE) and in the AUX position a bandwidth of 12 kHz. If an optional filter is placed in the AUX position the 12 kHz bandwidth ceases to be available. For CW and RTTY reception the NAR position can be fitted with the optional 500 Hz filter (CFL232). In the FM mode (narrow band FM), BANDWIDTH and AGC switches do not function.

The NRD525 is extremely "user friendly" having an easy to use numeric keypad for frequency entry and memory selection. Whether you are entering a full shortwave frequency, Vatican Radio on 6185 kHz, or the three digits of Radio Czechoslovakia's long wave transmission on 272 kHz, entry is simple, key in the digits as read and press enter. A megahertz only frequency can also be easily entered into the NRD525, simply key in the required number, e.g. 6 and press the button marked MHz. Switch pads select mode and bandwidth whilst a large heavy knob makes fine tuning a pleasure. A quick tune up or down the band is easily achieved using the up/down switch pads conveniently located above the tuning knob.

Memory capacity is 200 channels. As well as frequency, each memory holds mode, bandwidth, AGC setting (slow, fast and off) and whether or not the attentuator) approx 20 dB) is on or off. Frequencies can be easily transferred from memory to VFO.

The NRD525 has both memory scan and frequency sweep. The receiver can be quickly programmed with the START and END memory channel numbers. Pressing the run button initiates memory channel scan. Operation of frequency sweep is similar, START and END frequencies being entered before commencing sweep. Two additional controls are provided for use in conjunction with scan/sweep. A P LEVEL control adjusts the level at which an input signal causes the receiver to pause and a SPEED control sets the rate of scan/sweep.

By pressing numeric keys, 0, 1, 2, 3, or 4 with the MEMO key depressed certain receiver functions can be changed by the user. Key 0 enables frequencies to remain the same in all modes, key 1 switches the last 10 Hz digit of the frequency readout on and off, key 2 switches the flashing colon on the clock display, key 3 switches certain beep tones on or off and when key 4 is pressed the input RF filters are bypassed or inserted in circuit.

The NRD525 will operate from either 100/120/220/240 volts AC (selectable on back panel) or 13.8 volts DC so making it suitable for use at home or when out portable.

Add to the above an audio tone control, a tunable BFO for enhanced CW operation, two rates of VFO tuning, an adjustable level noise blanker, a dimmer switch for the fluorescent display, the ability to connect a high or low impedance aerial and switch between the two, a mute jack socket for use with a separate transmitter and the result is the NRD525 from the JAPAN RADIO COMPANY, a first class receiver purpose built for the dedicated short wave listener.

AR2002 receiver

Frequency range of the AR2002 is from 25 to 550 and from 800 to 1300 MHz. Modes of operation are wide band FM, narrow band FM and AM. The receiver has 20 memories, memory scan and a search mode which checks frequencies between user designated limits.

The receiver has a push button keypad for easy frequency entry and operation.

A front panel knob allows the listener to quickly step up or down in either 5, 12.5 or 25 kHz steps from the frequency initially chosen.

The AR2002 has a front panel LED bar "S" meter.

There is a front panel 3.5 mm jack socket for headphone use.

A socket for the optional RS232 interface (RC PACK) is provided on the rear panel. The RC PACK consists of an 8 bit CPU with its own ROM and RAM and with your own computer acting as a dumb terminal many additional operating facilities become available. Of course, if you want to write your own programs using the RC PACK as an interface then "the sky's the limit".

airband receivers

R537S . . . a tunable airband receiver covering 118 to 136 MHz plus the facility for two crystal controlled channels (crystals not included).

R528 . . . an airband receiver scanning four out of six crystal controlled channels (crystals not included). The R528 also has a manual channel selection switch.

R532 . . . not needing crystals, the R532 is a synthesized receiver covering the airbands from 110 to 136 MHz and having 100 programmable memory channels (ten banks of ten). Operating on 12 volts DC, the R532 can be used either mobile or at home with the optional mains power supply. Add a nicad battery pack and carrying case and the R532 is also ideal for portable use.

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1 TS940S HF transceiver. Modes › USB, LSB, CW, FSK, FM, AM. Frequency range › transceive 160 to 10 metres, receive 150 kHz to 30 MHz. Power input › 250 watts PEP, AM 140 watts. Power supply › internal psu, 240 VAC. Features › 40 memories, 2 VFOs, provision for internal ATU, keyboard frequency entry, SSB IF slope tuning, CW variable band width, CW full break-in, IF notch filter, Audio filter, variable CW pitch, optional voice synthesizer etc.

2 TS930S HF transceiver. Modes › USB, LSB, CW, FSK, AM. Frequency range › transceive 160 to 10 metres, receive 150 kHz to 30 MHz. Power input › 250 watts, AM 80 watts DC. Power supply › internal psu, 240 VAC. Features › 8 memories, 2 VFOs, optional internal ATU, CW full break-in, SSB IF slope tuning, CW variable band width, IF notch filter, audio filter etc.

3 TS440S HF transceiver. Modes › USB, LSB, CW, FSK, FM, AM. Frequency range › transceive 160 to 10 metres, receive 100 kHz to 30 MHz. Power input › 200 watts PEP, AM 110 watts DC. Power requirement › 13.8 VDC, transmit 20 amps. Features › 100% duty cycle, optional internal ATU, CW full break-in, IF shift, notch filter, 100 memories, keyboard frequency entry, manual or automatic bandwidth selection optional voice synthesizer etc.

4 TS430S HF transceiver. Modes › USB, LSB, CW, AM and optional FM. Frequency range › transceive 160 to 10 metres, receive 150 kHz to 30 MHz. Power input › SSB 250 watts PEP, CW 200 watts DC, FM 120 watts, AM 60 watts. Power requirement › 13.8 VDC, transmit 20 amps. Features › 8 memories, 2 VFOs, memory and programmable band scan, IF shift, notch filter etc.

5 TS830S HF transceiver. Modes › USB, LSB, CW. Frequency range › 160 to 10 metres. Power input › 220 watts PEP, CW 180 watts DC. Power requirement › 240 VAC. Features › pair of 6146B valves in PA, variable band width tuning, notch filter, IF shift, RF speech processor etc.

6 TS830SP HF transceiver. Modes › USB, LSB, CW. Frequency range › 160 to 10 metres. Power input › 220 watts PEP, CW 180 watts DC. Power requirement › 240 VAC. Features › pair of 6146B valves in PA, IF shift, notch filter etc.

7 SM220 station monitor. Features › TX and RX waveform monitoring, trapezoid linearity check, two tone test generator, wide band oscilloscope, panoramic display (band scan) with optional BS8 unit having 40 kHz/200 kHz sweep width. Versatile and invaluable station accessory.

8 TL922 HF linear amplifier. Modes › SSB, CW, RTTY. Frequency range › 160 to 10 metres. Power input › SSB 2000 watts PEP, CW 1000 watts DC. Drive › 80 watts or more for full output. Power requirement › 240 VAC, 14 amps. Features › class AB2 grounded grid amplifier using a pair of EIMAC 3-500Z valves.

9 TS670 Quad band transceiver. Modes › USB, LSB, CW, AM and optional FM. Frequency range › 40, 15, 10, 6 metres. Power output › USB, LSB, CW, FM 10 watts, AM 4 watts. Power requirement › 13.8 VDC, 4 amps. Features › 80 memories, 2 VFOs, keypad frequency selection, optional general coverage receive board etc.

10 TM201A two metre mobile. Mode › FM. Frequency › 144 to 146 MHz. Power output › 25 watts. Power requirement › 13.8 VDC, 5.5 amps. Features › compact, 2 VFOs, 5 memories, priority alert, memory and programmable band scan, full repeater facilities, includes external speaker, mobile mount and up/down microphone.

11 TM411E seventy centimetre mobile transceiver. Mode › FM. Frequency › 430 to 440 MHz. Power output › 25 watts. Power requirement › 13.8 VDC, 6.9 amps. Features › digital code squelch, tilting front panel, 2 VFOs, 5 memories, priority alert, memory and programmable band scan, full repeater facilities, includes external speaker, mobile mount and up/down microphone.

12 TM211E two metre version of TM411E mobile transceiver.

13 TM255OE two metre mobile transceiver. Mode › FM. Frequency range › 144 to 146 MHz. Power output › 45 watts. Power requirement › 13.8 VDC, 9.5 amps. Features › large display, illuminated keypad, optional digital channel link, high output power, optional voice synthesizer etc.

14 TH41E seventy centimetre handheld transceiver. Mode › FM. Frequency range › 430 to 440 MHz. Power output › 1 watt or 150 mW. Power requirement › 7.2 VDC from supplied nicad pack. Features › compact, slim and lightweight, thumbwheel switch frequency selection, full repeater facilities etc.

15 TH21E Two metre version of TH41E.

16 TR2600E two metre handheld transceiver. Mode › FM. Frequency range › 144 to 146 MHz. Power output › 2.5 watts or 0.3 watts in low power position. Power requirement › 8.4 VDC from supplied nicad pack. Features › compact and lightweight, 10 memories, memory scan, programmable band scan, keyboard frequency selection, digital code squelch, full repeater facilities etc.

17 TR3600E Seventy centimetre version of TR2600E. Note, does not include nicad or mains charger.

18 TS711E two metre base station transceiver. Modes › USB, LSB, CW, FM. Frequency range › 144 to 146 MHz. Power output › 25 watts. Power requirement › internal

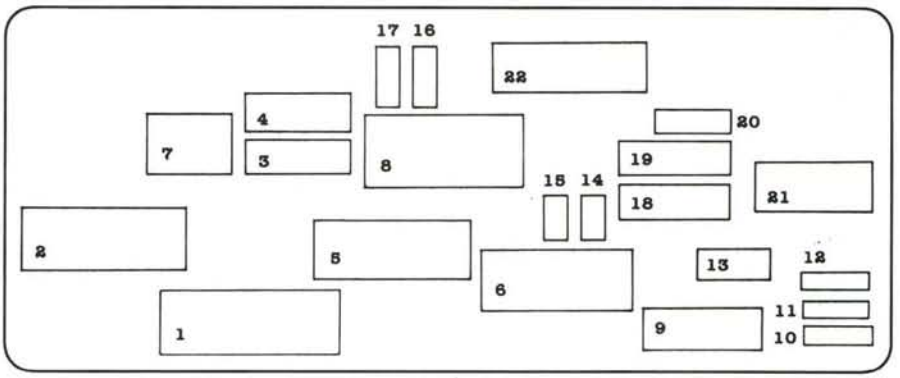
power supply 240 VAC or 13.8 VDC at 6.5 amps. Features› 10 Hz step dual VFOs, IF shift, auto mode selection, 40 memories retaining frequency, mode, simplex or repeater shift, tone burst. Programmable band scan, memory scan, free running or stepping VFO, digital code squelch etc.

19 TS811E seventy centimetre version of TS711E.

20 TR751E two metre mobile/base station transceiver. Modes› USB, LSB, CW, FM. Frequency range› 144 to 146 MHz. Power output› 25 watts. Power requirement› 13.8 VDC at 6 amps. Features› auto mode selection according to band plan, excellent receive performance, 2 VFOs, 12.5 kHz steps on FM, alert channel, all mode squelch, memory frequencies can be transferred to VFO, optional digital channel link, optional voice synthesizer, full repeater facilities etc.

21 TS780 dual band base station transceiver. Modes› USB, LSB, CW, FM. Frequency range› 144 to 146 and 430 to 440 MHz. Power output› 10 watts. Power requirement› 240 VAC or 13.8 VDC at 5 amps. Features› full coverage of two metres and seventy centimetres in one transceiver, 10 memory channels, 2 VFOs, memory scan, band scan, IF shift, full repeater facilities, VOX operation, free running or click stop VFO etc.

22 R2000 general coverage receiver. Modes› USB, LSB, CW, FM, AM. Frequency range› 150 kHz to 30 MHz. Power requirement› 240 VAC or 13.8 VDC. Features› optional internal VHF converter covering from 118 to 174 MHz, 10 memories storing frequency, band and mode. Memory scan, programmable band scan, all mode squelch, tone control, slow or fast AGC, high and low impedance aerial terminals, remote switching from internal clock (tape recorder), receiver muting etc.



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NS660P . . . switchable meter reading (average, normal PEP and hold PEP) and provision for optional remote head (U66V), frequency range 1.8 to 150 MHz, forward power switchable 15/150/1500 Watts, SO239 connectors.

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GPV7 . . . Seventy centimetre 5/8 over 5/8 over 5/8 base station colinear, 6.8 dB gain.

GPV720 . . . Dual band (144/430 MHz) base station aerial.

Mobile aerials

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2NE . . . Two metre 7/8 whip, 4.5 dB gain, foldover base.

OSCAR430 . . . Seventy centimetre 5/8 over 5/8 over 5/8 whip, 6.3 dB gain.

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RG4M . . . Cable assembly for GSS base, complete with SO239 and PL259 plug.

12B . . . Car wing mount with SO239 top and bottom.

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In Bournemouth,
the shop manager is Colin, G3XAS,
the address, 27 Gillam Road, Northbourne, Bournemouth,
telephone 0202 577760.

Although not a shop, there is on the South Coast a source of good advice and equipment, John, G3JYG. His address is Abbotsley, 14 Grovelands Road, Hailsham, East Sussex. An evening or weekend call will you put in touch with him. His telephone number 0323 848077.

Lowe Electronic Shops are open from 9.00 am to 5.30 pm, Tuesday to Friday and from 9.00 am to 5.00 pm on Saturday. Shop lunch hours vary and are timed to suit local needs. For exact details please telephone the shop manager.

data equipment

CD600 . . . RTTY, CW, ASCII, TOR, AMTOR decoder, output for UHF television, monitor and printer, can also be used as morse tutor.

CD670 . . . A higher specification RTTY, CW, ASCII, TOR and AMTOR decoder complete with liquid crystal dot matrix display, variable RTTY shift, normal/reverse mode switch, outputs for TV, monitor and printer and can also be used as morse tutor.

CD660 . . . Similar in specification to the CD670 but without the built-in dot matrix display.

Planning Difficulties– An Alternative Approach

Five Sussex radio societies have come together in a unique joint venture with seven local planning authorities in an attempt to produce an advisory service which will benefit amateurs and the local community. Robin Bellerby G3ZYE describes how this all came about, and how the venture has progressed so far.

In 1981/82, Adur District Council Planning Committee expressed great concern at the large number of unsightly "amateur" antennas which were springing up within the area, and instructed the Planning Officer to prepare a planning policy document with respect to such antennas. A number of local amateurs made submissions and the planning staff contacted RSGB Headquarters for technical information.

After a short space of time, Adur produced a Planning Policy Document which was most unfavourable to the requirements of radio amateurs, being aimed at the minimum requirements of a CB operator.

When in 1984, Hove Borough Council announced that they were to carry out a similar exercise, the local amateur movement responded in a well-coordinated manner.

Hove

RSGB Headquarters offered help and advice, including the offer of a visit to the local authority, but the Planning Officer felt that he had not left himself sufficient time for detailed input—the matter had been under consideration for several months before we became aware of it—and so we had to respond as best we could.

Representatives of four local societies—Brighton and District Amateur Radio Society, the Lewes and District Radio Amateur Club, The Worthing and District Amateur Radio Club and Sussex RAYNET—met informally and decided to seek a meeting with the Hove Planning Officer. The meeting was held in Hove Town Hall, and from the meeting two very interesting points emerged:

1. Neither the Planning Officer nor any member of his staff possessed more than the most rudimentary knowledge of amateur radio or antenna design and function.
2. The council was being subjected to a well-organised lobby by local CB organisations, particularly the socially responsible ones which provide CB for the disabled, etc. In terms of numbers alone, amateur radio could not attempt to match this at local level—the Planning Officer was reluctant to involve the RSGB in what he saw as a local matter.

The Planning Committee met, considered the revised notes and proposals submitted by the Borough Planning Officer as a result of the consultations, and accepted them as council policy. The important parts as far as local amateurs were concerned were:

"National legislation . . . clearly differentiates between Amateur Radio and CB users. The former operators have to pass a City and Guilds examination to qualify for a licence."

"In considering guidelines, the Committee may wish to bear in mind the difference between the needs of the Amateur and the CB enthusiast. As a generality the Amateur is likely to be more skilled, take a longer term view of his equipment and be more keen on its maintenance. If he moves house he is likely to take the aerials with him. CB enthusiasts can have a short-lived fascination with the hobby, especially those in the younger age bracket; this can lead to a proliferation of unused aerials. The Amateur radio operator is also a potential member of the semi-official RAYNET organisation which has close links with War and Peacetime Emergency schemes . . . the likelihood of a more dedicated commitment to the hobby by the Amateur . . ."

"The Amateur Radio enthusiasts have suggested that it would be helpful to the Council if an ad-hoc Committee of experts were to be available to give advice on the size and siting of amateur radio aerials. This Committee may be able to suggest less obtrusive but technically sound ways of siting aerials. The Amateur Radio operator could seek the advice of this Committee before submitting a planning application or our Committee could refer problem applications to it. The Amateurs have made it clear that they make this suggestion to be helpful and in no way seek to usurp your powers . . . I believe that the suggestion should be welcomed . . ."

WITCH OF THE YEAR

Mrs Milinda Jones, of Exeter, complained to the city planning council that two houses it was proposing to build next to hers would

interfere with her flight-path to Dartmoor, her coven's place of assignation. Planning permission was refused.

Reproduced with permission from The Sunday Express Magazine, 16 December 1984.

The outcome was almost more than we had dared to anticipate—a new planning policy, clearly giving preferential treatment to radio amateurs was adopted; the day after the meeting we were asked to form our Committee; within a week the first two cases were referred to us! Nevertheless, we appreciated that matters need not have progressed so smoothly, and resolved that, should similar events occur again, we would ask the RSGB to take the lead, providing local views and input were sought.

The invitation to form the Committee was made personally to the writer, who decided that the best way to proceed was to ask each society involved to decide whether or not they wished to go further, and if so to nominate two or three Committee members. All the societies concerned moved with remarkable speed, and the Committee was formed.

The first two applications were considered alongside discussion on a draft constitution for the Committee, and reports were submitted by the Hove deadline. The draft constitution was discussed with the RSGB Membership

Services department and their suggestions incorporated into the final document, which was eventually ratified by all the member societies.

The Current Position

Seven Local Authorities are now serviced by an advisory committee representing five local radio clubs, the Chichester and District society being accepted into membership on 18 May 1985. The Authorities involved are Chichester; Arun (Littlehampton); Worthing; Adur (Shoreham-by-Sea); Hove; Brighton and Lewes.

In many ways we feel that our work is just beginning. The planning committees and their officers have accepted that our primary role is to advise them on the technical merits of any application, and it became apparent to us at an early stage that if we were to attempt to push the amateur's case regardless of circumstances these bodies would not be interested—indeed, they as good as said so. We therefore see ourselves as being quite different from the excellent service provided by the Membership Services department and Planning Panel of the RSGB, since:

1. We will deal with any case concerning an amateur installation, not insisting that the amateur be a member of the RSGB (although we point out all the real benefits of RSGB membership in terms of practical help and advice, and have been responsible for a number of amateurs joining the Society).
2. Our advice might, on occasions, indicate the rejection of an application, and we make this very clear to all amateurs. This aspect of our service caused the most heartsearching amongst local clubs.
3. *All* our services are free of charge to the amateur and the planning authority.
4. Because the Committee is recognised by the authorities, it is felt that if we recommend the granting of permission in a particular case, and the planning committee concerned disregards our advice, the amateur has ammunition for use at appeal.

At all stages during our formation we were aware of the potential dangers and pitfalls, and took care to consult with all amateurs in the area, inviting input from the RSGB and its Planning Panel. The possible conflict between an amateur and the Committee was appreciated and accepted—we might, for example, find a particular application unreasonable for a whole variety of reasons, and then find the amateur, represented by the RSGB, fighting an appeal. We felt that the potential goodwill that we stood to gain justified the risks, although we have always said that should events make us change our minds we would revise our activities —it is up to each of the clubs in the scheme to decide to withdraw, at any time, should they feel the need to do so.

We have available to us considerable expertise: legal advice, DTI technical help, civil and mechanical engineers, etc., but so far we have found that what has been needed had been a "plain language" version of what is required by the applicant, an explanation by us of why the particular installation is needed, and the benefits to all concerned of a properly designed and engineered system.

So far we have not encountered problems, and long may this continue. Our "score" as at August 1986 is seventeen reports submitted; fifteen approved applications; one rejection, now subject to appeal; and one continuing discussion attempting to find a compromise, so we feel that we must be doing something right.

Our Role

We have not held ourselves out to be an officially-sanctioned RSGB committee or group, although we are all RSGB members, and we see our role as complementing the services of the RSGB and its Planning Panel. We do not see ourselves as a policy-making body, but as an advisory group, and as such believe that in this area we have met an existing need.

As a direct result of this close, often quite informal and off-the-record discussions which we have had with the planners, we feel confident that the local knowledge gained will enable us to predict with a high degree of accuracy the likely response of the planning staff to any particular application. If only we could predict the response of the elected councillors who make the actual decisions—but then, not even the most experienced planning officer can do that!

We understand that the RSGB is not entirely happy about our operations, as it is felt that there is great potential danger in groups such as ours. We also understand that the RSGB is to consider setting up local groups to advise the amateur on how to fill in forms and submit applications.

We do accept that direct liaison with planning officers could be dangerous if badly handled, but in the light of our track record we shall continue as we are. ***PW***

NEWS

ARMS

The Amateur Radio Maintenance Service is a service that allows amateur radio enthusiasts to protect themselves against incurring heavy costs through expensive faults developing with their equipment.

For an annual fee based on a small percentage of the new retails price of the equipment ARMS will refund the repair bill, including parts, labour and carriage from approved service agents throughout the country.

The man behind the scheme is Bernard Whitty G3HWX and you can write to him at ***ARMS, FREEPOST, Ormskirk, Lancs L39 3AB.***

Rathlin Island

Members of the Ballymena ARC went to Rathlin Island back in August with a special event station GB2MRI. They were commemorating the work done by Marconi on the island for Lloyds of London in 1898.

The photograph was taken by GI4POV and shows GI4CRL, GI4POV, GI4HCN, GI4VJC, GI1RBN, GI4KLH, GI4SFZ, GI4KIS, GI4KUM, GI4VJZ, GI4TOR, GI4DCC and GI1FWK.

Can You Help?

Two requests from Basil Spencer, he would like to hear from anyone using a Sinclair QL for amateur radio purposes; and would like to obtain the manual or circuit diagram for a Racal Instruments 9386 oscilloscope.

If you can help, please contact **Basil, c/o Steve Wilson, Saudi Arabia Office, Racal Tacticomm, PO Box 112, 472 Basingstoke Road, Reading, Berks RG2 0QF.**

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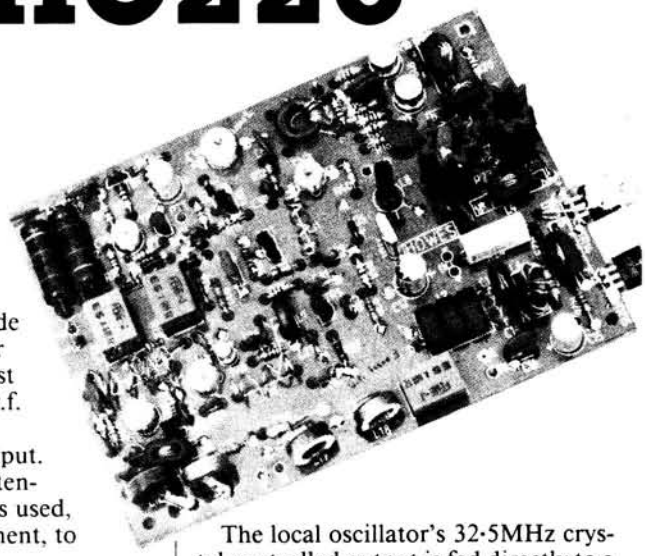
The Howes HC220 Transverter

A Review by C. L. Turner G3VTT



Many of the older Class A licensees will no doubt remember just how they got into h.f. amateur radio. For many, the first year was spent on the l.f. bands working with c.w. only, as required in the Licence terms. Before that the terrors of the RAE and Morse tests were no doubt preceded by a spell of intensive short wave listening.

It was during this period of short wave listening that many operators learnt all about h.f. radio, operating procedures and Morse Code.

The advent of the v.h.f. only "B" Class Licence coupled with the influx of operators from the 27MHz Citizen Band have meant that many novices start life in amateur radio with a 144MHz multi-mode transceiver.

When interest is kindled in the lower frequencies the 144MHz operator will have either to purchase a complete h.f. receiver or transceiver, or if funds are limited, revert to building equipment for one or more l.f. or h.f. bands. To a novice, and possibly to some of the older operators who may not have any constructional experience, to construct equipment from scratch would appear a daunting task. Howes Kits have now introduced a kit to cater for the Class "B" operator who wishes to try low power on 14MHz (20m) using his main station v.h.f. multi-mode.

The HC220

This exciting new kit from C. M. Howes converts on both transmit and receive, hence the name "transverter". It transposes the 144MHz s.s.b. or c.w. signal to a corresponding frequency in the 14MHz (20m) band.

Great care has been taken to ensure reliability and the output power is limited to 10 watts using a well tried transistor power amplifier stage developed by C. M. Howes. Ten watts can be obtained with 13·8 volts supply and the power is delivered into 50Ω. The drive required on the 144MHz band is between 0·5 watts and 5 watts with the drive level being adjusted internally by a small trimmer capacitor. This is used to allow the HC220 to work with any multi-mode transceiver, the capacitor being adjusted to give just the required amount of r.f. into the transverter consistent with clean output.

