FOR THE RADIO ENTHUSIAST ...

APRIL 1983

Practical Wireless

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FOR THE Radio ENTHUSIAST...

Practical Wireless

APRIL 1983 VOL. 59 NO. 4 ISSUE 913

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four **new** models from Trio

for the HF man, the **TS 430S**

£698.00 inc vat carriage £5.00

A new HF transceiver, taking into account the outstanding performance of the previous Trio rigs you could be forgiven for thinking that it would be impossible for them to improve on existing models and specifications. Alternatively of course, you might be of the opinion that engineers with the talents as displayed by the designers of such rigs as the TS830S, TS130V and TR2500 etc. would have no trouble in pushing forward the frontiers of transceiver technology s we know it today.

The new HF transceiver from Trio is the TS430S. Those who have seen it and the fortunate ones who have used it on the air are all agreed that here we have a major advance for the enthusiastic operator on todays busy bands. Not only does the transceiver have full amateur band coverage from 160 to 10 metres (including the three new bands) but it also incorporates a general coverage receiver (150 kHz to 30 MHz). The new transceivers features are many; USB, LSB, CW, and AM with FM available (optional FM430 board), compact size 270mm wide/96mm high/275mm deep, continuous tuning over the entire frequency range, two separate VFO's and an up/down scan mode using the optional MC42S microphone. Eight memories, each of which can be used as a separate VFO are provided and frequency scan is programable between the two frequencies held in memory channels six and seven. Not only does the memory remember frequency but also the mode of operation, thus short wave DX and Broadcast stations can be stored alongside a SSB net channel and complete sense made as the frequencies are scanned. The by now normal Trio features are all included, IF shift, notch filter, speech processor and narrow/wide filter selection on CW, SSB and AM modes.

The TS430S, Trio's rig for todays operator.

for the SWL who deserves the best, the **R 2000**

£391.20 inc vat carriage £5.00

Now from Trio, the R2000 general coverage receiver. By taking all the superb features of the R1000 and combining them with the latest in microprocessor control Trio have, in one step, completely revised the standard by which short wave receivers are judged. Among the many features provided for the discerning listener are programmable scan, memory scan, memory retention of the mode set for a particular frequency and last, but not least, Trio have included an FM mode – why FM after all this time and our repeated comment that for a shortwave broadcast receiver FM is not really necessary. Take a look at the rear panel of the R2000: a socket marked VHF converter. Wouldn't it be superb if Trio produced a VHF converter covering from 118 to 174 MHz – then you would require FM, you would also require AM. Study the features and I am sure you will agree the Trio R2000 is the receiver for you.

Continuous Coverage from 150 KHz to 30 MHz
Use of an innovative up conversion digitally controlled PLL circuit provides maximum ease of operation and superb receiver performance. Front panel up/down band switches allow easy selection within the full coverage of the receiver. The VFO is continually tunable throughout the full 150 KHz-30 MHz range.

Ten Memories Store Frequency, Band and Mode Data
Each of the ten memories can be tuned by the VFO, thus operating as ten built in digital VFO's. The original memory frequency can be recalled by simply pressing the appropriate memory channel key. All information on frequency, band, and mode is stored in the selected memory. The "auto M" switch allows two types of memory storage: when the "auto M" switch is off, data is memorized by pressing the "M in" switch; when the "auto M" switch is on the frequency being used at that time is automatically memorized.

Memory Scan
Scans all memory channels or may be user programmed to scan specific channels. Frequency, band and mode are automatically selected in accordance with the memory channel being scanned.

Programmable Band Scan
Scans automatically within the programmed bandwidth. Memory channels 9 and 0 establish the scan limit frequencies. The hold switch interrupts the scanning process. However, the frequency may be adjusted using the tuning knob whilst in the scan hold position.

Three Built In Filters with Narrow/Wide Selector
In the AM mode 6 KHz wide or 2.7 KHz narrow may be selected. In the SSB mode 2.7 KHz is automatically selected. In the CW mode 2.7 KHz is again chosen and if the optional YG455C filter is installed then 500 Hz in the narrow position. In the FM mode 15 KHz bandwidth is automatically selected.
Other important features are: squelch on all modes, noise blanker, a large 4 inch front mounted speaker, tone control, RF attenuator, AGC switch, high and low impedance antenna terminals, optional 13.8V DC operation, record jack and, of course, provision for a VHF converter.
All in all, a truly remarkable receiver.

and later in the year for the **R 2000** a 118 to 174 MHz internal vhf converter.

LOWE IN LONDON, Open monday to saturday, six days a week
lower sales floor, Hepworths, Pentonville Rd, London. telephone 01.837.6702
LOWE IN GLASGOW, Open tuesday to saturday
4,5 Queen Margarets Rd, Glasgow. telephone 041.945.2626

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WIDE COVERAGE ALL MODE MEMORY RECEIVER; FRG7700M £399 inc VAT @ 15% + Securicor

- ★ 30MHz down to 150kHz (and below).
- ★ 12 Channel memory with fine tune.
- ★ SSB (LSB/USB), CW, AM, FM.
- ★ 2.7kHz, 6kHz, 12kHz, 15kHz, @ – 6dB.
- ★ 3 Selectivities on AM, squelch on FM.
- ★ Up conversion, 48MHz first IF.
- ★ 1kHz digital, plus analogue, display.
- ★ Inbuilt quartz clock/timer.
- ★ No preselector, auto selected LPF's.
- ★ Advanced noise blanker fitted.
- ★ Antenna 500Ω to 1.5MHz, 50Ω to 30MHz.
- ★ 20dB pad plus continuous attenuator.
- ★ Switchable A.G.C. Variable tone.

'7700 THE ONE WITH FM!
Non memory version £335

- ★ 110 and 240V ac, 12Vdc option.
- ★ Signal meter calibrated in "S" and SIMPO.
- ★ Acc; Tuners, Converters, LPF, Memory.
- ★ **FRT7700**; 150kHz-30MHz, Switch, etc.
- ★ **FRV7700A**; 118-130, 130-140, 140-150MHz.
- ★ **FRV7700B**; 118-130, 140-150, 50-59MHz.
- ★ **FRV7700C**; 140-150, 150-160, 160-170MHz.
- ★ **FRV7700D**; 118-130, 140-150, 70-80MHz.
- ★ **FRV7700E**; 118-130, 140-150, 150-160MHz.
- ★ **FRV7700F**; 118-130, 150-160, 170-180MHz.
- ★ **FF5**; 500kHz (for improved VLF reception).
- ★ **MEMGR7700**; 12 Channels (internal fitting).
- ★ **FRA7700**; Active Antenna.

COMMUNICATION RECEIVER; NRD 515 £985 Inc. VAT @ 15% + Securicor.

- ★ 30MHz to 100KHz or lower, 100Hz steps.
- ★ PLL digital VFO stability.
- ★ Backlash free, 10KHz rev, 500Hz analogue calib.
- ★ Fast tune up/down switch, dial lockout.
- ★ SSB (USB/LSB), CW, AM, RTTY.
- ★ 6 and 2.4 KHz, 600* and 300* Hz @ –6dB.
- ★ Passband tuning ±2KHz on SSB and CW.
- ★ Variable BFO on CW for preferred tone.
- ★ Modular plug in design with mother board.
- ★ High reliability – low power schottky & CMOS.
- ★ Designed for maximum ease of operation.
- ★ Noise blanker. 0-10-20dB attenuator.
- ★ Small (140 × 340 × 300mm) light 7½Kg, rugged.

PROFESSIONAL MONITOR

- ★ Up conversion, 70.455 MHz and 455 KHz.
- ★ No R.F. amplifier, balance U310 mixer.
- ★ Crystal filter before first IF amplifier.
- ★ Transceiver provisions; mute, trip etc.
- ★ Frequency data input/output port.

NHD518	96 (4 × 24) channel memory unit.
NCM515	Remote frequency keypad controller, LCD readout. Up/down step tuning, 4 channel memory.
CQE515	Junction unit (NCM515 to NHD518).
NVA515	External 3W speaker 130 × 140 × 200mm.
CFL260	600Hz mechanical filter.
CFL230	300Hz crystal filter.

TWO OR SEVENTY; FT230R, FT208R, FT708R, FT730, 2030, FT726 PLUS:–

- ★ Multimode USB, LSB, FM, CW.
- ★ 100Hz backlit LCD Frequency display.
- ★ 10 memory channels '5 year' backup.
- ★ Any TX/Rx split with dual VFOs.
- ★ Up/Down tuning from microphone.
- ★ AF output 1W @ 10% THD.
- ★ Bandwidth 2.4kHz and 14kHz @ – 6dB.
- ★ LED's; 'On Air', 'Busy'. m/c meter; S, PO.
- ★ 58(H) × 150(W) × 195(D) (1.3kg).

SMC2.0C	NiCad 2.0A/hr "C"	2.35
SMC8C	Slow Charger (220mA)	8.80
MMB11	Mobile Mount	22.25
CSC1A	Soft carrying case	3.45
FL2010	Linear Amplifier 2m 10W	59.00
FL7010	Linear Amplifier 70cms	91.00

6, 2 or 70!

FT290R

£265
Inc. VAT @ 15% + Securicor.

- ★ 144-146MHz (144-148) possible.
- ★ 2.5W PEP, 2.5W RMS/300mW out.
- ★ FM: 25kHz and 12.5kHz steps.
- ★ SSB: 1kHz and 100Hz steps.
- ★ ±600kHz repeater split 1750Hz burst.
- ★ Integral telescopic antenna.
- ★ Rx, 70mA, Tx; 800mA (FM maximum).

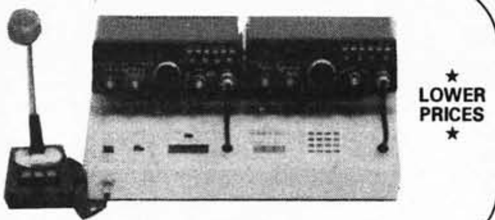
FT790R

£325
Inc. VAT @ 15% + Securicor.

- ★ 430-330MHz (440-450 alternative).
- ★ 1W PEP, 1W/250mW FM/CW out.
- ★ FM: 100kHz and 25kHz steps.
- ★ SSB: 1kHz and 100Hz steps.
- ★ 1.6MHz shift with input monitor,
- ★ 1750Hz burst.
- ★ Rx; 100mA/200mA. Tx; 750mA max.
- ★ BNC Mounting ¼λ flexi antenna.

6, 2 or 70!

- ★ USB-LSB-CW-FM (A 3j, A1, F3).
- ★ 30W PIP A3j, 10/1W out A1 F3.
- ★ Any Tx Rx split with dual VFO's.
- ★ Four easy write-in memory channels.
- ★ Memory scanning with slot display.
- ★ Up/down tuning/scanning from mic.
- ★ Priority channel on any memory slot.
- ★ Digital RIT. Advanced noise blanker.
- ★ Satellite mode allows tuning on Tx.
- ★ Semi break in with side tone.
- ★ Very bright blue 100Hz digital display.
- ★ Display shows Tx & Rx freq (inc RIT).
- ★ String LED display for "S" and PO.
- ★ LED's; "On Air" Clar, Hi/Low, FM mod.
- ★ Size (Case): 8.3" D, 2.3" H, 6.9" W.



Ills. c/w SCI station consol and YD 148 mic.

★ LOWER PRICES ★

FT480R £369 Inc. VAT @ 15% + Securicor.

- ★ 144-146 MHz (143.5-148.5 possible).
- ★ ±600kHz standard repeater split.
- ★ Excellent dynamic range and sensitivity.
- ★ FM; 25, 12½, 1kHz steps.
- ★ SSB; 1,000, 100, 10Hz steps.

- ★ 430-434MHz (440-445 possible).
- ★ GaAs Fet RF for incredible sensitivity.
- ★ FM; 100kHz, 25kHz, 1kHz, steps.
- ★ SSB; 1,000, 100, 10Hz steps.
- ★ FT780R 1.6 fitted 1.6MHz Shift **£459** inc.

FT780R £399 Inc. VAT @ 15% + Securicor.

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BARCLAYCARD VISA

HF TRANSCEIVERS; FTONE, FT980, FT707, FT101Z, JST100 & FT102

- ★ 80–10 metres including WARC allocations
- ★ Multimode LSB-USB-CW (W)-CW (N) *and* FM
- ★ 100W PEP output. (10W "S" version)
- ★ No tune design — inbuilt SWR meter
- ★ Only 3⅞" × 9½" — Less than a foot deep!
- ★ Dual selectable pulse width noise blanker

FT77	Transceiver 100W output	**£475.00**
FT77S	Transceiver 10W output	**£399.00**
MARK7	Crystal Marker board	**£7.65**
FMU77	FM Unit	**£23.75**
XF8.9HC (N)	600Hz or 300Hz (N)	**£24.90**
FV707DM	Digital Memory VFO	**£203.15**
FC707	Antenna Tuner	**£85.10**
FP707	Mains P.S.U.	**£112.50**
FTV707	Transvertor, frame only	**£90.00**
Modules	432 **£185.00**, 144 **£100.00**,	70 **£80.00**

FT902DM, £885 Inc. VAT @ 15% + Securicor.

- ★ 160-10 metres including new allocations.
- ★ Variable IF bandwidth 2.4kHz down to 300Hz.
- ★ Audio Peak and independent notch controls.
- ★ AM, FSK, USB, LSB, CW, FM, (Tx and Rx).
- ★ Semi-break in, inbuilt Curtis IC Keyer.
- ★ Digital plus analogue frequency displays.
- ★ VOX built-in and adjustable.
- ★ Instant write in memory channel.
- ★ Tune up button (10 sec, of full power).
- ★ Switchable AGC and RF attenuator.
- ★ 350 or 600 Hz CW, 6kHz, AM filters.
- ★ Clarifier (RIT) switchable on Tx, Rx or both.
- ★ Plug in modular, computer style constructor.
- ★ Fully adjustable RF Speech processor.
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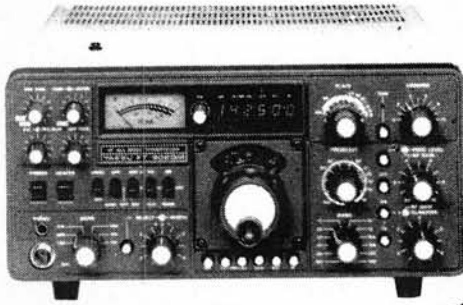
NOW WITH CW FILTER, AM FILTER, CURTIS KEYER‡ INCLUDED



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PRICES MAY HAVE CHANGED DUE TO CURRENCY FLUCTUATIONS PLEASE CHECK BEFORE ORDERING

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105BA	5 Ele Yagi 10 metres	18.5'LE	24.0'B	£143.75	3.95
153BA	3 Ele Yagi 15 metres	23.0'LE	12.0'B	£90.85	2.90
155BA	5 Ele Yagi 15 metres	24.5'LE	26.0'B	£217.35	5.90
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204BA	4 Ele Yagi 20 metres	36.5'LE	26.0'B	£286.35	7.30
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TH2MK3	2 Ele Yagi 10-15-20M	27.3'LE	6.0'B	£169.05	3.20
TH3MK3	3 Ele Yagi 10-15-20M	27.0'LE	14.0'B	£274.85	5.30
TH5DXX	"Thunderbird" 5 Ele	31.0'LE	18.0'B	£378.35	6.70
TH6DXX	"Thunderbird" 6 Ele	31.1'LE	24.0'B	£281.75	8.50
TH7DXX	"Thunderbird" 7 Ele	31.0'LE	20'TR	£458.85	8.75
18TD	Dipole Tape 10-80M		132'	£113.85	2.80
JAYBEAM					
VR3	Vertical 10-15-20M. DC Short	6lb	13.5'H	£46.00	2.30
TB3	3 Ele Yagi 10-15-20M PEP	14.6'TR	14.1'B	£189.75	5.40
MINI BEAM					
C4	Vertical Mini 10-15-20M	8lb	11.5'H	£54.99	2.30
HQ1	"Mini" Quad 10-15-20M	11.0'LE	4.5'B	£119.00	4.00
G4MH MINI BEAM					
	Mini Beam 10-15-20M			£82.50	4.00
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50463	Clamps/U Bolts HD CDE CD45 HAM4		£7.36	1.85
51472	Mast Mount Kit ST CDE HAM4 etc.		£12.08	2.10
51467	Mast Mount Kit HD CDE T2X etc.		£24.15	2.10
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KS050	Rotary Bearing 1¾" Kenpro		£29.32	1.40
KS065	Rotary Bearing 2" Kenpro		£18.69	1.85
KC038	Lower Mast Clamp KR400, KR600		£10.92	1.70
RC5W	5 Way AR30 AR40 KR400RC	p/m	£0.35	
RC6W	6 Way KR250/400/500/600RC	p/m	£0.48	
RC8W	8 Way CD45 Ham 4 T2X KR2000RC	p/m	£0.52	

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Cables, ropes and masting are normally despatched by Roadline. Carriage is £2.00 to 7Kg thereafter add an extra £0.15 per Kg. (Mainland.)

Where Securicor delivery on an item, or items is possible (i.e., less than 25Kg/55lbs and 5'6" long) it is charged at £4.49 per lot.

If in doubt of carriage send a cheque crossed, "not more than £ . ."

ALL PRICES INCLUDE VAT @ 15%.