On the receive path a ten-element bandpass filter is used, which requires no alignment, to give a clean input to a balanced j-f.e.t. mixer using two 2N3819 devices. This form of balanced mixer offers low noise and good dynamic range. The local oscillator chain uses a 32·5MHz crystal and a frequency quadrupler to drive the receive mixer at a local oscillator frequency of 130MHz. The same frequency is also used on the transmit path where it is mixed in a simple j-f.e.t. mixer with the 144MHz signal to give 14MHz output.

Let's take a closer look at the HC220 transverter block diagram (Fig. 1). Considering our receive path first, a 14MHz signal will enter the HC220 via a low pass filter consisting of a five-element pi network and then be fed via a transmit/receive relay to the 14MHz ten-element high pass filter. From here the signal is mixed in a balanced j-f.e.t. mixer to give an i.f. of 144MHz by the action of the mixer and the 130MHz local oscillator. The received signal, now at 144MHz, is fed via a further band pass tuned circuit and transmit/receive relay to the input of the multi-mode transceiver.

On transmit the r.f. input at 144MHz, be it s.s.b. or c.w., is fed via a dummy load and series capacitor combination to the transmitter mixer, which utilises a j-f.e.t. mixer, and is mixed down to 14MHz by the action of this f.e.t. and the 130MHz local oscillator. A further bandpass filter ensures that only 14MHz is selected for amplification in the driver power amplifier chain which consists of three push-pull amplifiers using bipolar devices. Finally our transmitter signal is fed via the transmit/receive change over relay and the low pass filter to the antenna.

The local oscillator's 32·5MHz crystal controlled output is fed directly to a quadrupler circuit and then to a 130MHz band pass filter, again a bandpass filter is used ensuring selection of the correct signal. The signal at 130MHz is fed directly to the receiver mixer but for transmit path it is fed via a further buffer amplifier and bandpass circuit. It can be appreciated that Howes have taken every possible precaution to ensure clean output signals by the inclusion of these bandpass filter circuits.

As three relays are used in the HC220, for the change over of input and output connections on receive and transmit and for 13·5 volt switching, a method is required to give automatic operation. Some of the signal at 144MHz is sensed by a detector diode and then rectified to give a d.c. potential which is then amplified in a d.c. amplifier circuit and used to operate the three relays through a transistor switch. If normal p.t.t. (push-to-talk), operation is required the microphone p.t.t. line can be used to switch the relay driver transistors.

The Kit

The kit itself comprises a printed circuit board measuring some 107 × 148mm using high quality glass fibre p.c.b. Both sides of the board are "masked", i.e. both sides show the layout of components, which aids the constructor in placing the correct resistor, capacitor or transistor into the right holes in the board.

Like all Howes kits the instructions are clear, concise and are full of useful constructional tips. To give one or two examples, coil winding could appear

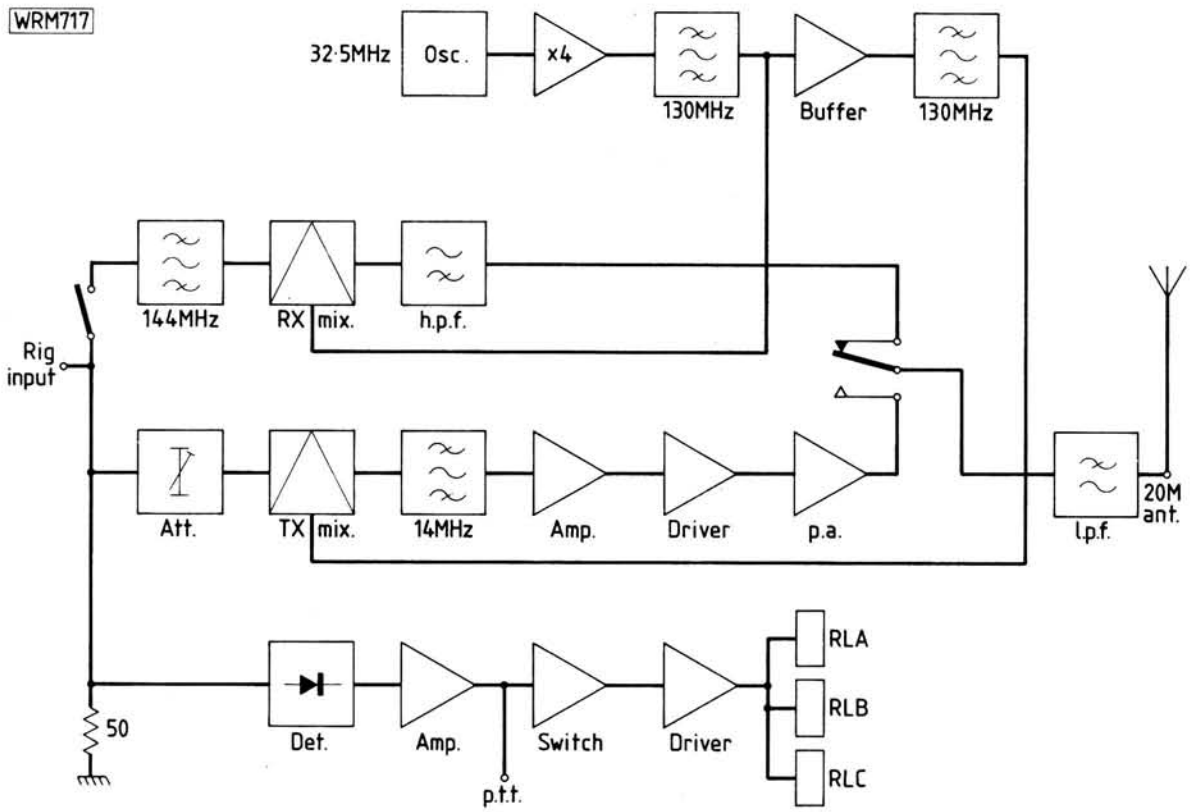


Fig. 1

daunting so Howes give full instructions and even mark the p.c.b. with the correct colour for whichever wires should enter a circuit board hole from a bifilar transformer. The fitting of the 32·5MHz crystal, possibly a fragile device, is well catered for within the instructions as are the fitting of the power amplifier transistors with the aid of clear diagrams. It is strongly recommended that the would-be constructor follows the advice given in the instruction with as least one read-through before starting the construction. There should be no trouble encountered at all with this kit provided the clear instructions are followed.

As with all Howes kits the components are of excellent quality, full details are supplied to ensure every device or component is identified.

Once the main p.c.b. is constructed and tested a cabinet must be found to house the unit. The author has always used Eddystone die cast boxes, or aluminium die cast boxes of similar construction, for all r.f. oriented projects. Both screening and stability must be taken into account and the die cast box is ideal for both of these constructional and design criteria. Of course, many constructors have their own favourite range of boxes to match other projects in the shack.

Howes give details in the construction and operating hints on using an aluminium die cast box and on how to prevent coil vibration under mobile conditions. A further point would appear to be with the p.a. transistor heat sinks and once again a die cast box will allow excellent heat dissipation if the heat sink supplied with the kit is securely fitted to the die cast box. Once the module is fitted into a box and aligned we can think about operation on 14MHz.

Operation

With the aid of another local amateur and his FT-290R, the HC220 was tried out over a period of two weeks. The antenna used was a 41m doublet fed with open wire feeder via a "transmatch" from the *ARRL Handbook* and a 4:1 balun to allow for the high feed impedance. Results, bearing in mind the poor 14MHz band conditions at the time were good. The major European countries were worked with ease during the daylight hours with excellent reports received on both s.s.b. and c.w. from HA8, YU6 and UA3.

The best DX was without a doubt W9ZVY in Wisconsin, who was worked at 1635 one day and gave us the report of 559. Considering the state of the band at the time and our low power of ten watts the report was most pleasing. At 1320Z a few days later a UL7 was worked giving us a report of 579, once again a most pleasing result from the other side of the Ural mountains. Reports of both audio quality on s.s.b. and the keyed waveform quality were good. There are however one or two points noted about the operation of this transverter which may be of interest to readers. First, on receive it was noted that the stronger stations tended to overload the FT-290R and this point was discussed with Howes Kits. It soon became obvious that the FT-290R being used for the trials had a muTek front-end and therefore exhibited a considerable amount of gain at 144MHz. Howes Kits informed us that the receive mixer output coil (L13), should be moved away from L12 so reducing the coupling and therefore the level of 144MHz i.f. signal into the FT-290R. The second point was one of operator convenience which concerned switching from 14 to 144MHz operation by unplugging the HC220 each time this operation had to be performed.

Obviously a good quality switch or relay would be the answer, unfortunately the cost of such an item would far exceed the cost of the kit if the high level of isolation required to prevent leakage around this switching is taken into account. Far better to manually unplug the FT-290R each time you revert to 144MHz operation than to incur the wrath of your locals on 144MHz when you are operating on 14MHz with the FT-290R and HC220!

So there you have a cheap and easy way for you 144MHz operators to join the fun on h.f. Come on, contact those Europeans direct (who is this Oscar fellow they keep talking about anyway?).

The HC220 kit is available from **C. M. Howes Communications, 139 Highview, Vigo, Meopham, Kent DA12 0UT. Tel: 0732 823129**, priced £48.90.

Ionospheric Refraction—a correct description

The ionosphere and its effect on h.f. propagation are familiar subjects to radio amateurs but this is, we believe, the first time in its history that a correct description in simple terms of the process of ionospheric refraction has ever been published, say Dr. L. W. Brown G0FFD and F. C. Judd G2BCX.

We take for our starting point the usual diagrammatic representation of reflection and refraction at a boundary surface between air and a denser medium as illustrated in Fig. 1, but diagrams of this kind are strictly applicable only to the ray theory of light, they are not applicable to **wave** theory of light and certainly not to radio propagation. To give a correct description applicable to radio waves we require to introduce the concept of **wavefront.**

The Wavefront

If we drop a pebble into a pond a series of circular waves will travel outward and the pattern of the waves as they spread is evidently similar to the pattern of radiation from an isotropic radiator except that the radiation from an antenna is three- not two-dimensional. If the radiator is not isotropic the waves will spread out only within the limits set by the polar diagram of the particular antenna, nevertheless the waves still diverge on a broad front. In two-dimensions the wavefront is a line, in three-dimensions it is a surface. To understand reflection and refraction more fully we must therefore consider the progressive motion of this surface, i.e. the propagation of the broad wavefront and not merely the single rays of Fig. 1. The diagram in Fig. 2 shows (edgewise) a section of wavefront surface (which is perpendicular to the paper) approaching the boundary of a reflecting/refracting medium, and also shows later positions of the same section of wavefront after partial reflection and refraction. The arrows show the direction of motion before and after reflection/refraction. We should note that the leading edge (1) of the section of wavefront is the first to be reflected and the trailing edge (2) is last, but whereas the leading edge is **uppermost** on approaching it is **lowermost** on leaving **after reflection.**

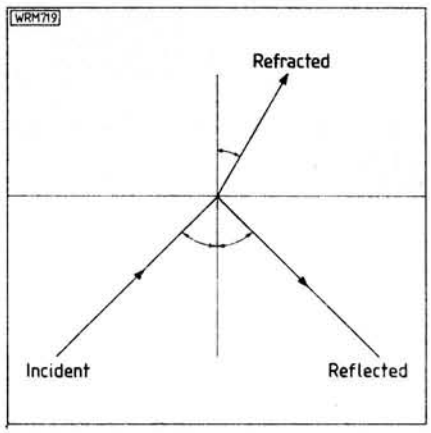


Fig. 1: Reflection and refraction by ray theory

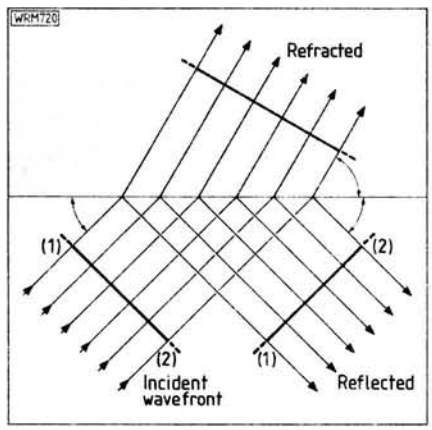


Fig. 2: Reflection and refraction of the wavefront

The angles between the rays and the normal to the boundary surface in Fig. 1 are termed the angles of incidence, reflection and refraction respectively. They are, of course, convenient concepts whereas the angles between the wavefronts of Fig. 2 and the boundary surface, while numerically equal to those of ray theory, are **real** angles, they exist in reality. Partial reflection and refraction is, however, not a feature of radio propagation and therefore this aspect is not pursued further here.

Refractive Index

The significant aspect of refraction is that the velocity of the wavefront in the denser medium is less than the velocity in air and, therefore, that part of the section of wavefront which has entered the denser medium travels a lesser distance in a given interval of time than a part which has not yet entered. In this way the wavefront is retarded and turned to travel in a direction closer to the normal to the surface as shown in Fig. 2. Because of the lesser velocity the width of the section of wavefront becomes greater in the denser medium than in air. Thus the refracted wavefront is also stretched. It is for this reason that an object under water appears foreshortened when viewed from an oblique angle to the surface. The ratio of the velocity of the wavefront in air to the velocity in a denser medium is termed the **refractive index** of the medium, i.e.

$$\text{Refractive Index} = \frac{\text{Velocity in Air}}{\text{Velocity in Medium}}$$

and because the velocity in air is greater than the velocity in any other medium then the refractive index of any medium is a number greater than unity, generally a decimal fraction greater.

Radio Wave Propagation

At v.h.f. and higher frequencies the medium which affects radio propagation is the lower atmosphere which behaves in the main as a dielectric whose refractive index is determined by atmospheric pressure, humidity and the occurrence of temperature inversion, i.e. a layer of warm air overriding colder air. As v.h.f. operators know, anticyclonic conditions may produce this latter effect and give rise to abnor-

continued from page 50

mally large refraction, i.e. bending, leading to DX working.

The text-books on h.f. propagation contain diagrams similar to Fig. 3 and Fig. 4[1] of which Fig. 3 bears some similarity to and has the same shortcomings as the ray theory of reflection as in Fig. 1, failing further qualification to be described later. It also has the additional shortcoming that it might imply a sharp lower boundary to the ionised regions of the upper atmosphere. On the other hand as we shall see, Fig. 4 incorrectly attempts to describe the nature of the wave's traverse of the ionosphere. The text in the chapter containing that Fig. 4 states "a wave carrying power penetrates to heights where the speed is increased". We see at a glance the error of Fig. 4 insofar as the speed of a wave carrying power **cannot exceed the velocity of light in air;** if the speed changes in the ionosphere it can only decrease!

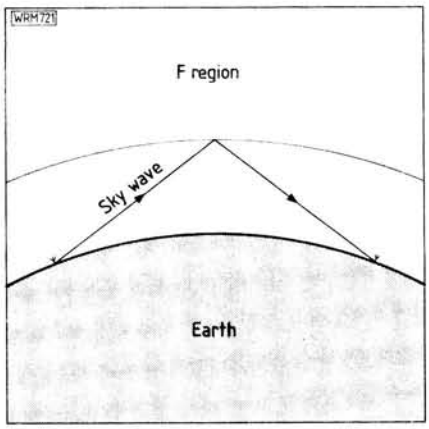


Fig. 3: Diagrammatic ionospheric reflection

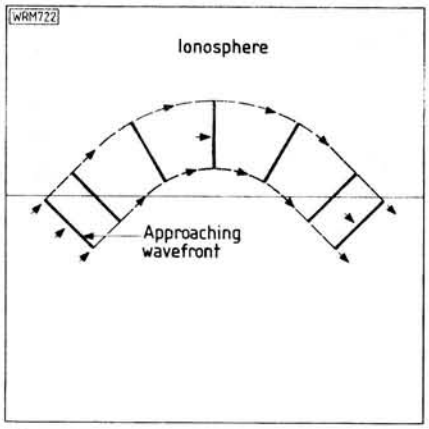


Fig. 4: Alleged and incorrect ionospheric traverse

Ionospheric Refraction

The ionosphere is a region of upper atmosphere extending from roughly 100 to 500km above ground in which electrons are disassociated from gas molecules by solar radiation. The free electrons will, besides having elastic collisions with gas molecules, all individually recombine sooner or later with electron-deficient molecules which they encounter. However, because of the very low atmospheric pressure especially in the upper part of these regions, the distance between gas molecules is large, the frequency of collisions is small, and the electrons therefore have a correspondingly long free life before capture. With the onset of daylight at ionospheric altitude disassociation increases until the number of free electrons is large enough for their rate of recombination to balance the rate of disassociation: the regions are thus characterised by a fairly stable existence of a large number of free electrons. The number of free electrons per cc is termed the density of ionisation. Because of the lesser rate of recombination at the higher altitudes of the ionosphere, due partly to lower atmospheric pressure and therefore less encounters and partly the chemical nature of the molecules available for recombination, the density of ionisation increases upward not sharply but **gradually.**

In his Magneto Ionic Theory of the upper atmosphere, E. V. Appleton has shown that the ionised medium in fact resembles a dielectric and that the refractive index there can, if we neglect the influence of absorption and of the earth's magnetic field, be expressed in its simplest form as:

$$(\text{ionospheric refractive index})^2 = \frac{1}{1 - \dfrac{Ne^2}{4\pi^2 \varepsilon_0 mf^2}}$$

in which e and m are the electronic charge and mass respectively
ε_0 is the permittivity of space (all in MKS units)
f is the radio frequency and
N is the number of free electrons per cc.

From this expression we see that as N increases from zero the refractive index increaes and the velocity therefore decreases until, if and when the term involving N becomes unity, the refractive index becomes infinite and the velocity zero. Because N increases **gradually** from zero the ionosphere does not have a sharp lower boundary.

Ionospheric Propagation

Because velocity gradually decreases with increasing penetration into the ionosphere, the section of wavefront is **progressively** retarded and now **gradually** (in contrast to refraction at the sharp boundary of Fig. 2) changes direction toward the vertical, as shown in Fig. 5. If the density of ionisation (N) becomes sufficient, the velocity falls to zero, the section of wavefront becomes horizontal and its direction vertical. At this point the section of wavefront cannot proceed further upward and therefore the direction reverses to vertically downward and then gradually changes away from the vertical as shown in Fig. 5, until the section of wavefront emerges from the ionosphere with the same velocity and a direction complementary to that with which it entered. In strict terms, any section of wavefront is vertically incident at the point of reversal of direction and emerges from the ionosphere with a velocity equal to its entry velocity and an angle of emergence equal to the angle of approach. The leading edge (1) of the section of wavefront is

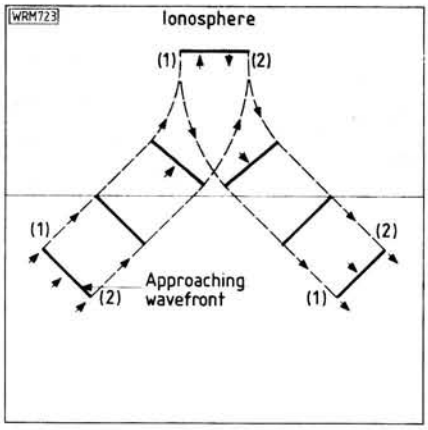


Fig. 5: Correct ionospheric traverse

the first to reach the ionosphere and the first to leave, but whereas it was **uppermost** on approaching it is **lowermost** on leaving and the effect is very similar to what we found in connection with Fig. 2. To an observer on the ground these are the characteristics of straightforward reflection and there is therefore some justification in the use of Fig. 3 providing that it does not claim to represent the reality of ionospheric refraction. There is similar justification in the use of the expression "reflection by the ionosphere" providing that is it understood to be a colloquialism. On the other hand, Fig. 4 and any other description or diagram alleging that kind of traverse of the ionosphere is incorrect, as our Fig. 5 and its derivation demonstrates.

Appendix

Wavefront as used in this article defines a position reached at any moment by the radiated power. The refractive index used is the classical definition of refractive index, i.e. greater than unity, and termed the **group** refractive index. The Magneto Ionic Theory of Appleton leads to a formula known as the Appleton-Hartree equation[2] which is a misnomer insofar as Hartree, a contemporary of Appleton, made no contribution to the

equation as it now stands: it should today be called the Appleton equation. It is the equation for the **phase** refractive index of the ionosphere. The group refractive index which we have used here is the reciprocal of that phase refractive index in its simplest form. Maybe the error of Fig. 4 arises from a misinterpretation of these two refractive indices.

There is nothing innovative in this article insofar as it simply describes the physics of reflection/refraction at both abrupt and gradual change of refractive index applicable to all media including Appleton's refractive ionosphere, and it will be noticed from Figs. 2 and 5 that both produce a similar subjective reflection effect. The mistake typified by Fig. 4 appears to have first been made by an old colleague[3] of one of the present authors in the early 1930s and passed unnoticed at the time, and then possibly copied by Ratcliffe and from there perpetrated by all subsequent authors.

The numerical values for the individual quantities in the equation for the refractive index are:

N	(E–F2 regions)	10^1 to 10^6
e	electron charge	$1{\cdot}6 \times 10^{-19}$
m	electron mass	$9{\cdot}1 \times 10^{-31}$
ε_0	permittivity	$8{\cdot}85 \times 10^{-12}$

The velocity of the radiation in air is with sufficient accuracy for the present purpose equal to the velocity in free space, namely

$$c = 3 \times 10^8 \text{ metres/sec}$$

References

(1) *Sun, Earth and Radio* by J. A. Ratcliffe. World University Library.
(2) *The Upper Atmosphere and Solar-Terrestrial Relations* by J. K. Hargreaves (p22). Van Nostrand.
(3) *Electromagnetic Waves* by F. W. G. White. Methuen.

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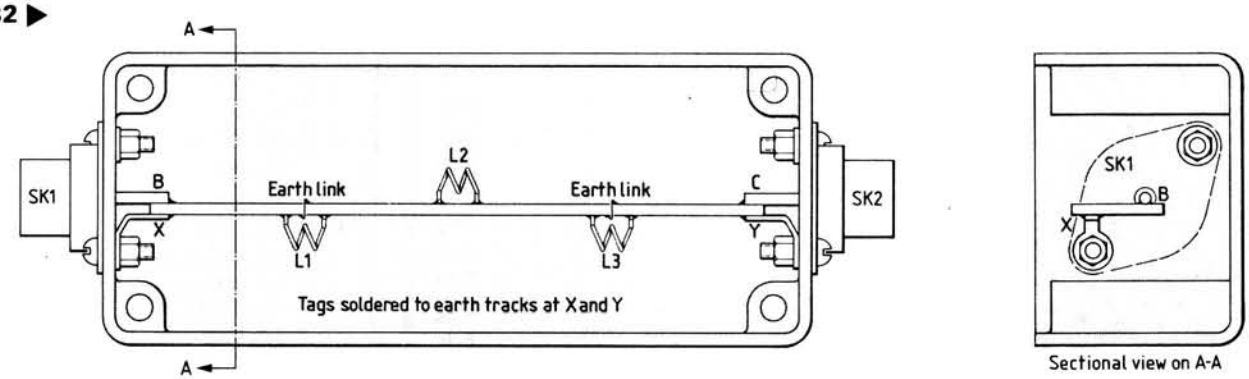

Fig. 4: The completed TVI filter fitted into die-cast box

Manager of RACAL-Mobilcal Ltd, for the use of the test equipment as detailed below.

Specification

Forward response:
4 to 30MHz better than –65db
30 to 300MHz better than –35dB
Cut-off frequency:
430MHz ±15MHz
Passband:
430MHz ±15MHz to at least 1300MHz
Passband ripple:
Less than 6dB variation over passband

References

(1) Practical LC Filter Design, Edward Wetherhold W3NQN, *Practical Wireless, August 84, pp 46 et seq.*
(2) Test equipment used by the author.
Network Analyser:
Hewlett Packard Type 8754A
Bandwidth 4MHz to 1300MHz.
Transmission/Reflection test set:
Hewlett Packard Type 8502A
Bandwidth 4MHz to 1300MHz.
BNC to Belling Lee 50Ω URM-76-BBW coaxial test leads of 440mm length each (2 off).

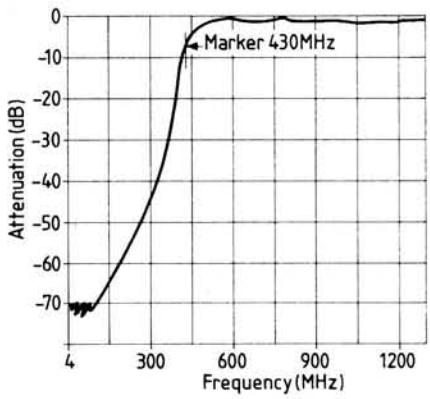

Fig. 5: Cartesian plane of TVI filter showing the forward response

Eddystone die-cast box, type 7969P 2, internal dimensions 25 × 89 × 35mm*; 26 s.w.g. tinned copper wire; surface mounting Belling Lee sockets (2); double-sided copper clad s.r.p.b. printed circuit board 12 × 80 × 1·5mm; 6BA screws, nuts, washers (4); 6BA solder tags (2); 150mm of 75Ω low-loss coaxial cable terminated either end with Belling Lee coaxial plugs.

* West Hyde Developments Ltd, 9–10 Park Street Industrial Estate, Aylesbury, Bucks HP20 1ET. Tel. (0296) 20441. Catalogue code number for box is, EDD10.

County Armagh

Armagh & Dungannon District ARC: J. A. Murphy (Armagh 522153). Meets 2nd Tuesdays, 8pm above the Wine Market, Lonsdale, Armagh.

Avon

City of Bristol RSGB Group: Colin Hollister G4SQQ (Bristol 508451). Meets 4th Mondays, 7.30pm in the small lecture theatre, Queens Buildings, UoB, Clifton. Nov 24—Home-brew Competition.

North Bristol ARC: Alan Booth G4YQQ (Bristol 6904040). Meets Fridays, 7.0pm in the Self-Help Enterprise Centre, 7 Braemar Crescent, Northville. Nov 14—Sporadic-E by G8UUE and G8VPG; 21st—HF Activity Night; 28th—CW Activity Night; Dec 5—Natter Night; 12th—RSGB Rep G4SQQ; 19th—VHF Activity Night; Jan 2—Xmas Party.

Bedfordshire

Dunstable Down RC: Philip Morris G6EES (Dunstable 607623). Meets Fridays, 8pm in Room 3, Chews House, 77 High Street South, Dunstable. Nov 21—Aspects of the Weather by John Kettley: Dec 5—Junk Sale.

Buckinghamshire

Amateur Radio & Electronics Group: Dave McQue G4NJU (Milton Keynes 78277). Meets Tuesdays, 7.30pm in the Green Grass Social Club, Watling Street, Fenny Stratford, Milton Keynes.

Chiltern ARC: Ron Ray G3NCL (High Wycombe 712020). Meets 2nd and 4th Wednesdays, 8pm in Sir William Ramsey School, Science Block, Rose Avenue, Hazelmere, High Wycombe.

Cambridgeshire

Cambridge University Wireless Society: Chris Forshaw G6VMA, St John's College. Meets alternate Mondays in Seminar Room 2/3, Trinity Hall. Next meetings Nov 24 and Dec 8.

Cheshire

South Cheshire ARS: Chris Wiseman G1PUV (Kidsgrove 73185). Meets 2nd and 4th Mondays, 8pm in the Crewe LMR Sports Club, Goddard Street, Crewe.

Chester & District ARS: Dave Hicks G6IFA (Chester 336639). Meets 2nd, 3rd, 4th and 5th Tuesdays, 8pm in the Chester RUFC, Hare Lane, Vicars Cross, Chester. Dec 9—Your Questions Answered; 16th—Annual Construction Contest.

Warrington ARC: Paul Forster GOCBN (Warrington 814005). Meets Tuesdays, 7.30pm in the Grappenhall CC, Bellhouse Lane, Warrington. Nov 18—Power Regulation via Op-amps by G6AWD; 25th—Noise Blankers by G8HLZ; Dec 2—Open Forum; 9th—Computer Security by G3NFB.

Clywd

Rhyl & District ARC: Mike Drew GW1PLI (Llandegla 621). Meets 1st and 3rd Mondays, 7.30pm in the 2nd Rhyl Scout HQ, Bale Rd, Rhyl. (Behind the Little Theatre) Dec 15—Xmas Night Out; Jan 5—Members Quiz Night.

Derbyshire

Alfreton & District ARC: Elaine Bunkle G1SFR, 7 Byron Avenue, Alfreton. Meets Mondays, 8pm at the ECP S&SC, Carnfield Hill, Alfreton.

Glossop & District RG: Geoff Sims G4GNQ, 85 Surrey Street, Glossop. Meets last Thursdays, 8pm in the Nags Head, Charlestown Road, Glossop. Nov 27—AGM.

Nunsfield House CA ARG: John Robson G4PZY (Derby 767994). Meets Fridays, 7.45pm in Room 7, Nunsfield House, Boulton Lane, Alvaston. Nov 14—Surplus Sale & Natter Night.

Tor ARA: Clive W. Rawlins G1SDY (Matlock 3503). Meets alternate Tuesdays, 7.30pm in Jackson Tor House, Matlock. Nov 25—My World of AR by R. J. Hillier of Lowes; Dec 9—Display of AR & CB Radios by Zycomm.

CLUB NEWS

PLEASE NOTE!

Starting with the January issue of *PW*, Club News will be different. For all the details, please read *Comment* on page 17. Keep the information coming to **Elaine Richards G4LFM, Practical Wireless, Enefco House, The Quay, Poole, Dorset BH15 1PP.**

Devon

Axe Vale ARC: Bob Newland G3VW (Lyme Regis 5282). Meets 1st Fridays, 7.30pm in the Cavalier Inn, West Street, Axminster. Nov 7—Constructors Contest; Dec 5—Annual Dinner; Jan 2—Packet Radio by G1DII.

North Devon RC: Charles Searle G4LST (Torrington 23764). Meets 1st Wednesdays, 7.30pm in the Micro Centre, The Strand, Barnstaple.

Tiverton (SW) RC: A. Smith G1OYO, PO Box 3, Tiverton, Devon EX16 6RS. Meets Tuesdays, 7.30pm in the Half Moon Inn, Fore Street, Tiverton.

Torbay ARS: Brian Wall G1EUA (Teignmouth 78554). Meets alternate Fridays and Thursdays and last Saturdays, 7.30pm in the ECCSC, Ringslade Road, Highweek, Newton Abbot. Nov 29—Looking at Broadcasting from Plymouth by Mr Melhuish.

Dorset

Wessex Amateur Wireless Club: Michael Hughes G1HBF (Ferndown 895100). Meets alternate Wednesdays in the Corfe Mullen Squash & SC, Wareham Road, Corfe Mullen.

Dyfed

Aberporth RAC: GW0DDR (Llechryd 274). Meets Wednesdays, 7pm in Building 17, Royal Aircraft Establishment's Airfield, Blagnannerch, Aberporth.

Essex

Braintree & District ARS: Mrs Ann King (Braintree 28714). Meets 1st and 3rd Mondays, 7.30pm in the Braintree CC, Victoria Street, Braintree. Dec 1—Film Show; 15th—Christmas Social.

Colchester RA: F. R. Howe G3FIJ (Colchester 851189). Meets 1st and 3rd Thursdays, 7.30pm in the Colchester Institute, Sheepden Road, Colchester. Nov 17—Demonstration by BNOS Electronics; Dec 11 Film & Video Evening.

Loughton & District ARS: Dave Thorpe G4FKI, 44 Townfield Road, Flitwick. Meets alternate Fridays, 7pm in Loughton Hall, Rectory Lane, Loughton. Nov 21—History of Laser 558; Dec 5—Informal.

Glamorgan

Bridgend & District ARC: D. E. George (Bridgend 723508). Meets 1st and 3rd Fridays, 7.30pm in the YMCA, Angel Street, Bridgend.

Swansea ARS: R. Williams GW4HSH (Swansea 404422). Meets 1st and 3rd Thursdays, 7.30pm in Lecture Room N, Applied Sciences Building, Swansea University.

Gloucestershire

Cheltenham ARA: Tim Kirby G4VXE (Cheltenham 36723). Meets 1st and 3rd Fridays, 7.30pm in the Stanton Room, Charlton Kings Library, Cheltenham. Nov 21—Any Questions?; Dec 5—AGM; Dec 12—Christmas Party at The Hobnails; 19th—Natter Night.

Stroud ARS: P. R. Gainey G0DZM, Prencott, Harley Wood, Nailsworth, Stroud. Meets in Nelson School, Stratford Road, Stroud. Next meetings Nov 26 and Dec 10.

Grampian

Aberdeen ARS: Don Travis GM4GXD (Pitcapple 251). Meets Fridays, 7.30pm at 35 Thistle Lane, Aberdeen. Nov 14—President's Address; 21st—Do You Believe Your S-Meter by Frank Dinger; 28th—RSGB Videos.

Greater Manchester

South Manchester RC: D. Barber (061-973 0395). Meets Mondays and Fridays, 8pm in the Sale Moor CC, Norris Road, Sale. Nov 14—Experiences in Lybia by G4SVW; 21st—CW Evening by G3ZDM; 28th—Mystery Lecture by G8UQC; Dec 5—History of SMRC by G3HZM; 12th—Technical Forum/Clinic by G4SVR; 19th—Xmas Party; 26th—Club Closed.

Gwent

Abergavenny & Nevill Hall ARC: J. B. Davies GW4XQH (Abergavenny 4655). Meets Thursdays, 7.30pm in Pen-Y-Fal Hospital, above Male Ward 2.

Pontypool ARS: Ivor Wilkinson GW4RJA (Cwmbran 72110). Meets Tuesdays, 7pm in The Settlement, Rockill Road, Pontypool.

Gwynedd

Merion ARS: Brian Viney GW4KDP, 10 Heol Meirion, Barmouth. Meets 1st Thursdays, 7.30pm in the Dolserau Hall Hotel, Dolgellau. Dec 4—Xmas Dinner at Dolserau Hall Hotel.

Hampshire

Amateur Radio & Computer Club: Trevor Tugwell (Fareham 43031 ext 2591). Meets every 4th Friday, 8pm in The Crown, Bishop's Waltham. Meetings on Dec 5; Jan 2.

Andover RAC: Mike Adams G0AMO (Andover 51593). Meets 1st and 3rd Wednesdays, 8pm in the Wolversdene Club, Love Lane, Andover. Nov 19—Oscilloscopes by G8ALP; Dec 3—AGM.

Binstead ARS: D. F. Barnes G4VJF, 2 Sherbourne Avenue, Binstead, Ryde. Meets Wednesdays, 7.30pm in the 1st Ryde/1st Binstead Scout HQ, Binstead.
Itchen Valley RC: M. E. Cheeseman G1IPQ (Southampton 736784). Meets alternate Fridays, 7.30pm in The Scout Hut, Brickfield Lane, Chandler's Ford, Eastleigh.
Winchester ARC: Gordon Crittell G4ZNO (Southampton 772191). Meets 3rd Saturdays, 7.30pm in The Log Cabin, Stockbridge Road, Winchester. Nov 21—Getting Started on 6m by G2DBT.

Hereford & Worcester

Bromsgrove ARS: Bob Stacey G4XQW (Bromsgrove 33959). Meets 2nd and 4th Tuesdays, 8pm in the Aston Field WMC, Stoke Road, Bromsgrove.
Worcester & District ARC: Derek Batchelor G4RBD (Worcester 641733). Meets 1st and 3rd Mondays, 8pm in the Odd Fellows Hall, New Street, Worcester. Nov 17—AGM; Dec 1—Talk on RAYNET.

Hertfordshire

Borehamwood & Elstree ARS: Tony G0DDJ (01-207 3809). Meets 2nd Mondays, 7.30pm in The Organ CC, Bairstowe Close, Borehamwood. Nov 10—RTTY by G0DDJ.
Cheshunt & District ARC: John Watkins G4VMR (Dane End 250). Meets Wednesdays, 8pm in the Church Room, Church Lane, Wormley. Nov 20—Natter Night; 26th—AGM; Dec 3—Natter Night; 17th—Cheese and Wine Evening plus Video; 24th & 31st—No Meetings.
Stevenage & District ARS: Peter Daly G6EDA (Stevenage 724991). Meets 1st and 3rd Tuesdays in Sitec Ltd, Ridgemond Park, Telford Avenue, Stevenage. Nov 18—Club On The Air; Dec 2—Sale of Treasured Goodies.

Humberside

North Ferriby United ARS: Phil Lambert G1LSZ (Hull 493777). Meets Fridays, 7.30pm in the North Ferriby FC.

Kent

Biggin Hill ARC: Bob Senft G0AMP (Farnborough 57848). Meets 3rd Tuesdays, 7.30pm in Downe Village Hall, High Street, Downe. Nov 18—Surplus Equipment Sale; Dec 16—Xmas Dinner.
Bredhurst R&TS: Kelvin Fay G0AMZ (Medway 376991). Meets Thursdays, 8.15pm in Parkwood CC, Parkwood Green, Rainham. Nov 13—A Packaging Problem by GODCA; 27th—Construction Contest; Dec 11—An HF Vertical by G3ZHZ.
Dartford Heath DF Club: Peter B. Sharman G8DYF (Greenhithe 844467). Meets at the Horse & Groom, Leyton Cross, Nr Dartford Heath prior to the hunt. Dec 14—Dual Band Hunt; 16th—Xmas Get Together; Jan—No Hunts.
Maidstone ARS: Paul Martin G0BUW (Maidstone 30544). Meets Fridays, 7.30pm in the YMCA Sports Centre, Melrose Close, Cripple Street, Maidstone. Nov 21—Natter Night & RAE; 28th—The Use of Club Test Equipment by G4AXD; Dec 5—Natter Night: 12th—Constructional Contest: 19th—Social Evening.

Lancashire

Bolton & District ARS: Kevin Prince G4TQL (Bolton 55092). Meets Wednesdays, 8pm in the Horwich Leisure Centre, Victoria Road, Horwich, Nr Bolton.
Bury RS: Miss C. J. Ashworth G1PKO (061-764 5018). Meets Tuesdays, 8pm in the Mosses Y&CC, Cecil Street, Bury. Dec 9—AGM.
Central Lancashire ARC: G. W. Humphrey G1GEM (Leyland 423621). Meets 1st and 3rd Mondays, 8pm in the Priory Club, Leyland. Nov 17—Microwave Modules; Dec 1—AFS 144MHz Contest Planning and Christmas Junk Sale.
Fylde ARS: H. Fenton G8GG (Lytham St Annes 725717). Meets 1st and 3rd Tuesdays, 7.30pm in the Kite Club, Blackpool Airport. Nov 18—Informal; Dec 2—Equipment Construction Competition.
Oldham ARC: Kath Catlow G4ZEP (061-624 7354). Meets Thursdays, 8.30pm in the Moorside Conservative Club, Ripponden Road, Moorside, Oldham. Nov 27—10 Gigs Home-brew and Getting Started by G8SIG; Dec 18—Xmas Party.
Wigan-Douglas Valley ARS: Dave Snape G4GWG (Wigan 211397). Meets 1st and 3rd Thursdays, 8pm in the Standish CC, School Lane, Standish. Dec 4—Visit to Amateur Radio Exchange.
Wigan & District ARC: Jim Cooke G6TYB (Wigan 214969). Meets Wednesdays, 7.30pm in St Judes Club, Poolstock Lane, Wigan.

Lincolnshire

Stamford & District ARS: David Bradberry G4OZM (Stamford 54433). Meets 2nd and 4th Wednesdays in the Scotgate Cellar Bar, Stamford.

London

Acton, Brentford & Chiswick ARC: W. G. Dyer G3GEH, 188 Gunnersbury Avenue, Acton, London. Meets 3rd Tuesdays, 7.30pm in the Chiswick Town Hall, High Road, Chiswick, London W4. Nov 18—New Problems with TVI.
Southgate ARC: D. C. Elson G4YLL (Waltham Cross 30051). Meets 2nd Thursdays, 7.45pm in the Holy Trinity Church Hall (upper), Green Lanes, Winchmore Hill N21. Nov 13—Home-brew Constructional Contest for G6QM Trophy & Slide Show/Video Evening; 27th—Informal.
Wimbledon & District ARS: George Cripps (01-540 2180). Meets Tuesdays, 7.30pm in St. Andrews Church Hall, Herbert Road, Wimbledon SW19.

Middlesex

Echelford ARS: Peter Coleson G4VAZ (Sunbury 783823). Meets 2nd Mondays and last Thursdays, 7.30pm in The Hall, St Martins Court, Kingston Crescent, Ashford. Nov 27—6 Metres by G3COJ.
Edgware & District RS: John Cobley G4RMD (Hatfield 64342). Meets 2nd and 4th Thursdays, 8pm in the Watling CC, 145 Orange Hill Road, Burnt Oak, Edgware. Nov 13—Lecture by G3RDG; 27th—Film Show; Dec 11—The Grand Edgware Junk Sale; 25th—No meeting; Jan 8—AGM; 22nd—Informal.
RS of Harrow: Dave Atkins G8XBZ (Rickmansworth 779942). Meets Fridays, 8pm in the Harrow AC, High Road, Harrow Weald.
Thorn EMI (Feltham) ARC: Dave Austen G1EHF (01-890 3600 ext 2617). Meets alternate Tuesdays in the Thorn EMI S&SC, Mono Lane, Feltham. Nov 18—Natter Night 5.30 Upper Bar: Dec 16—Xmas Drinks 6.30pm Upper Bar; Jan 6—Natter Night 5.30pm Lower Bar.

Nottinghamshire

Worksop ARS: Carole Gee G4ZUN (Worksop 486614). Meets 2nd and 4th Tuesdays, 7.30pm in the Woodhouse Inn, Woodend, Rhodesia, Worksop.

Shropshire

Salop ARS: Simon Price G0EIY (Shrewsbury 67799). Meets Thursdays, 8pm in the Olde Bucks Head, Frankwell, Shrewsbury. Nov 13—Club Station on Air; 20th—Equipment Bring & Buy; 27th—Natter Night; Dec 4—Wartime Army Signals by G3KYU.

Somerset

Taunton & District ARC: A. Moxon G8ZSP (Taunton 78903). For details of venue contact club secretary.
Yeovil ARC: Eric Godfrey G3GC (Yeovil 75533). Meets Thursdays, 7.30pm in the Recreation Centre, Chilton Grove, Yeovil. Nov 13—Oscilloscopes 2 by G3GC; 20th—Junk Sale; 27th—Natter Night; Dec 4—Sunspot Cycle 21 by G2FKZ.

Staffordshire

Burton upon Trent & District RS: Mick Cotton G4HBY (Burton upon Trent 33958). Meets Wednesdays at the Stapenhill Institute.

Strathclyde

Ayr ARG: R. D. Harkness (Ayr 42313). Meets alternate Fridays, 7.30pm in the Community Leisure Centre, 24 Wellington Square, Ayr. Nov 14—In the Workshop by GM3KJF; 28th—Field Day Planning; Dec 10—Visit to Prestwick Circuits; 12th—Making Your Own PCBs by GM4OOU.
Mid-Lanark ARS: David Williams GM1SSA (Holytown 732403). Meets Fridays, 7.30pm in the Wrangholm Hall, Jerviston Street, New Stevenston, Motherwell. Nov 28—Tom's Special Evening by GM4FDM: Dec 12—Xmas Junk Sale; 19th—Gordon's Xmas Film Show by GM3ULP.
West of Scotland ARS: Allan Buchan (041-959 4786). Meets Fridays, 7.30pm at 154 Ingram Street, Glasgow. Nov 14—Chat Night; 21st—DXpedition to Hoy by GM4NUN; 28th—Chat Night; Dec 5—RAYNET by GM4ZDH; 12th—Chat Night.

Suffolk

Felixstowe & District ARS: Paul Whiting G4YQC (Ipswich 642595). Meets alternate Mondays, 8pm in the Feathers, Walton High Street, Felixstowe. Nov 17—Visit to Gaumont Cinema, Ipswich; Dec 1—Computer Evening; 15th—Family Social; 29th—Social.

Surrey

308 Radio Club: Bob G1JRR (01-391 0788). Meets Tuesdays, 8pm in The Coach House, Church Hill Road, Surbiton.
Sutton & Cheam RS: Geoff Plucknett G4FKA (Epsom 21349). Meets 3rd Fridays, 7.30pm in the Downs LT Club, Holland Avenue, Cheam. Nov 21—Test equipment Demo by G3MES; Dec 1—Natter Night in Downs Bar; 19th—Xmas Get Together.
Thames Valley ARTS: John Pegler G3ENI (East Horsley 4279). Meets 1st Tuesdays, 8pm in the Thames Ditton Library, Watts Road, Giggshill, Thames Ditton.

Sussex

Chichester & District ARC: C. Bryan G4EHG (Chichester 789587). Meets 1st Tuesdays, 7.30pm in the North Lodge Bar, County Hall, Chichester. Nov 18—Junk Sale;

Dec 2—Club Meeting; 16th—Annual Xmas Social.

Crawley ARC: David Hill G4IQM (Crawley 882641). Meets 2nd and 4th Wednesdays, 8pm in the United Reform Church, Ifield Drive, Ifield. Nov 26—Magazine Production by G1CKF at the Leisure Centre; Dec 10—Fish & Chip Supper.

Eastbourne E & ARC: Richard Peirce G1BRC (Eastbourne 29913). Meets Sundays, 7.30pm at the Archery Youth Centre, Seaside Road, Eastbourne.

Hastings E&RC: Dave Shirley G4NVQ (Hastings 420608). Meets 3rd Wednesdays, 7.45pm in the West Hill CC, Croft Road, Hastings, and on Fridays, 8pm in the Club House, Downey Close, St Leonards-on-Sea. Nov 19—2m and 70cm Linears by G8VR; Dec 17—Xmas Special.

Mid-Sussex ARS: C. R. Cook G1FRF (Hassocks 2937). Meets Thursdays, 7.30pm in the Marie Place AEC, Leylands Road, Burgess Hill. Nov 13—CW and the Test by G3SWC; 27th—Mick Senior from Microwave Modules.

Tyneside

Sunderland ARS: Nigel Marston G0ASM (091-528 8079). Meets Mondays and Thursdays, 7pm in The Brewery, Westbourne Road, Sunderland.

Warwickshire

Atherstone ARC: Roy Fuller G6YQU (Nuneaton 370600). Meets 2nd and 4th Mondays, 7.30pm in the Physics Lab, Atherstone Upper School, Long Street, Atherstone. Nov 24—RSGB Film; Dec 8—Club Night on the Air; 22nd—No Meeting.

Mid-Warwickshire ARS: Stan Hobbs G6XRI (Kenilworth 53099). Meets 2nd and 4th Tuesdays, 8pm at 61 Emscote Road, Warwick. Nov 25—Early Radio Collections; Dec 9—Christmas Supper with RSGB Guest.

West Midlands

Mirfield RC: Mrs. K. F. Field, c/o Club Address. Meets Mondays, Tuesdays, Wednesdays and Thursdays, 7pm in the Mirfield CC, Yockleton Road, Lea Village, Birmingham.

Slade RS: D. S. Chapman (Walsall 647687). Meets 1st Fridays, 8pm in the Community Centre, 75 Kingsbury Road, Erdington, Birmingham.

Stourbridge & District ARS: Derek Pearson G3ZOM (Kingswinford 288900). Meets 1st and 3rd Mondays, 8pm in the Robin Woods Centre, School Street, Stourbridge. Nov 17—Surplus Sale; Dec 1—Informal.

Wiltshire

Trowbridge & District ARS: Gerry Callaghan G4SPE (Trowbridge 4532). Meets alternate Wednesdays, 8pm in the Territorial Army Centre, Bythesea Road, Trowbridge. Nov 26—Chat Night; Dec 10—Main Meeting, Jan 7—AGM; 21st Chat Night.

Yorkshire

Halifax & District ARS: D. L. Moss G0DLM (Halifax 202306). Meets 3rd Tuesdays, 7.30pm in the Running Man, Pellon Lane, Halifax. Nov 18—Components Sale by J. Birkett.

Maltby ARS: Keith Johnson G1PQW (Rotherham 814135). Meets Fridays, 7pm in the Community Centre, Clifford Road, Hellaby. Nov 14—Building a 100W Linear; 21st—Video Evening; 28th—3 in a Row; Dec 5—On the Air Night; 12th—A Direct Conversion RX for 80m; 19th—Xmas Junk Sale and Buffet; 26th—No Meeting.

Otley ARS: Howard Davey G0CLD (Otley 464213). Meets Tuesdays, 8pm in the RAOB Club, Westgate, Otley.

Pontefract & District ARS: Colin Mills G0AAO (Pontefract 43101). Meets Thursdays, 8pm on the Ground Floor, Carleton Community C, Pontefract. Nov 13—On the Air Night from South Kirkby Town Council HQ; 20th—Video on Microwaves; 27th—Informal Natter Night; Dec 4—Committee Meeting; 11th—Visit to China Video; 15th—Club Party Night; 18th—Informal.

Spen Valley ARS: Ian Jones G4MLW (Heckmondwike 409739). Meets Thursdays, 8pm in the Old Bank WMC, Mirfield. Nov 20—Open Computer Evening; Dec 4—Breathalyser by G1DWA.

Todmorden & District ARS: Val Mitchell G1GZB (Todmorden 7572). Meets 1st and 3rd Mondays, 8pm in the Queen Hotel, Todmorden. Nov 17—RR2 Rep Peter Sheppard.

Wakefield & District RS: Walter Parkin G3PBE (Wakefield 378727). Meets alternate Tuesdays, 8pm in the Ossett CC, Prospect Road, Ossett. Nov 18—Film Night; 25th—Amateur Satellites by G4JJ; Dec 2—On the Air; 9th—Mastermind Quiz; 14th—Bermuda by G4JMT.

ON THE AIR

AMATEUR BANDS

Reports to: John Fell G0APJ, 14 Rectory Avenue, Corfe Mullen, Wimborne, Dorset BH21 3EZ

by John Fell G0APJ

Well, yet another month has passed and true to form bands from 50MHz upwards have been enhanced by the first Autumnal tropo.

I mentioned 50MHz quite deliberately as, until now, I have assumed that tropospheric enhancement was apparent on this band but had no real "cast iron" first hand evidence. This may sound strange but 50MHz during the months since it became available in the UK has been subjected to just about all the available propagation modes and sometimes by a complex mixture of several different types.

The daily occurence of Sporadic-E during the peak summer months provided the chance for many in-band and cross-band contacts, however against this the exceedingly strong TV QRM, spaced at 15·625kHz intervals often blocked the band completely. Even in early October there is evidence of a good deal of DXTV and Spanish cordless (QRP?) telephones. However, I am pleased to report that activity is much on the increase, with several of the more active 6m folk already having worked over 20 countries direct.