ANTENNAS VHF FIXED

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4Y/4M	Yagi 4 ele	7.5'B	7dBd	£29.90	2.20
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5Y/2M	Yagi 5 ele	5.2'	7.8dBd	£12.08	2.20
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SMCGP2M	⅝λ. 2M ground plane, 3.4dB¼		4.6'	£15.70	2.20
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SMCGP432X	Colinear 70cm, 3×⅝λ, 6.8dB¼		5.6'	£25.70	1.70
SMC70N2V	Vert. 2.8dB¼ 2M, 5.7dB¼ 70cm		3.6'	£25.70	2.20
SMCHS770	144/432MHz Diplexer 50w max.			£13.80	1.30
SMC2HB6	6M, 2ele, HB9CV Beam			£19.95	2.20

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FM Receiver	70FM05R5	68.25	48.25
Synthesiser (2 pcb's)	70SY25B	84.95	60.25
Synthesiser Transmit Amp	A-X3U-06F	27.60	17.40
Synthesiser Modulator	MOD 1	8.10	4.75
Bandpass Filter	BPF 433	6.10	3.25
PIN RF Switch	PSI 433	9.10	7.75
Converter (2M or 10M i.f.)	70RX2/2	27.10	20.10
FM Package 2 (Synthesised)	70PAC2	163.00	128.00
TV Products			
Receive Converter (Ch 36)	TVUP2	26.95	19.60
Pattern Generator	TVPG1	39.95	32.53
TV Modulator	TVM1	8.10	5.30
3W Transmitter (boxed)	ATV-1	87.00	—
3W Transceiver (boxed)	ATV-2	119.00	—
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50mW to 500mW	70FM1	14.65	8.85
500mW to 3W	70FM3	19.65	13.25
500mW to 10W	70FM10	30.70	22.10
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FM Receiver	144FM2R	64.35	45.76
Synthesiser (2 pcb's)	144SY25B	78.25	59.95
Synth Mult/Amp (1.5W o/p)	SY2T	26.85	19.40
Bandpass Filter	BPF 144	6.10	3.25
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Kaytone	PTK3	6.80	4.25
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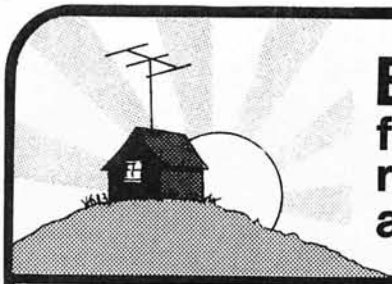

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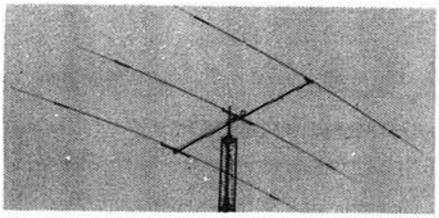

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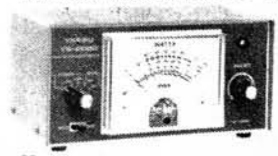
Antennas Various/Accessories			
HQ1	Mini beam 10/15/20m 2 ele. 1kW	TBA	(4.00)
C4	Vertical 10/15/20m	48.50	(3.00)
G4MH	Mini beam 10/15/20	85.00	(4.00)
KTLM-4	Gutter mount/Cable assy. SO239	6.90	(0.50)
DATONG PRODUCTS			
PC1	50KHz to 30MHz receive converter	137.42	(0.50)
VLF	Very low freq. converter	29.90	(0.50)
FL1	Frequency agile audio filter	79.35	(0.50)
FL2	Multimode audio filter	89.70	(0.50)
ASP/A	Auto RF speech clipper (YAESU)	82.80	(0.50)
ASP/B	Auto RF speech clipper (TRIO)	89.70	(0.50)
D75	Manual RF speech clipper	56.35	(0.50)
RFC/M	RF speech clipper module	29.90	(0.50)
D70	Morse tutor	56.35	(0.50)
AD270	Active dipole RX ant. (indoor)	47.15	(0.50)
AD370	Active dipole RX ant. (outdoor)	64.40	(0.50)
MK	Morse keyboard	137.42	(0.50)
DC144/28	2m converter	39.67	(0.50)
RFA	Broadband preamplifier	33.92	(0.50)
MPU	Mains power unit	6.90	(0.50)
MICROWAVE MODULES			
Transverters			
MMT28/144	10m transverter	109.95	(2.50)
MMT70/144	4m transverter	119.95	(2.50)
MMT432/144R	70cm transverter	184.00	(2.50)
MMT1296/144	23cm transverter	184.00	(3.00)
MMT70/28	4m transverter	119.95	(2.50)
MMT144/28	2m transverter	109.95	(2.50)
MMT432/28S	70cm transverter	159.95	(2.50)
Linear Amplifiers			
MML28/100S	10m 100W linear amp.	129.95	(3.00)
MML70/50S	4m 50W linear amp.	85.00	(2.50)
MML70/100S	4m 100W linear amp.	139.95	(3.00)
MML144/30LS	2m 30W linear amp. 1-3W in	69.95	(2.50)
MML144/50S	2m 50W linear amp.	85.00	(2.50)
MML144/100LS	2m 100W linear 1-3W in	159.95	(3.00)
MML144/100S	2m 100W linear 10W in	139.95	(3.00)
MML432/50	70cm 50W linear amp.	109.95	(3.00)
MML432/100	70cm 100W linear amp.	228.65	(4.00)
MML1296/10	23cm 10W linear amp.	199.00	(2.50)
MML432/30	70cm 30W linear amp. 1-3W in	99.00	(3.00)
Converters			
MM1000KB	ASC11 morse converter with keyboard	99.95	(3.00)
MM4001	RTTY to TV converter	189.00	(2.50)
MM4001KB	RTTY transceiver	269.00	(2.50)
MM4000KB	RTTY transceiver with keyboard	299.00	(4.00)
MMC28/144	10m to 2m converter	29.90	(1.00)
MMC50/28	6m to 10m converter	29.90	(1.00)
MMC70/28	4m to 10m converter	29.90	(1.00)
MMC70/28LO	4m to 10m with LO	32.90	(1.00)
MMC432/28S	70cm to 10m converter	37.90	(1.00)
MMC432/144S	70cm to 2m converter	37.90	(1.00)
MMC435/600	UHF ATV converter	27.90	(1.00)
MMC1296/28	23cm to 10m converter	34.90	(1.00)
MMC1296/144	1296MHz low noise converter	69.95	(1.00)
MMK1691/137.5	1691MHz meteosat converter	129.95	(2.50)
Morse Talkers			
MMS1	Morse tutor 2-20WPM Side tone	115.00	(2.50)
MMS2	Morse tutor (advanced) 6-32WPM + speak back	169.00	(2.50)
Amateur TV			
MTV435	70cm 20W (PSP) transmitter	149.00	(2.50)
MMC435/600	Converter ATV UHF output	27.90	(1.00)
Preamplifiers			
MMA144V	2m preamp RF switched	34.90	(1.00)
MMA28	10m preamp	16.95	(1.00)
MMA1296	23cm preamp	34.90	(1.00)
Frequency Counters			
MMD650/500	500MHz digital meter	75.00	(1.00)
MMD600P	600MHz pre scaler	29.90	(1.00)
MMDP-1	Probe	14.90	(0.50)
Filters			
MMF144	2m band pass 40W max.	11.90	(1.00)
MMF452	70cm band pass 40W max.	11.90	(1.00)
Various			
MMS384	384MHz signal source	29.90	(1.00)
MMR15/10	15db 10W attenuator	11.90	(1.00)
HI-MOUND MORSE KEYS			
HK702	Up down keyer marble base	24.50	(0.50)
HK704	Up down keyer	16.68	(0.50)
HK705	Up down keyer	12.50	(0.50)
HK706	Up down keyer	13.75	(0.50)
HK708	Up down keyer	11.96	(0.50)
HK808	Up down keyer marble base	39.57	(0.50)
MK704	Twin paddle keyer	10.95	(0.50)
MK705	Twin paddle keyer marble base	22.00	(0.50)
MOULDINGS			
IK	Iambic keyer	19.95	(0.50)

TOKYO HY POWER			
HC150	HF ATU SWR/Power meter 200W PEP	62.50	(n/c)
HC2000	HF 2kW ATU SWR/Power meter 6 POS ant. switch. 6 to 1 vernier high Q coils 2kW peak 1kW continuous	276.55	(n/c)
Antenna Rotators & Accessories			
SU2000	Light duty rotator	34.95	(3.50)
9502	Channel master med duty up to 8 ele.	57.00	(3.50)
9523	Alignment bearing for 9502	14.38	(1.25)
KR400	Med/Heavy duty 180° meter (inc. lower casting)	90.85	(3.50)
KR400RC	Med/Heavy duty 360° meter Load 200Kg 1½"-2" masts	102.35	(3.50)
CASTING	Lower casting set (400RC)	15.00	(1.25)
KR600RC	Heavy duty 360° meter Load 200Kg Rot600Kg/cm Brake 4000Kg/cm 1½"-2" masts	136.85	(3.50)
Antenna Switches			
SA450	SO239 connectors 1 in 2 out	9.75	(0.50)
SA450N	"N" type connectors 1 in 2 out	12.75	(0.50)
Baluns			
BL50A	RAK 50 ohm ferrite BALUN 1:1 1.8-38MHz 1kW	12.88	(1.50)
W2AU	1:1 50 ohm 3-40MHz 1kW	14.99	(1.50)
Dummy Loads			
T30	30W DC 500MHz PL259	6.61	(0.50)
T100	100W DC 500MHz SO239	20.12	(1.00)
T200	200W DC 500MHz SO239	31.36	(1.50)
T210	Wide band 10W 1.2G-2.4G	24.50	(0.75)
AW05	Pocket RF wattmeter 5W up to 500MHz BNC	19.75	(1.00)
Filters			
AKD	Hi-pass blocks 0-200MHz RF interference to UHF above 400MHz	5.50	(0.50)
Linear Amplifiers			
YAESU			
FL110	HF 160/80/40/20/15/10m 100W (10W drive)	155.25	(n/c)
FL2100Z	HF WARC 1200w PEP, SSB 1kW CW, 400W AM/FM/FSK	449.00	(n/c)
FL2010	2m VHF 10W linear	54.00	(n/c)
FL2050	2m VHF 50W linear 10W drive	115.00	(n/c)
FL7010	70cm UHF 10W linear	91.00	(n/c)
TOKYO HY POWER			
HL32V	VHF 30W linear 1-5W drive HI-LOW output	53.50	(n/c)
HL82V	VHF linear preamp output meter 2-12W in 35-85+ out	144.50	(n/c)
HL160V	VHF linear preamp output meter 1-10W in 160W+ out	242.40	(n/c)
HL45U	UHF linear preamp 2-15W in 10-45W out	119.75	(n/c)
ADONIS MICROPHONES Mobile/Base			
MM202S	Mobile safety mic. (non scanning)	23.00	(1.00)
MM202HD	Mobile safety mic. (scanning)	30.00	(1.00)
AM502	Desk mic. (compressor selectable)	45.94	(1.00)
Miscellaneous			
Mutec			
SNL144S	2m preamp RF switched	33.90	(1.00)
RPCB	144UB FT221/225 front end board	64.50	(1.25)
Ni-cads			
AA	AA size Ni-cad	1.00	(0.20)
C	C size Ni-cad	2.40	(0.30)
NC1850	Ni-cad charger (4 x C or 4 x AA)	9.50	(1.00)
DRAE PRODUCTS			
DRAE4	4 amp PSU	30.75	(2.00)
DRAE6	6 amp PSU	48.00	(2.50)
DRAE12	12 amp PSU	74.00	(3.00)
DRAE24	24 amp PSU	105.00	(4.00)
DRAE WM	135-450MHz wavemeter	27.50	(1.00)
"N" Connectors (Silver Plated)			
N58	"N" Male connector RG58	2.25	(0.25)
N8	"N" Male connector RG8	2.40	(0.25)
N308	"N" T adaptor (three female)	2.40	(0.25)
N307	"N" L adaptor (1 male 1 female)	2.40	(0.25)
N306	"N" Double female adaptor	1.90	(0.25)
N310	"N" Double male adaptor	2.50	(0.25)
NB304	"N" Female to BNC male adaptor	2.10	(0.25)
N402	"N" Plug to SO239	2.05	(0.25)
N403	"N" Socket to PL259	2.00	(0.25)
N404	"N" Socket to SO239	1.80	(0.25)
Speakers/Headphones			
Various			
RT650	4 ohm, 8 ohm 3W nom 6W max	6.50	(0.50)
MS60	3W nom 5W max	7.50	(0.50)
S2	Headphones (cobalt magnets)	5.75	(0.50)
YAESU			
YH55	Headphones Low Z	10.00	(0.50)
YH77	Lightweight headphones Low Z	10.00	(0.50)



SWR/Power Meters			
YAESU			
YS200		52.90	(n/c)
YS2000		69.79	(n/c)
Other Makes			
RF2000	Twin meter 3.5-150MHz F/Scale 200/2000W	18.25	(1.00)
YM1X	Twin meter 3.5-150MHz F/Scale 12 or 120W	14.99	(1.00)

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Comment...

Opportunity

BY THE TIME this issue of *PW* appears on the bookstalls, the first of the additional March sittings of the UK Radio Amateur's Examination will be almost upon us.

Provisional figures for the December 1982 exam, just released as I write, show that 3855 candidates sat the first paper and 3929 sat the second. Overall, 68·2 per cent of candidates were successful.

Since the present multiple-choice format was introduced in May 1979 it has come in for a lot of criticism. Some people thought the exam had been made too easy by taking away the need to write essay-type, in-depth answers. Others thought it was too hard. The number of "questionable" questions included in the various papers since 1979 has not helped the exam's reputation, and you may recall that I've had a go at City and Guilds on that particular topic in past issues. There haven't been so many moans just lately, but whether that's because the papers have been getting better, or because people have given up complaining, I'm not too sure.

Like all City and Guilds examinations, the RAE comes up for a periodic review of the syllabus. There was a minor change in 1982, and the next review is now under way. Elsewhere in this issue (see page 30), we publish an invitation from the CGLI to any interested individuals or groups, to send in suggestions for alterations or amendments to the present syllabus. Now's your chance — let's have some really constructive comment.

The background of many aspiring amateurs now is quite unlike that of the average RAE candidate of a few years ago. The "short wave listener" route has been largely replaced by the "frustrated CBer" route (either legal or illegal), so that the student is building on different interests and experience. This means that, more than ever before, the real point is whether the RAE is asking the right questions. The sentence in the CGLI announcement: "The principal objective of the Examination is to ascertain the candidate's ability to operate an amateur station within the terms of the licence and not necessarily to test expertise in particular aspects of the Amateur Service" really says it all, to my mind. What the examination needs to discover is whether the candidate is safe to let loose on the amateur bands, using either home-built or bought equipment, without causing mayhem among other radio users, of whatever sort. The expertise comes later, with experience.

Should some basic level of practical operating ability have to be demonstrated by a candidate, as well as passing the multiple-choice papers? I can see considerable problems in such a scheme, not least in choosing and providing some standard form of equipment for the test, but they should not be impossible to overcome. No closing date for comment is quoted in the City and Guilds announcement, but don't leave it too long before setting pen to paper.

Geoff Arnold

Services

QUERIES

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

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

PROJECT COST

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

INSURANCE

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

CONSTRUCTION RATING

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

Beginner

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

Intermediate

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

Advanced

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

SUBSCRIPTIONS

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

BACK NUMBERS AND BINDERS

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

Binders are available (Price £5.00 to UK addresses, £5.25 overseas, including post and packing) each accommodating one volume of *PW*. Please state the year and volume number for which the binder is required.

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

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

MODS

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

Roger Hall G8TNT (Sam)

No. 21

Mods for the FT-290R seem to be very popular and we have another set this month.

Semi-Reverse Repeater

I have received three mods for semi-reverse repeater (listen-on-input) operation. The first was supplied by Harry Leeming G3LLL, of Holdings Photo Audio Centre in Blackburn. He has said that although this mod has been approved by the importer, Amateur Electronics UK Ltd., anyone thinking of doing it should heed the warning at the top of this page about invalidating their guarantee. Harry has also asked me to point out that he will only do this mod to rigs that he has supplied, so if you are unable to carry it out yourself, please do not send your rig to him.

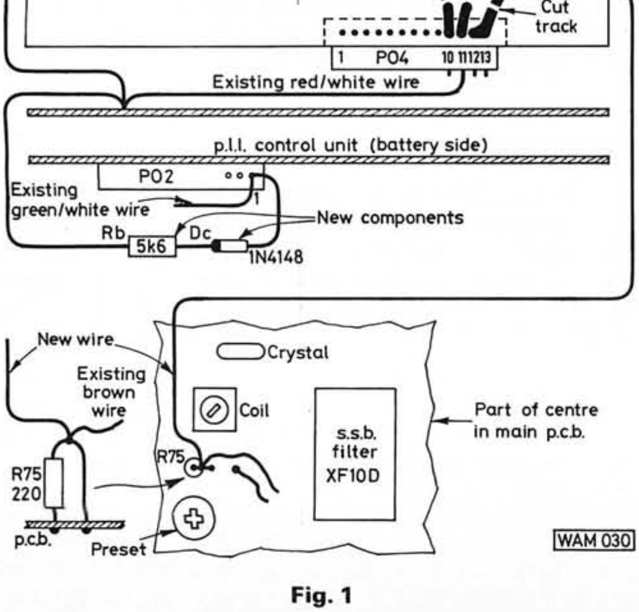


Fig. 1

This mod uses two diodes, any sort of small switching diode will do. After removing the top and bottom covers, locate the back of the MODE switch. Solder the anode of one of the diodes to the tag that has a green wire connected to it, this is the +600kHz wire. Use sleeving on the lead from the diode to prevent shorts. Solder the other end of this diode to the green/white wire that goes to Pin 1 of Plug A. You will need to scrape away some of the insulation on the wire to do this. Now turn the rig over and locate Plug B. Cut the green wire that is soldered to Pin 12. Wrap insulating tape around the end that is attached to the plug and solder the anode of the other diode to the end of the wire that leads to the MODE switch below. Solder the cathode of the diode to the black/white wire that is connected to Pin 11. Again you will need to scrape away some of the insulation. Make sure that the two joints that have been made by soldering to the green/white and black/white wires are well wrapped in insulating tape and then replace the covers. The +600kHz position on the MODE switch now switches the receiver −600kHz for listening on the input.

The second semi-reverse repeater mod was supplied by Amateur Electronics UK Ltd. First, remove the bottom cover and locate the black/white wire on SK1—it's the tenth one in from the left. Cut this wire at the socket and insulate the free end. Now find the green/white wire on SK2 and solder the anode of an 1S1555 or 1N914 diode to it. Connect the cathode of the diode to the red/white wire soldered to the p.c.b. adjacent to the microphone socket. Both diode leads should be insulated to prevent shorting. This mod is now complete and pressing the CALL BUTTON should allow listening on the repeater input whenever the MODE switch is in the + or − position.

A third variation of this mod which seems to have originally come from SMC has been sent in by Nick G8MCQ. He suggests adding a 10µF 16V capacitor, a 150kΩ resistor and a 1N4148 diode to Pin 2 of PO 3 as shown in Fig. 1. A lead should also be run from the end of Ca and Ra to Pin 11 on PO 4 on the Voltage Regulator Unit. D1 should then be removed from that unit and the track cut as shown. Now add two wires, one between R75 (220Ω) and the cut p.c.b. track near PO 4 and one from the junction of the red/white wire to Pin 1 of PO 2 via a new 5·6kΩ resistor and 1N4148 diode as shown. The CALL button should now activate the Listen Input facility and there should also be an automatic toneburst whenever the −600kHz shift is selected.

A VERSATILE ATU

Tony Smith
G4FAI

This is a simple a.t.u. based on the "transmatch" tuner originally developed by Lew McCoy W1ICP about 20 years ago. This version can be used for low power transmitting, up to about 20 watts, on all authorised frequencies 1·8 to 30MHz, and for listening on the medium as well as all short wave bands.

Construction features a wood and hardboard case, use of a standard twin-gang receiving type capacitor instead of the split-stator capacitor usually specified, a simple all-band 4:1 ferrite balun, a dummy load to assist in tuning up QRP (low power) transmitters and an easily made tapped tuning coil. Three different types of antenna feed lines can be connected at the same time, selected for use from a switch on the front panel, and various options are possible to adapt the unit to the needs of the user.

What is an Antenna Tuner?

The first thing to remember is that an a.t.u. *does not usually tune an antenna.* It is merely a device which ensures that the antenna feeder does not present a mismatch to the equipment in use. Most transmitters today need to "see" a 50Ω load at their output and the function of the a.t.u. is to transform the impedance at the transmitter end of the feeder to meet the transmitter's needs whilst discriminating against the radiation of unwanted frequencies (harmonics) by the transmitter.

When used with a receiver an a.t.u. matches the impedance of the antenna circuit to the receiver input circuit ensuring maximum transfer of available signal. It also provides a high degree of selectivity which helps to reduce "image" interference from stations on other frequencies.