From my observations so far it seems that my 10W/5-element Yagi station is reasonably normal and well within the average capability to set-up. For those of you waiting for the confirmation of full-access next year, expect to be able to have regular contacts at ranges of up to 200km, dependent on local site conditions. I regularly hold QSOs with stations using barefoot FT-690 transceivers, some using indoor antennas—best so far was with Terry G4GBS in Doncaster, Yorks, who peaked at 41 with rapid QSB at 18.50 on 23 September. Terry was running 1W to a 5-element Tonna Yagi and provided me with a 54 and slightly less fluctuating report over the 275km path.

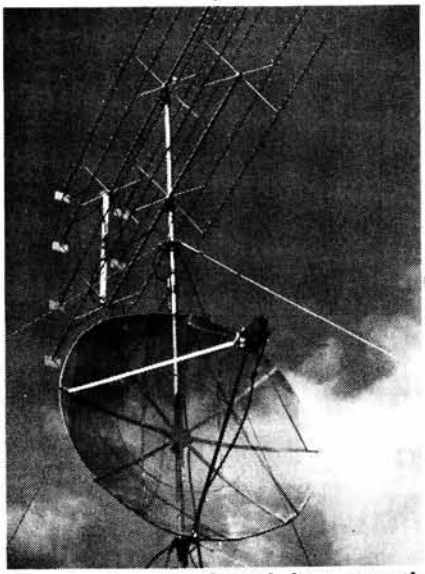

Fig. 1: As mentioned last month Flight Refuelling ARS (G4WHO/P) were active on 1·3 and 2·3GHz during v.h.f. NFD 1986. The 8 x 50-element 1·3GHz quad loop Yagi array and 2m diameter 2·3GHz parabolic dish, built by guess who, proved quite effective *Photo: Ashley Hulme G0CDY*

I mentioned tropo first and without doubt the "rock crunching" (or chassis bending as they say in the States) signals of **Dave G3KMS** Bolton, Lancs, at 2213 on 29 September were due to this mode. Dave mentioned activity from further north and at the end of this armchair copy QSO I did indeed copy signals from Bill G3BW up there in Whitehaven, Cumbria, which must be a good 400+km.

News of some of the rather longer haul DX on 50MHz is still filtering through but many would have been pleased with the contact made by **Ted G4TLY,** Malmesbury, with WA1OUB on 21 July. Solid reports were exchanged and no doubt the 1kW and 11-element Yagi at the far end helped just a little! Ted, like me, awaits the return of sunspot maxima and worldwide F2 layer possibilities, but hopefully the Los Angeles Taxi Cabs and their low band a.m. rigs will have disappeared—1949 was apparently a good year for US QRP/mobile DX on the old 5m band.

If you are interested in 50MHz and want to promote its use, the setting up of further propagation beacons, etc., why not join the 6m Group. For further details/membership, subscriptions (£5.00) contact the Six News Editor GW8ZCP at 6 Cwm Eithin, Wrexham, Clwyd, LL12 8JY. Incidentally, I understand that 50MHz will become the mainstay for packet radio digipeaters in the UK. Details of your activity and impressions of 50MHz will be most welcome.

QRP Working

Several readers' logs this month show that QRP working continues to provide plenty of activity, principally on the h.f. bands but with a steady increase at v.h.f. also. **Brian Fields G4XDJ** of Billingham, Cleveland, sent in details of QRP contacts made on the 7MHz band which included OZ1DKG, DA2CZ the British Forces Station in Berlin, run at the time by Bill G3JCZ, and SM6UP. This last contact was made with both stations running 1W of c.w. The *PW* Severn and SommerKamp FR-100B and Delta loop antenna combination produced further European contacts during September with UC2 LDA worked through the normal night time QRM.

Phil Dykes G4XYX was also active on 7MHz during September and noted a c.w. contact with LX/DF5BM on the 2nd—slightly more e.r.p. here with the 2W, 2-element quad system. Phil continues to winkle out the DX on 28MHz with his 10W p.e.p. modified ex-CB rig and lists CE3HFI, F6BZA/P/7X, VA3ADF, VA3ZIE and ZB2FK on s.s.b. Pounding the brass

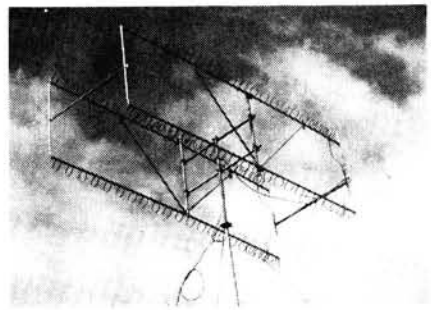

Fig: 2: If you ever hear G4RFR or G0API/P on 432MHz this is the normal 96-element quad loop system to blame for the QRO signal. Each boom of the array is some 6m long

on 24 August managed to attract the attention of PY5ZBU. The lengthening days are already showing that 28MHz openings into Africa are on the increase again with the 9L1FTN beacon logged for the first time since last winter. Hopefully the darker evenings will lead to longer periods in the shack and more activity on 28MHz (and other bands).

Before leaving h.f. matters this month I am grateful to **Brendan J. McCartney G4DYO** for a copy of RSGB DX News Sheet. This highly informative A4 format weekly newsletter edited by Brendan, provides subscribers with a wealth of topical h.f. band news, listing current and projected DX activity, band reports, QSL details together with propagation forecasts and solar figures. Once again a valuable weapon in the DXer's armoury. For those who can't even wait for a week to pass you can also contribute to the BT pension fund by dialing up the DX News Sheet Voicebank on 01-725 7373 (who choses these numbers?) for the very latest DX news.

VHF Bands Activity

I hope that my interests in bands well above d.c. are apparent and hope that somewhere out there some of you will find the time to pass on details of all the experimental and/or DX work undertaken together with the odd photograph. You don't have to have multi-element stacked and bayed antenna arrays to achieve results and as I mentioned last month now is the season for ultra low loss ducting effects on v.h.f. and above.

To demonstrate the point a couple of readers' logs this month cover 144MHz band activity and both stations I am sure would feel no shame at being described as "average" in terms of location and equipment. **Jim Smith G1DWQ,** Wimborne, runs 24W from a Trio 930 multimode transceiver in conjunction with a 9-element Tonna Yagi at 8m a.g.l. After several "flat" weeks during August and early September 144MHz opened up with contacts into F, PA and ON. Sunday 21 September produced QSOs with FC1AJD and F6ARQ (JN05) and HB9AEN/P (JN36). This was followed by F6DRO (JN03) at a distance of 852km, HB9SRJ/P (JN36) and DB3VE (JN39). With the 24th producing OZ1ALS (JO44) Jim has now worked 81 squares and 20 countries on

144MHz. Heard but not worked on the 23rd were OK1KEI and DK2EG (JN59).

Ian Gilpin G1SMD, Poole, runs even less power, approximately 5W to a 6-element (ex G0API) quad. From his 6m a.s.l. QTH in a well built up part of the town Ian has experienced the first thrill of v.h.f. tropo. He notes, sadly, missing the monumental Sporadic-E opening on Saturday 20 September, during which many UK stations worked non-stop for nearly 3 hours into such exotic locations as OK, HA, YU, YO, and probably VO5. European contest stations brought contacts with FC1 DUZ/P in the rare IN86 square (YG for you real OM's), PI4ALK and PI4VLI together with the ever present "so loud thought they were local" PE0MAR/P in JO21BX for a report of 54 and 769 serial no. Mid September brought contacts with GD, GW, GM, GI, ON, LX and HB9, making a current personal total of 10 countries and 37 squares with best DX to date being IT9. We can only wonder at what Ian will work when he finally withdraws the roots of his 7m scaffold pole from the salty edge of Poole Harbour and finds a "real" v.h.f. QTH.

Reports to arrive with John by 20 November

RTTY

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

"Despite low levels of solar activity, the 14MHz band always has something to offer," wrote **Len Fennelow G4ODH** from Wisbech.

This is very true. Newcomers to the data-mode of communications, who have a RTTY programme for their home computer, can gain a wealth of experience and chalk up some DX at the same time. Just tune around 14·090MHz at almost anytime during the day and, sometimes, much of the night.

One of my DX catches on this band was CO2BB, a DX group in Habana, Cuba. My report was acknowledged with their QSL card, Fig. 1.

Between August 12 and September 15, Len copied AMTOR signals from 2 countries on 3·5MHz, 4 on 7MHz and 23 on 14MHz, and RTTY stations from 3 countries on 3·5MHz, 5 on 7MHz and 57 on 14MHz. He also received three new prefixes this time, 5V7—Togo (on AMTOR), VP8—Falklands and EL2—Liberia (on RTTY), thus bringing his all time data score up to 126 countries.

On August 11, **Geoffrey Powell,** Tamworth, logged a CN8 and a German station, on 14MHz, who was calling "South Atlantic" and on the 12th he copied signals from Italy and Sweden on 3·5MHz. Geoffrey uses the new receive version, Telereader CD-660 communications decoder in conjunction with his receiver for reading AMTOR, Morse code and RTTY signals.

Len noted that signals from the 14MHz beacons CT3B, OH2B and ZS6DN/B were very strong during the evening of August 22 and after 2100, he copied RTTY traffic from Argentina and the Falkland Islands.

"I took advantage of a sporadic-E opening to work a few RTTY QSOs, on 28MHz, with DF8WO and IK2FIL on September 4," wrote **Lawrence Morgan GM0ATQ,** Greenock. He also exchanged RTTY signals with AA4VI in Virginia, USA, and EA9MY, Melilla, North Africa, on 14MHz.

The best RTTY DX that I found on 14MHz, during a similar period, was WL7X, Fairbanks, Alaska, at 0927 on September 10. Although his signals were chirpy, suffering from QSB and often watery, he seemed to have little trouble working stations in Europe and Scandinavia.

I also copied RTTY from France, Germany and Sweden on 3·5MHz; 6 prefixes, DJ, EA9, HB9, OK, ON and Y23, outside the UK on 7MHz this time and 3 German stations, in QSO with each other on 28MHz, during a Sporadic-E opening at 1125 on September 20.

My thanks to Geoffrey, Lawrence and Len for the information in their logs which I used to prepare the lists of AMTOR and RTTY signals, Figs. 2 and 3, heard or worked during this reporting period.

Fig. 1

Fig. 2

Country (Prefix)	Frequency (MHz) 3·5	7	14
Austria (OE)			X
Brazil (PP, PT, PY)			X
Canada (VE, VO)			X
Canary Is (EA8)			X
Cyprus (ZC, 5B)			X
Denmark (OZ)			X
England (G)			X
France (F)			X
Greece (SV)			X
Italy (I, IK, IT)		X	X
Jersey (GJ)	X		
Poland (SP)			X
Portugal (CT)			X
Sicily (IT9)			X
South Africa (ZS)			X
Spain (EA)		X	X
Sweden (SM)			X
Switzerland (HB)		X	X
Tanzania (5H)			X
Togo (5V)			X
USA (W)			X
Venezuela (YV)			X
Wales (GW)			X
Germany (DF, DJ, DL)	X	X	X

Fig. 3: The RTTY chart up until September 15 ▶

Country (Prefix)	Frequency (MHz) 3·5	7	14	21	28
Alaska (KL7/WL7)			X		
Argentina (LU)			X		
Austria (OE)		X	X		
Balearic Is (EA6)			X		
Belgium (ON)		X	X		
Brazil (PP, PT, PY)			X		
Bulgaria (LZ)			X		
Canada (VE, VO)			X		
Canary Is (EA8)			X		
Ceuta & Melilla (EA9)		X	X		
Cyprus (ZC, 5B)			X		
Czechoslovakia (OK)		X	X		
Denmark (OZ)			X		
Dominican Rep. (HI)			X		
East Germany (Y2)			X		
England (G)	X	X	X		
Falkland Is (VP8)			X		
Finland (OH)			X		
France (F)	X		X		
Gabon (TR)			X		
Gozo & Comino (9H4)			X		
Greece (SV)			X		
Hungary (HA)			X		
India (VU)			X		
Israel (4X)			X		
Italy (I, IK, IT)	X		X	X	X
Japan (JA)			X		
Korea (HL)			X		
Kuwait (9K)			X		
Lebanon (OD)			X		
Liberia (EL)			X		
Luxembourg (LX)			X		
Malta (9H)			X		
Morocco (CN)			X		
Netherlands (PA)	X		X		
Nigeria (5N)			X		
Norway (LA)			X		
Oman (A4X)			X		
Pakistan (AP)			X		
Poland (SP)			X		
Portugal (CT)			X		
Rumania (YO)			X		
Sardinia (IS)			X		
Scotland (GM)			X		
Sicily (IT9)			X		
South Africa (ZS)			X		
Spain (EA)		X	X		
Suriname (PZ)			X		
Sweden (SM)	X	X	X		
Switzerland (HB)		X	X		
Tanzania (5H)			X		
Trinidad (9Y)			X		
Turkey (TA)			X		
Ukraine (UT)			X		
USA (W)			X		
USSR (UA, UB)			X		
Vatican (HV)			X		
West Germany (DF, DJ, DL)	X	X	X		X
Yugoslavia (YU)			X		

Make sure your reports are posted in time. They must arrive by November 20

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Trio

			P&P
TS440S	NEW Amateur band transceiver General coverage RX	998.00	(—)
PS50	Heavy Duty PSU for TS440S	198.00	(5.00)
AT440	Auto ATU for TS440S	135.48	(3.00)
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TS930S	9 Band TX General Cov RX	1595.00	(—)
TS830S	160-10m Transceiver 9 Bands	981.59	(—)
AT230	All Band ATU/Power Meter	185.98	(2.00)
SP230	External Speaker Unit	56.03	(1.50)
TS530SP	160m-10m Transceiver	849.82	(—)
TS430S	160m-10m Transceiver	867.68	(—)
PS430	Matching Power Supply	151.48	(3.00)
SP430	Matching Speaker	39.50	(1.50)
MB430	Mobile Mounting Bracket	14.78	(1.50)
FM430	FM Board for TS430	45.00	(1.50)
SP120	Base Station External Speaker	36.33	(1.50)
MC50	Dual Impedance Desk Microphone	43.10	(1.50)
MC35S	Fist Microphone 50K ohm IMP	20.33	(1.00)
LF30A	HF Low Pass Filter 1kW	30.18	(1.00)
YK88A	6KHz AM filter for TS430S/440S	46.18	(1.00)
YK88C	500Hz CW filter for TS430/440/830/530	43.10	(1.00)
YK88CN	270Hz CW filter for TS430/440/830/530	51.11	(1.00)
YK88S	2.4KHz SSB filter for TS440S	44.34	(1.00)
YK88SN	1.8KHz SSB filter for TS430/440/830/530	43.71	(1.00)
MC85	Deluxe Desk Mic with Audio Compensator	95.45	(2.50)
MC42S	Up-Down Hand Mic 8-Pin 500 Ohm	19.70	(1.50)
MC40S	Up-Down Hand Mic 6-Pin 500 Ohm	19.07	(1.50)
MC60A	Desk Mic with built-in Pre-amp	77.60	(2.50)
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TH21E	2m Mini Handhelds	199.00	(—)
TH41E	70cm Mini Handhelds	240.79	(—)
HMC1	Headset with vox for TH21E/41E/2600/3600	30.80	(2.00)
SC8	case for TH21E/41E	11.09	(1.00)
DC21	DC/DC converter for TH21E/41E	23.40	(1.50)
TS711E	2M Base Stations	839.96	(—)
TS811E	70cm Base Stations	998.00	(—)
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TR2600	New 2m FM Synthesised Handheld	328.00	(—)
ST2	Base Stand	72.05	(1.50)
SMC30	Speaker Mike	26.47	(1.00)
MS1	Mobile Stand	41.88	(1.00)
R2000	Synthesised 200kHz-30MHz Receiver	565.32	(—)
HS5	Deluxe Headphones	32.02	(1.00)
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TL922	160/10M 2kW Linear	1350.00	(7.00)
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TR751E	**2M Multimode with DCL (mobile)**	580.70	(3.00)
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Linear Amps

MICROWAVE MODULES

MML144/30-LS	inc preamp (1/3w i/p)	94.30	(2.00)
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MML144/100-S	inc preamp (10w i/p)	149.95	(2.50)
MML144/100-HS	inc preamp (25w i/p)	159.95	(2.50)
MML144/100-LS	inc preamp (1/3w i/p)	169.95	(2.50)
MML144/200S	inc preamp (3/10/25w i/p)	334.65	(2.50)
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MML432/50	inc preamp (10w i/p)	149.50	(2.00)
MML432/100	linear (10w i/p)	334.65	(2.50)
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MMT432/28S	70cms linear transverter 10W output	195.50	(3.50)
MMT1296/144G	23cms linear transverter 2W output	258.75	(6.00)
MMC144/28	2M converter	35.65	(2.00)
MMG144V	2M RF switched GASFET preamp	37.90	(2.00)

B.N.O.S.

LPM 144-1-100	2m, 1W in, 100W out, preamp	197.50	(2.50)
LPM 144-3-100	2m, 3W in, 100W out, preamp	197.50	(2.50)
LPM 144-10-100	2m, 10W in, 100W out, preamp	175.00	(2.50)
LPM 144-25-160	2m, 25W in, 160W out, preamp	255.00	(2.50)
LPM 144-3-180	2m, 3W in, 180W out, preamp	295.00	(2.50)
LPM 144-10-180	2m, 10W in, 180W out, preamp	295.00	(2.50)
LP 144-3-50	2m 3W in, 50W out, preamp	125.00	(2.50)
LP 144-10-50	2m 10W in, preamp	125.00	(2.50)
LPM 432-1-50	70cm, 1W in, 50W out, preamp	235.00	(2.50)
LPM 432-3-50	70cm, 3W in, 50W out, preamp	235.00	(2.50)
LPM 432-10-50	70cm, 10W in, 50W out, preamp	195.00	(2.50)
LPM 432-10-100	70cm, 10W in, 100W out, preamp	335.00	(2.50)

Yaesu

FT757GX	HF Transceiver	969.00	(—)
FC757	Auto A.T.U.	349.00	(2.00)
FP757HD	Heavy Duty PSU	239.00	(2.00)
FP757GX	Switched Mode PSU	199.00	(2.00)
MMB11	Mobile Bracket	37.50	(1.00)
NC11	Charger	10.50	(1.00)
CSC1A	Carrying Case	6.50	(1.00)
YHA15	2m Helical	7.50	(1.00)
YHA44D	70cm ½wave	12.50	(1.00)
YM49	Speaker Mike FT290/790	22.00	(1.00)
FT209RH	NEW 2m H/Held/C/W FNB4	309.00	(—)
FT709R	70cm H/Held	319.00	(—)
FT270R	2m 25W F.M.	399.00	(—)
FT2700R	2m/70cm/25W/25W	499.00	(—)
MMB10	Mobile Bracket FT209/709	10.00	(1.00)
NC9C	Charger	10.35	(1.00)
PA3	Car Adaptor/Charger	20.50	(1.00)

Royal Blue

Photo Acoustics have pleasure in presenting the ROYAL BLUE — a Short Wave Listeners folded dipole antenna that covers 2-30MHz. Its neat and compact design (just 6' tall) makes it ideal for unobtrusive outdoor or indoor use. It will work quite happily on your roof or stood in the corner of your shack. It is a truly versatile antenna that will pull in the DX and which works exceptionally well with modern receivers such as the Yaesu FRG8800, Icom R71, Trio R2000 and so on.

To buy this superb new antenna, just send us £25, plus £3 for postage and packing and we will rush one to you.

Yaesu (cont.)

			P&P
YM24A	Speaker Mike FT208/708	27.00	(1.00)
FT726R	2m Base Station	999.00	(—)
430/726	70cm Module for above	349.00	(2.50)
FRG8800	HF Receiver	639.00	(—)
FRV8800	Convertor 118-175 for above	100.00	(1.50)
MH1B8	Hand 600 8pin mic	20.00	(1.00)
MD1B8	Desk 600 8pin mic	79.00	(1.00)
MF1A3B	Boom mobile mic	25.00	(1.00)
YH77	Lightweight phones	19.50	(1.00)
YH55	Padded phones	19.95	(1.00)
YH1	L/weight Mobile H/set-Boom mic	19.00	(1.00)
YH2	L/weight Mobile H/set-Boom mic	19.00	(1.00)
SB1	PTT Switch Box 208/708	21.00	(1.00)
SB2	PTT Switch Box 290/790	18.00	(1.00)
SB10	PTT Switch Box 270/2700	21.00	(1.00)
QTR24D	World Time Clock	39.00	(1.00)
NEW			
VT767GX	HF Gen. Coverage trans. with optional VHF/UHF/6M modules	1550.00	(—)
FL7000	Solid State linear with built in auto ATU	1600.00	(—)
FT727G	Dual Band handheld transceiver 144-146MHz, 430-440MHz up to 5W on each band	425.00	(3.00)
FT290RMK II	2M multimode portable/mobile/base	429.00	(3.00)
FT23R/FNB10	2M mini handheld with LCD display 5W	249.00	(2.00)
FT73R/FNB10	70cms mini handheld with LCD display 5W	269.00	(2.00)

Icom

IC751A	HF Transceiver	1465.00	(—)
IC735	New HF Transceiver	949.00	(—)
PS15	P.S. Unit	158.00	(4.00)
PS30	Systems p.s.u. 25A	343.85	(—)
SM6	Base microphone for 751/745	46.00	(1.00)
IC290D	2m 25w M/Mode	542.00	(—)
ICR71	General Coverage Receiver	789.00	(—)
IC02E	2m H/Held	299.00	(—)
IC04E	70cm handheld	299.00	(—)
BC35	Base Charger	70.15	(1.00)
HM9	Speaker mic	21.85	(1.00)
BP3	Std Battery Pack	29.90	(1.00)
BP5	High Power Battery Pack	60.95	(1.00)
CP1	Car Charging Lead	6.90	(1.00)
DC1	12v Adaptor	17.25	(1.00)
R7000	VHF/UHF Scanning Receiver	957.00	(—)
IC3200	2M/70cm Mobile Transceiver	556.00	(—)
SPECIAL OFFER			
IC505	50MHz multimode 10W ONLY	349.00	(3.00)
NEW			
IC28E	25W FM mobile (Tiny)	359.00	(3.00)
IC28H	45W FM mobile (Tiny)	399.00	(3.00)
IC-Micro	2 mini hand portable LCD display 1W	P.O.A.	(2.00)

Power Supplies

DRAE			BNOS		
4 amp	40.50	(2.00)	6 amp	69.00	(2.50)
6 amp	63.00	(2.50)	12 amp	115.00	(3.00)
12 amp	86.50	(3.00)	25 amp	169.00	(4.00)
24 amp	125.00	(4.00)	40 amp	345.00	(4.00)

Aerial Rotators

KR400	Med/H Duty	129.95	(3.50)
KR500	6 core Elevation	139.95	(3.50)
KR400RC	5 core Medium Duty	159.95	(3.50)
KR600RC	6 core Heavy Duty	209.00	(3.50)
KC038	lower mast clamps	14.95	(2.00)
AR1002	Lightweight VHF Rotator	52.95	(3.50)
KS065	Rotary Bearing	26.00	(2.50)

Switches

Sigma	2 way SO239	17.50	(1.00)
Sigma	2 way 'n' Skts	22.95	(1.00)
Welz CH20A	2 way SO239	30.75	(1.00)
Welz CH20N	2 way 'n' Skts	54.00	(1.00)
Drae	3 way SO239	15.40	(1.00)
Drae	3 way 'n' Skts	19.90	(1.00)

CW/RTTY/Equipment

			P&P
BENCHER			
BY1	Squeeze Key, Black base	67.42	(2.00)
BY2	Squeeze Key, Chrome base	76.97	(2.00)
HI-MOUND MORSE KEYS			
HK708	Straight Key	21.82	(2.50)
HK702	Deluxe version of above on Marble Base	43.30	(3.00)
HK706	Straight key	21.80	(2.50)
HK707	Straight key	20.15	(2.50)
MK704	Squeeze paddle	20.25	(2.50)
MK705	Squeeze paddle on Marble Base	32.78	(3.00)
NEW			
RTTY-EQUIPMENT			
PK-232	Packet, Amtor, RTTY, CW, ASCII transceive in one unit. Works with any computer equipped with an RS232 interface. 12V operated	269.95	(3.50)
FAX-1	NEW HF Fax receiver. Obtain weather maps, press photographs and satellite cloud cover detail on any Epson FX-80 compatible printer. 12V operated	269.95	(3.50)
AMT-2	Terminal Unit RTTY/AMTOR/ASCII/CW	245.00	(3.00)
AMT-2/CBM64	Software for the above for the Commodore 64	51.75	(2.50)
AMT-2/VIC20	Software for the above for the Commodore VIC 20	51.75	(2.50)
AMT-2/BBC B	Software for the above for the BBC B	44.85	(2.50)
CWR 610E	RTTY/CW/ASCII Decoder	216.45	(3.00)
CD660	Amtor/RTTY/CW/ASCII decoder	231.00	(3.00)
Soon to be available software for the Amstrad 644 series.			
KEYERS & ACCESSORIES			
Star Master Key	Electronic Keyer	54.70	(3.00)
NEW Star	Masterkey electronics CMOS memory keyer	95.00	(3.00)
TRX3	Morse Oscillator	13.65	(1.50)
Drae	Morse Tutor	52.00	(3.00)
Datong	D70 Morse Tutor	56.50	(2.50)