When used with random length end-fed wire antennas an a.t.u. will function as already described for both transmitting and receiving and will, in this case, also tune the antenna to resonate at the desired frequency.

Circuit Details

Switch S1a selects the dummy load in position 4 whilst switch S1b then isolates all antennas. The dummy load may be omitted if the tuner is to be used only for receiving. C1 tunes L1 and, whilst transmitting, provides good rejection of harmonics with TVI (television interference) protection when properly adjusted.

L1 is tapped at 12 positions by S2 to give full coverage from 3·5 to 30MHz whilst S3 extends the range to 1·8MHz (top band) and, if required, to the medium wave band.

The final match between input and output for both transmitting and receiving is achieved by adjustment of C1

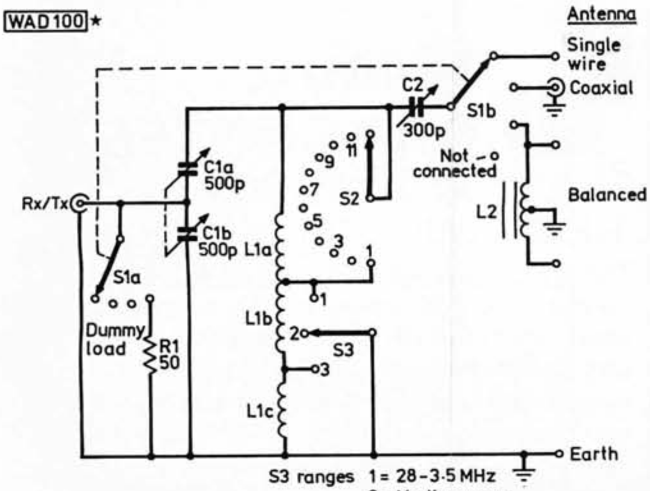
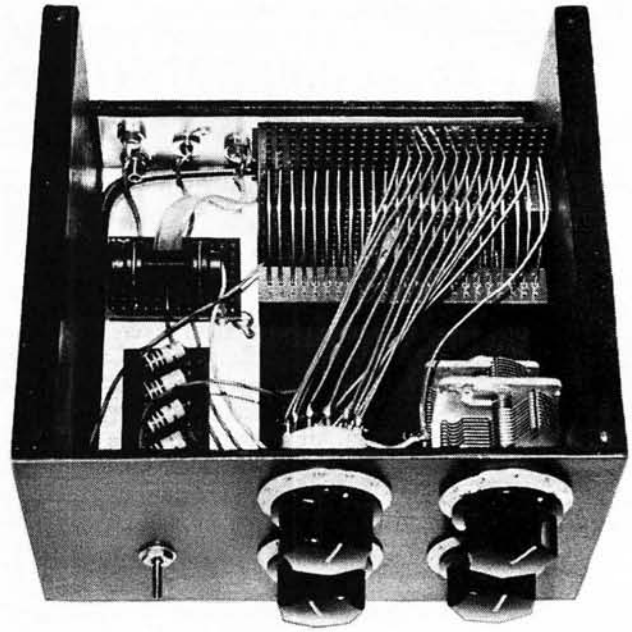


Fig. 1: Circuit diagram



and C2 in conjunction with each other. C1 in the prototype was of the type used in valve receivers, which can often be obtained cheaply as surplus components. Neither value is very critical. If bought new Jackson type OO twin-gang 365pF would be suitable for C1 and type O single-gang 365pF for C2.

S1b selects up to three different antenna feeders, i.e. single wire (end-fed), coaxial, and balanced, thus allowing a flexible and versatile antenna system to be tailored to the needs of the operator.

Construction

The base and ends of the case are made from 12·5mm wooden board with the front, rear, and top panels from hardboard, as shown in the photographs. If the constructor has limited workshop facilities it may well be possible to obtain the wood pre-cut to size from the local timber supplier when the making of the case will then become a simple assembly job.

Capacitors C1 and C2 are mounted on the front panel. Note that they are not earthed. The drilling of holes and the method of fixing will depend on the type of capacitor used. Switches S1, S2, and S3 are also mounted on the front panel.

The main coil, L1a and L1b combined, is threaded through a piece of Veroboard 95 × 95mm (0·15in matrix). The copper track is cut, and holes carefully drilled out, as shown in Fig. 2. A 4·5 metre length of 18 s.w.g.

★components

Resistors
Carbon
To suit dummy load (see text)

Capacitors
Air-spaced variable

500pF+500pF	1	C1a,1b (see text)
300pF	1	C2 (see text)

Inductors

Main coil	1	24T 18 s.w.g. 47mm dia (see text)
Medium wave coil	1	140T 24 s.w.g. 9·5mm dia (see text)
Balun	1	10T + 10T 22 s.w.g. bifilar wound on ferrite rod 9·5mm dia × 40mm

Switches
Rotary

3p.4w.	1	S1
1p.12w.	1	S2

Min. toggle

s.p.d.t. centre off	1	S3 (see text)

Miscellaneous
Chassis mounting phono sockets (2); Wander sockets, red (3), non-insulated (2); Knobs (4); Veroboard, 0·15 inch matrix (see text); Ferrite rod 40mm × 9·5mm dia; Wire, cable (see text); Wood, aluminium sheet etc. for case.

tinned copper wire is wound round a 47 mm diameter former. A sauce bottle found in the kitchen served this purpose for the author. When removed from the former the coil will spring out and be approximately the correct diameter to thread through the enlarged holes on the Veroboard. Before this is done two strips of plain Veroboard (24 × 3 holes) are required to act as spacers for the coil at right angles to the main board. These strips are cut from a larger board, using a sharp cutting/scoring tool, and the holes in the centre line are enlarged to 1·5mm.

CONSTRUCTION RATING Intermediate

BUYING GUIDE

The majority of the components used for this project are easily obtained. The variable air-spaced capacitors are made by Jackson Brothers and should be obtainable from Bi-Pak, Electrovalue, Maplin Electronics and Watford Electronics.

APPROXIMATE COST £15

The coil is threaded through the main board and the spacing strips in the direction indicated in the diagram. Some care is required towards the end of the operation to avoid distorting the windings with undue pressure but the enlarged holes allow the completion of the threading without too much difficulty. Individual turns should then be adjusted to ensure a uniform size winding and any surplus wire at the end removed. The spacing strips should be centred and secured with spots of glue at one or two points, and each winding then soldered to the main Veroboard.

The coil is mounted by wooden strips forming slots on the floor and side of the case. A piece of aluminium sheet is cut to shape and fitted to provide a back mounting and general earthing plate. Thin flexible aluminium, often obtainable in hardware/d.i.y. shops, is preferred as this is easily cut and bent to shape whilst the case can provide the necessary rigidity.

The medium wave coil L1c is made separately from the tapped coil. It is wound on a 60mm length of 9·5mm diameter wood dowelling. There are 140 turns of 24 s.w.g. enamelled copper wire in two layers of 70 turns each, so the two connecting wires are at the same end of the coil. Two rubber grommets having 9·5mm diameter holes are used to secure the windings. The coil is mounted on a piece of Veroboard by two pieces of 18 s.w.g. tinned copper wire, each 75mm long, bent round the grommets, inserted through the holes in the board and soldered underneath. The board is then secured to the side wall of the a.t.u. by small woodscrews using 6·3mm × No. 6 (4BA) spacers.

If the medium wave coil is not required S3 can be changed to single pole changeover as the centre-off facility will no longer be required.

The balun is wound on a piece of ordinary ferrite rod, as used for medium wave antennas, 9·5mm diameter × 40mm long. The rod can be cut to size by filing a groove all round and carefully tapping the rod to achieve a clean break at the desired point. Two lengths of 22 s.w.g. enamelled copper wire, each 420mm long, are wound

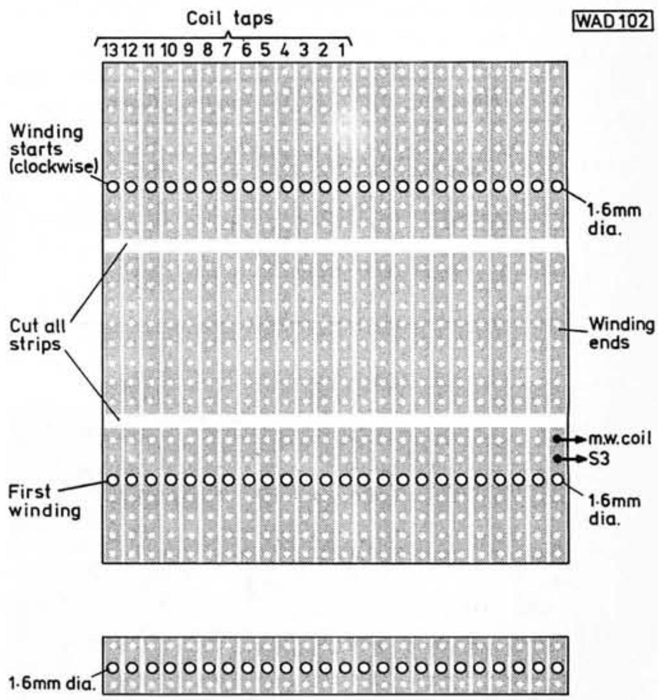


Fig. 2: Details of the 0·15in matrix Veroboard used to support the main coils

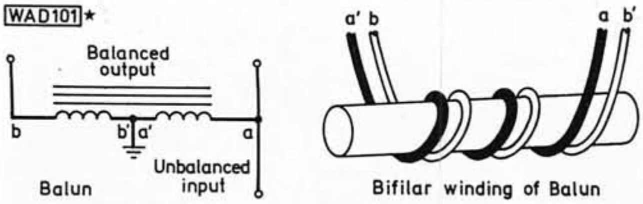
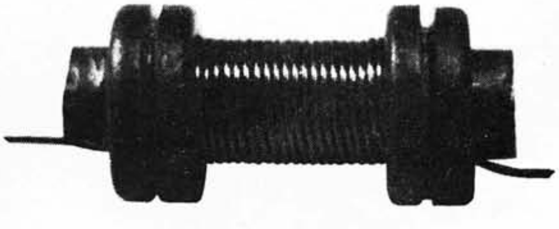
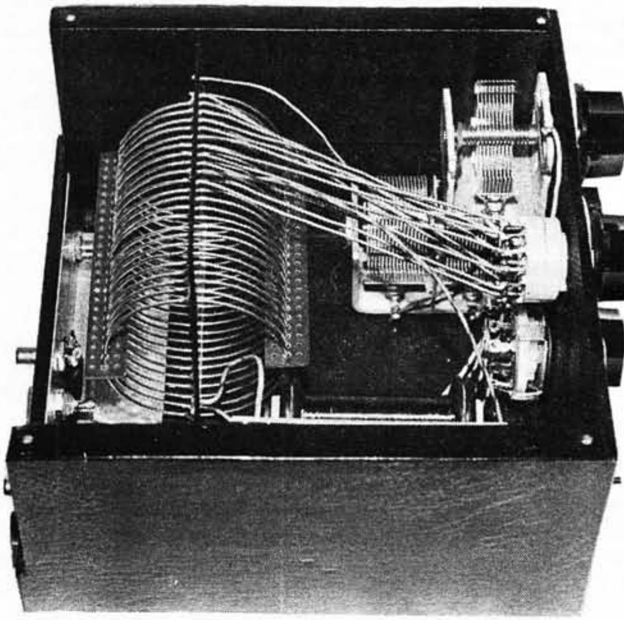


Fig. 3: Details of winding the balun



The completed balun

round the rod in bifilar fashion for ten turns. The windings are secured at each end by rubber grommets as for the medium wave coil, leaving approximately 40mm of wire protruding at each end. The balun is mounted on Veroboard and fixed to the earthing plate as shown in the photograph.

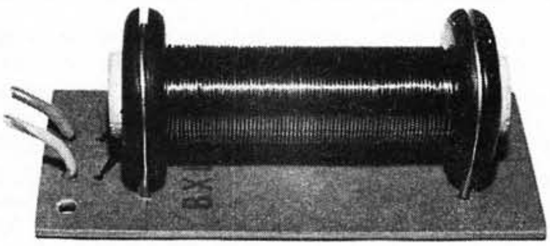


Dummy Load

The optional dummy load consists of a number of carbon resistors mounted on Veroboard to provide the impedance and wattage required. In the prototype, for example, a two watt load was required, at approximately 50 ohms, and four resistors, each 220 ohms × $\frac{1}{2}$ watt, were used. Five 270Ω 1W resistors will give 54Ω at 5W. If a dummy load is not required S1a can be dispensed with. In this case the number of positions on S1 can be reduced to three or a single pole-twelve way switch, with adjustable stop limit, could be substituted for selecting the outputs required.

The rear panel layout and general wiring details can be seen in the photographs. Before the components are finally mounted the case can be painted or covered with Contact or Fablon.

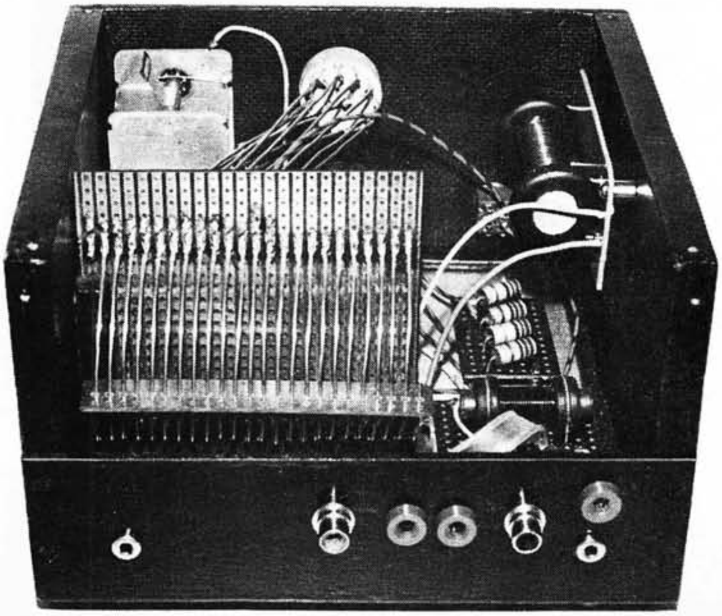
The various outputs are connected to S1 and a length of UR43 or similar 50 ohm coaxial cable wired from the input phono socket to C1. The tappings on the coil are wired as shown in Table 1. Note that position 1 of S2 effectively shorts out the coil windings when S3 is set for the 28-3·5MHz range. This is necessary to match some antennas when operating in the 28MHz band.



The medium wave coil

Table 1

Tap	Connect to	Tap	Connect to
13	Rotor S2/Stator C2	6	S2 6
12	Not connected	5	S2 5
11	S2 11	4	S2 4
10	S2 10	3	S2 3
9	S2 9	2	S2 2
8	S2 8	1	S2 1
7	S2 7		



Cardboard discs are glued behind the knobs and marked by Letraset or similar system. The discs used were obtained from the local stationers in the form of "conference badges". The centres were removed by perforating them with the aid of a domestic sewing machine.

Operation

The input of the unit is connected to the transceiver or receiver. It is desirable to have an s.w.r. (standing wave ratio) bridge connected between the a.t.u. and the transmitter to assist tuning. The antennas to be used are connected to the appropriate output sockets and an earth connection is required if an end-fed antenna is to be used. When transmitting the dummy load can be used to establish the forward setting for the s.w.r. bridge before adjusting the a.t.u. Both capacitors should be fully open for this operation otherwise their capacitance affects the impedance of the dummy load.

The bands required are selected by S3 and the antenna to be used by S1. The correct setting for the tuner is found by adjusting the coil tappings (S2) in conjunction with the input and output capacitors. Starting with C1 and C2 at minimum capacitance C1 is adjusted for minimum s.w.r. and then C2 is similarly adjusted. This procedure may have to be repeated once or twice before the optimum setting is found.

This is not as difficult as it sounds and once the correct settings are identified they can be recorded on a reference chart (one for each antenna). On the 28-3·5MHz range the higher number tappings will be appropriate for 3·5MHz and the lower, probably Nos 1 and 2, for 28-21MHz. The aim should be to achieve maximum capacitance, i.e. vanes as fully meshed as possible, to obtain best power output. Where it is possible to tune a particular frequency to a 1:1 s.w.r. on more than one coil tapping the lowest number of tappings (i.e. minimum inductance) should be chosen and this will give maximum capacitance. On some bands it may be necessary to re-tune the unit at different frequencies across the band.

For listening the audible difference between peaks on different coil settings may not always be apparent. It is, however, still desirable to select maximum capacitance and minimum inductance, as with transmitting, in order to optimise performance.

The unit will effectively match random lengths of wire although the aim should always be to get as much wire up as possible in these circumstances. Matching will be simplified if lengths can be used which have a frequency relationship to the bands to be used. A good all-amateur band length is 40 metres, which is a half wave on the 3·5MHz band, but other lengths will often perform surprisingly well. Dipoles and beams cut to individual bands and fed by coaxial cable can be tuned across the band even if they are not accurately cut. Dipoles and loops cut to almost any length and fed with balanced feeder, including 300 ohm ribbon, can be matched to any frequency higher than that at which they naturally resonate.

This is a very versatile unit suitable for both the beginner and the more experienced operator interested in QRP working. Many antenna configurations of various dimensions can be tried and matched and satisfactory results obtained. It must be stressed however that as described the unit is suitable only for low power transmission. The switching arrangements may cause problems if higher power is used and this is not recommended. The basic circuit is quite suitable for higher power but a heavy duty switch would be required for selecting the coil tappings and the antenna switching arrangement as described would not be feasible. ●

PRODUCTION LINES

ALAN MARTIN G8ZPW

Morse Code Keyer/Trainer

I.C.S. Electronics Ltd announce the availability in the UK of a full function computerised Morse code keyer and trainer unit called the model KT-2, and manufactured by A.E.A. Inc. of Seattle, USA.

The KT-2 provides precisely calibrated code speed controls allowing the user to choose between the Fast (Farnsworth) mode or the Slow Code mode of intracharacter speeds and actual code speeds from 1 to 99 w.p.m. in 1 w.p.m. increments. For example, the user can program a character speed of say 12 w.p.m. within an overall code speed of 4 w.p.m.

An additional facility is the ability of the unit to increase automatically the speed during practice sessions. The user may select a starting speed and a finishing speed, within a variable length of practice time (from 0·1 to 99·9 minutes). At the end of the practice time, the characters continue to be sent at the finishing speed until interrupted manually.

Two levels of code difficulty may be selected for practice: normal characters or all characters. The normal character mode sends all the alphabet, numerals and common punctuation. Also the user may select either five-letter code groups or random word length. Characters are perfectly timed but the ratios can be independently programmed (full weighting control).

A 24 000 character Answer Booklet is supplied to enable the student to check his progress. Ten known starting positions are available, that correspond to positions within the Answer Booklet. For normal practice there is also a random mode.

The unit provides an automatic Tune function which enables easy tuning of the transmitter, this function can be

overridden by simply touching any key pad or the paddle. Semi-automatic or "bug" key operation can be selected instead of the normal iambic operation. A sidetone can also be selected.

The KT-2 operates from any 12V (±3V) d.c. source capable of delivering 200mA and costs £89.00 (inc. VAT) plus £2.50 p&p and insurance.

For further information contact: *I.C.S. Electronics Ltd., P.O. Box 2, Arundel, West Sussex BN18 0NX. Tel: (024 365) 590.*

QRV 28MHz FM

You can't judge a book by the cover is an old adage that would seem to apply to the Ranger 4800 transceiver, stocked by Dewsbury Electronics of Stourbridge, West Midlands.

The chassis for the Ranger 4800 was originally designed for the legal 27MHz f.m. CB service; however, in its imported form it has been re-engineered for amateur use on the f.m. section of the 28MHz (10m) band.

The rig employs Motorola devices and covers the frequency range 29·310 to 29·700MHz over 40 10kHz spaced channels selected by a rotary switch.

RF output power is 6W (1W low) and other front panel controls are Volume, Squelch and receiver sensitivity via a DX/LOC (local) toggle switch. Selected channel is displayed

on a digital readout and l.e.d.s indicate transmit and free channel, an S-meter is also provided.

The Ranger 4800 costs only £46.25 (inclusive of VAT) plus £2.00 for p&p, carries a six month warranty and is available from: *Dewsbury Electronics, 176 Lower High Street, Stourbridge, West Midlands. Tel: (0384) 390063.*

FT101 Modification Kit

Owners or prospective purchasers of Yaesu's FT101 Mk 1-E transceiver may be interested to learn of the availability of a modification kit that will enable the transceiver to operate on the 10, 18 and 24MHz bands.

Harry Leeming G3LLL, Technical Director of Holdings Photo Audio Centre, informs me that they now produce the simple modification kit which enables early FT101s to operate on the three new bands by adapting the CB and WWV switch options, together with an interlocked relay in the 15m position.

The kit is easy to install and is designed to produce full power; however, the manufacturers warn potential users that they should observe the power limitations of the particular band regulations. The manufacturers emphasise that the kit is specifically for the early series of FT101s, and that they have no intention of marketing a kit for other models.

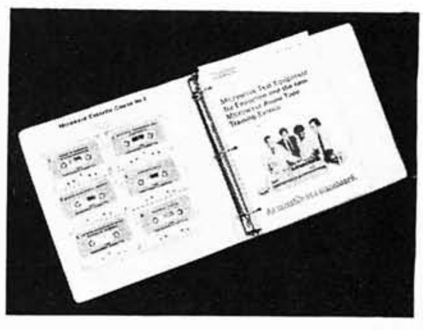
Priced at £15.75, which includes VAT and carriage, the kit is available from: *Holdings Photo Audio Centre, Mincing Lane, Darwen Street, Blackburn BB2 2AF. Tel: (0254) 59595.*

Microwave Learning Lab.

Schools, Colleges and perhaps even radio clubs and societies who wish to progress their knowledge of microwave technology and equipment may be interested in a tutorial package, called *Understanding Microwave Equipment,* prepared for the Microwave Products Division of Marconi Instruments Ltd.

The course, which comprises six lectures on 90-minute audio cassettes and an accompanying book of cross-referenced charts, diagrams and photographs, explains the basic concepts of microwave technology, principles of operation, performance and typical applications in simple terms without recourse to detailed mathematics.

Packaged in a sturdy ring binder that contains the six cassettes and associated lecture notes, the course (Part No. 2200284) costs £80.00 plus VAT and is available from: *Marconi Instruments Ltd., Microwave Products Division, P.O. Box No. 10, Gunnels Wood Road, Stevenage, Herts. SG1 2AU.*



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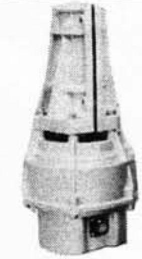

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ICOM

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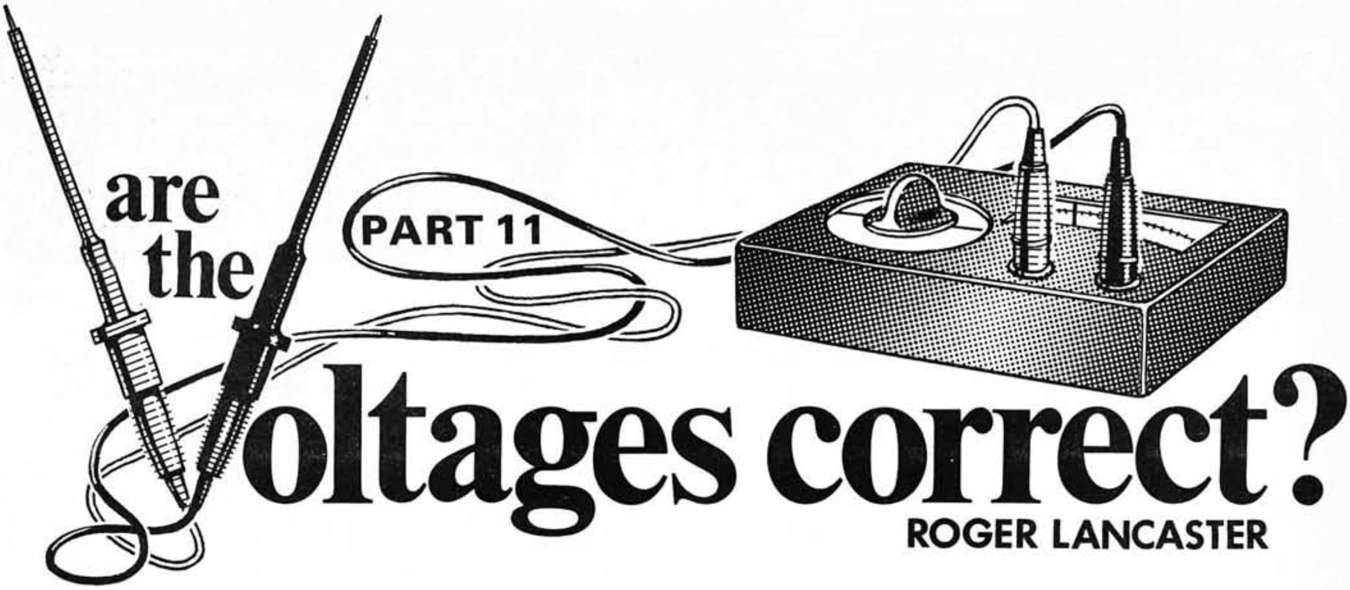


are the Voltages correct?

PART 11

ROGER LANCASTER

Solution to last month's problem: The circuit is reproduced here in Fig. 11.1.

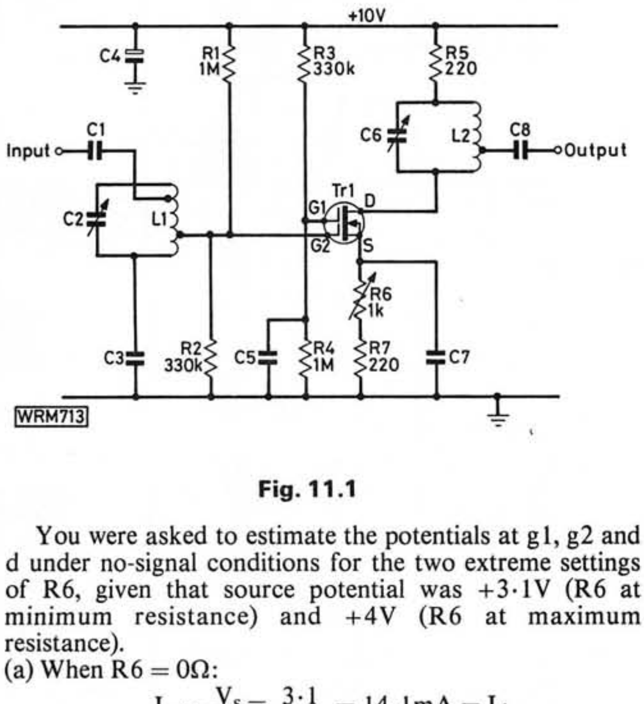


Fig. 11.1

You were asked to estimate the potentials at g1, g2 and d under no-signal conditions for the two extreme settings of R6, given that source potential was +3·1V (R6 at minimum resistance) and +4V (R6 at maximum resistance).

(a) When R6 = 0Ω:

$$I_s = \frac{V_s}{R7} = \frac{3\cdot1}{0\cdot22} = 14\cdot1\text{mA} = I_d$$

$$V_{R5} = 14\cdot1 \times 0\cdot22 = 3\cdot1\text{V}$$

Therefore, potential at d = +10 − 3·1 = **+6·9V**

(b) When R6 = 1kΩ:

$$I_s = \frac{V_s}{(R6 + R7)} = \frac{4}{1\cdot22} = 3\cdot3\text{mA}$$

$$V_{R5} = 3\cdot3 \times 0\cdot22 = 0\cdot7\text{V}$$

Therefore, potential at d = +10 − 0·7 = **+9·3V**

The setting of R6 does not affect either of the gate potentials with respect to earth, since gate currents are negligible, and so these gate potentials depend solely on the potential dividers.

So, potential at g1 =

$$\frac{R4 \times 10}{(R3 + R4)} = \frac{1000}{1330} \times 10 = \mathbf{+7\cdot5V}$$

And, potential at g2 =

$$\frac{R2 \times 10}{(R1 + R2)} = \frac{330}{1330} \times 10 = \mathbf{+2\cdot5V}$$

Integrated Circuits

There are such a wide variety of integrated circuits available that it is impossible to cover all types in this series. They vary in complexity from basic digital gates whose operation can be fully described by a simple truth table, through a vast selection of linear and specialised i.c.s which need several pages of description (as in *IC of the Month*) to microprocessor i.c.s which require a whole textbook to describe the operation of a single device.

One obvious voltage applicable to all types will be the power supply to each i.c. Ironically, it is all too easy to overlook this basic requirement, the reason being that the wiring of power supplies to i.c.s is often omitted from circuit diagrams in the interest of clarity. So don't forget that each i.c. will need its power supply even if no details of this are shown on the circuit diagram.

In this series, I shall only be able to look at certain general-purpose i.c.s and the d.c. voltages that apply to them. However, once you can understand the principles you should not have much difficulty in applying the same ideas to more specialised i.c.s in conjunction with data sheets.

On frequent occasions I shall be obliged to use words such as "normally", "usually", etc. This will contribute nothing to readers' confidence in dealing with i.c.s but it is unavoidable, unfortunately, because even among these basic general-purposes i.c.s there are variations available. The trouble is that, as soon as you attempt to generalise about the operation of any type of i.c., you will discover that some manufacturer has produced a version which operates in precisely the **opposite** way; and if not, some manufacturer will produce such a version next week! As an example, the usual master-slave JK bistable is clocked by a negative-going transient, but there are variations which are clocked by positive-going transients.

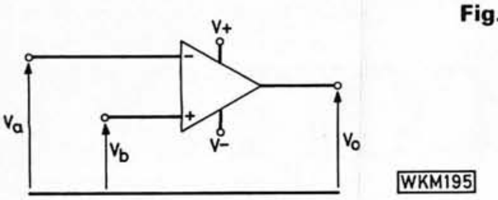
I shall therefore be describing voltage measurements applicable to the "most common" forms of these general-purpose i.c.s. Variations will be comparatively rare, but if you do take measurements around an i.c. which do not tally with the descriptions in this series, it is just possible that you may have one of the uncommon versions and you would have to refer to its data sheet.

Operational Amplifiers

The basic operational amplifier has many applications in scientific and experimental work as well as being a substitute for a multi-stage voltage amplifier. This is because it is a **differential** amplifier (output being the amplified **difference** between two inputs) and also because its gain can easily be set to anything between unity and about 200 000 times. It has the further advantages of high input impedance (a megohm or so), low output impedance (about 150 ohms) and very good temperature stability. "Op. amps." form the basis of a multitude of more specialised i.c.s.

The circuit symbol for the basic op. amp. is shown in Fig. 11.2 (the voltages and the common line not being a part of the symbol).

Fig. 11.2



Power supplies are "V+" and "V–", "V+" being positive with respect to "V–". The p.d. between these two will be quoted by the manufacturer and should not be exceeded, a typical figure being 30V. This is usually applied so that "V+" is positive with respect to the common line by half the total (e.g. +15V in the example quoted) and "V–" therefore negative with respect to the common line by the same amount (e.g. –15V). There are variations, but we will consider this symmetrical application of supply voltages to be the case for the time being. We will also consider the common line to be earthed (0V).

With no input voltages applied (i.e. $V_a = V_b = 0V$), the output voltage V_o should be halfway between the "V+" and "V–" supplies, i.e. at 0V. This results from the internal circuit configuration within the i.c.

When voltages are applied at the "+" and "–" inputs, the output is determined by the formula:

$$V_o = A_v (V_b - V_a)$$

where A_v is the differential voltage gain (or "open-loop" gain), a typical figure being 200 000 at low frequencies, although this falls as frequency increases. As we are only concerned with d.c. potentials in this series, A_v will be the full open-loop gain.

From the formula, V_o is therefore equal to A_v times the **difference** between the input voltages.

There are limits to V_o, however, imposed by "V+" and "V–". The positive limit of V_o is slightly less positive than "V+" (e.g. +14V) and the negative limit of V_o is slightly less negative than "V–" (e.g. –14V).

Using these typical figures, let us see what the input voltage **difference** will be to cause such a limiting of V_o. If the V_o positive limits to +14V, the formula will be:

$$14 = 200\,000 \times (V_b - V_a)$$

Therefore,

$$(V_b - V_a) = \frac{14}{200\,000} = 70\mu V$$

You are not likely to notice this very small difference in input potentials in your meter readings yet this is the **maximum** difference you are likely to get because the op. amp. will normally be operating well within its output voltage limits. So, for all practical purposes, the potentials measured at the "+" and "–" inputs will be **the same**, in this case virtually 0V.

There are two basic op. amp. circuits for conventional voltage amplification, the first of these being shown in Fig. 11.3. This is the inverting op. amp., where the input voltage is applied via R1 to the inverting input ("–") and produces a **phase-inverted** output, V_o. The gain of the amplifier is determined solely by the ratio of the resistors. This gain, called the "closed-loop" gain, because negative feedback is now being applied via R2, is given by R2/R1. Notice that it is independent of A_v. Remember also that there is a phase reversal (change of polarity as far as d.c. is concerned).

In the example of Fig. 11.3, therefore, the gain is $100k\Omega/10k\Omega = 10$. So if $V_i = +1V$, then V_o is ten times this and with reversed polarity, i.e. **–10V.** If V_i is –0·5V, $V_o = +(10 \times 0{\cdot}5) =$ **+5V.** If $V_i = +3V$, however, V_o is **not** $-(10 \times 3) = -30V$, but will be **–14V**, the negative limit.

In all of the preceding examples, the potential measured at the "–" input will be **0V** because the "+" input is earthed and these two are virtually the same potential. In many cases there will be no d.c. component at the output, only undistorted sine waves (e.g. signals), in which case the measured d.c. potentials at V_i, "–", "+", and V_o would all be zero.

The other common amplifier arrangement is shown in Fig. 11.4. It is the non-inverting op. amp. circuit, so called because the output is **in phase** with the input. Voltage V_i is applied direct to the "+" input but the negative feedback is still to the "–" input via the potential divider R2/R1.

Fig. 11.3

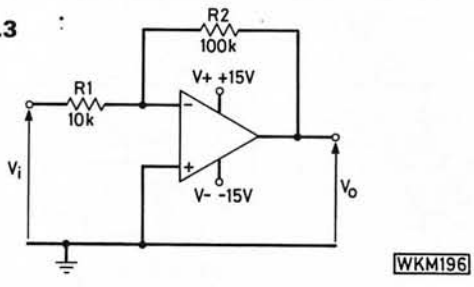
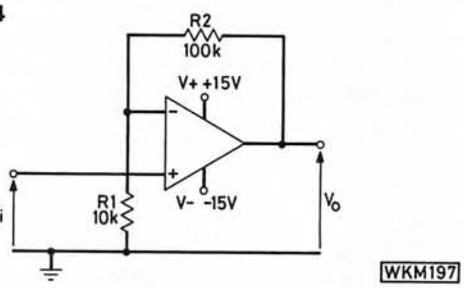


Fig. 11.4



Gain is given by:

$$1 + \frac{R2}{R1}$$

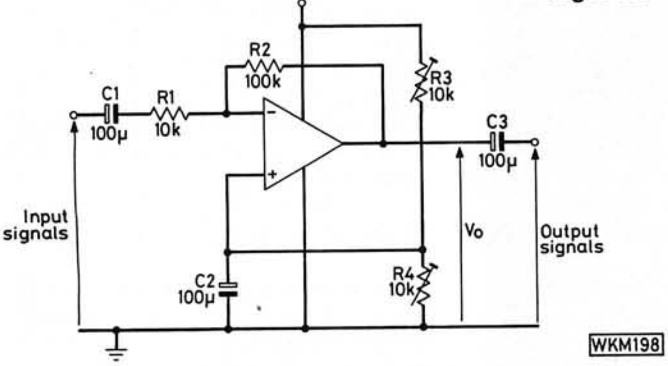
in this example gain is therefore $1 + (100/10) = 11$. So, if $V_i = +1V$, then $V_o =$ **+11V.** If $V_i = -0{\cdot}5V$ then $V_o = 11 \times (-0{\cdot}5) =$ **–5·5V.** If $V_i = +3V$, V_o is **not** +33V but is limited to **+14V.** The potential at the "–" input will be equal to V_i in all cases, since V_i is applied direct to the "+" input and we have already established that there is negligible difference between the potentials of the "+" and "–" inputs.

The circuits of Figs. 11.3 and 11.4 require two power supplies (the +15V and the –15V). Where a.c. only is to be amplified, as is the usual case in radio work, the circuits can be adapted to operate from a single supply of +30V, an example of an inverting op. amp. circuit of this type being shown in Fig. 11.5.

Now "V+" is at **+30V** and "V–" at **0V**, the same potential **difference** existing between these as before. There is no d.c. input because of C1, so V_o will be at a d.c. potential halfway between "V+" and "V–" (due to the internal circuits of the chip), i.e. **+15V**. The "–" input will be at **+15V** also, via R2, through which no d.c. current flows. So the "+" input must be made to be **+15V** as well, otherwise the d.c. potential difference between the "+" and

"–" inputs would cause V_o to be other than +15V and would reach limit level if the "+" input was earthed to d.c. The "+" input level is therefore set by the potential divider R3/R4 until V_o is exactly +15V, the resistors being made variable pre-set to allow compensation for slight differences in their resistance values and to compensate for any asymmetry in the circuits of individual i.c.s. A slight difference of a few mV in p.d. between the "+" and "–" inputs usually has to be applied anyway in order to achieve the correct no-input value of V_o, this small p.d. being called the "input offset voltage".

Fig. 11.5

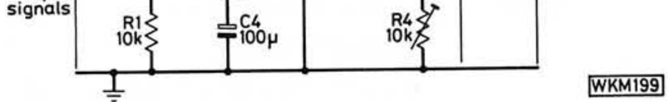


Capacitors C1 and C3 are d.c. blocks which prevent the d.c. conditions of other stages from upsetting the critical d.c. conditions of the op. amp. circuit. As far as signals are concerned C2 earths the "+" input but allows the correct d.c. potential to exist there.