Sony

Sony	ICF 2001D 150KHz-30MHz, 76-108MHz, 108-136MHz. 32 memories AM/SSB/FM broadcast/Air-band	329.95	(3.00)
Sony	ICF7600D 150KHz-30MHz, 76-108MHz, 10 memories AM/SSB/FM broadcast receiver	179.95	(3.00)
Sony	Air-7 108-136MHz, 144-174Mhz, 76-108MHz plus LW/MW/SW superb handheld receiver	249.95	(3.00)

Aerials

TONNA			
Tonna	5 element 50MHz	37.90	(5.00)
Tonna	9 element fixed 'N' socket 144MHz	27.80	(5.00)
Tonna	2×9 element 'N' socket 144MHz	52.10	(5.00)
Tonna	9 element portable 144MHz	29.80	(5.00)
Tonna	13 element portable 144MHz	41.40	(5.00)
Tonna	17 element 'N' socket 144MHz	55.40	(5.00)
Tonna	9 element 435MHz 'N' socket	25.80	(5.00)
Tonna	19 element 435MHz 'N' socket	30.95	(5.00)
Tonna	2×19 element 435MHz	36.00	(5.00)
Tonna	21 element 432MHz 'N' socket	40.15	(5.00)
Tonna	21 element 438MHz ATV	40.15	(5.00)
Tonna	23 element 1250MHz	27.75	(3.00)
Tonna	23 element 1296/1269MHz	27.75	(3.00)
Tonna	55 element 19 1296/1269MHz	44.75	(5.00)
G5RV	Full size 102'	16.75	(2.00)
G5RV	Half size 51'	14.25	(2.00)
HB9CV	2 metres	3.95	(3.00)
HB9CV	70cms	3.95	(2.00)
2 metre	Slim Jim	8.95	(2.50)
1–1 & 4–1	Baluns	12.95	(2.00)
3.7 and 7.1MHz	Traps (pair)	9.50	(2.00)
Dipole	Centrepieces	2.00	(0.50)
Copper wire	50M rolls hard drawn	7.95	(2.00)
CX140D	Masthead coaxial relay with control box (weatherproof)	39.95	(3.00)
G-WHIP	Tribander helical mobile HF antenna 10/15/20 metres	45.50	(3.00)
	Coils for above for 40/80/160M	8.40	(1.50)
	Telescopic whip for above coils	5.60	(1.50)
	Basemount single hole fixing with 5M of coax	8.25	(2.00)
	Flexiwhip 10M antenna mobile	25.25	(3.00)
	Coils for above for 15/20/40/80/160M	8.40	(1.50)
	Multisect 86 10/15/20M mobile auto selecting antenna	38.00	(3.00)
	Coils for above for 40/80/160M	8.40	(1.50)
	Telescopic whip for above coils	5.60	(1.50)
	Extendarod for fixed use with above aerials, improves LF band performance	14.55	(2.00)
	PL259 base loaded single band mobile aerials for 10/15/20/40	17.75	(2.00)
	PL259 base boarded single band mobile aerials for 80/160M	19.25	(2.00)
	(Above PL259 aerials will fit on normal SO239 mag mounts or SO239 gutter mounts.)		
	G8/100 8 band self selecting Base Station antenna. Ground mounting, complete with stake and radials. All bands 10-80M	92.50	(5.00)
BOOKS	Confidential Frequency List (NEW Edition)	5.95	(0.75)
	Air Traffic Radio	2.00	(0.75)
	VHF/UHF airband frequency list	3.95	(0.75)
	The Complete guide to VHF/UHF frequencies 25-2000MHz (NEW)	4.95	(0.75)
	The International VHF FM guide	2.00	(0.75)
	SCANNERS (NEW Book)	7.95	(0.75)
	Towards the RAE	4.25	(0.75)
	Logbooks	3.50	(0.75)
SPECIAL OFFER			
Alinco ALM203E	2 metre handheld with 30W amplifier ONLY	249.95	(3.00)
Alinco ALR206E	25W FM mobile transceiver	249.95	(3.00)
Tonna	21 ele ATV old style (few only left)	27.90	(5.00)

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by Pat Gowen G3IOR

Current Satellite News

This month we again start with news of the new "JO-12" satellite, alias "Fuji", which has been working very well indeed on the basic analogue mode, with lots of activity evidenced from some forty different DXCC countries. Good QSOs have been made by your scribe with many of the established satellite users normally found on RS or OSCAR-10 from Europe, North America and Asia, though none as yet in Africa or South America. (Australasia and Oceania, of course, will be quite impossible from Europe on Mode "JA", but this is where the "JD" store-and-forward mode will win out).

One evening's log in September shows RL7GBX, VU2LO, HG5AM, SV1OE, RA3AHN, HG3GJ, I5TDJ, UA4NM, VE2LI, VE3KLA, W1NU, W2RS, NN2T, W0RR, LX1SI, and many European countries, with quite a lot of G and DL stations evidenced.

Quite a few stations seem unaware of the inverted passband, and s.s.b. stations are frequently to be found in the c.w. lower end of the passband, some of these on l.s.b. This factor is complicated by stations using simple antennas who are unaware that they are accessing JO-12 when they are transmitting uplinks between 145·960 and 146·000MHz to RS-7, or between 145·910 and 145·950 to RS-5, in the correct band for those satellites, but adding to the chaos on the new bird. As feared, many new inexperienced users are employing far too much power than that required, and are badly blocking the passband for those who are employing the absolute maximum of 100W e.i.r.p. neccessary. Regrettably some of these are same old transgressors who regularly blocked the older RS and OSCAR-10 satellites, who seem very slow to learn the basic requirements clearly demonstrating that a few moments spent improving the receiving system is far better for all than running an excessive power just to hear ones own signal. The number of amateurs heard "whistling their dogs" on the satellite had to be heard to be believed!

Many would-be users, particularly those using combined 70cm/2m beams, have found that the intermodulation products and the presence of a strong third harmonic from their uplink transmitter is severely desensitising their downlink receiver when they transmit. They are thus unable to hear their own downlink, and are unable either to net or to know which of the many "birdies" heard is their own return. The answer for this common problem is to use a good filter ahead of their receiver, either a commercially available model, or a home-brew, the suitable design, which may be obtained from the Practical Wireless Office, marked "Filters".

Many stations complain of a weak downlink, some of whom have been found to be using the right-hand circularly polarised antenna as for OSCAR-10, when left hand is the current preferred twist for JO-12 Mode "JA". This will become even more essential once the on-board magnet has stabilised the present satellite topple and spin to bring it into line with the earth's geo-magnetic field, phase locking the attitude with the orbital period.

The downlink has been copied, albeit weakly, by users using a simple dipole or ground plane, so it is mainly a matter of low feeder loss, a relatively low noise front end, and a suitable antenna that is needed to produce clear signals from the transponded signals that vary from some 1 watt for alligators, down to the beacon level of 100mW.

Those with good receiving capability will be aware of the "birdy" located some 49kHz above the 435797·2kHz nominal beacon frequency. This is an intermodulation product caused by a minor limitation of p.a. base current, and nothing to worry about.

At the time of writing, the satellite is still noticeably gyrating, that is to say behaving like a spinning top at slow down, with a distinct wobble, the "top" pointing to us from the west at the commencement of an overhead orbit, giving a right-hand circular polarisation preference, changing at TCA, the time of closest approach, and leaving us east-bound with a left-hand circular preference as we see the "bottom" of the receding satellite. In time, thought to be by the end of October, the pair of bar-magnets mounted to the Z-axis will bring JO-12 in line with the earth's magnetic field, behaving in the same way as a compass needle when it at first oscillates and finally comes to rest. This will mean that with close to overhead passes in the UK, we will first see a squint angle of some forty-five degrees off axis at AOS, then looking mainly into the base at TCA on high elevation passes, the satellite then leaving us angulated again at LOS.

Miki JR1SWB, who is currently active from Nairobi on the satellite, (and on Packet) has sent in the values of the "revised" telemetry checked just before launch, which now reads as in Table. 1.

All in Table 1 have "N" as the value transmitted following the channel indication number (see the September issue column on the telemetry of JAS-1). Already, the "3" prefix channels are showing a cooling of the spacecraft, hopefully toward the ideal zero degrees centigrade that NiCad cells, with their characteristic negative temperature co-efficient, seem to prefer. The battery seems perfect although the transponder was on continuously for the first few weeks of operation. In September, the satellite was out of sunlight for up to 35 minutes per orbit, and for this reason, plus the need to test and load programs to test the digital mode, Mondays and Fridays were instituted as "off" days. November brings it back to continuous sunlight charging again.

Already the digital mode has been tested, and the 145·920MHz one watt "JD" mode downlink proved to be the needed 10dB improvement expected over the "JA" Mode 20 w.p.m. c.w. beacon. It is hoped that the programs will be written and loaded, and that the "store and forward" system will be operating by the time this column reaches you.

JO-12 is now known to be object 86-61-B, catalogue number 16909, having been refined by NORAD radar tracking from object 86-61-A, catalogue number 16908, which is the mirror-ball, known as "EGP" (Experimental Geoditic Payload) before launch, and now as "EGS-1" (Experimental Geoditic Satellite No. 1) and also as "Ajisai" (the name of the Hydrangea flower, as is "Fuji"—the Japanese name for Wisteria. The Japanese name all of their satellites with flower names).

Reflections on "Ajisai"

"Ajisai" is being used for phased laser reflection to accurately determine the movement of land and island site areas, playing a useful role in plate tectonics research, an area of science much valued in Japan because of the possibilities of earthquake forecasting. It has no beacon, nor any active electronics aboard whatsoever, but has its surface covered with many laser retro-reflectors and plane mirrors. The corner reflectors consist of 120 clusters of 12 cubes around the centre, each being the corner of a cube so set that three faces meet at 90 degrees at the vertex. An equilateral triangle is thus formed on illumination of the 0·1 light wavelength accurately polished silica glass.

It can be seen by the naked eye, better with binoculars, at magnitude 1 to 3, as a twinkling star, about as bright as Polaris, the Pole Star, but flashing six times each rotation, or some two flashes per second. The flashes are brought about by the 40 r.p.m. spin of the satellite, and are actually of only 5 milliseconds duration, but the persistence of vision of the human retina means that it appears longer, without the total extinctions between the flashes being obvious as they are to sensitive detectors. There is now thought to be little hope of "bouncing" an amateur radio signal from EGS-1, as the basic structure is of glass-fibre, however, for those who wish to try, or merely to see it after dusk and before dawn.

The carrier rocket 2nd stage, which has now undergone a change of orbit, can also clearly be seen, and shows a blue glow around the bright centre, caused by the ionisation of intentionally vented hydrogen gas propellant in sunlight, the purpose of which was to lighten and thus bring about an earlier de-orbit. Even JO-12 itself can be seen under suitable conditions, e.g. a pollution free dark sky such as at the coast, and has been observed by G3IOR, VE3DSO, and many more. It too exhibits a blue colour with a noticeable twinkle, brought about by sun reflection from the solar panels as it rotates and topples.

JO-12 Operating

John Branegan GM4IHJ, who is an old hand at Mode "J" operating, has kindly shared his earlier experience, helping some of the operators now getting their first taste of Mode J operating. Now that "Fuji" JAS1 is aloft and working they are finding out that like its illustrious predecessor OSCAR 8J, Fuji is a much more difficult target than the older circular orbiters. It came as no surprise to John that some 90 per cent of the JO-12 operators in the first few weeks of use were not getting QSOs, whilst a few well trained ex-OSCAR 8 Mode "J" types were having a ball. How do some operators manage an easy passage on our latest satellite? Here are some good tips from GM4IHJ, based on his considerable experience.

1. EQUIPMENT. Sensitive 435MHz reception is a must, but be careful. A lot of good pre-amplifiers and receivers use bi-

Channel	Content	Calculation
1A	Total Solar Panel Current	20x (N+4)mA
1B	Battery Charge/Discharge	40x (N−46)mA
1C	Battery Voltage	(N+4)x0·22V
1D	Half-Battery Voltage	(N+4)x0·098V
2A	Bus Voltage	(N+4)x0·20V
2B	+5V Regulator Voltage	(N+4)x0·60V
2C	JTA Power Output	2·0x(N+4) ∧ 1·618mW
2D	Calibration Voltage 1	(N+4)/50V
3A	Battery Temperature	1·5x(62−N) deg C
3B	Baseplate Temperature 1	1·5x(62−N) deg C
3C	Baseplate Temperature 2	1·5x(62−N) deg C
3D	Baseplate Temperature 3	1·5x(62−N) deg C

Table 1

◀ **Fig. 1**

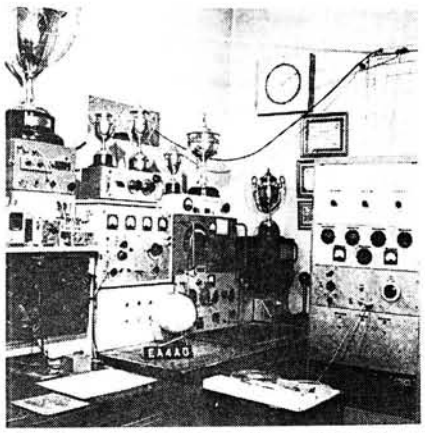


Fig. 2: The 1965 station of EA4AO, who made the first transatlantic satellite QSO with W2AZL

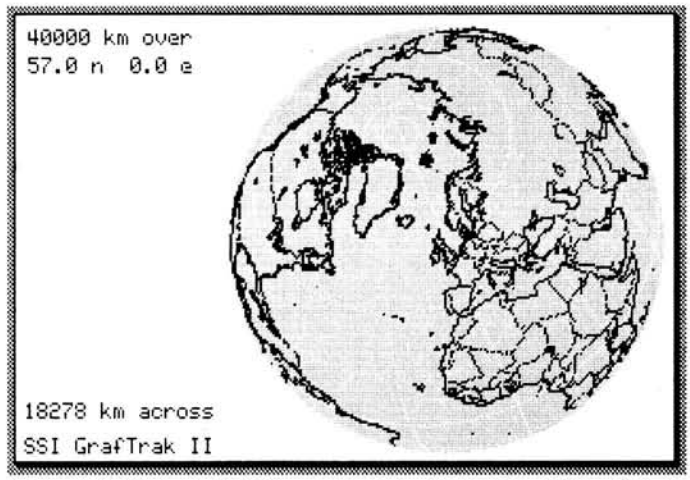
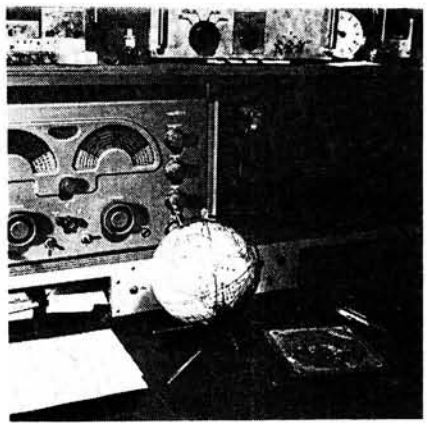


Fig. 5: Graftrak simulation by WA2LQQ. How earth is "seen" by a Molniya type orbit

Fig. 3 ▼



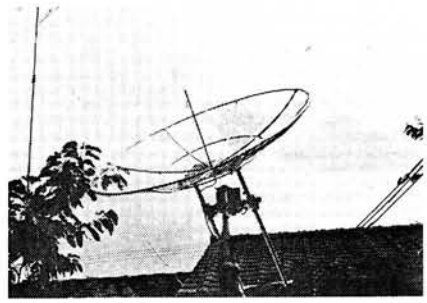


Fig. 4: The modern station of ▶ JR1WZI, who has worked 64 different stations around the world

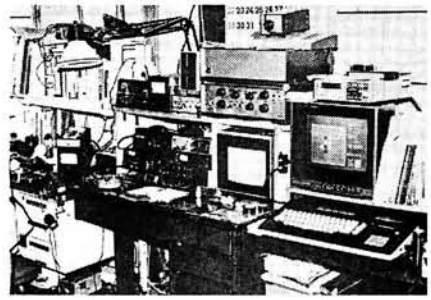


Fig. 6: The very modern station of JR1WZI

Fig. 7: The latest picture from Uo9

polar front ends. These are very prone to overload if hit by a powerful signal, and in many cases the 145MHz uplink provides enough 3rd harmonic content in the 435MHz front end to destroy all incoming signals. FET pre-amps, low noise mixers, and if found to be necessary a 435MHz cavity filter in the 435MHz antenna line is the best solution.

2. FINDING THE SATELLITE. The Doppler shift is fierce on "J" Mode, so alert operators make full use of a computer prediction of Doppler, so that they always know where the beacon has moved to.

3. TUNING. Once you have found the beacon, you can then tune up the band to find someone to talk to, but, how do you tune your uplink onto him when you find him? The remedy is simple—if your 144MHz has "Transmit Incremental Tuning" (TIT) you briefly key your TX on c.w. with the TIT set about 2·5kHz high. Tune your signal quickly to zero beat that of the station you wish to contact, then switch off TIT, switch from c.w. to l.s.b., and start calling.

4. ANSWERING CQs. Do NOT call "GM4IHJ, Golf Mexico four Italy Hotel Japan, GM4IHJ, ditto, ditto, ad infinitum" as so many stations seem to do. Remember, he knows well and can probably recognise his own call, backwards, forwards or sideways. What he does not know until you tell him slowly and clearly, is YOUR call. Use a reply such as "EI6AS this is W1UW, Whiskey One Uniform Whiskey, Washington One United Washington, W1UW . . ." etc., thereby giving him plenty of opportunity to identify you even in fading and marginal conditions, and whilst he is tuning to correct any Doppler offset.

5. Doppler. When you get a contact try to stay on the same downlink frequency by gently tuning your transmitter. Remember that the JO-12 Doppler is causing downlink signals to ALWAYS go DOWN in frequency, so practice automatically tuning your uplink transmitter ONE way, always UP, to correct the Doppler shift experienced. If you find the rapid Doppler swing on an overhead pass too fierce to follow, try first practising on the much slower Doppler you will get on orbits near your horizon. You lose very little by this because the best DX is obtained when JAS is near your horizon, i.e. closer to the furthest stations. Overhead orbits produce only local contacts.

6. Doppler DIFFERENCE. Remember that stations at some distance from you are in quite a different part of the satellite pass than you are. When you begin to hear Americans they are already in the last part of their pass, so they have a slowly reducing Doppler shift. By contrast, you, at the beginning of your pass, are experiencing a Doppler shift which is getting faster. Naturally at the end of your pass when the satellite is to your east, you will hear a slowly descending Doppler, whilst the UA you are talking to has a Doppler which is descending fast. Thus, please try to appreciate what the other man is experiencing. Remember that the operator who is in the middle of his satellite pass has the most difficult job, and is also trying to track the now fast changing satellite in both azimuth and elevation.

It was often suggested that the previous problems of constant receiver and transmitter tuning, antenna azimuth and elevation tracking, switching, keying, writing and noting required at least eight appendages, and that only an octopus could be a good A-O-8 'J' operator. Please be assured JO-12 is much easier, as its passage across the sky is slower, its Doppler is slower, its overs are longer, and it gives greater range. In fact, it is a super satellite,

as we are sure all who are prepared to work at it will soon discover.

Users and listeners reports on the new satellite for the February column need to be in with G3IOR by 20 November. It will be interesting to discover what rare DXCC countries are populating JO-12, and what the ultimate DX distance QSO is.

RS-5 & 7

Whilst RS-7 has been continuously active during full orbit sunlight on both transponder and ROBOT mode simultaneously, the same cannot be said for RS-5, whose battery has little capacity left now. RS-5 continuously switches itself off when overloaded by alligators, as the bus voltage falls to that predetermined value automatically shutting down the transponder. The problem is that of poor regulation, there being little battery back-up, as little more than the raw solar panel current is available. When excess current is drawn, the bus voltage drops, and off goes the transponder, which cannot be put on again until in range of one of the USSR command stations. Thus, the answer for the continuity of the use of RS-5, and even RS-7, is in the hands of the users.

On 18 September RS-7 started a new eclipse period, and RS-5 followed suit on 23 September. A new schedule commenced on 23 September which should have RS-7 activated for transponding between 0500 and 0900UTC, with occasional ROBOT operation, and with RS-5 operations from 0900 to 1300UTC, batteries and alligators permitting. If the satellites survive the rigours of the eclipse, they will be back in full sunlight when the new 24 hour per day (except Wednesdays MSK) starts again on 8 December 1986.

Bill Kelly of Belfast, despite a bout of ill health, kept up his usual listening watch on the series, and sends in an imposing list of calls. Some are new to the satellite scene, such as Y25LI, IW5BHI, IT5ITU, RA3PU, UA9LQ, RA4CAK, UV9FF, UZ9WWK, HG7BFK, UA9FIZ, DK8NX, PA0IFB/A, RA3UUD, RA6HKQ, OH8EK, W3LCZ, SM7ICL, SM4DOG, SM4BKD, GM4DGT, PA3EKM, RA3PU, HG8KGS/P, VE1BZV, SP7BGA, SP6BCA, while many are heard with regularity, such as G3DDG, RS3A, DJ3UH, F3KI, G4LWM, HG8CF, G0DLJ, UA1QEK, UZ1AWT, SM7BYU, RA9YG, W3TFA, G3CAG, G3BGM, OZ1BUR, RB4IYF, UA4NM, F9EA, F6GOY, G4ULS, HG5AM, UA0AIS, F9YW, OE1LM, UA3VB, UK3A, SP7BCA, EB8QC, HG5DE, YO2IS, SP9DH, UL7CBP, DL1HAE, OH2BDQ, G3AJX, and a whole lot more, without whom a pass would seem devoid of activity. During the September activity week, the 40kHz passbands were really crammed, and so much power was activating the a.l.c. that G3IOR's 100W e.r.p. was barely audible!

RS-9 & 10

The new pair of RS satellites, originally hoped for much earlier this year, have again been deferred due to no positive launch opportunity being in evidence. "It would now appear that there is little chance of launch this year" says **Leonid Labutin UA3CR** "and that we are now hoping to have them in orbit early next year, possibly late January or early February 1987".

OSCAR-10

OSCAR-10 has been losing memory just about as fast as DJ4ZC can re-route and load new programs to attempt to maintain the satellite in operational mode. At the time of writing the beacon is a plain unmodulated carrier, thus giving no indication of the battery condition. However, the transponder has been on, and was for a time able to be used for small parts of each orbit at low power. How things will be by the time you receive this news is anybody's guess, but it has to be said that the long term outlook is bleak.

Readers will be aware that the nets and media have been carrying urgent requests for the cessation of all transmissions through A-O-10 following a brief re-appearance of transponder activity.

The origins of the problems that have brought forth the requirement commenced in the initial injection of the satellite, which should have been at a 57 degree inclination with a 1500km perigee. Due to kick motor firing problems, the satellite finished up with a 26 degree inclination with a 3000km perigee, which means that OSCAR-10 passes through the Van Allen radiation belt twice daily, thus being exposed to intense radiation giving depletion layer ionisation that has destroyed a major part of the controlling computer memory, called the "IHU" (Internal Housekeeping Unit).

As this column is being written in late September, loss of command, control and the telemetry is being experienced, the last of which means that the battery voltage is unknown. As the satellite is soon coming to a sun angle that will eclipse the solar cells and prevent battery re-charge, this will result in a drastic reduction in the power supply level and threatens the total loss of the IHU, especially if the limited battery charge is taken by stations employing the satellite's transponders. It is for this reason that AMSAT have been requesting no use of the systems if the transponder is found on due to loss of command.

It is possible that the satellite may survive the eclipse, and the battery the very low temperatures experienced, and it is still possible that users may be asked during this time to load the satellite in order to fully discharge the battery, thus permitting a "wipe" of any charges on the c.m.o.s. IHU memory by de-powering, and then to permit a steady re-charge as the satellite returns to solar cell illumination in the hope that re-programming of the computer will permit operations to continue. At this time it is imperative that potential users closely follow the numerous AMSAT nets to learn of the changing situation, in order to assist with the planned programme instituted by the command stations in trying to maintain OSCAR-10 as a functional satellite.

Currently large scale effort is being put into attempting to load programs that will permit sun attitude changes by magnetorquing, by command stations in Germany, Canada, New Zealand and Australia, and all available power is needed for this attempt. By November, when you will be reading this column, we should know if the attempted resurrection has been successful.

Phase III-C

The successor to OSCAR-10 still looks hopeful in mid-1987, and it should prove to be bigger and better, with improved shielding for the memory. Already AMSAT have obtained at bargain costs a new series of Harris memory modules valued at US$ 80 000 for the OSCAR-10 successor that are far more radiation hardened than those in the current satellite. Additional memory will also be provided to 32Kbytes that will give additional bulletin facilities and also act as a "spare" facility back up.

A computer print out from AMSAT President WA2LQQ (Fig. 5) shows the "view" from the coming satellite as it is above the UK at 57 degrees North, 0 degrees East, with four continents having simultaneous access!

Phase IV

AMSAT have now formulated a one year study programme that could see the launch of a pair of geosynchronous satellites that would provide high speed packet trunks, digital ATV and intercontinental QSO between mobile and hand-held walkie talkie users by 1990–1991.

Already launch opportunities can be seen that will permit amateurs to fully occupy the precious u.h.f. and s.h.f. bands that are being looked at with greed by commercial interests, by utilising the 2m, 70cm, 24cm and 13cm bands. One GEOSAT placed over the equator 47 degrees west interlinked by ground station relay to another over 145 degrees west is under consideration to provide virtual world wide amateur communications independent of the vagaries of our sun.