The single power supply version of the non-inverting op. amp. circuit is shown in Fig. 11.6. The d.c. conditions are as follows: "V+" = **+30V** and "V–"= **0V.**

Therefore V_o is **+15V.** The "—" input is at +15V via R2, the "+" input is also at **+15V** via the potential divider R3/R4/R5 (there is no d.c. voltage dropped across R5 as no d.c. current flows through it).

Fig. 11.6



As before C1 and C3 are d.c. blocks. Capacitor C2 allows the negative feedback to the "–" input to be due to **signals only.** The +15V bias is decoupled to the "+" input via C4, and R5 allows input signals to be developed across it, being connected between the "+" input and earth as far as signals are concerned.

External circuits are often connected to other pins of the i.c., for example to modify the op. amp.'s basic frequency response, but these will not normally affect the d.c. conditions of the points mentioned.

If the d.c. voltages are incorrect, the i.c. itself may be suspect. The easiest way to prove this is to substitute a new i.c., as most of them are relatively inexpensive. If this is not possible or convenient, the suspect i.c. could be removed and tested in a simple test rig similar to the circuit of Fig. 11.3. Where the i.c. is plugged into a holder this makes substitution easy and also enables the d.c. potentials to be checked on the pins with the i.c. out of circuit. If the i.c. is soldered in, the voltage readings should be carefully analysed, if necessary taking into account meter resistance and referring to the appropriate data sheet, before undertaking the difficult task of unsoldering the i.c.

Often i.c. faults are intermittent and temperature sensitive. In these cases, a squirt of freezing fluid onto the i.c. can frequently bring a change in its operation, so directing suspicion to the i.c. rather than to the associated circuit. Freezing fluid should be obtainable from component retailers and is very handy when fault-finding on integrated circuits, whether of the op. amp. type or not.

Now to this month's problems:

Fig. 11.7

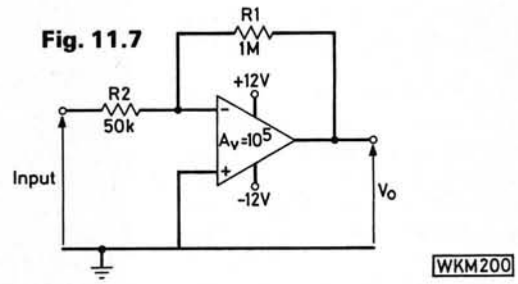
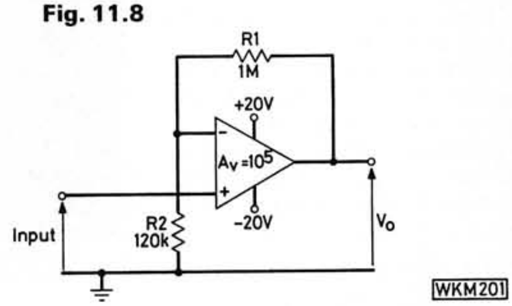


Fig. 11.8



No. 1: Calculate the d.c. potentials at the "+" and "–" inputs and the value of V_o if the following d.c. inputs are applied to the circuits of (a) Fig. 11.7 and (b) Fig. 11.8.

(i) +100mV
(ii) –500mV
(iii) –2V

No. 2: Referring to Fig. 11.5, what d.c. potentials should exist on the following pins of the i.c. holder if the i.c. was removed?

(i) "+" input
(ii) "–" input
(iii) "V+"
(iv) "V–"
(v) V_o

Next month we will take a look at some of the more common digital i.c.s as used in control and counting circuits.

NEWS NEWS NEWS

Find That Project

The third edition of the *Electronic Projects Index* (EPI), compiled by M. L. Scaife G6RJU, Bibliographical Services Officer of North Tyneside Libraries and Art Department, is now available.

The index provides a complete list of projects published during 1979–80, in 16 named technical magazines, which includes *Practical Wireless, Practical Electronics, Everyday Electronics, Television, Wireless World and Practical Hi-Fi.*

Containing 118 A4 size pages, EPI No. 3 costs £2.50 (which includes p&p) and is available on a cash-with-order basis from: *EPI Sales, Central Library, Northumberland Square, North Shields, Tyne & Wear NE30 1QU.*

The next edition, EPI No. 4 covering 1981–82, is being compiled at this moment and should be published mid-1983.

New Amateur Radio Shop

A new shop, specialising in amateur radio equipment, has opened at Stourbridge in the West Midlands.

Called Dewsbury Electronics, the proprietor, Tony Dewsbury G4CLX, is the designer of the respected Morse sending "G4CLX Keyboard" and the firm, an approved Trio dealer, are also stockists of Daiwa, Weltz, Davtrend, Tasco Telereaders, AEA Products, Microwave Modules, ICS Amtor and Drae equipment.

The address of the new shop is: *176 Lower High Street, Stourbridge, West Midlands. Tel: (0384) 390063.*

News from AMSAT-UK

Phase IIIB: The latest launch date for this satellite, from French sources, is now 27 May, 1983.

Phase IIIC: The USAF has not taken up the launch option for this satellite. The cost is estimated at 1·8 million dollars and no part of the budget can be undertaken at this time. So, it looks like AMSAT will have to find another launch agency for Phase IIIC.

Components Fair

The Pontefract and District Amateur Radio Society will be holding a "Components Fair" at the Carleton Community Centre, Pontefract, on Sunday, 13 March, 1983.

The doors will open at 1100 and there will be talk-in on 144MHz (S22), bring-and-buy stall, licensed bar and refreshments plus RSGB publications, and the overall emphasis of the fair will be on home construction.

Further details from: *G4AAQ, tel: (0977) 791071.*

New Catalogue

Jaybeam's latest catalogue called *Amateur Radio Antennas* is now available. The catalogue contains technical details, including v.s.w.r. graphs of their entire range of amateur antennas, plus other associated products, such as rotators, masts, phasing harnesses, mounting brackets etc.

The catalogue is available from most Jaybeam stockists on receipt of a medium-sized s.a.e., or direct from: *Jaybeam Ltd. (Dept. AM/CAT), Kettering Road North, Northampton NN3 1EZ.*

Teleprinter Handbook

The 2nd edition of the *Teleprinter Handbook,* jointly edited by A. G. Hobbs G8GOJ, E. W. Yeomanson G3IIR and A. C. Gee G2UK, has recently been published.

The book, now revised and updated, is one of the most comprehensive guides to the theory and practice of amateur RTTY available, and is a must for anyone seriously interested in this mode.

The book gives system descriptions and servicing information for several popular European and American machines. Other essential RTTY equipment, including test gear, is described and designs for home construction are given where appropriate.

Chapter titles are: Basic telegraph transmission theory; Teleprinters; Other RTTY machines; Power supplies; Demodulators; Polarised relays; Keying methods; Filters; Test Equipment; A video display unit; The Hellschreiber system; Control systems; The RTTY station; Operating procedures; plus three appendices: Glossary of commercial equipment; Terminology; Data.

This hardbound book has 368 pages measuring 246 × 184mm and is fully illustrated with hundreds of line diagrams and photographs.

The UK cover price is £12.00 from booksellers, or £13.84 by post from: *RSGB, Alma House, Cranborne Road, Potters Bar, Hertfordshire EN6 3JW. Tel: (0707) 59015.*

Radio Amateur's Examination

The periodic review of the syllabus for the Radio Amateur's Examination is now due and the City and Guilds R.A.E. Committee has established a working party for this purpose.

The principal objective of the Examination is to ascertain the candidate's ability to operate an amateur station within the terms of the licence and not necessarily to test expertise in particular aspects of the Amateur Service. Suggestions for alterations or amendments to the existing syllabus would be welcome and should be sent to: *Mr. S. D. Allison, City and Guilds of London Institute, 46 Britannia Street, London WC1X 9RG.*

NEWS NEWS NEWS

GB3SF s.s.b. Repeater Experiment

We have recently received details of the proposals for the 144MHz pilot carrier s.s.b. repeater GB3SF submitted to the RSGB RWG by Dr. A. J. T. Whitaker G3RKL, of the University of Sheffield Department of Electronic & Electrical Engineering.

This unique experimental installation will be operational for a 12 month period, during which time investigations will be carried out into the feasibility of pilot carrier s.s.b. for mobile use. Comparisons will be made between f.m. and s.s.b. systems in respect of range, quality, ease of use and occupied bandwidth. The RWG have approved the proposals and have made it quite clear that this 12 month experiment is **not** being established to enhance or promote DX working — in fact the predicted range will be no greater (probably less) than a conventional f.m. repeater. Data obtained during the operational period will be fed back to the RWG and, if the system is found to be viable, will in the long term assist with amateur band planning. Following the experimental period a full report will be submitted by G3RKL to the 1984 IARU Conference.

As this is an experimental project, involving a new technique, much of the equipment will also be experimental in nature. It will all be designed, constructed or modified at the University of Sheffield, some possibly by final year students in connection with their projects.

The pilot carrier system chosen for the repeater is thought to be the most appropriate for the amateur service and will allow adequate reception of the repeater without modification. A small modification will be required to the transmitting section of individual transceivers to provide a steady carrier at 16dB below peak output (14·5dB down on peak modulation). In practice this will be accomplished by leaking the correct amount of carrier around the balanced modulator/filter sections.

In order to provide acceptable voice quality in the presence of both frequency and doppler shift, the repeater will extract the pilot from input signals, using a 200Hz wide filter, apply limiting and then be re-inserted as the b.f.o., resulting in "perfect" demodulation. This same system can be applied to individual receivers to derive the same "locked" benefits. To allow for drift in input signals the repeater receiver will have a capture range of $\pm$200Hz and a tracking range of approximately $\pm$500Hz with respect to the nominal input frequency.

Apart from status signals from the GB3US Mk II m.p.u. based control logic, to indicate HI/LOW frequency and "overmodulation", the repeater will perform in the same way as existing f.m. devices. Output power will be 10W p.e.p. u.s.b. using a single vertical antenna (probably a $\frac{5}{8}\lambda$ ground-plane) and located at the top of the 36m University's metallurgy tower near to the city centre. In order to cause negligible interference to the existing repeater network the INPUT/OUTPUT frequencies requested are 145·185 and 145·785MHz respectively.

ZX81 QTH Locator Programs

With these two programs, written for the ZX81 + 16K, you can find your QTH Locator or, using QTH Locators, work out distance and bearings as well as contest scores. You will also be helping a good cause—the RAIBC (The Radio Amateur Invalid and Blind Club) as for each tape sold £1·00 will be donated to this worthy cause.

Program A uses latitude and longitude data and performs the complicated and tortuous calculations needed to work out the equivalent QTH Locator. This is displayed on the screen in a novel way showing the position within the final QTH Locator square as a black block and also showing the surrounding squares with their Locator designations.

The other program works out the distance, bearing and contest score from QTH Locators input into the ZX81 via the keyboard. The program also calculates your lat. and long. from your QTH Locator which it displays on the screen. As the contest progresses the computer keeps a tally of total points scored and the best DX so far together with the number of contacts. Of course the program is useful even if you are not working a contest.

The two programs are available on a cassette from *G8CEZ, 35 Chichester Walk, Merley, Wimborne, Dorset,* price £3·50 inc. post and packing. Out of this £1·00 will be donated to RAIBC. RAIBC members can purchase the cassette for £2·50 but then no donation will be given to the club.

ATV Group

The Home Counties Amateur Television Group, which has been in existence for over a year, meets on the fourth Wednesday of every month at the Richings Park Sports and Social Club, Richings Park, near Iver, Bucks. A talk-in station is operated on 145·200MHz.

The group's committee is quite active in trying to attract newcomers to ATV and invite interested parties to attend their meetings.

At the moment, the group's main interest lies with fast-scan on 432MHz (70cm); however, they are trying to generate more activity with fast-scan on 1·3GHz (24cm) and slow-scan on the h.f. bands and 144MHz (2m).

The group's next meeting, at Richings Park, is on Wednesday 23 March 1983, starting at 2000hrs.

Further information is available from: *Sec. HCATVG, P. Miller G4REE. Tel: Maidenhead (0628) 76020.*

Radio Rally

The White Rose Amateur Radio Society, based at Moortown R.U.F.C., Leeds, have organised their radio rally for Sunday 27 March 1983, starting at 1100 at The Refectory, University of Leeds, which is the same venue as last year.

In addition to all the usual attractions of a radio rally, ample car parking is available and the entrance fee is only 50p—free to senior citizens, XYLs and harmonics.

For further details contact: *Rally Manager, Richard R. Hughes, 3 Primley Park Crescent, Leeds LS17 7HY.*

AIR TEST

USER REPORTS ON SETS AND SUNDRIES

Continuing last month's theme of antennas for small gardens

HS-HF5 5-band Vertical Antenna

The HF5 operates as a quarter-wave vertical on the five pre-WARC h.f. amateur bands at 3·5, 7, 14, 21 and 28MHz, with a maximum power-handling capability of 200W p.e.p. on the two lower bands and 500W p.e.p. on the remainder.

Automatic band-switching is accomplished by the inclusion of one trap and one loading coil, with separate top-loading elements for 3·5 and 7MHz looking rather like the horns on a snail. The overall height of the antenna is 4·8 metres from the tips of these elements to the SO239 connector at the base.

The HF5 can be installed in three ways. 1: On a ground post, in which case the base of the antenna must be not more than 100mm from the surface of the ground. 2: As a ground-plane antenna using wire radials, at least one wire per band, sloping downwards at approximately 30° below the horizontal, and with lengths ranging from 2·7 to 21·5m (λ/4). 3: As a ground-plane antenna using the HF5R radial kit (maximum power 150W p.e.p.), which comprises a loading coil plus five adjustable rod elements slightly over 2 metres long, sloping downwards at 45°. Using either of the ground-plane systems, the antenna can be mounted above ground, on a mast or roof-top. The HF5 weighs 2·9kg and the HF5R 1·8kg.

Adjustment of the HF5 for minimum v.s.w.r. at the desired part of each band must be carried out at ground level, even if it is to be used ultimately with a ground-plane system on a mast, etc. The 28MHz band is pre-set (no adjustment), the 21 and 14MHz bands are set by telescoping the lower and upper sections respectively, and the 7 and 3·5MHz bands by trimming the loading elements to length.

Adjusting the ground-plane radials can be more difficult because of the problem of getting at them when the system is installed.

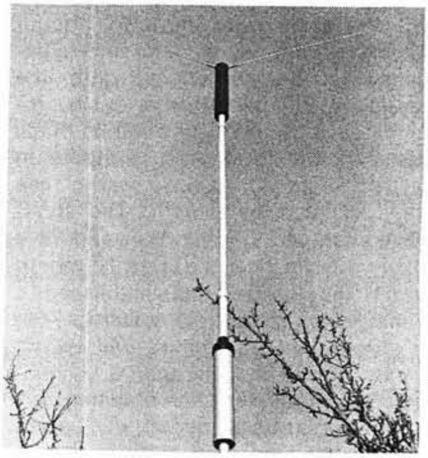
I first used the HF5 with an HF5R, all mounted on the gable-end of the roof, with the antenna above the ridge and the HF5R below. Because it was very difficult to get at the system in that position due to a large beech hedge in my neighbour's garden, I set it up first using a temporary pole in my garden. This was fairly successful, though it was difficult to get the v.s.w.r. down to the specified maximum of 1·5:1, and bandwidth was very restricted on 3·5 and 7MHz. When mounted on the roof-end though, the radial element ends were obviously much too close to the brickwork, and the v.s.w.r. went way up and refused to come down again, no matter what adjustments were made. I used the antenna there for some months with an a.t.u. (but see comment later), though not with very great success.

Other HF5 users have had better results with the system in the clear, on a mast-top or even on the corner of a house, so that the radials were farther from the wall, but neither of these solutions was really practical for me at the time. Eventually, against much advice, I drove an aluminium post into the ground at the bottom of the garden and bolted my HF5 to that, feeding it underground through about 15 metres of UR43 coaxial cable, protected by a length of garden hose-pipe. There are trees pretty well all round it, some of them twice as tall as the antenna, and all the pundits say it will give lousy results. But it works, giving good contacts even with a low-power transmitter (see *PW*, October 1982, page 54). After over two years' exposure, the only corrosion is rust on a couple of self-tapping screws.

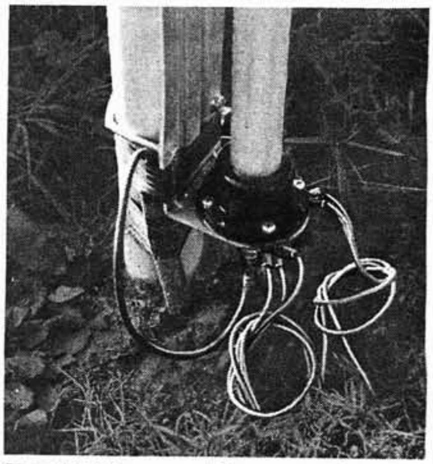
The graphs show the v.s.w.r. measured on the three lower bands. You can, of course, set the minimum to whatever part of the band is your particular interest. In wet weather, the v.s.w.r. minimum moves down in frequency by about 10kHz on 3·5MHz and about 25kHz on 7MHz. On 21 and 28MHz the v.s.w.r. is between 1·2:1 and 1·4:1 right across the band. I would advise against trying to extend the operating bandwidth of the HF5 on the 3·5MHz band by using at a.t.u. to improve the match at the transmitter. I tried this using a 100W transmitter but the high voltage generated in the 3·5/7MHz loading coil obviously caused a flashover. Result, one "dead" loading coil.

The HS-HF5 and HF5R are widely stocked by amateur *radio* retailers around the UK. Current prices are around £40·25 for the HF5 and £29·90 for the HF5R. Contact your local dealer or South Midlands Communications Ltd. for further details.

Geoff Arnold

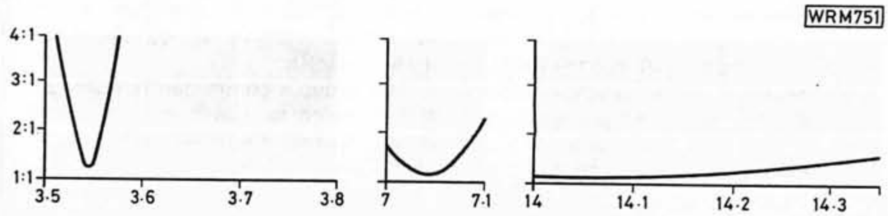


The loading coil with its two "horns", and the trap



The HF5 base, with connections to five buried radials for improved soil conductivity

WRM751



The v.s.w.r. obtained on the three lower bands with the HF5 on the ground post

AIR TEST
USER REPORTS ON SETS AND SUNDRIES

YAESU FT-230R 144MHz FM Transceiver

Every month it seems that the Japanese electronics industry produces yet another 144MHz transceiver to make the radio amateur's choice even more difficult.

Yaesu's latest contender in the f.m. only mobile lists is the 25W FT-230R—a smart and compact piece of equipment which performs as well as it looks.

Simple to operate, an essential requisite for safe mobile operation, the FT-230R has 10 programmable memories selected by a rotary switch on the front panel. Programming the memories can be a little confusing at first but once the hang of selecting the DIAL mode to tune the rig has been mastered and the fact that the displayed frequency changes as the required memory is selected, the operation becomes simplicity itself. The memories can be scanned by turning the memory switch to MS and pushing the MR button. A slide switch on the rear panel selects BUSY/MAN/CLEAR modes for scanning.