Technically, all is possible, and it remains to be seen if the £700K needed for the project (four times the cost of OSCAR-10) can be realised by the "ways and means" group by international funding and donation.

MIR and Salyut-7

Both space stations are unoccupied at the time of writing, and Salyut-7 has been boosted up to a higher orbit to continue its passage in acting as a store and supply source to future MIR activities.

In late September, Bandi, of HG5BME, the Technical University of Budapest, went to Moscow to discuss with the DOSAAF satellite group feasibility of having a "ham in space" mission from the space station(s), and other related amateur radio space activities.

John Branegan GM4IHJ, has been pursuing a very interesting study of the propagational variables of the Cosmos 19·955MHz beacon attached to Salyut-7 that is evidencing some fascinating new information by outdating some of the earlier assumptions of earth—F2 earth reflections considered responsible for sub-horizon reception of satellite signals coming from above and within the ionosphere. In the same way as looking through the sea tells one far more of its content than merely observing surface reflections, the satellite h.f. path is giving much data that we hope to give some details of in a future column.

UoSATS

The bulletin board of UoSAT-OSCAR-9 which has been giving regular news weekly updated for transmission each Saturday and Sunday may soon be changed to hold a content that stays on board for one month, whilst UoSAT-OSCAR-11 will continue to have its bulletin updated on a weekly basis, or even more frequently if some hot news comes about. Some of our readers who obtained the earlier tapes of computer programs have found that they are no longer decoding the telemetry, which has changed its format. If they return their tapes to source with postage, they can have them replaced with the new

program that will perform on the new format as before.

U-o-9 will carry the monthly bulletin with the months schedule, including WOD (Whole Orbit Data) surveys, the diary description, and any special events. The 21MHz beacon will be on daily, and new WOD surveys will commence on a daily basis, with the radiation experiment (channel 3) on three consecutive days, probably starting Saturdays. CCD images will be sent down on Wednesdays, of images taken the previous Thursday, and listed as to when taken in the diary. The latest picture is shown in Fig. 7.

In addition to the usual 2m (145·825MHz) transmission, U-o-11 includes the 70cm and 2GHz experiment, and will contain both bulletins and the latest Keplerian elements for all the main satellites. The digitalker, with its larger vocabulary and greater f.m. deviation, (hence better readability) will come on Wednesdays, primarily for school use. Reports of the 2GHz beacon that will transmit on Saturdays would be appreciated, as would requests for any special contents on the WOD channels. Wednesday will be the day for 70cm deployment. The diary including the WOD, telemetry, status points and bulletin will be on Saturdays and Sundays, and the memory loading for all of this will be accomplished on Thursdays.

UA3CR/MM and 4K1

Leo and the UK3KP Antarctic expedition will leave Moscow by boat in mid-October, and will be active on f.m. as they come down the North Sea using the calls EK3KP, 4K1CR, UA3CR, UK3KP, etc. They will try to come up on S20 and the repeaters when accessible and would like to talk satellites and the like to interested callers. They will hope to call in the 3·782MHz AMSAT-UK nets, and will be on 14·182MHz as they go to the pole via Las Palmas and Montevideo, arriving on the Antarctic mainland on Christmas day. They will be active on the satellites from 4K1CR and 4K1KP, and will be navigating across the continent by using COSPAS/SARSAT information on the UoSAT digitalker if all the plans work out. If all goes well, it may be possible for them to carry a new solid state DCE (Data Communications Experiment) package now developed by the University of Surrey UoSAT team in order to prove the effectiveness of communications with digital communications from a remote area. All in all, it looks like being an excellent piece of international amateur radio co-operation.

DP0SL

It would appear that the list of stations taped by the SPACELAB STS 61-A SHUTTLE DP0SL operation was incomplete, as **Doug Nicolson G0FBS**, nee G6LBU, has sent in his QSL card (Fig. 1) to confirm this fact. Doug received his card in May, and hopes that some more readers may be fortunate to yet get a QSL following more fine attention to the tape made on the mission.

Reports to arrive by November 20

Quarter Century of HAMSATS

December 12 marks 25 years of amateur satellites commemorating a quarter of a century of OSCAR, as it was this day in 1961 when OSCAR-1 was launched, to send its "Hi Hi" around our planet. Since then, enormous strides have been made in this part of our hobby, which could hardly have been envisaged by the enthusiasts of those times. To remind readers of those who helped make history, Figs. 2 and 3 show the station of Jesus EA4AO, taken in 1965 when he was very active on OSCAR-3. Note the station equipment, and the earth globe used for tracking the satellite. Jesus is still active on all the new modes and orbiters, and is on OSCAR-10 Mode "L" now. If we make a comparison with Figs. 4 and 6, the ultra modern station and dish of JR1WZI, who has worked 64 different stations around the world on Mode "L" (including EA4AO) we can see that things have moved on more than a little.

To commemorate the anniversary, veteran and new OSCAR operators alike will be encouraged to polish their operating skills over the entire month of December by contacting as many other 'oscarators' as possible via the satellites, to exchange your AMSAT membership numbers, your international satellite organisations, satellites worked through, and to compare experiences in time. The top ten stations will be recognised with a unique engraved OSCAR 25th. Anniversary Operating Even Plaque, and all who enter will receive an OSCAR 25th Anniversary Operating Event Certificate.

VHF BANDS

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

by Ron Ham BRS15744

Regular readers will know that my columns usually run from the 15th of a month to the 14th of the following, however, this time it is extended by about 10 days, by the change in publication date. This change should help toward closing that unavoidable gap between the time when I receive your reports and when you see to them in *PW*. Be sure to get your reports to me in time, see the dates at the end of the section.

Solar

"Allan Doherty GI8YDZ, mentions that he worked OY9JD and a couple of GMs during an aurora on August 20, and Ray James GM4CXM was on a meteor scatter sked at 0500 on September 12 and found that the signals from the beacons at Keil—DL0PR 144·910MHz and Lerwick—GB3LER 144·965MHz, were tone-A," wrote **Lawrence Morgan GM0ATQ** from Greenock. He added, "At 1800, I heard GM4IPK, 100 per cent auroral on s.s.b."

"Auroral activity was trickling away from August 28 to 31, with reports from Halifax, Nova Scotia, on the 30th and observations from northern Scotland," said **Ron Livesey**, Glasgow. He is the auroral coordinator for the British Astronomical Association. Ron also received reports of aurora on September 5 and 11, from the weathership, *Cumulus* and observers in Northumberland and Stornaway. **Karl Lewis** in Saltash, told Ron that his magnetometer was very unsettled on August 21, 22 and 29 and stormy on the 30th and Ron's own magnetometer was particularly active on September 4, 5, 11, 12, 13, 17 and 20. "Most aurorae at this time mainly appear as arcs, rayed arcs or rayed bundles, sometimes quiet, sometimes active, but usually at the higher magnetic latitudes. These are the coronal hole or sunspot minimum high speed solar wind streams, so, although there is seldom a sunspot to be seen at present, disturbance of the earth's magnetic field does not cease," writes Ron. He also received reports of auroral disturbance to radio signals from August 21 to 24 and on September 12. The U.S. Space Environmental Services, Boulder, Colorado, listed, "Major storm at high latitudes," from 21 to 24 and, "some high latitude activity from 25 to 31."

Fred Pallant G3RNM in Storrington, worked a couple of GMs on 28MHz, around 1900 on the 26th and noted that the signals from the station in Aberdeen were raspy, but those from the GM in Elgin were normal.

Gerry Brownlow observed a blackout on the 14MHz band while he was operating the Chalk Pits Museum station GB3CPM, at Amberley, during the morning of the 31st.

Ted Waring in Bristol, observed a single sunspot on August 27 and September 3. At his observatory in Selsey, **Patrick Moore**, made a drawing of the sunspot on the 27th, Fig. 1. From Johannesburg, **Bob Anderson's** group counted 5 spots in a group on August 21, 3 on the 22nd and 2 on days 23, 24 to 28 and 31. "Overcast and rain on 29/30," said Bob. In Sevenoaks, **Cmdr. Henry Hatfield**, using his spectrohelioscope on August 23, 29 and 31 and September 2, 4, 5, 8, 9 and 10, observed one or two spots on the disc at any one time together with 3 or 4 filaments and a few quiet prominences. "On days 9 and 10, a small spot was seen in latitude 26°N, possibly indicating that it is one of the first of the new series," said Henry.

Sporadic-E

I see in the Chichester Club newsletter that Kevin Piper G0CHE, is always looking for contacts on 144MHz during Sporadic-E openings. In June and July he worked stations in Italy, Malta, Sweden, USSR and Yugoslavia, thus adding 5 new locator squares to his total during the 1986 Sporadic-E season. At the end of the season, I counted 17 very strong signals from eastern-European f.m. broadcast stations, operating between 66 and 73MHz, during an opening around 1815 on September 5

Fig. 1

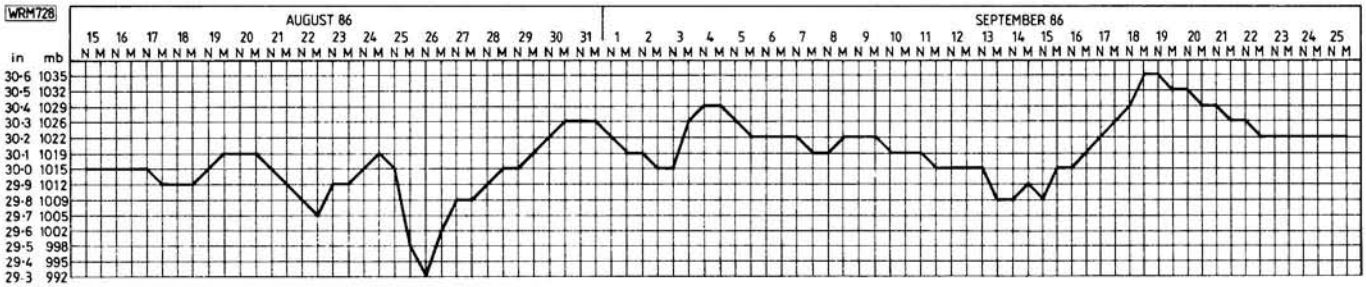
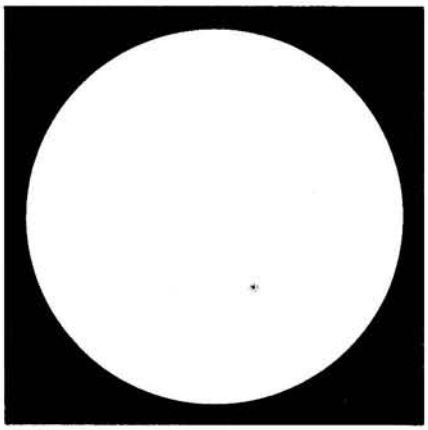


Fig. 2 ▲



▲ Fig. 3

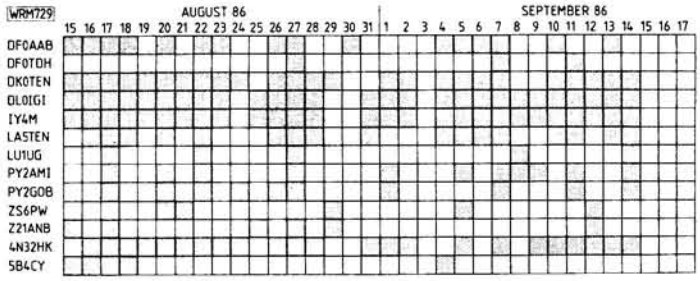


Fig. 4 ▶

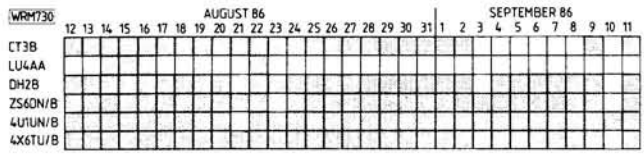


Fig. 5 ▶

and 46 such signals while a very intense disturbance was in progress at 0839 on the 20th.

The 28MHz Band

"Plenty of Sporadic-E openings on 28MHz through August with most European countries being heard," writes **Dave Lingard G0CLH** from Birmingham. He also worked 5N9GM on the 17th, 4X6DK on September 5 and stations in CE, CT, LU, PY, ZP and 9Y, on the 14th.

At 1534 on the 8th, Fred Pallant logged an EA at good strength and between 1900 and 1930 he received s.s.b. signals from Brazil, Scandinavia and the USSR.

During the month prior to September 15, **Don Hodgkinson G0EZI** in Hanworth worked CE3HFI, LX1GQ and UM8MIG, giving him three new countries, plus stations in Argentina and Brazil. "Luxembourg is a difficult country to work from this QTH because the distance appears to be too short for normal Sporadic-E," said Don. He also heard, but did not work, s.s.b. signals from CE3JED, LU1HOO, LU3MAM, LU7HJM, LU9ENE, PP5AN, PT9ZZ, PY1YT, PY7ZZ, ZP5PMQ and 5N9GM. "A rather strange one, on c.w., on the 14th was PU2LOK, presumably from Brazil," observed Don. While on holiday near Dumfries early in September, Brazil was the best DX heard by **Gordon Pheasant G4BPY.** He was using his Sony ICF-2001D and a wire dipole on the Galloway hills.

I received c.w. signals from Scandinavian stations at 1640 on August 22 and Europeans at 0845 on September 20.

During the month of August, **Filip Rogister** was delighted to work European and British amateurs on the 14, 21 and 28MHz bands, using the callsign ON1BRL/EA, from a sea level location at Lage on the Atlantic coast of Spain. Filip, now resident in the UK, used an FT-102 with wire dipoles at only 9m a.g.l. He often heard British f.m. stations on 29MHz many times, like locals, as well as signals from the Rutherford Appleton Labs. beacon—GB3RAL, which he cannot normally hear in Belgium and Luxembourg.

Propagation Beacons

First, my thanks to **Chris van den Berg**, The Hague, **Len Fennelow G4ODH** in Wisbech, Henry Hatfield, Don Hodgkinson, **Norman Hyde G2AIH** from Epsom Downs, **Bill Kelly** in Belfast, Lawrence Morgan, **Ted Owen** in Maldon, Fred Pallant, Gordon Pheasant, Filip Rogister and Ted Waring, for their routine beacon observations which enabled me to prepare our monthly 28MHz chart, Fig. 4.

"This month, rather dull, skip seemed to be confined to Europe, though occasionally down to the Mediterranean area," wrote Bill Kelly.

"It was good to hear the Brazilian beacons coming through more frequently, usually in the late afternoon/evening, though nothing else from South America was heard," remarked Don Hodgkinson. He continued, "An interesting one, first heard on August 28, was G3NQF at 1845GMT, sending, "DE G3NQF QTH STROUD LAT 51N 2W PWR 50W ANT 5/8 GP" on 28·211MHz. Stroud is about 130km from here, so I put that down to good groundwave conditions. I received this signal again at 2154GMT on September 11 on 28·200MHz, with a different message format, "DE G3NQF QTH 51N 2W STROUD PWR 5W ANT 5/8 GP" and lower power. During a QSO with a Yugoslavian station, Don learnt that a new v.h.f. beacon 4N3ZVK, replacing YU3VHF, on 144·927MHz, is on the same site as 4N3ZHK. "Both beacons are 1219m a.s.l. at locator JN76MC," said Don. He also gets reports that signals from GB3RAL are being heard in various parts of Europe.

Gordon Pheasant received signals from the German and Italian beacons DK0TEN and IY4M, via meteor scatter on September 3 and from the 50MHz beacon in Gibraltar ZB2VHF on days 6 and 8.

"14MHz beacons have shown a very consistent pattern, apart from the disappearance of CT3B for a whole week in early September. LU4AA was logged 4 times," reported Len Fennelow, for the month ending on September 11 (Fig. 5).

The generally high atmospheric pressure enabled Don Hodgkinson to receive signals from the 144MHz beacons at Cornwall GB3CTC and Wrotham GB3VHF, each day from August 15 to September 14, the Angus beacon GB3ANG on days 18, 19, 24 and 31 and September 14. He also logged the French beacon FX0THF on September 11 to 14 inclusive and FX3THF on August 16, 19–22, 24 and 30 and September 1, 2, 4, 6, 11, 12 and 14.

Both Chris van den Berg and I received signals from GB3VHF each day from August 15 to September 10.

Tropospheric

The slightly rounded atmospheric pressure readings, Fig. 2, were taken at noon and midnight between August 15 and September 25 from the Short and Mason Barograph installed at my QTH. Briefly, even the small fluctuations in the predominantly high pressure, throughout the period, were good news for the v.h.f/u.h.f. enthusiast. Although a real big opening was lacking, several minor events occurred which frequently disturbed Band II and the 144MHz repeater network. Between August 15 and September 10, Chris van den Berg received signals almost daily from the repeaters in Belgium—ON0OV, France—FZ2THF and the UK—Danbury GB3DA on R5, on August 17 and 29 and September 1, 4, 5 and 10, Maidstone—GB3KN R4 on August 23 and September 1, 5 and 7 to 10 and Tacolneston—GB3NB R1 on August 15, 16, 17, 22 and 24 and September 5 and 10.

"The RSGB/IARU 144MHz contest, on September 6/7, produced good conditions and plenty of activity, including Continentals," wrote George Haylock G2DHV from Sidcup. Although his best DX was with PA0GUS/P, at 490km, George was delighted to work G4APA/P in north Yorkshire, plus 4 other Gs at over 200km and 4 stations in Belgium, 5 in France, 7 in Holland, 4 in Wales and he heard GU0BDV on the key. This is a fine effort when one considers that George uses 25W to a 7-element Yagi and that his QTH is in a hollow.

Early in September, Gordon Pheasant climbed to the top of Knockgray Down and using just 2·5W of s.s.b. from a 144 MHz handheld transceiver to a HB9CV antenna, he exchanged signals with G3UNM and G4EUE in the Midlands.

Band II

Bill Kelly kindly sent the QSL card, Fig. 1, that he received from the American Forces Network confirming his report of their signals which he received on 106·025MHz at 1320GMT on July 1.

During the afternoon of August 22 **Chris Wood**, from his QTH in Durham, logged BBC Radios Derby, Devon, Furness, Leicester, Newcastle, Nottingham and Scotland and during a similar opening on September 20, he added BBC Radios Cleveland, Humberside, Lancashire, Leeds, Sheffield, Shropshire and York to the above. Chris also received the ILR stations Broadland, Leicester Sound, Hallam, Hereward, Metro, Pennine, Red Rose, Radio Aire, Signal Radio and Tees.

While tuning Band II, on my Plustron TVR5D, in Michelham Priory, East-Sussex I found many interstation warbles throughout the band and several, very strong, signals from France between 95 and 100MHz.

Harold Brodribb, St. Leonards-on-Sea, sent a most detailed log of the French networks—Culture Frequence Nord, Inter and Musique, that he received at various times and strengths, between August 15 and September 23 from stations in Abbeville, Amiens, Boulogne, Caen, Le Havre, Lille, Neufchatel, Reims and Rouen. "I agree with Bill Kelly," said Harold . . . "the best DX time is between 0500 and 0900GMT, both for signal strength and the hope of some utilities being quieter."

Reports must arrive by November 20

TELEVISION

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

by Ron Ham BRS15744

Apart from isolated events at midday on the 12th and during the morning of the 20th, the 1986 Sporadic-E season, which began in May, appeared to close early in September. Generally speaking it was an active period, with the majority of TVDXers getting their fair share of pictures from those countries listed in Fig. 1 and, at times, a few more. As usual my thanks are due to **Stuart Arundale** in Manchester, **Mike Bennett** in Slough, **Harold Brodribb** from St. Leonards-on-Sea, **Len Eastman** in Bristol, **Simon Hamer** from New Radnor, **Tony and Edwina Mancini** in Belper, **David Meredith** in Dudley, **Lawrence Morgan** from Greenock, **Gordon Pheasant** from Walsall, **Ian Smith** in Paisley and **Noel Smythe** from Penyrheol, for their detailed logs which enabled me to produce the following report.

Band I

"During this season I kept a note of the number of times that I received signals from the most popular countries and Spain was top at 40 and Italy next at 23," wrote David Meredith. He reported that the Sporadic-E conditions on September 7 lasted from around 0930 to 1600 with strong pictures from Poland and Spain.

"Another excellent month for DXing," remarked Mike Bennett, on September 11, adding, "Two unusual ones, J.T.V.—Jordan and a test card scribed DDK 2—unidentified. Also a couple of new captions for me this month, TG 1 which is the Italian RAI news and EPP TVB1, a JRT caption from Belgrade".

"Early in September, some members of the Kidderminster Radio Society camped on the Black Mixen on Penyfforest Hill, with the luxury of a caravan and an attached tent. They were working on the h.f. and v.h.f. bands and some evenings I took up my Hitachi K2300 receiver so they could see some good ATV signals with their 21-element 432MHz antenna. I also demonstrated DXTV with Norwegian news, a concert from Sweden, Estonian TV from Russia and Polish news, showing the Brighton TUC Conference and ending with the Polish flag and national anthem," wrote Simon Hamer.

"At last after many months of trying, I've managed to catch Denmark television, in the form of a test card. I've noticed a distinct lack of pictures from Scandinavia this year in Paisley, as opposed to last year when I received Norway nearly every week from June to August," comments Ian Smith. Maybe your area is too close to Scandinavia Ian, for this season's more predominant Sporadic-E reflections.

Among the many interesting items mentioned by Noel Smythe in his log were the European games on August 27, a news flash about a high-jacking from Italy, on September 5, and an episode of *Colditz*, from Spain at 1900 on the 6th.

An entry in the Mancini's log for August 11 read; "Far too much to go into detail so we will just put the countries logged, Austria, Czechoslovakia, Denmark, E. Germany, Finland, Iceland, Italy, 4 Norwegian regions, Poland, Switzerland, Spain and the USSR." They rightly summed it up by saying, "A DXers dream." On the 14th, on Chs. R1 and 2, they saw Poland's TVP-1 logo from Gdansk, a discussion type programme called *Domator* and test cards from Czechoslovakian Television, enscribed RS-KH and SR-ITV BRATISLAVIA.

Between 1300 and 1355 on August 27, the Mancinis saw Spain's TVE 1, regional news from Aitana, Hoy, Madrid and Santiago." It was also exicting on the 27th to see the TSS EESTI TV, TALLIN, test card, with its digital clock," said Tony. He also enclosed a mystery picture, with logo, which they received, on Ch. R2, on July 24 (Fig. 7). After some detective work with maps and her knowledge of Russian, my wife Joan thinks that this signal came from Georgia on the east of the Black Sea. Any other suggestions readers?

During one of the Soviet sports reports (Fig. 2) I saw the introduction (Fig. 3), a close up of the logo (Fig. 4) and a game progress report (Fig. 5) of an obviously important chess tournament.

"August 27 was the most exciting period of DXTV for me so far," wrote Lawrence Morgan after seeing many idents including an Arabic caption and an outside panorama of a city with mosques and temples.

Len Eastman saw a lady presenter of a Spanish afternoon chat show (Fig. 6).

Your letters confirmed that at least 10 regional stations were received from Norway and identified by the inscriptions on their test cards; NORGE BAGN, BREMANGER, GAMLEM, GREIPSTAD, GULEN, HEMNES, KONGSBERG, KVELDNYTT, MELHUS and STEIGEN.

News programmes and their captions are always interesting and some of you reported seeing BPEMR, Fig. 8 and HOBOCTN from the USSR, 'dt'—Poland, TAGESSCHAU (Germany), TELEDIARIO (Spain) and TELEJORNAL (Portugal) and ZPRAVY from Czechoslovakia. Among other test card idents seen were from Austria—ORF FS1; Belgium—RTBF 1; Denmark—DR DANMARK; E. Germany—DFF and DDR F1; Finland—YLE HLKI (Helsinki); Holland— PTT NED 1; Hungary—MTV 1; Iceland—RUV ISLAND; Italy—RAI 1; Portugal—RTP-LISB 1; Fig. 9, received by Noel Smythe; Rumania—TVR BUCURESTI; Spain—TVE 2; Sweden—TV1 SVERIGE; Switzerland—+PTT SRG 1; USSR—0249 Optical Test Card, Fig. 10, received by the Mancinis; W. Germany—ARD 1 and Yugoslavia—JRT BGRD and ZGRB 1, representing Belgrade and Zagreb, respectively.

Tropospheric

Excluding the low pressure of 29·3in (992mb) which I recorded at midday on August 26, the barometer was predominantly high throughout this extended reporting period, August 15 to September 25, and although the noon average was almost 30·1 (1019mb), it peaked at 30·6 (1036) on September 18 and 19. These figures were good news for DX in Bands III, IV and V.

On August 17, Simon Hamer received pictures from Radio Telefis Eireann 1 on their Chs. F and H and RTE 2 on Chs. I and J in Band III and Chs. 29 and 33 in the u.h.f. band, respectively. **Fig. 1 ▼**

	DXer											
Country	1	2	3	4	5	6	7	8	9	10	11	12
Austria	X	X			X		X	X		X	X	X
Belgium		X					X					
Czechoslovakia	X	X			X		X					X
Denmark		X					X				X	X
East Germany		X					X				X	X
Finland				X	X		X					
Hungary		X		X	X	X						X
Iceland		X		X			X					
Italy		X	X		X		X				X	X
Netherlands		X					X			X		
Norway		X	X	X	X	X	X					X
Poland		X		X	X		X	X			X	X
Portugal	X	X		X			X				X	X
Rumania		X										
Spain	X	X		X	X		X	X	X	X	X	X
Sweden		X		X	X		X					X
Switzerland		X			X		X					X
USSR		X	X	X	X	X	X	X		X	X	X
West Germany					X		X			X	X	X
Yugoslavia		X			X		X			X		X

1 Stuart Arundale
2 Mike Bennett
3 Harold Brodribb
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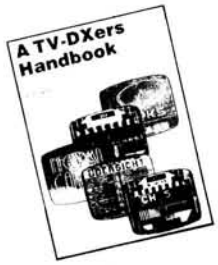

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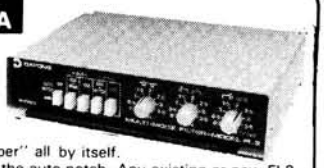

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Fig. 2: Soviet sports programme

Fig. 3: Soviet chess tournament

Fig. 4: Close-up of chess logo

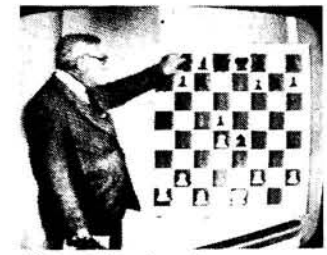

Fig. 5: Soviet chess tournament in progress

Fig. 6: Spanish (TVE)

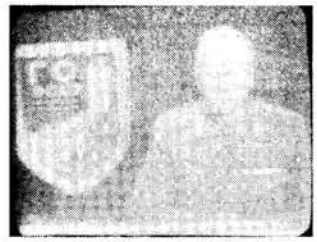

Fig. 7: Mystery Russian picture Ch. R2

Fig. 8: Soviet News logo

Fig. 9: Portugese test card

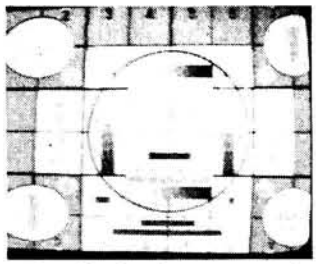

Fig. 10: Soviet test card

Fig. 11: Bloomdean amplified loop

Fig. 12: Scottish TV logo

Fig. 13: SSTV picture from G4ULP

While David Meredith was trying out his new XG14 antenna on the 18th, he received u.h.f. signals from S4C at Carmel, a distance of about 145km.

Harold Brodribb, received pictures from Belgium and France in Band III on the 17th. I logged a test card from Belgium; BRT TV1 on Ch. E10 early on the 15th and weak pictures, with some QSB on Chs. E8 and 10 at 1915 on the 19th.

George Garden in Edinburgh, has added a Bloomdean amplified loop antenna (Fig. 11) to his station for portable use in conjunction with his JVC CX610 receiver. On September 2, George took this outfit to a high spot on the Pentland Hills for a tune around the u.h.f. band and with the loop mounted on a small cairn of stones, he received strong colour pictures from the Selkirk and Darvel transmitters of Border and Scottish IBA as well as Grampian IBA's transmitters at Angus and Durris. "My greatest surprise was on Ch. 34, when I received a strong b/w picture of a film, which, on checking the TX guide, could only have come from the Border IBA transmitter at Caldbeck near Carlisle," said George. He added, "The view of Edinburgh city up there is breathtaking."

Last summer, **Brian Buckley**, turned his u.h.f. antenna east from his QTH in Dungannon and located pictures from Scottish Television, Fig. 12, on his GEC/McMichael C1403H receiver, without preamplifiers.

On September 4, 6 and 7 Harold Brodribb, logged pictures from Belgium—RTBF 1; Germany—SWF 1 HGR and Luxembourg—RTL+, in Band III and negative pictures from the French stations at Lille and Boulogne, Chs. 27 and 34, on the 6th. While the very high pressure was gradually falling, from the 20th to 23rd inclusive, Harold and I received strong pictures, often in colour, from Belgium, Germany and Holland in Band III. Harold also found negative signals from French stations on Chs. F5, 6, 7, 9 and 10, in Band III, and Chs. E21, 24, 27, 40, 43, 48, 51, 54, 57, 59, 60, 63 and 65, in Bands IV and V. We also identified programmes from Germany's ARD/ZDF and NDR and WDR networks.

ATV and SSTV

Simon Hamer received fast scan Amateur Television pictures, on 435MHz, from G4YPB, Kidderminster, on September 5, G4DVN, Stoke-on-Trent, and G8VZT and G8YDG Telford, on the 9th and G1TRS, Tenbury Wells Radio Society, on the 10th. "All pictures were P5 rating," said Simon.

Despite a move of QTH in Germany during recent months, **Allan Sancto** DD5FM (G6BWH), found a bit of time for a tune around and logged slow scan television pictures from SM5EEP, a G station calling, "CQ SSTV", Fig. 13, and later in QSO with IS0XRI and the captions, "MY WISHFUL HOBBY HT HT" and "5 ELE WX SUNNY TEMP 12C HW COPY".

Reports must arrive by November 20

MW BROADCAST BAND DX

Reports to: Brian Oddy G3FEX, Three Corners, Merryfield Way, Storrington, W. Sussex RH20 4NS

by Brian Oddy G3FEX

The traditional way of keeping accurate records about the reception of signals on any band is to note them in a log book under certain headings. However, as time goes by more and more log books are needed to store the facts. It is then no longer a simple matter to look up a previous record to make comparisons! One way cf overcoming this problem might be to enter the facts into a home computer **database** and then store them on a cassette or disc so that they may be easily viewed and up-dated at any time—it is then a simple matter to ask the computer to search for the entries required to make comparisons and even provide a print-out!

Log keeping for the m.w. listener is especially important because the signals noted during the hours of daylight may well be quite different from those after dark, due to the effects of the sun on the lower layers of the ionosphere. Some way of making simple comparisons between day-time and night-time reception is therefore of importance to the serious m.w. listener and a very novel approach to this problem has been devised by **John Greenwood** of Evesham. He uses two, spiral-bound, note books to provide a very comprehensive log—a similar system is employed in both of these books, which detail "Strong" and "Weak" signals respectively.

Each pair of facing pages in the book is assigned a 100kHz segment of the m.w. band and 9kHz frequency steps are

Freq (kHz)	Station	BBC/ ILR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
603	Invicta Sound	I		X													
630	R. Cornwall	B	X							X							
630	R. Bedfordshire	B		X	X	X		X		X							
666	Devonair R.	I	X		X											X	
666	R. York	B						X		X					X	X	
756	R. Cumbria	B													X		
774	R. Leeds	B						X								X	
774	Severn Sound	I			X												
792	Chiltern R.	I						X								X	
801	R. Devon	B	X		X	X				X			X				
828	R. WM	B													X		
828	R. Aire	I						X								X	
828	Chiltern Radio	I			X					X							
837	R. Leicester	B				X									X	X	
855	R. Devon	B													X		
855	R. Norfolk	B		X				X									
855	R. Lancashire	B						X								X	
873	R. Norfolk	B						X									
936	GWR	I			X												
954	Devonair R.	I											X				
990	R. Devon	B								X							
990	Beacon R.	I	X														
990	Hallam R.	I						X								X	
999	Red Rose R.	I	X					X	X	X						X	
999	R. Trent	I						X									
1026	R. Jersey	B											X				
1026	R. Cambridgeshire	B						X								X	
1035	R. Sheffield	B						X							X	X	
1035	R. Kent	B		X													
1035	North Sound R.	I								X							
1035	West Sound	I								X							
1107	R. Northampton	B			X			X									
1116	R. Derby	B						X					X		X	X	
1116	R. Guernsey	B												X			
1152	LBC	I	X														
1152	R. Clyde	I								X							
1152	BRMB	I				X											
1152	Plymouth Sound	I	X														
1152	Piccadilly R.	I							X							X	
1152	R. Broadland	I	X			X											X
1161	GWR	I			X												
1161	R. Tay	I							X	X							
1161	Viking R.	I						X					X			X	

Freq (kHz)	Station	BBC/ ILR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1170	Swansea Sound	I											X				
1170	R. Tees	I						X									
1170	R. Orwell	I		X													
1170	Signal R.	I							X							X	
1242	Invicta Sound	I				X								X			
1260	GWR	I												X			
1260	Marcher Sound	I							X							X	
1260	Leicester Sound	I						X									
1278	Pennine R.	I		X				X								X	
1305	Red Dragon R.	I			X										X		
1305	R. Hallam	I						X								X	
1323	R. Bristol	B											X				
1323	Southern Sound	I		X													
1332	Hereward R.	I	X	X				X	X			X	X			X	
1359	Essex R.	I							X								
1359	Red Dragon R.	I			X			X									
1359	Mercia Sound	I													X		X
1368	R. Lincolnshire	B						X									
1431	Essex R.	I							X								
1431	R. 210	I				X											
1458	R. London	B			X												
1458	R. Manchester	B							X						X	X	
1458	R. Newcastle	B						X									
1458	R. Devon	B				X											
1476	County Sound	I			X	X		X						X			
1485	R. Merseyside	B				X			X							X	
1485	R. Humberside	B		X				X									
1485	R. Sussex	B		X													
1485	R. Oxford	B													X		
1503	R. Stoke-on-Trent	B						X	X	X						X	
1521	R. Mercury	I		X	X	X		X	X	X							
1521	R. Nottingham	B								X							
1530	Pennine R.	I										X	X			X	
1530	R. Wyvern	I				X	X			X	X						
1548	Capital R.	I	X							X		X					
1548	R. Bristol	B			X												
1548	R. Forth	I										X					
1548	R. City	I							X				X				
1557	Hereward R.	I	X						X	X		X					
1557	R. Lancashire	B					X		X	X					X	X	
1584	R. Nottingham	B														X	
1584	R. Tay	I															X
1602	R. Kent	B						X			X					X	

Fig. 3

marked in down the margin of the left-hand page. A log of each day-time signal received in this segment is then noted on the left-hand page while the facing right-hand page details the night-time signals heard. Strong signals are detailed in that log book but weak signals are moved to the weak signal log book and a note in the remarks column refers to this point. Arrow symbols are used to indicate that co-channel stations can be separated by using a directional antenna and where applicable, are included in the remarks column—the whole concept is an effective solution to the problem of m.w. log keeping!

DX Report

(Note: All frequencies in kHz: Time UTC = GMT)

Transatlantic DX: Now that the nights are growing longer as we approach the winter period, the Transatlantic DX signals are being heard earlier in the UK. One of those early signals to look out for is the Caribbean Beacon on 1610, located in Anguilla. According to a QSL card received by **Alexander Little** confirming his reception of their signals in Glasgow, they have been receiving many reports from the UK recently. They broadcast mainly Evangelical programmes which **Billy Kelly** has been hearing in Belfast as early as 0015.

Some of the most frequently reported stations to appear early on the band are located in Newfoundland—CJYQ 930 of St. Johns heads the list and is normally a good signal by 0030 just now. Although, it was apparently picked up in Macclesfield at 2230 recently by **Phil Englehard G0DNB.** A close runner-up is CKYQ located in Grand Bank, which broadcasts many exciting ball game commentaries and relays other sporting events on 610—their signal is often good by 0100, although Billy Kelly is a regular listener to their programmes at all kinds of unearthly hours! CBNA 600 in St. Anthony, mentioned by **George Morley** of Redhill, can sometimes be heard as early as 0001, but the signals are often very weak.

Apart from these early arrivals on the band from Newfoundland, a number of other Canadian signals can be heard much later at night in the UK, for example Bill Kelly has been hearing CBN in St. Johns on 640 very well at 0300 and also listened to CKLM 1570 in Lavel, Quebec, broadcasting a programme of songs in French at 0455.

There are usually a number of interesting signals from the USA to be found on the band too, including New York's WINS on 1010 and WHN on 1050 which bring many topical items to the ears of the listener along with details of New York's news and weather reports; also WWWE 1100 in Cleveland, Ohio, and WMRE the "memory" station from Boston, which broadcasts music and memories from the past on 1510—all heard recently by George Morley between 0200 and 0300.

1 Michael Banbrook—Streatham
2 Reg Billing—Rochester
3 Colin Diffel—Corsham
4 Francis Hearne—Bristol
5 Paul Hegart—Blackrock, Co. Dublin
6 Dave Jackson—Goole
7 David Jones—Walton, Liverpool
8 Bill Kelly—Belfast
9 John Parry—Northwich
10 Stewart Russell—Forfar
11 Darren Taplin—Port Isaac
12 Alan Williams—Helston
13 Chris Wood—Washington, Co. Durham
14 Bill Eyre—Stockport
15 Bob Taylor—Edinburgh

A report on the weather in Washington DC can be heard via WTOP on 1500 at 0415 according to Bill Kelly—adverts, a financial report and pop music were just some of the interesting items heard by Bill following that report, who not only enjoys the thrill of looking for the DX, but listens to their programmes too! WCAU 1210 in Philadelphia, also mentioned in his log, can be heard at 0430.

Tim Shirley has been checking the DX scene at night in Bristol and heard WFHG from Bristol in Virginia on 980 at 0100 for half an hour before it faded out. A programme of Country and Western music attracted his attention to a station which he believes to be KTKT in Tucson, Arizona on 990—he is now anxiously awaiting their QSL! Tim says he also received several other stations which have not been reported before in this series, so they are subject to confirmation by QSL, namely WNYM 1330 located in New York N.Y. at 0200; KXOL 1360 in Fort Worth, Texas at 0024; WGEE 1360 in Green Bay, Wisconsin at 0330 and KGAY 1430 of Salem, Oregon at 0230.

In an interesting report form Ranburg, S. Africa, **Leo Gieske** says he has been successful in obtaining a QSL from WOAI 1200 located in San Antonio, Texas, and

has been hearing, on a few occasions, signals from WPTR 1540 located in Albany, N.Y. and WQXR 1560 in New York N.Y. Two Canadian stations located in Quebec, namely CKLM 1570 in Lavel and CBJ 1580 in Chicoutimi have been received several times, however Leo thinks conditions are poorer at his location just now than in the past years at this time.

In an effort to improve results, Leo has been experimenting with a "spiral" loop antenna which consists of 9 turns of 15 strand Litz wire wound 10mm apart in a spiral form, tuned by a 500pF variable capacitor. A single turn of 75Ω coaxial cable is spaced 5mm from the inner end of the main winding to form a Faraday shielded inductive coupling loop. This new loop seems to produce a deeper "null" than his normal 1m square loop used for DXing, which consists of 25 turns spaced 6mm apart, tuned by a dual gang 365pF variable capacitor wired in parallel. A simple two turn winding provides the coupling to his Drake SPR4 receiver in this design.

Other DX: Some of the interesting stations which Leo Gieske has been hearing before 0400 when turning his loop towards Europe include Wolfsheim, W. Germany 1017; Saarbrucken, W. Germany 1422; Marnach, Luxembourg 1440; Monte-Carlo, Monaco 1467; Vienna, Austria 1476; Kosice, Czechoslovakia 1521; Mainflingen, W. Germany 1539; Sarnen, Switzerland 1566 and Langenberg, W. Germany 1593. Leo says "Maybe this is not so interesting for the UK m.w. DXer, but for Southern Africa this is considered rather good DX!". The latest batch of QSLs received by him include MBC Mauritius 684; VOA Monserrat 930; JOOR Japan 1179 and 4QD located in Queensland, Australia 1548!

Writing from Christchurch, New Zealand, **David Howe** says he has built up the little reflex receiver design used by John Ratcliffe in Southport, Australia. It is performing well, bringing in many Australian stations when using just the ferrite rod antenna and sometimes the 50kW station KNX 1070 located in Los Angeles, California, USA, too! When a loop antenna is placed near the set, KFRE on 940 can be heard at good strength—this is a 50kW station located in Kavala, California. Using his Trio 9R-59 receiver plus an amplified loop antenna David has been hearing 7SD located in Tasmania, which runs 5kW on 540; Radio Australia via 8DR in Darwin, which runs 2kW on 657 and from New South Wales, he picked-up 2RE a 2kW station in Taree on 1557 and 2BE in Bega, which runs just 200W on 1584—a most impressive list by anyone's standard!

Coming back to the UK, Tim Shirley has been busy checking the l.w. & m.w. bands with his Trio R600 receiver. His extensive l.w. list includes Brasov, Roumania 155 at 0115; Donebach, W. Germany 155 at 1900; Saarlouis, W. Germany 185 at 2100; Etimesgut, Turkey 200 at 0200; Kiev, Ukraine 209 at 0130; Reykjavik, Iceland 209 at 0230; Oslo, Norway 218 at 2359; Warsaw, Poland 227 at 2359; Junglinster, Luxembourg 236 at 0100 and Minsk, USSR 281 at 1500. On the m.w. band he logged Ain Beida, Algeria 531 at 2200; Jerusalem, Israel 531 at 0330; Torshavn, Denmark 531 at 0230; Oulu, Finland 540 at 0100; Maribor, Yugoslavia 558 at 0330; Gafsa, Tunisia 585 at 1900; Oradea, Roumania 603 at 2230; Vigra, Norway 630 at 0500; Neubrandenburg, E. Germany 657 at 1820; Tallinn, USSR 711 at 2359; Dakar, Senegal 765 at 0230 and Cadiz, Spain 1314 at 2100. **Jim Willett** of Grimsby has been looking around the l.w. band after 2100 with his Marconi 2807A "Kestrel" receiver and logged Ankara, Turkey on 182; Azilal, Morocco 209; Erzurum, Turkey 245 and Tipaza, Algeria 254.

Using a Vega 206 receiver while on holiday in Port Isaac, Cornwall, **Darren Taplin** found he could hear Manx Radio, Isle of Man, there at 0930—no doubt the clear sea path enables the "ground wave" signal to reach Port Isaac with little attenuation, whereas at his home location of Tunbridge Wells, only the "sky wave" signal at night makes it audible there. Darren also noted that the BBC Radio Ulster signal on 1341 was good at 1400, too. Another holiday-maker, **Michael Banbrook** of Streatham Vale, London, took his JVC 3050 TV/Radio with him to Falmouth and was amazed at the signals he could hear there, for example RTE-1 on 567 and RTE-2 on 612 & 1278 could be received very strongly 24 hours a day! So remember to take your receiver with you on holiday—it could prove to be very worth-while!

In Helston, **Alan Williams** has changed his receiver to a multi-band Amstrad Model 6010 and was pleased to hear for the first time Alger, Algeria on 891 at 2000. Phil Englehard heard a new one, too—Radio Vilnius on 666 at 2130, which was almost buried under adjacent signals! A first report from **Paul Hegarty,** who uses a Philips PH 4212 valved receiver in Blackrock, Co. Dublin, mentions Radio Moscow 1386 & 1494; Radio Luxembourg 1440; BRT Brussels, Belgium 1512 and Vatican Radio 1530. John Greenwood has been observing BRT on 1512 because he noticed that there is a sudden 20dB lift in signal strength just as dusk occurs in Belgium, although the sun is still above the horizon in Evesham—it lasts for about 10 minutes before a deep fade sets in. It would be interesting to know if listeners in other areas of the UK have observed this effect.

David Jones of Walton, Liverpool, is an American football/baseball fan and recommends anyone interested in these games to listen to AFN Frankfurt, W. Germany 873 in the evening. Using an ITT Golf 330 receiver between 2100 and 0200 he has logged RTE-2 Athlone, S. Ireland 612; RNE1 via La Coruna, Spain 639; BBC World Service Orfordness? 648; Marseille, France 675 and RNE1 Sevilla, Spain 684; DLF Braunschweig, W. Germany 756; SER Sevilla, Spain 792; Kaliningrad, USSR 1143; AFN Stuttgart, W. Germany 1143; Strasbourg, France 1278; RSI Solvesburg, Sweden 1179; Stavanger, Norway 1314; BBC Radio Ulster 1341; Kaunas, USSR 1386; Saarbrucken, W. Germany 1422; Wein-Bisamburg, Austria 1476; Edintsy, USSR 1494 and Stargard, Poland 1503.

Local Radio DX

As can be seen from Fig. 1, there has been plenty of activity and "local" radio is almost a misnomer! Here are a few of the many comments received from DXers this time:

"BBC Radio Essex have commenced test transmissions . . . the main frequency is 765kHz. The Colchester area is served on 792 and Southend on 1530kHz", writes Phil Englehard.

Writing from Goole, **Dave Jackson** mentioned that he is now using a "Sooper Loop" with his Sony ICF-7600D receiver instead of a long wire antenna and says, ". . . I am already highly delighted with its performance!"

Upon his return from a holiday in Port Isaac, Darren Taplin writes "I decided to take my Vega 206 portable with me and report what I heard using its internal rod antenna." During his holiday in Falmouth, Michael Banbrook noticed that, ". . . Capital Radio on 1548 could be heard strongly after 2100."

David Jones says "DXers should try for Red Rose Radio 999kHz from 2100 until 0100UTC . . . 'Argue with Alan Beswick' phone-in is the most popular show in the North West . . . its my favourite as well!"

Many DXers have been looking for the ILR Red Dragon from Cardiff—**Martyn Lindars** of Wallington, Surrey, says, "I have been unable, as yet, to hear the Red Dragon station here." However, **Colin Diffell** of Corsham writes, "I receive the Red Dragon loud and clear here!" It's been heard in Washington, Co. Durham, by **Chris Wood** on 1305, who says, "It seems that Red Dragon has become very popular with DXers!" Jim Willett says, ". . . it's covered by Bradford on 1359, but will keep my ears open for it."

It seems that the Red Dragon has not "ventured" into Scotland however! "I have been trying . . . without success—there are other stations on the same frequency" writes Alexander Little in Glasgow. From Edinburgh, **Robert Taylor** says, "I have been unable so far to hear Red Dragon Radio, RBI Berlin uses 1359 at various times and that comes in loud and clear."

QSL Addresses

ILR West Sound, Radio House, 54 Holmston Road, Ayr KA7 3BD.

ILR Beacon Radio, PO Box 303, 267 Tettenhall Road, Wolverhampton WV8 0DQ.

ILR Southern Sound, Radio House, Franklin Road, Portslade, Brighton BN4 2SS.

SW BROADCAST BANDS

Reports as for Medium Wave DX, but please keep separate

by Brian Oddy G3FEX

For the Newcomer SWL

Some of the basic facts about Halfwave or Hertz antennas have already been mentioned in this series (*PW* September and October '86). Because they can be used as a practical receiving system, as a reference and as a building block for some of the many other antenna designs, it is important to understand a few more of the basic facts about them before moving on to consider some of the antennas which are of special interest to the s.w.l.

When the electromagnetic waves from a distant transmitter arrive in the immediate vicinity of a resonant halfwave antenna, they impart a tiny charge (voltage) onto it, which travels in the form of a tiny current (charge in motion) along the wire to the

end and back in the time of one cycle of the radio frequency signal concerned. It can be shown that in the case of a resonant halfwave antenna the ratio of voltage and current varies along its length, whereby voltage (V) is highest at the ends of the antenna and low at the centre, while the current (I) is highest at the centre and lowest at the ends. This is shown graphically in Fig. 1(a)—the distance measured vertically from any point along the line representing the antenna wire to the curve marked (I) indicates the current as would be measured by an ammeter at that point. The same principle applies to the voltage curve (V)—note, however, the change of phase at the centre of the antenna. The impedance (Z) also varies from very high at the ends (thousands of ohms, kΩ), to a low value at the centre, where it is a pure resistance at resonance called the radiation resistance (R_r)—for a halfwave antenna mounted high and well clear of surrounding objects, the value of R_r is about 72Ω. (If you don't understand Voltage, Current, Resistance and Impedance, it may help if you visit your local library and look for books on very simple "DC & AC Theory".)

Unlike a point source radiator, which in theory could receive signals equally well from all directions, the halfwave antenna exhibits directional properties and responds best to signals which arrive at right angles to the line of the antenna wire, with a minimum response to signals off the ends—it is said to have directivity and this is usually represented graphically by drawing a radiation pattern—Fig. 1(b) shows the radiation pattern for a halfwave antenna. All practical antennas have some form of directivity and different designs produce different radiation patterns—it is therefore important to consider them when erecting any high frequency antenna and also refer to a Great Circle map if reception from particular places is desired—see last month's article.

So far in this series, the only practical antenna we have considered is one which contains a single halfwave erected in the "Inverted L" configuration. It is also possible to erect a wire in a similar manner which is resonant but is several halfwaves long—such an antenna is often called a long wire antenna.

As was explained in the September article in this series, the length of wire required for a resonant halfwave antenna may be calculated by using the formula:

$$L = 142{\cdot}5/f,$$

where L = length of wire in metres; f = frequency of operation in MHz. This formula takes into account end effect and results in the wire being a little shorter than expected. Because the end effect must only be allowed for once in the calculation, when an antenna contains several halfwaves a different formula has to be used to calculate the length of wire required—one which takes into account the number of halfwaves involved, namely:

$$L = 150(N-0{\cdot}05)/f,$$

where L = overall length of wire in metres; N = number of halfwaves and f = frequency of operation in MHz. Let us consider a practical example:

What is the length of wire required for an antenna containing three halfwaves at 21·600MHz?