Frequency is displayed on a liquid crystal display showing the last five digits of the operating frequency. The display also indicates memory operation, priority channel, scanning and priority checking and memory shift operation. A red l.e.d. indicates that the rig is in transmit mode while a matching green l.e.d. shows that the squelch is open. An analogue meter indicates signal strength on receive and r.f. output power during transmit. Manual tuning is carried out by rotating the large knob below the digital display panel.

Repeater operation is catered for by the provision of 600kHz shifts in both directions giving reverse repeater operation if desired. The audio tone-burst is selected by a push-button on the front panel just above the 7-pin mic socket. If required the tone-burst can be switched to auto by operating a slide switch on the rear panel. This is only recommended for accessing repeaters still requiring a tone-burst for re-access. Also on the rear panel is the antenna socket (SO239) and the 12V d.c. power socket which is also of the screw-locking type—a good feature for a mobile rig as it makes life much safer.

Operating the rig was a pleasure and the reports received indicated that the output was clean and the audio very good. It must be pointed out though, that this was the fourth sample tried—the first three all suffered from such appalling audio quality on transmit that it was impossible for the other end of a QSO to even tell the sex of the operator! Obviously Yaesu have taken note of the complaints and it is understood that the necessary mods have been carried out to rectify the problem.

Receiver sensitivity was good and the squelch operated smoothly. The r.f. output measured 25W at 13·8V d.c. and on the low power setting was reduced to 2·5W. When pushing out full power the current consumption was 4·7A reducing to 1·8A on low power. On standby the current drawn was 200mA.

The handbook is good and clearly written and covers alignment and maintenance as well as operation and installation. A full circuit diagram and parts list is also included—useful when the rig is no longer a current model.

The FT-230R costs £235 inc. VAT from **South Midlands Communications Ltd., SM House, Rumbridge Street, Totton, Southampton SO4 4DP, Tel: 0703 867333,** to whom we extend our thanks for the loan of the review samples.

Dick Ganderton

Benny

M.J.AXSON B.A.G8WHG

The latest introduction to the amateur satellites currently in orbit is OSCAR 9, more commonly referred to in the UK by its pre-launch title of UOSAT.

After the successful launching of OSCAR 8 into a near-Earth circular orbit, the thoughts of AMSAT turned to more adventurous projects for dedicated radio amateurs to be known as the Phase 3 series satellites and which would be in elliptical orbit. However a number of people, principally in the UK, had the idea that an alternative route would be to introduce more of the non-technical population to the concept of satellite use and at the same time to provide facilities for scientific experimentation. Both projects were to be given the blessing of the appropriate authorities and to proceed in parallel.

UOSAT-OSCAR 9, which is the largest and most complex OSCAR spacecraft yet launched, was built by a team from the Department of Electronic Engineering at the University of Surrey, hence its name, who received support from AMSAT, the RSGB and various sections of industry. Unlike the other active satellites, UOSAT does not carry any transponders, since it is intended to be used for educational and scientific purposes rather than simply as a means of enhancing communication. To this end it carries a number of sophisticated experiments and has two on-board computers.

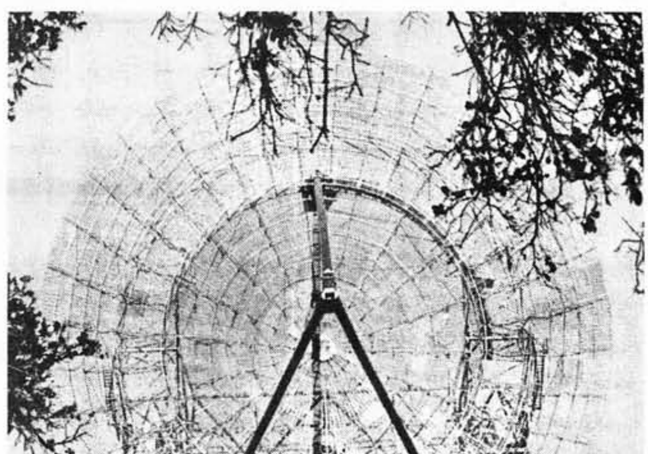
The experiments can be divided into two broad groups. Firstly, those on the scientific side. There is a series devoted to propagation experiments on various amateur bands. On the h.f. bands phase-related beacons, when activated, will be available on 7·050MHz, 14·002MHz, 21·002MHz and 29·510MHz, all at output powers of 100mW. Two further beacons in the microwave regions will be on 2·401GHz and 10·470GHz with a power output of 125mW. There are two radiation detectors to provide information on solar activity and auroral effects, and a magnetometer experiment to study the earth's magnetic field. All of these will provide ample scope for the scientifically minded to carry out some meaningful research.

The second group, of the so-called educational experiments, are designed to be of more general interest, and are transmitted on the general data beacon at a frequency of 145·825MHz with a power output of 350mW. Much information is transmitted on the status of the spacecraft systems derived from sensors situated at vital points. These are available from time to time at various data rates and types of transmission, i.e.

1200, 600, 300 & 110 baud ASCII
45·5 baud RTTY
10 or 20 w.p.m. c.w.
and synthesised voice.

These varying formats allow for a considerable range of sophistication in the ground receiving equipment. The voice synthesiser has been switched on on a number of occasions, at first just going through its vocabulary, but more recently giving telemetry reports, and it can be clearly received at the author's home in Cheshire on an ordinary 144MHz band amateur transceiver (TR-9000) fed from a vertically polarised colinear antenna. The transmissions are n.b.f.m. and no pre-amplification is necessary. A friend who listened to the synthesised voice beacon did remark that it sounded rather like "an American Dalek with a cold", but that presumably originated with the programming of the synthesiser chip and not through any defect in the ground station!

Perhaps the most intriguing apparatus in this section is the camera. This is a solid-state charge-coupled-device (c.c.d.) and it will be pointed at the Earth to transmit SSTV pictures from orbit. The standard to be employed is rather higher than that usually used in amateur SSTV, being 256 lines × 256 picture elements (pixels) and 16 possible grey levels, so good quality pictures should be obtained. Each frame will take apporoximately $3\frac{1}{2}$ minutes to transmit and optimum resolution on the earth's surface is



The 46m antenna used to rescue OSCAR 9

photograph EIMAC VARIAN

expected to be 2km. Full details of a suitable decoder to display the pictures on a domestic TV set have been published by AMSAT-UK, and p.c.b.s should be made available when the system is proven.

Finally, the spacecraft carries an engineering beacon with a power output of 650mW on 435·025MHz which will transmit further telemetry.

UOSAT was successfully launched from Vandenburg Air Force Base in the USA on board a Delta launch vehicle which also carried an SME spacecraft into orbit, on 6 October 1981. Work then commenced on loading data into the on-board computers from the Surrey ground control station in preparation for attitude control manoeuvres required before initiating the major experiments—this was a slower process than had been anticipated. The orbital height of approximately 540km gives three useful orbits each day, with a further three at night, each averaging 10 minutes duration. The project manager, Dr. Martin Sweeting, graphically likened this aspect of the operation as attempting to de-bug a computer at the end of a noisy telephone line in your coffee breaks!"

However, all proceeded well until 4 April 1982, when through an unfortunate combination of circumstances, both the 145 and 435MHz beacons were switched on together without the usual computer control being in operation. This de-sensed both spacecraft receivers and prevented the reception of further command signals from the ground.

Eventually, on 20 September 1982, after a number of unsuccessful attempts by various parties throughout the world, a team of amateurs from Stamford University (USA) using very high power u.h.f. equipment were able to switch the 145MHz beacon off, so enabling Surrey to regain control of the spacecraft. The state of all systems appears to be good and work is continuing to achieve full operational status.

In addition to the information available from AMSAT-UK, the University of Surrey maintains a recorded information service on Guildford (0483) 61202, which is updated at frequent intervals and includes orbital predictions.

The Phase 3 Project

So far, the satellites discussed have been in relatively low, near-circular orbits. As was shown in Part 1 of this series, these have the disadvantages of short visibility times over fairly limited areas. High circular orbits would give a great improvement in coverage, but at a considerable cost in terms of power required from the launch vehicle. A compromise can be found by placing the spacecraft in an elliptical orbit and this is the plan adopted for the Phase 3 transponder project.

If an object in a circular orbit has its velocity increased, e.g. by firing a booster rocket, it will climb away from the earth. Unless the new velocity is greater than approximately 11 200m/s (the escape velocity from the earth's influence), gravity will slow it down until a point is reached where the velocity is too low to maintain a circular orbit at that distance and the object will return towards the earth. Gravity will now act to increase the velocity and the process will be repeated so sustaining an elliptical orbit (Fig. 3.1.). This is a very much simplified explanation but it may help in understanding the concept. The lowest point of the orbit is called the perigee and the highest, the apogee.

The Phase 3 project anticipates a perigee of 1500km and an apogee of 35 000km, with the apogee initially being over the northern hemisphere of the earth. In practice this means that the spacecraft will be visible for periods of ten hours at a time over the northern half of the earth, i.e. most of the land masses including Europe, Northern

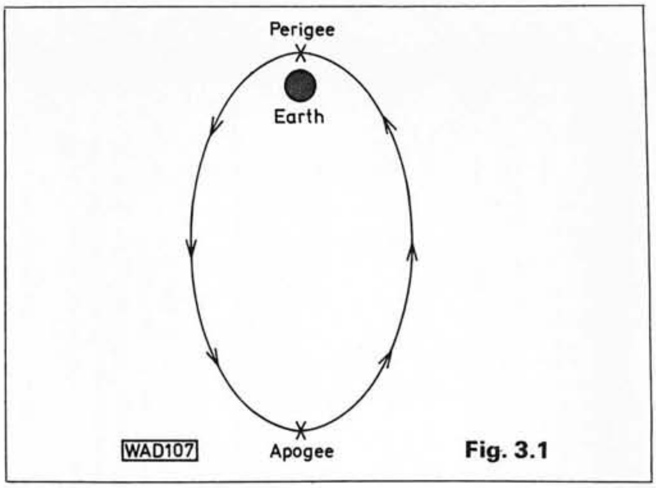


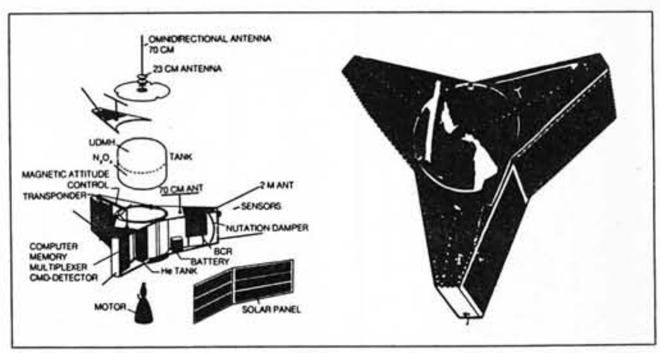
Fig. 3.1

Africa, Asia and North America. Further, due to the nature of an elliptical orbit it will appear to be almost stationary (i.e. in the same part of the sky) for about 3 hours either side of apogee, a total of 6 hours per orbit.

These facts lead to some interesting conclusions about the equipment and antennas required by a station wishing to operate through the satellite, particularly in view of the proposed uplink and downlink frequencies which are in the 1·3GHz and the 432MHz band respectively. Calculations suggest that antennas with a gain of 20dB would allow the use of a normal 432MHz amateur band transceiver. The output could be transverted to 1·3GHz so requiring a minimum of equipment.

A gain of 20dB for an antenna sounds formidable for those used to thinking in terms of h.f. and v.h.f. frequencies, but at u.h.f. the physical dimensions are so much smaller that it becomes a practical proposition. The RSGB *VHF/UHF Handbook* shows a design for a 32-element Yagi for 1·3GHz which has a gain of approx 19dB with an overall length of 2 metres. Two or more could be combined to give greater gain.

Don't think that the chimney would not stand up to the strain of such an array for there may be no need to put it up there. If the satellite is on a pass of say ±30 degrees from overhead and the antenna has a 3dB beamwidth of 20 degrees it may simply be pointed in a roughly vertical direction, so that it could be fixed on a short post just



The Phase 3b satellite due to be launched in mid-1983

AMSAT-UK/ESA

above ground level. This would give the advantages of short feeder runs, no great wind loading and no planning approval required! Parabolic dish antennas would also be a practical propositon again situated at low level.

So when will it all happen? Sadly, it should already have done so, for the first Phase 3 satellite was on board the European Space Agency Ariane LO2 vehicle which was launched from the Guyana Space Centre on 23

continued on page 41 ▶▶▶

BASIC QSOs in German

PART 2

G.W. Roberts GW4JXN

Weather and Radio Conditions

The temperature is . . . degrees centigrade.	Die Temperatur ist . . . Grad Celsius.	Dee tempera**twr** ist . . . grad t**sel**siws.
Today the weather is fine/sunny/(very) cold/hot/misty/windy.	Heute ist das Wetter schön/sonnig/(sehr) kalt/heiss/neblig/windig/bewölkt.	Hoyte ist das **ve**ter shoen/**so**nig/(zayr) kalt/haiss/n**eb**lig/**vin**dig/bev**oel**kt.
It is raining. It is snowing. The snow is 300mm thick. The weather has been fine.	Es regnet. Es schneit. Der Schnee ist dreissig Zentimeter tief. Das Wetter ist schön gewesen.	Es **rayg**net. Es shnait. Der shnay ist d**rai**sig tsentim**eter** teef. Das **ve**ter ist shoen ge**ves**en.
Today/yesterday/during the weekend it has been raining. It has been snowing.	Heute/gestern/am Wochenende hat es geregnet. Es hat geschneit.	**Hoy**te/**ges**tern/am vochen**end**e hat es ge**reg**net. Es hat ges**hnai**t.
Winter/spring/summer/autumn has come.	Der Winter/Frühling/Sommer/Herbst ist gekommen.	De **vin**ter/**free**ling/**zom**er/herbst ist ge**ko**men.
The wind has been strong. There has been thunder and lightning.	Der Wind ist stark gewesen. Es hat gedonnert und geblitzt.	Der vint ist shtark ge**ves**en. Es hat ge**donn**ert unt geb**lits**t.
Working conditions are poor/bad/good/very good/excellent.	Die Arbeitsbedingungen sind schlecht/gut/sehr gut/ausgezeichnet.	Dee **ar**baitsbed**ingwn**gen zind shlect/goot/zer goot/awsget-saichnet.
All the bands are open. The 10, 15, 20, 40, 80 metre band is closed/open to North/Central/South America, Eastern/Northern/Southern/Western Europe, Asia, Australasia, Africa, the Far East, Japan.	Alle Bänder stehen offen. Das zehn/fünfzehn/zwanzig/vierzig/achtzig Meterband ist geschlossen/offen in der Richtung Nord/Zentral/Südamerika. Ost/Nord/Süd/West Europa, Asien, Australien, Afrika, Fernostern, Japan.	Ale **ben**der s**hta**yen **o**fen. Das tsen, **fin**ftsen, t**swan**tsig, **feart**sig, **ach**tsig meterbant ist gesh**losen**/**of**en in der **richt**wng nord/ts**entral**/s**i**damerika. Ost/nord/sid/vest **oyro**pa, **az**ien, awst**ral**ien, **af**rica, **fer**nostern, Japan.
I have just heard a . . .	Ich habe eben einen . . . gehört.	Ish **ha**be **e**ben **ain**en . . . geh**oer**t.
I can hear but cannot work a . . .	Ich höre aber ich bekomme keinen Kontakt . . .	Ish h**oe**re aber ish be**ko**me k**ai**nen k**on**takt . . .
There is an opening on 2 metres, 70cm.	Auf zwei Meter, siebzig Zentimeter ist es frei.	Awf tsvai meter/**zea**btsig t**sen**timeter ist es frai.
This lift is getting better/getting worse. Hope it lasts.	Diese Arbeitsbedingungen werden immer besser/schlimmer. Hoffentlich bleibt es so.	Deeze **ar**baitsbed**ingwn**gen **ver**den **i**mer b**e**ser/sh**li**mer. H**o**fent**lich** blaibt es zo.
Nice to speak to you.	Prima so mit Ihnen zu sprechen.	Prima zo mit **een**en tsw sh**prech**en.
It is . . . o'clock approximately here local time/GMT.	Es ist hier ungefähr . . . Uhr Lokal/Grenwichzeit.	Es ist hear **wn**gef**ayr** . . . whr lo**cal**/**grenits**htsait.
What time is it in . . .	Wie spät ist es in . . .	Vee shpayt ist es in . . .

Arranging a Sked

May I speak to you again?	Darf ich Sie noch mal rufen?	Darf ish zea noch mall **roo**fen?
Are you free tomorrow/this time next week/at . . . hrs GMT?	Sind Sie morgen/zu dieser Zeit nächste Woche um . . . Uhr Grenwichzeit frei?	Zint sea m**or**gen/tsw d**ee**zer tsait n**aych**ste voche wm . . . whr **grenitsh**tsait frai.
How about this frequency or alternatively let's try the 10, 15, 20, 40, 80 metre band.	Wie wäre es mit dieser Frequenz oder Versuchen wir mal das zehn, zwanzig, vierzig, achtzig Meterband.	Vee **vay**re es mit **dee**zer freqvents oder vers**wch**en veer mal das tsayn, t**svan**tsig, f**ear**tsig, a**ch**ttsig **meter**band.
No I'm sorry, I am not free at that time.	Nein es tut mir leid, Ich bin zu der Zeit nicht frei.	Nain es toot mir **lai**d, Ish bin tsw **der** tsait nicht frai.
I am usually on 20 metres at . . . GMT on (days of week) except . . .	Ich bin gewöhnlich auf vierzig Metern um . . . Uhr Grenwichzeit am (days of week) ausser . . .	Ish bin gev**oen**lich awf t**swan**tsig **me**tern um . . . whr **grenitsh**tsait am **mon**tag (days of week) awsser.
I have to go to bed/to work now.	Ich muss jetzt ins Bett/zur Arbeit gehen.	Ish mws yetst ins bet/tswr **ar**bait **geh**en.