Answer:

$$L = 150\ (N-0{\cdot}05)/f,$$

so

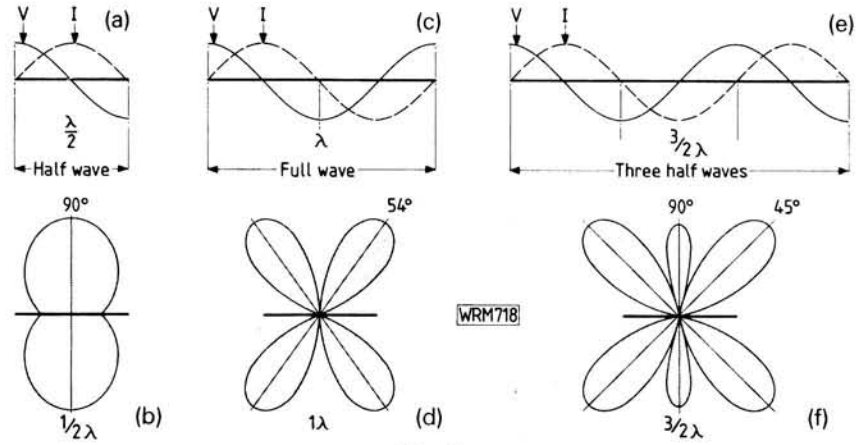

Fig. 1

$$L = 150\ (2{\cdot}95)/21{\cdot}600 = 20{\cdot}48\text{m}.$$

When the wire becomes two or more halfwaves long the directional properties change and the maximum response to incoming signals is no longer at right angles to the wire, for example with a wire two halfwaves long (a fullwave) the radiation pattern becomes a clover-leaf shape with four **lobes** at 54 degrees to the line of the wire—minimum pick-up is at right angles to the wire and off the ends! The reason for this is that the two adjacent halfwaves are out of phase with one another—see Fig. 1(c) and the field patterns from each halfwave interact—Fig. 1(d).

If the length of wire contains three halfwaves as in Fig. 1(e), four lobes at 45 degrees plus two at 90 degrees to the wire exist—see Fig. 1(f). A three halfwave antenna is an excellent DX performer and will cover four continents if erected either N–S or E–W in the UK! There is a lot to this interesting subject of antennas!

Conditions on 25 and 21MHz

(Note: Frequencies in MHz. Time in UTC = GMT.)

As expected, the 25MHz (11m) band has remained very silent here in the UK, due to our present position in the 11 year solar sunspot cycle—there have been no reports of any activity on this band reaching me from other areas of the world either!

Although the 21MHz (13m) band conditions can best be described as poor and unreliable in the UK, it is also probably true to say that there have been a number of days when reception has been better than in recent months.

By making regular checks on some of the signals beamed to Europe by broadcasters, a very good idea of band conditions can quickly be established; for example, UAE Radio Dubai, which broadcasts programmes mainly in Arabic to Europe from 0615 until 1500 on 21·700, provides a very good daily indication of the reception conditions from that area. They can also be found on 21·605 from 1000 until 1500—around mid-day, when good conditions exist, their signals can reach the SINPO 55555 mentioned by **Alan Curry** in his report from Stockton-on-Tees! Similarly, Radio RSA, which beams programmes to Europe on 21·590 from Johannesburg can be used as a good pointer to band conditions from S. Africa—their programmes commence on this frequency at 1000 in Portuguese, but at 1100 change to English until 1556.

There are a number of interesting signals to be found on this band which are not directed towards the UK, but can nevertheless be received here when the conditions permit—these include both direct transmissions from the country concerned and also those received via relay stations, which may be located many thousands of kilometres from the associated studio centre.

Some examples of direct transmissions to other continents were mentioned by **Sheila Hughes** who listened in Morden, to a programme in English from RBI Berlin, GDR on 21·540 at 0845 intended for Australia and Asia and to a 15 minute broadcast from Vatican Radio to Africa and the Middle East from 1115 on 21·485. Up in Edinburgh **Robert Taylor** listened to the Asian Service of Radio DW Cologne, FRG on 21·680 at 0930 and to a programme in French at 1130 from RFI Paris, intended for Africa, on 21·620 and **Alan Williams** picked up two broadcasts intended for Africa in Helston, namely, Radio Moscow on 21·465 at 1500 and Radio Prague on 21·505 at 1535.

Two examples of distant relay stations used by broadcasters to beam their signals to Asia and yet received in the UK were detailed by **George Morley** in his report from Redhill—Radio Nederlands, which uses a relay in Madagascar on 21·485 from 0700 until 1125 and the BBC World Service on 21·550 which uses a relay on Masirah Island, Oman between 0600 and 0815. Of course, some of the relay stations are used to provide a better service to Europe than would be possible with direct transmissions from distant countries—an example of this was mentioned by **Tim Shirley** of Bristol who has been listening at 1500 to the programmes from Radio Japan beamed to Europe via a relay in Moyabi, Gabon on 21·700.

The 17 and 15MHz Bands

Although the reception conditions on the 17MHz (16m) band have also been rather poor and unreliable in the UK, it has been possible to receive signals from several Continents on this band during the day. Radio Australia's broadcasts to Asia on 17·715 and 17·750 have been monitored daily by **George Hewlett** in Torquay and it seems that the best frequency to tune to in the UK is 17·715, where the signal often reaches SI0 433 at 0700 and again around 0845. The transmission on this frequency has now been extended to include the News at 0900, so the remarks concerning the start-up of their Chinese Service on this frequency at 0855, mentioned last month, are no longer applicable.

Although you may not understand the Urdu language used by Radio Pakistan

Freq	Station	Country	1	2	3	4	5	6	7	8	9	10	11	12
2·380	Falkland BC	Falkland I.							0328					
3·220	R. Kara	Togo					2240							
3·225	R. Occidente	Venezuela							0110					
3·230	R. RSA	S. Africa				0350							0040	
3·235	AIR Gauhati	India											2359	
3·250	Radio 5	S. Africa				2145								
3·270	SWABC 1	Namibia	2240											
3·285	R. Belize	Belize											0100	
3·300	V. of Revolution	Burundi											0210	
3·310	R. Universal	Peru											0220	
3·315	R. Fort de France	Martinique										1800		
3·325	R. Liberal	Brazil											0240	
3·330	R. Rwanda	Kigali										1930		
3·338	R. Maputo	Mozambique											0250	
3·366	GBC Radio 2	Ghana	2230				2250				2330			
3·395	R. Zaracay	Ecuador										0100		
3·395	ZBC Gweru	Zimbabwe										1750		
3·462	R. Pasuran	Indonesia										1700		
3·905	AIR Delhi	India											0050	
3·915	BBC Kranji	Singapore				2210							0115	2040
3·925	R. Capital	Transkei										1920		
3·955	R. Orion	S. Africa										0336		
4·395	R. Yakutsk	USSR										2130		
4·045	PBS Fuzhou	China										2300		
4·500	Xinjiang	China									0207			
4·520	Khanty Mansiysk	USSR									0130			
4·635	R. Dushanbe	USSR									0310			
4·725	BBS Rangoon	Burma											2359	
4·735	Xinjiang	China				2215								
4·740	R. Afghanistan	Afghanistan				1820					0100			
4·760	ELWA Monrovia	Liberia						1930						
4·770	FRCN, Kaduna	Nigeria						1930					0025	
4·770	CPBS Beijing	China									0130			
4·770	R. Mundial, Bolivar	Venezuela									0208	0320		
4·775	Libreville	Gabon											0040	
4·775	TWR, Manzini	Swaziland											0030	
4·777	Maputo	Mozambique											0110	
4·785	Baku, Azerbaidjan	USSR										2000		
4·790	R. Atlantida	Peru							0330					
4·795	R. Douala	Cameroon	2205			2215		1900					0050	
4·800	AIR Hyderabad	India									0233			
4·800	LNBS Lesotho	Maeru										2359	0100	
4·800	R. Pop. de Cuenca	Ecuador							0540					
4·805	R. Diff Do Amazonas	Brazil					2333		0135		0300			
4·805	Voice of Kenya	Kenya											0105	
4·805	RN Sao Tome	R. Grande do Nth										2359		
4·810	RSA	S. Africa	2130					2045			2258		2114	
4·815	R. Beijing	China									2359			
4·815	R. Diff. TV Burkina	Ouagadougou				2200		1840					0117	
4·820	R. Botswana	Botswana				1835		1845		2150			2150	
4·820	La Voz Evangelica	Honduras										0430		
4·830	Africa No. 1	Gabon	2150			2240		1835			2227		1930	
4·830	R. Tachira	Venezuela							0242		0305			
4·832	R. Reloj	Costa Rica					0645		0435					
4·835	RTM Bamako	Mali	2345					1830			2300			
4·840	AIR Bombay	India				0425						1900	0125	
4·840	R. Bukvu	Zaire										1900		
4·845	ORTM Nouakchott	Mauritania	2215			2230		1925			2230			
4·845	R. Nacional, Manus	Brazil	2215				2349		0225				0130	
4·850	R. Yaounde	Cameroon											0040	
4·850	R. Capital, Caracas	Venezuela							0542					
4·870	R. Cotonou	Benin				2230		1845			0030	2135	0050	
4·880	Acreana, Rio Branco	Brazil										0300		
4·885	R. Clube do Para	Brazil											0310	
4·885	Voice of Kenya	Kenya											0030	
4·890	ORTS, Dakar	Senegal	2207											
4·990	R. diff Nat. Conakry	Guinea						1930						
4·902	Ekala	Sri Lanka										2359	0230	
4·905	N'djamena	Chad										2230	2200	
4·910	R. Maracaibo	Venezuela										2359		
4·910	R. Zambia	Zambia										0354		
4·915	R. Anhanguera	Brazil				0640								
4·917	Accra	Ghana				2200	2240	2055			0010		2211	
4·915	Voice of Kenya	Kenya										0455		
4·920	R. diff Nat. Chad	Chad						1830						
4·920	R. Quito	Ecuador							0300					
4·920	VLM4 Brisbane	Australia										0836		
4·930	Ashkabad	USSR	2140			0330								
4·940	R. Abidjan	Ivory Coast										1650		
4·940	Kiev	USSR	2200			0315						1600		
4·945	Caracol, Neiva	Colombia					2359		0603					
4·945	R. Nat. Porto Velho	Brazil			0154						0200			
4·958	Azerbaijan	USSR				0300								
4·960	AIR Renshi	India				1845								
4·960	R. Federation	Ecuador											0255	
4·970	R. Rumbos	Venezuela											0145	
4·976	R. Uganda	Uganda						2020						
4·980	Ecos del Torbes	Venezuela			0210	0245			0208		0215		0245	
4·985	R. Brazil Central	Brazil							0600				0230	
4·990	FRCN, Lagos	Nigeria	2200	2320		2140					2307	2359		
4·990	R. RSA	S. Africa				0335								
4·990	Yerevan	USSR			0116	0315								
5·005	R. Nacional, Bata	Eq. Guinea											1940	
5·005	R. Nepal	Khumaltar				1945								
5·010	R. Garoua	Cameroon			2030	0430					2310			
5·015	Arkhangelsk	USSR	2040											
5·026	R. Uganda, Kampala	Uganda											0045	
5·038	Omdurman	Sudan										2114		
5·045	R. Cultura do Para	Brazil	0135								0227		1950	
5·047	Toglekope	Togo	2310					1930						
5·060	R. Amazonas	Peru	0145											

1 Neil Dove, Lockerbie
2 Albert Fisher, Heston
3 David Jones, Liverpool
4 Bill Kelly, Belfast
5 George Morley, Redhill
6 Fred Pallant, Storrington
7 Graham Powell, Pontypridd
8 Colin Rolls, Pulborough
9 Michael Sargeant, Bolton
10 Tim Shirley, Bristol
11 Jim Willett, Grimsby
12 Alan Williams, Helston

during much of their programme from Islamabad on 17·660, there are some short sections in English which make interesting listening. **Colin Rolls** has been checking their signal around 0900 in Pulborough—they make a useful guide to 16m band conditions from that area, because they are actually intended for Europe. Rather a similar situation exists with UAE Radio Dubai, mentioned by **Francis Hearne** in his report from Bristol, because their programmes for Europe on 17·775 are mainly Arabic between 0615 and 1500 with only two segments in English—nevertheless, they also make a good pointer to reception conditions!

Some of the other interesting signals to be found on the band during the morning were mentioned by **Philip Rambaut** of Macclesfield who has been listening to the Voice of Greece on 17·565 at 0900; AIR New Delhi, India on 17·875 at 1000; RTBF Brussels, Belgium 17·685 at 1112. Philip has been hearing Chinese on 17·715 at 0920, which is probably the Chinese service on Radio Australia.

Using a DX-150A receiver in Tunbridge Wells, **Darren Taplin** has been listening to RCI Montreal, Canada, which can be heard on 17·820 at 1445—their programmes include local news and sports reports and are very popular. The broadcasts from Radio HCJB on 17·790, which **Alexander Little** has been hearing in Glasgow at 1930, originate from Quito, located high in the Andes mountains of Ecuador. Their programmes are always very popular with s.w.l.s everywhere, no doubt because they cover such a wide variety of topics! Their programmes especially for DXers have a huge audience throughout the world, because they go to a lot of trouble to make them interesting. Their evening transmission to Europe on 17·790 is often one of the few remaining signals audible in the UK at 2130.

It seems that **Neil Dove** has been monitoring this band up in Lockerbie, Scotland, during the evening and at times has been appalled by the "blanket cover" produced by the illegal jammers which continue to operate on 16m. Nevertheless, his log includes Radio Surinam, Paramaribo broadcasting via an RNB Brasilia relay in Brazil on 17·755 at 1730; Radio Algiers, Algeria on 17·745 with programmes in English (which are under-modulated) at 2000 and the Voice of Free China which is relayed by a transmitter in Okeechobee, Florida on 17·845 from 2100.

In view of the generally poor reception conditions prevailing on the higher frequencies just now, it is not surprising that a large number of broadcasters have been attracted to the rather more reliable 15MHz (19m) band—although many of them use their highest power transmitters in an attempt to reach their chosen target areas, many illegal jammers create havoc on the band.

Radio New Zealand is known to operate on 15·150 with programmes intended for

the Pacific area, but despite hours of dedicated daily monitoring in South Shields by "old-timer" **A. Scholefield**, who has been especially interested in their signals for many years, there has been no sign of them so far this Autumn. Radio Australia can sometimes be heard on this band in the morning on 15·415, but their transmissions are marred by interference and jammers around 0900.

John Parry G4AKX has been checking the band in the early morning in Northwich and found Vatican Radio on 15·190, which beams its programmes to Africa at 0615. Some of the other signals which may be heard in the UK during the morning include the Voice of Nigeria on 15·120 at 0845; AFRTS via Munich, W. Germany on 15·265 at 0850; Radio Algiers, Algeria 15·160 at 0945; Africa No. 1 Gabon on 15·200 at 1009; Radio Kuwait on 15·495 and 15·505 at 1020 and VOA broadcasting to Asia via their relay in Tinang, Philippines on 15·410 at 1125—all logged by Philip Rambaut.

During the afternoon **Stewart Russell** of Forfar has been listening to BRT Brussels, Belgium on 15·590 from 1300 and Darren Taplin logged Radio Peace and Progress, Moscow on 15·310 beaming to N. America at 1400 and later found REE Madrid, Spain on 15·375 broadcasting to Africa at 1830. UAE Radio Dubai, noted by Colin Rolls, can be found on 15·320 from 1430 and WYFR can be heard via their relay in Taipei, Taiwan on 15·055 at 1445.

Writing from Nigeria, **Bobby Enebeli** says he has been listening to Radio Monte-Carlo on 15·465, broadcasting in Arabic to the Middle East between 0700 to 1455 and has also received good signals from Radio Baghdad, Iraq on 15.130 at 1730.

There is a wide choice of stations to be found on this band during the evening —John Parry heard VOA broadcasting to Africa at 1800, using two direct transmissions from Greenville, USA on 15·410 and 15·580 and via a relay in Monrovia, Liberia on 15·600—it would be interesting to know which one in fact provides the best service! While testing out a new Sharp QT27 stereo cassette radio in Bishops Stortford during the evening, **John Sadler** logged RNB Brasilia, Brazil on 15·267 at 1800; RCI Montreal, Canada on 15·325 with programmes for Europe at 2100; Radio HCJB in Quito, Ecuador on 15·270 at 2130 and Radio Sophia, Bulgaria, broadcasting to N. America on 15·330 from 2130.

Two of the popular programmes from the USA were mentioned by **Colin Diffell** of Corsham—he has been listening to news and sporting events from AFRTS via their Greenville, USA, transmitter on 15·430 at 1945 and to Family Radio WYFR of Oakland, California, who broadcast to Europe via their Okeechobee, Florida, transmitter on 15·566 from 1900. He also heard Radio Norway, Oslo on 15·310 from 1900. Up in Stockton-on-Tees, **Michael Hill** has been listening to the Voice of Vietnam in the evening at 2030, which broadcasts in English to Europe on 15·010 and later, at 2315, has been hearing Radio Australia on 15·395 with a programme beamed to N. America and the Pacific area—there is certainly plenty to interest s.w.l.s. on the 19m band!

The 13MHz Band

Radio Moscow continues to dominate the 13MHz (22m) band, since they are active on no less than twenty-one frequencies between 13·605 and 13·785MHz during the day—as **Ian McLuckie** of Darvel, Scotland, says, "You can hear them all over the place!"

Tim Shirley logged Radio Baghdad on 13·700 with a programme in Arabic for Europe at 0830 and later, at 2010, listened to a mailbag and DX programme in English from the Voice of Israel, who occupy 13·725 for much of the day with programmes in eleven languages intended for Europe. Colin Diffell has been listening to Radio Prague, Czechoslovakia, who beam programmes in Arabic, French and English to Africa on 13·605 from 1630 until 2125. Radio Pyongyang, N. Korea, also use this band—Bobby Enebeli has been hearing them in Nigeria at SINPO 32222 on 13·650 at 2330.

The 11, 9, 7 and 6MHz Bands

Despite the high level of mutual interference resulting from overcrowding and the havoc caused by deliberate illegal jamming, there is plenty to interest the listener on these bands just now, where signals from all continents are audible at some time of the day or night.

George Hewlett has been monitoring the 11MHz (25m) signals from Radio Australia around 0500, but finds that reception on 11·910 varies from day to day and is either very poor or non-existent! It's quite a different story on 9MHz (31m), where their transmission is often very well received in the UK from 0700 until 1000—"old-timer" **Harry Smith** is a regular listener to the local news from "down under" on 9·655 in Sale because he has relatives there. Their 7MHz (41m) transmission can be heard from 1430 but suffers from interference—Ian McLuckie, who heard them for the first time ever on 7·205 at 1655 says, ". . . this made me smile and still does!" The reception of their 6MHz (49m) signals is frequently good between 1600 and 1930, in fact **Peter Gent G4DPY** picks them up on 6·035 every evening without fail in Retford, Nottingham, on his Sony ICF-7600 receiver plus whip antenna!

Although it was 47 years ago that **George Markwick** of Thornaby, Cleveland, built his first s.w. receiver, he is still a keen DXer—his latest 25m list includes Radio Bucharest, Roumania on 11·940 at 1045; Radio Finland, Helsinki 11·945 at 1200 and with programmes for Europe, the Voice of Greece on 11·645 at 1715, Radio Beijing on 11·500 at 2000 and the Voice of Vietnam on 10·040 at 2100. **Julian Wood** of Buckie, Scotland, listened to RAI Rome, Italy on 11·800, which broadcasts to the Middle East in English at 2025 and **David Jones** picked up All India Radio, New Delhi on 11·620 at 2000.

[illegible] Washington, Co. Durham, **Chris Wood** says he has been hearing excellent signals from Radio Japan on 9·675 at 0100 and RAE Buenos Aires, Argentina on 9·690 at 0115. **Albert Fisher G4VBH** of Heston, Hounslow, has been exploring the top end of the 31m band and found Radio Beijing, China on 9·860 with English at 1900; Radio Riyadh, Saudi Arabia, broadcasting in Arabic on 9·870 at 1850; All India Radio, New Delhi, with programmes in English at 2000 on 9·910 and VOFC Taipei, Taiwan 9·955 which beams on Europe at 2200.

While tuning over the 41m and 49m bands in Blackrock, Co. Dublin, **Paul Hegarty** found Radio Prague, Czechoslovakia on 7·345 at 1932; Radio Australia on 7·215 at 2000; the Voice of Israel, Jerusalem on 7·410 at 2233; REE Madrid, Spain on 6·020 from 2200 and RBI Berlin, GDR on 6·080 at 2330.

As for the 5, 4, 3 and 2MHz bands, there is plenty to interest the dedicated DXer here—see chart.

Short Wave Awards

Four attractive awards are available to all s.w.l.s from W. Germany, namely "Middle East Award," "Fifty Countries Award," "Africa Award" and "America Award." To obtain them, a list of verified reception of certain countries is required, plus 5 German marks (or 5 IRC's)—for full details contact: EAWRC Award Secretary, Adolf Schwegeler, Brahnhofstrasse 56, D-5042 Erftstad 1, W. Germany.

My thanks to **Edward Baker** of Cramlington, Northumberland, for sending along this information.

Books

The *International Listening Guide* is a most useful reference guide to s.w. broadcasts throughout the world for newcomer and old-timer alike. It is published four times a year, March, May, September and November, to correspond with broadcasters' schedule changes and a UK subscription costs £8 for all four issues. Send cheque, payable to "DX Listeners Service," to Bernd. Friedwald, Merianstr. 2, D-3588 Homberg, West Germany.

Station Addresses

Radio Afghanistan, External Service, Ansary Wat, P.O. Box 544, Kabul, Dem. Rep. Afghanistan.

Radio Cairo, External Services, P.O. Box 566, Cairo, Egypt.

Radio Riyadh, Broadcasting Service of the Kingdom of Saudi Arabia, P.O. Box 570, Riyadh 1116, Saudi Arabia.

ERRORS & UPDATES

PW "Taw" VLF Converter

November 1986

Our sincere apologies to M. F. J. Rowe G8JVE the author of the *PW* "Taw" VLF Converter project. We inadvertently attributed the wrong callsign to Mr. Rowe and we are very sorry for any confusion caused.

Last month, the telephone number in the South Midlands Communications Ltd. advertisement was incorrect. It should be (04215) 55111, our apologies.

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PRODUCTS

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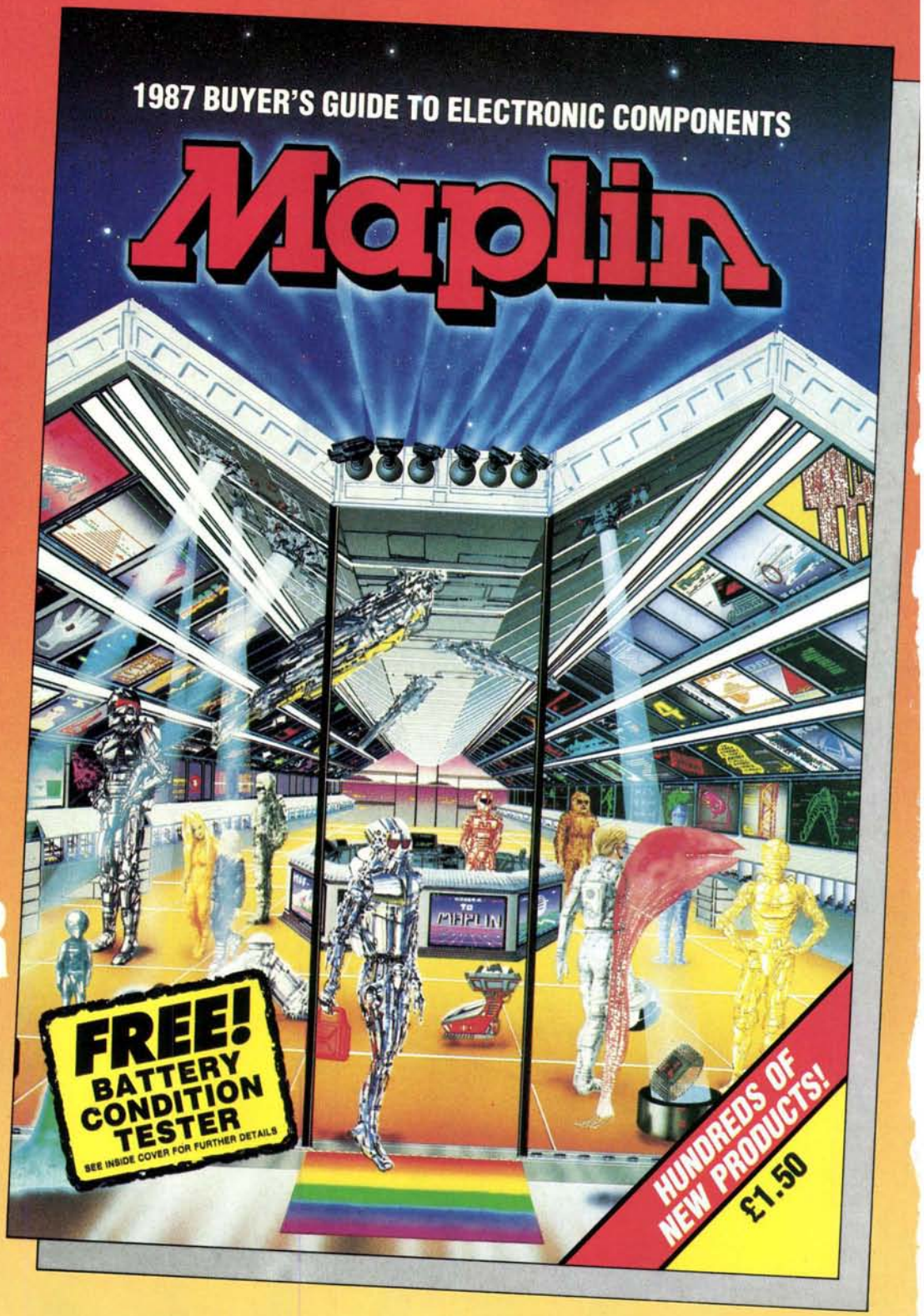

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