English	German	Pronunciation
Technical		
I have a new rig/linear/antenna which I am testing.	Ich habe eine neue Anlage/eine neue Linear welche ich probiere/eine neue Antenne die ich probiere.	Ish habe **ai**ne **no**ye **an**lage/eine noye **linear vel**she ish probi**ere**/**ai**ne **na**oye an**tene** dee ish prob**iere**.
Is my modulation OK? Your modulation is good/bad.	Ist meine Modulation in Ordnung? Ihre Modulation ist gut/schlecht.	Ist maine modw**lats**ion in **ord**nwng. **Ee**re mod**wlats**ion ist goot/shlecht.
What is my exact frequency?	Was ist meine genaue Frequenz?	Vas ist m**ai**ne gen**aw**e freqvents?
I'm using a speech compressor.	Ich benutze einen Spreechcompressor.	Ish ben**wt**se **ai**nen speechprocessor.
Does this make any difference?	Hören Sie einen Unterschied?	**Hoer**en zee **ai**nen **wnter**sheet?
Thank you for the test.	Danke für den Test.	**Dan**ke fir den test.
Social		
From the shack I can see mountains/sea/moors.	Von dem Schack (der Funkbude) aus sehe ich das Gebirge/die See/die Heide.	Fon dem shak (der f**wnk**b**ww**de) **aws** s**e**he ish das geb**irg**e/dee zee/dee **hai**de.
I have a friend/wife/children in the shack with me.	Ich habe einen Freund/meine Frau/Kinder bei mir im Schack.	Ish **habe ain**en froynt/maine fraw/kinder bai mir im shak.
He is a visitor/a short wave listener.	Er ist ein Besucher/ein Kurzwellenhörer.	Er ist ain bez**wc**her/ain k**wrt**svelenh**oe**rer.
She is a visitor.	Sie ist eine Besucherin.	Zee ist **ai**ne bez**wc**herin.
He intends to sit his radio exam.	Er will seine Amateurradioprüfung machen.	Er vil **sai**ne amateurradiop**ri**fwng m**ach**en.
I am at home/at work/at a friend's house.	Ich bin zu Hause/am Arbeitplatz/bei einem Freund.	Ish bin tsw hawse/am **arbait**splats/bai **ai**nem froynt.
This is a demonstration/special station/club station.	Dies ist eine Vorführstation/Sonderstation/Klubstation.	Deez ist aine **for**firstats**io**n/**zonder**stats**io**n/k**lw**bstats**ion.**
I have visited your country.	Ich habe ihr Land besucht.	Ish **habe** ear lant be**zw**cht.
I hope to visit your country.	Ich hoffe Ihr Land zu besuchen.	Ish **hoff**e ear lant tsw bez**wch**en.
We had a nice time.	Wir haben viel Spass gehabt.	Veer **ha**ben feel shpas geh**abt.**
Excuse my German.	Entschuldigen Sie mein Deutsch!	Ents**hwl**digen zee main doytsh.
I wish I could speak your language as well as you speak mine.	Ich wollte ich könnte ihre Sprache so gut sprechen wie Sie meine.	Ish **vol**te ish k**oen**te **ear**e shp**rach**e zo gwt sh**prech**en vee zee m**ai**ne.
Can we continue in English?	Können wir englisch weitersprechen?	K**oe**nen veer **eng**lish v**aiter**shp**rech**en?
May I say it in English?	Darf ich es auf Englisch sagen?	Darf ish es awf **eng**lish **za**gen?
May I explain it in English?	Darf ich es auf Englisch erklären?	Darf ish es awf **eng**lish erk**layr**en?
QSL		
Could you please send me your QSL card?	Könnten Sie mir bitte eine QSLkarte schicken?	K**oen**ten zee mir b**itt**er **ai**ne k**oe**ss**el****kar**te s**hik**en?
I would be very pleased to get a QSL card from you.	Es würde mich freuen eine QSLkarte von Ihnen zu bekommen.	Es **vi**rde mish f**roy**en **ai**ne **Koo ess e**l **kar**te fon **een**en tsw be**kom**en.
I shall send you my QSL card via the bureau/direct.	Ich werde meine QSLkarte über das Büro/direkt schicken.	Ish **ver**de m**ai**ne koo ess el karte **i**ber das **biw**ro/dee**rekt** **shic**en.
My name is in the American/British callbook.	Mein Name ist im Amerikanischen/Englischen Callbook (Rufzeichenliste).	Main **na**me ist im amerik**anis**hen/**eng**lishen callbook (**roo**ftsaichen**list**e).
Is your name and address in the callbook?	Stehn Ihr Name und Ihre Anschrift in der Rufzeichenliste?	Sh**ta**yen eer name wnt **eare** **ansh**rift in der **roo**ftsaichen**list**e?
Can you give me your address and telephone number over the air?	Könnten Sie mir Ihre Anschrift und Telefonnummer per Funk sagen?	K**oen**ten zee mir **eare ans**hrift wnt tele**phonnwm**er per fwnk **za**gen?
What is your postal code/telephone code?	Was ist ihre Postleitzahl/Vorwahlnummer?	Vas ist **ea**re postla**it**staal/**for**wa**a**lnwmer?
This is my address and my telephone number.	Heir sind meine Anschrift und meine Telefonnummer.	Here zint m**ai**ne **an**shrift und **ma**ine teleph**onnwm**er.
Concluding Remarks		
May I thank you once more for this call/contact and wish you a very good morning/afternoon/evening/good weekend.	Noch einmal besten Dank für diesen Ruf(Kontakt)/dieses QSO und wünsche Ihnen einen guten Morgen/Tag/Abend/ein gutes Wochenende.	Noch **ain**mal be**s**ten dank fir d**ee**zen roof (contact) deezes QSO unt **win**she **een**en **ai**nen **gwt**en m**or**gen/taag/**ab**ent ain gwtes **voch**en**end**e.
Merry Christmas and a Happy New Year.	Fröhliche Weihnachten und glückliches neues Jahr.	**Froe**liche v**ai**nachten wnt g**lik**liches n**oy**es yaar.
I send you my best regards.	Herzliche Grüsse.	**Her**tsliche gr**iss**e.

All the best to you and yours.	Alles Gute an Sie und Ihre Familie.	**Al**es g**wte** an zee wnt **ee**re fam**eel**ie.
I look forward to working you again.	Ich hoffe Sie bald wiederzuhören.	Ish h**o**ffe zee balt **veederts**wh**oer**en.
May I wish you 73, 55, 88 and make this my final.	Ich wünsche Ihnen dreiundsiebzig, fünfundfünfzig, achtundachtzig und mache jetzt mein Final.	Ish **win**she **ee**nen dr**ai**unt**zeeb**tsig, f**inf**untf**inf**tsig, **ach**twnt**ach**sig, wnt m**ach**e yets main f**een**al.
Back to . . . from . . . who is waiting for any concluding remarks from you.	Zurück an . . . von . . . der auf ein paar abschliessende Bemerkungen von Ihnen wartet.	T**swrik** an . . . fon . . . der awf ain paar **ab**shl**ees**ende bemer**kwn**gen fon **ee**nen v**art**et.
So best wishes and good DX.	Also alles Gute und gut DX.	Alzo ales **goo**te wnt gwt day ecs.
Goodbye until next time/until the pleasure of seeing you again.	Auf Wiederhören bis zum nächsten Mal/bis zu unserem nächsten Gespräch (Kontakt).	Awf **veederhoe**ren bis tswm **nex**ten mal/bis tsw unzerem n**ext**en geshp**ray**ch (contact).

Stating Future Intentions

This is . . . signing off and clear with . . . and I am now standing by for a call on this frequency.	(Callsign) verabschiedet sich hiermit von . . . und geht jetzt auf allgemeinen Empfang. Ich bleibe auf dieser Frequenz.	(Callsign) ferabshaidet zich hecurmit fon . . . wnt gayt yets awf **al**gem**ain**ern **emp**fang. Ish b**lai**be awf **deez**er freqvents.
. . . now monitoring this frequency and waiting for any call.	. . . und warte auf einen Ruf auf dieser Frequenz.	. . . wnt **var**tr awf **ain**en roof auf **deez**er freqvents.
. . . now changing frequency to . . .	Ich schalte jetzt um auf . . .	. . . ish **shal**te yetst **wm awf . . .**
. . . now returning to the calling channel.	Ich gehe jetzt auf den Anrufskanal zurück.	**. . . ish gay**e yets awf den **anroofskan**al **tswrik.**
. . . now going QRT.	Ich mache jetzt QRT.	**. . . ish mach**e yets coo er tay.

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

absorption wavemeter — der Absorptionswellenmesser
ammeter — das Amperemeter
amplifier — Der Verstärker
amplitude modulation — Die Amplitudenmodulation
antenna — Die Antenne
antenna tuning unit — Der Antennen-Abstimmkries
aurora — das Nordlicht
auroral — Nordlicht
auroral zone — Die Nordlichtzone
balun — das Symmetrierglied
beam — der Beam
calibrator — das Eichgerät
a carrier — Der Träger
coaxial cable — Das Koaxialkabel
coil — die Spule
condenser — Der Kondensator
continuous wave — die ungedämpfte Welle (c.w.)
cross-modulation — Die Kreuzmodulation
deviation — Die Abweichung
dial — Die Skalenscheibe/Die Skala
directional antenna — Die Richtantenne
disturbance — Die Störung
dummy load — die künstliche Antenne
the earth — Die Erde
to earth — erden
earthed — zu Erde/geerdet
fading — das Fading/der Schwund
feeder — Die Verbindungsleitung/das Antennenkabel
final stage — Die Endstufe
fixed — fest
frequency modulation — Die Frequenzmodulation
fuse — die Sicherung
groundwave — Die Bodenwelle
high-pass filter — das Hochpass-filter
indoor antenna — Die Zimmerantenne
insulator — Der Isolator
ionosphere — die Ionosphäre
jack — die Buchse
lightning protection — Der Blitzschutz
line of sight — auf Sichtweite
lower sideband — Das untere Seitenband
low-pass filter — das Tiefpass-filter
metal case — Das Metallgehäuse
a meter — Das Messgerät
modulated wave — die modulierte Welle
omnidirectional antenna — Die Rundstrahlantenne
operator — Der Funker
parasitic oscillations — parasitäre Schwingungen(f)
plug — Der Stecker
power supply — Das Netz/der Netzanschluss
preset — voreingestellt
preset potentiometer — der Trimmer
pulse modulation — die Impulsmodulation
radiate — strahlen/abstrahlen
the range — Die Reichsweite
readability — die Lesbarkeit
receiver — der Empfänger
repeater — der Umsetzer/die Relaisstation
r.f. amplifier — Der h.f. Verstärker
rotating antenna — die drehbare Antenne
a rotator — der Rotor
satellite — der Satellit
selectivity — Die Trennschärfe
sensitivity — Die Empfindlichkeit
shielded braiding — die abgeschirmte Litze
short circuit — Der Kurzschluss
sideband — Das Seitenband
skip zone — Die Tote Zone
sky wave — Die Raumwelle
sound frequency — Die Tonfrequenz
splatter — der Splatter
standing wave — die stehende Welle
switch — der Schalter
to test — prüfen
transceiver — der Senderempfänger
transistor — der Transistor
transmitter — der Sender
troposphere — Die Troposphere
tuned circuit — Der Schwingkreis
to tune up — abstimmen
upper sideband — Das obere Seitenband
valve — die Röhre
variable — veränderlich/variabel
vertical antenna — eine vertikale/senkrechte Antenne
voltmeter — das Voltmeter
wavelength — Die Wellenlänge
wavemeter — der Wellenmesser
Yagi — der Yagi

The German alphabet — this is used to give the Q code and also for callsigns. The German names for the letters give an adequate representation of the pronunciation.

A	ah	N	enn
B	bay	O	oh
C	tsay	P	pay
D	day	Q	koo
E	ee	R	air
F	eff	S	ess
G	gay	T	tay
H	hah	U	ooh
I	ee	V	fow (as in fowl)
J	yot	W	vay
K	ka	X	icks
L	ell	Y	ipsilon
M	emm	Z	tset

Numbers together with their pronunciation

1	eins	ains	18	achtzehn	**acht**tsane
2	zwei	tsvai	19	neunzehn	**noyn**tsane
3	drei	dry	20	zwanzig	**tsvaan**tsig
4	vier	fear	21	einundzwanzig	**ain**wnt**tsvan**tsig
5	fünf	finf	22	zweiundzwanzig	**tsv**aiwnt**tsvan**tsig
6	sechs	sex	23	dreiundzwanzig	**dry**wnt**tsvan**tsig
7	sieben	**zee**ben	30	dreissig	**dry**sig
8	acht	acht	40	vierzig	**fear**tsig
9	neun	noyn	50	fünfzig	**finf**sig
10	zehn	tsane	60	sechzig	**sex**tsig
11	elf	elf	70	siebzig	**zeeb**tsig
12	zwölf	tsvoelf	80	achtzig	**acht**tsig
13	dreizehn	**drai**tsane	90	neunzig	**noyn**tsig
14	vierzehn	**fear**tsane	100	hundert	**hwnd**ert
15	fünfzehn	**finf**tsane	200	zweihundert	**tsvaihwnd**ert
16	sechszehn	**sex**tsane	500	fünfhundert	**finfhwnd**ert
17	siebzehn	**seeb**tsane	1000	tausend	**tawz**ent
			2000	zwei tausend	tsvai **tawz**ent

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

Alfred	Karl
Bernd	Klaus
Dieter	Kurt
Erich	Ludwig
Ernst	Norbert
Fritz	Otto
Georg	Paul
Gerhard	Peter
Günter	Philipp
Hans	Rainer
Heinz	Rudi
Helmut	Rudolf
Herbert	Thomas
Hermann	Tilman
Jürgen	Udo
Kai	Ulli

Days of the week

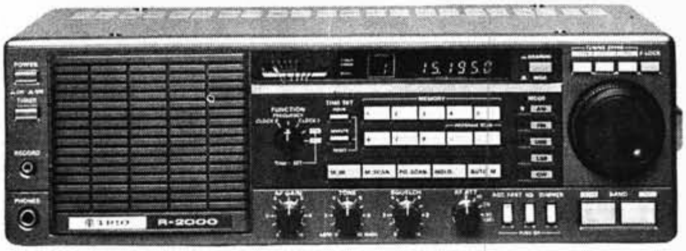
Sunday	Sonntag	**Zon**taag
Monday	Montag	**Moan**taag
Tuesday	Dienstag	**Deans**taag
Wednesday	Mittwoch	**Mit**voch
Thursday	Donnerstag	**Doner**staag
Friday	Freitag	**Frai**tag
Saturday	Samstag/Sonnabend	**Zam**staag/**Zon**abent

on Sunday	Sonntag/ am Sonntag	**Zon**taag/ am **Zon**taag
on Sundays	Sonntags/ jeden Sonntag	**Zon**taags/ yayden **Zon**taag

Time

It is 1 o'clock — es ist ein Uhr (es ist ain whr)
It is 2 o'clock — es ist zwei Uhr (es ist tsvai whr)
It is 2.30 — es ist halb drei (es ist halb dry)
Note: The Germans look forward to the next hour at half past.
quarter to/past — Viertel vor/nach (**fear**tel for/nach)

Modern Receiver Front ~ End Design



part 1

G.W. GOODRICH

The keen radio amateur, short wave listener, or for that matter anybody else interested in communications receiver design, can hardly have failed to notice that some of the traditional design concepts of the superhet are slowly being superseded by modern, and to my mind at least simpler, techniques at the front-end of the system. However, I will qualify this statement by saying that actually generating the local oscillator frequency appears more complex in commercial equipment, due to the use of MPU driven digital frequency systems.

The use of higher, and yet higher, first i.f.s in the conversion process has meant that image responses can, with suitable pre-selection arrangements, be reduced to a minimum. This, along with the use of very efficient passive mixers and suitably narrow crystal filters for these high i.f.s, means that the home designer/constructor no longer needs to consider the double conversion technique in order to guarantee a reasonable performance in communication terms.

This article discusses, in simple terms, the implications of the modern single conversion approach, and how this may affect the potential designer/constructor.

The Traditional Superhet

The "traditional" double conversion superhet is a very complex beast indeed. I spent a lot of time in the early 70s looking at amateur designed receivers while researching data for my own project, and I have developed a great deal of respect for designers, such as G2DAF who produced a superb "advanced amateur receiver". Frankly, if I had been interested in designing my own equipment at this time, I would have given up long before drawing the block schematic!!

The problem for the designer of the traditional superhet front end, as shown in block schematic form in Fig. 1, was to provide enough selectivity to help alleviate cross-modulation and image responses. However, bearing this in mind, the designer also had to provide r.f. amplification to overcome noise generated in the mixer stages, and inherent noise in the rest of the receiver's circuitry.

In fact he had to work against himself, in that he was actually encouraging the very interference he was trying to filter to appear at the input to the first mixer. For this reason the local oscillator and the pre-selector (or r.f. tuning if you prefer) needed to be arranged in such a way that only the desired signal would find its way to the first mixer, whilst the local oscillator would provide the correct frequency to generate the desired i.f.

The usual method of achieving these goals was to track the r.f. pre-selection circuits with those of the local oscillator, the circuits' relationships to one another being designed such that the local oscillator ran higher, or lower, in frequency terms in order that a fixed i.f. would appear at the output of the mixer stage.

At a first glance it might appear to be quite easy to achieve such a condition. If the two circuits shared a common spindle to their respective variable capacitors, surely all the designer needed to do was to add a bit of inductance or capacitance to one circuit to create the ideal relationship? Inevitably it is not quite as simple as this. Why? Considering the equation used to derive the resonant frequency of a tuned circuit, it will be remembered that frequency is inversely proportional to the square of the product of two co-efficients, namely inductance and capacitance.

$$f_r = \frac{1}{2\pi\sqrt{LC}} \quad \text{so } f_r \propto \frac{1}{\sqrt{LC}}$$

The implications of this law are easier to understand by studying the graphs (Fig. 2). Fig. 2(a) shows the resonant frequency curves for two similar tuned circuits, except that the circuit giving curve T2 has a small amount of extra capacitance in parallel with the main tuning capacitor. If we look at the relationship between the two curves, we can see that the two circuits do not track one another constantly over the whole range. In fact there is only one point where the i.f. produced at the mixer was correct, and the error grows very quickly either side of this point. So by

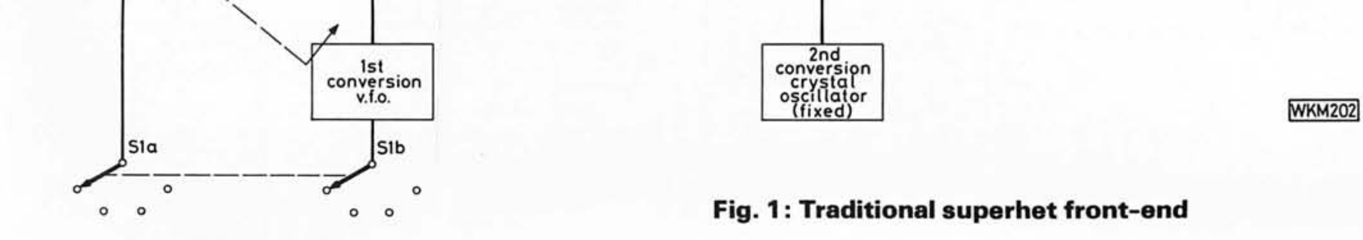


Fig. 1: Traditional superhet front-end

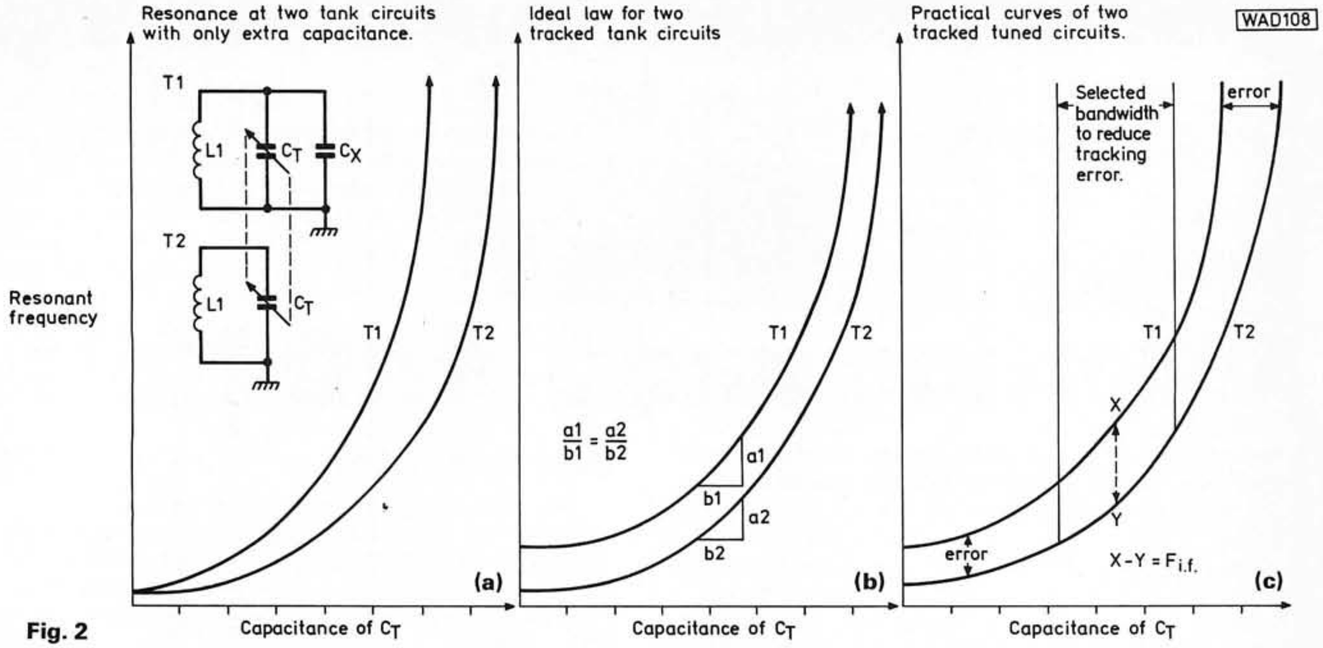


Fig. 2

simply adjusting one factor defining the resonant frequency of the circuit, we will certainly not get the ideal curves we require. The ideal curves are shown in Fig. 2(b). Notice how the curves for each idealised network have the same gradient, and that all along the graph the following relationship will apply.

$$F_{i.f.} = F_1 \pm F_2$$

This is impossible to achieve in practice, but a close approximation can be obtained by adjusting both the capacitance and the inductance of one of the circuits to obtain the graph shown in Fig. 2(c).

The capacitance and inductance are arranged so that the i.f. is correct at the centre of the band being tuned. Tracking errors then increase from the centre of the band toward the edges, and can therefore be reduced by keeping the band as narrow as possible.

Even when the designer went to the trouble of using a relatively high first i.f., he still needed to design the pre-selection and local oscillator circuits to track one another, because the filtering arrangement normally did not have a very high Q. Consequently the shape of the first i.f. response curve suffered, allowing any nasties appearing at the output of the mixer to bully their way onto the i.f. strip.

Having described the trouble the engineer has to go to get a decent signal into the first mixer, we will now look at the mixer itself.

The Mixer

The mixer was usually an active device, which found itself working in the non-linear portion of its characteristic curve. Any device operated in this way is liable to various forms of instability if it's not very carefully designed. Drive levels to the device will also be very different over the whole of the r.f. spectrum so some form of a.g.c. to this stage is very desirable; this needs to be done to prevent the circuit from becoming unstable should a very large signal appear at the input to the mixer. Thus the mixer needed as wide a dynamic range as possible in order that it could cope with the tiny signal of the DX, as well as "Bodkins wif-de-linear" five doors down the road, without causing cross-modulation in later gain stages.

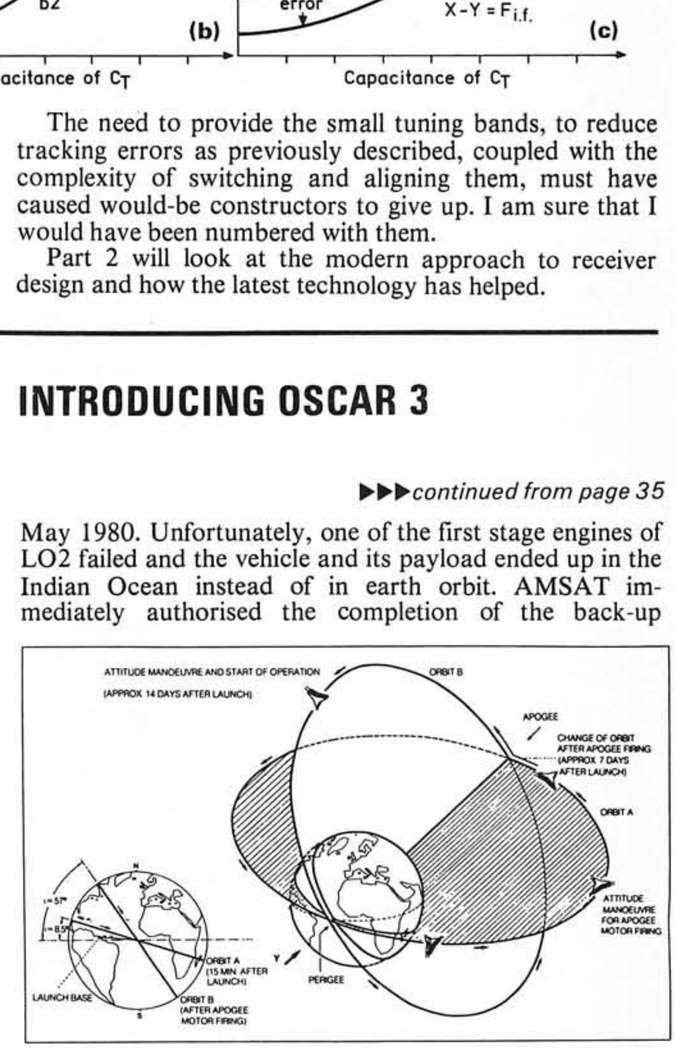
The need to provide the small tuning bands, to reduce tracking errors as previously described, coupled with the complexity of switching and aligning them, must have caused would-be constructors to give up. I am sure that I would have been numbered with them.

Part 2 will look at the modern approach to receiver design and how the latest technology has helped.

INTRODUCING OSCAR 3

▶▶▶continued from page 35

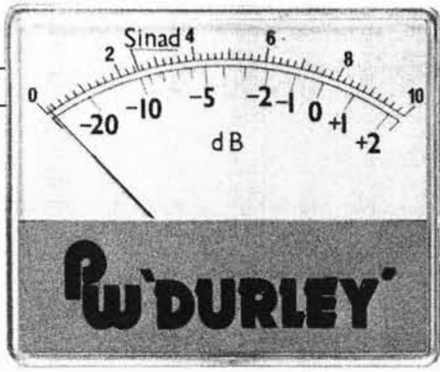
May 1980. Unfortunately, one of the first stage engines of LO2 failed and the vehicle and its payload ended up in the Indian Ocean instead of in earth orbit. AMSAT immediately authorised the completion of the back-up



Phase 3b launch/orbit details

AMSAT-UK/ESA

satellite 3b which is now awaiting launch on a later Ariane vehicle. It was initially hoped that this would take place in 1982, but further problems have taken place with the launch vehicle and it is now likely that it will be at least mid-1983 before another attempt to put the Phase 3 satellite in orbit will be made. However, it should be worth waiting for! ●



by E.A. RULE
Part 2

Distortion and SINAD Meter

Following the circuit considerations of Part 1 the second part of this article details the constructional phase of this versatile instrument.

Construction

Although full construction details are given, many readers will prefer to construct a chassis to match in with existing equipment. There is nothing against this, but great care should be taken to ensure that screening between the various sections and their general layout is carefuly followed as shown. This aspect of construction is most important as we are dealing with circuits that have a high overall gain between input and output (× 10 000) and which are also of relatively high impedance. Particular attention should be given to the way switching has been carried out, **do not** be tempted to use less wafers to save on switching costs because stray capacitance coupling across switches can completely prevent satisfactory operation. (The author found out the hard way!)

Front Panel and Chassis

The rear layout of the front panel is shown in Fig. 2.1 and consists in fact of one sheet of aluminium folded into an "L" shape. No measurements are given for the indicating meter cut-out as this will depend on the type used, but it should be arranged so that its vertical centre line is on the same line as the voltmeter range switch. All other front panel measurements may be obtained from the two-thirds scale Fig. 2.1. The printed circuit mounting holes are best positioned by laying the finished boards in place and marking through their holes and then drilling the chassis to suit.

Details of the screens required are shown in Figs. 2.1, 2.2 and 2.3. The one mounted over the bridge section is best made from thin tinplate which is easy to form and can then be soldered into its final position with the help of solder tags fitted to switch S3 and the bridge potentiometers. Alternatively, brackets could be used and screwed to the front panel, but this would mean that the screws would be seen from the front. The other screen is made from aluminium and fixed in position by screws in the chassis.

The meter movement will also need screening while the unit is being tested without the main screens in place. This screen is formed by wrapping a thin tinplate strip around the meter and connecting to earth as shown in the main layout wiring diagram. It can then be left in position permanently. Calibration marks for the dB scale of the meter can be obtained from the prototype photograph used in the heading.

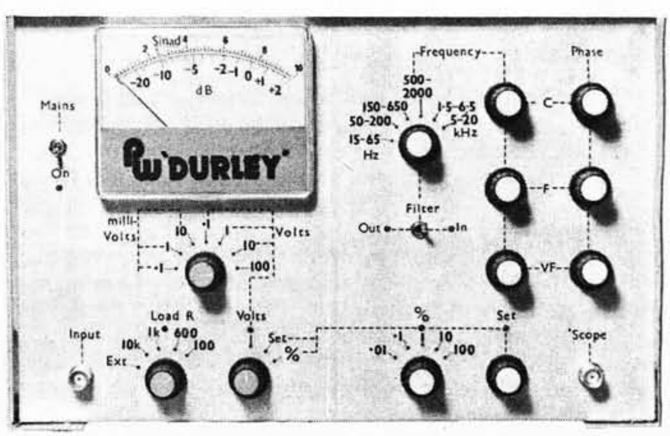
Case Construction

This is simply a wrap-around case made from one sheet of aluminium to form the top and sides to which is fitted another folded aluminium sheet to form a back. A commercial case of suitable size could be used for the *PW* Durley, with the overall size of the front panel/chassis modified to suit.

Control Assembly

If switch kits are used to make up the main switches these should be assembled first. They should be carefully checked to ensure that they are correctly assembled **and** that the end stops are in the correct positions. Check all wafers for position and don't forget the metal screen fitted between the wafers, this screen is very important. The FREQUENCY selector switch S3 has a dummy wafer fitted in its centre and this is used to anchor the common ends of capacitors etc. The required spacing of the various switches will be shown in Part 3, and is correct for the switch types specified. Other types of switch may need modified spacing. When mounting the finished switches onto the panel, make sure the wiper contacts are positioned as shown in the diagrams.

The various potentiometers, l.e.d.s and sockets can be assembled and when all controls have been fitted the two screens should be checked for size and fixing. These screens should then be removed while wiring is carried out. The meter should be fitted last, after any extra drilling or filing has taken place. Control spindles should of course be cut to the correct length to suit the knobs before fitting onto the panel.



★ components

Resistors

¼W 2% Carbon film

9·1Ω	1	R37 (100Ω and 10Ω paralleled)
82Ω	1	R36
91Ω	1	R31 (100Ω and 1kΩ paralleled)
820Ω	2	R30, 35
8·2kΩ	2	R29, 34
82kΩ	2	R28, 33
820kΩ	2	R27, 32

¼W 5% Carbon film

100Ω	2	R4, 19
150Ω	3	R67, 68, 64
470Ω	2	R24, 26
560Ω	2	R65, 66
600Ω	1	R3 (2 × 1·2kΩ paralleled)
820Ω	1	R72
1kΩ	9	R2, 9, 10, 18, 41, 49, 56, 61, 62
2·7kΩ	1	R70
5·6kΩ	4	R21, 51, 54, 58
10kΩ	4	R1, 38, 40, 47
15Ω	1	R42
22kΩ	2	R13, 14
27kΩ	1	R43
47kΩ	1	R7
100kΩ	8	R39, 46, 48, 50, 53, 57, 60, 69
120kΩ	2	R16, 44
1MΩ	2	R17, 71

1W 5% Carbon film

2·7kΩ	4	R5, 23, 45, 63

Miniature horizontal preset

10kΩ	3	R52, 55, 59

Linear Carbon track potentiometer

2kΩ	1	R25
5kΩ	3	R8, 11, 22
100kΩ	2	R6, 20

Ganged linear potentiometer

100kΩ	1	R12/15

Capacitors

Polyester

10nF	2	C6, 7
22nF	1	C17
32nF	2	C4, 5
68nF	1	C18
0·1µF	6	C2, 3, 22, 29, 41, 42
0·22µF	3	C1, 19, 21

Polystyrene

33pF	1	C26
220pF	1	C25
330pF	2	C12, 13
680pF	1	C14
1nF	6	C10, 11, 20, 35, 40, 49
2·2nF	1	C15
3·3nF	3	C8, 9, 28
4·7nF	2	C30, 31
6·8nF	1	C16

Electrolytic single-ended p.c.b. type

2·2µF (63V)	6	C32, 34, 38, 46, 47 50
22µF (16V)	5	C27, 33, 36, 37, 39
22µF (50V)	2	C48, 51
470µF (63V)	3	C43, 44, 45

Air spaced trimmer

5 – 65p	1	C24
C23	1	see text
Cx	1	see text

Semiconductors

Integrated circuits

LF353	3	IC1, 2, 3

Diodes

BZX61C 18V	2	D11, 12
OA202	4	D13, 14, 15, 16
TIL209	7	D1, 2, 3, 4, 7, 9, 10
1N4148	3	D5, 6, 8

Switches

Midget wafer

1p 6w	1	S4
2p 6w	1	S1

Rotary switch assemblies

2p 7w	1	S5
4p 6w	1	S3
8p 3w	1	S2

Miniature toggle

d.p.s.t.	1	S7
d.p.d.t.	1	S6

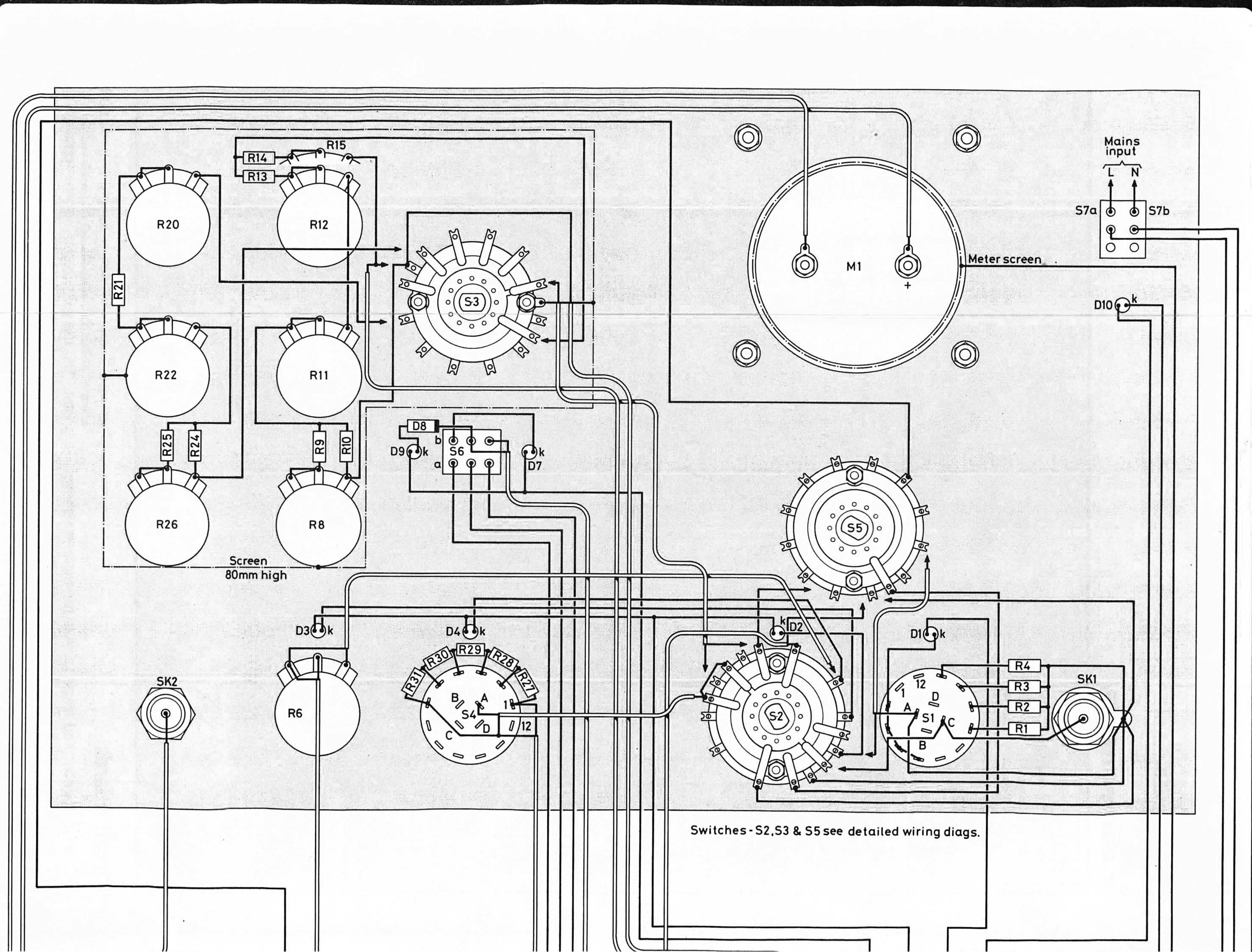
Miscellaneous

20–0–20V 6VA transformer; 1A bridge rectifier; 0–1mA f.s.d. meter RS 259–640 or equivalent; aluminium sheet; p.c.b.s; BNC sockets (2); knobs (12)

Circuit Boards

The component and track layouts for these are shown in Fig. 2.1, no problems should be encountered.

Start assembly with the smaller components and progress to the larger ones as assembly proceeds. Pay particular attention to the polarity of electrolytics and diodes as with a split rail power supply the negative end is not always at earth potential, so be extra careful regarding this point. The use of Veropins for the terminations is recommended, although some constructors may prefer to solder the wires directly through the holes onto the copper track. The author prefers the use of pins as it makes it easier to remove the board for any reason at a later date.


Mains input
L N
S7a S7b
M1
+
Meter screen
D10 k
R14 R15
R13
R20
R12
S3
R21
R22
R11
R25 R24
R9 R10
D8
b
S6
D9 k
D7 k
a
R26
R8
Screen 80mm high
S5
D3 k
D4 k
k D2
D1 k
R29 R30 R28 R31 R27
B A
S4
C D
1 12
R6
SK2
S2
R4
R3
R2
R1
SK1
1 12
D
A S1 C
B
Switches - S2,S3 & S5 see detailed wiring diags.

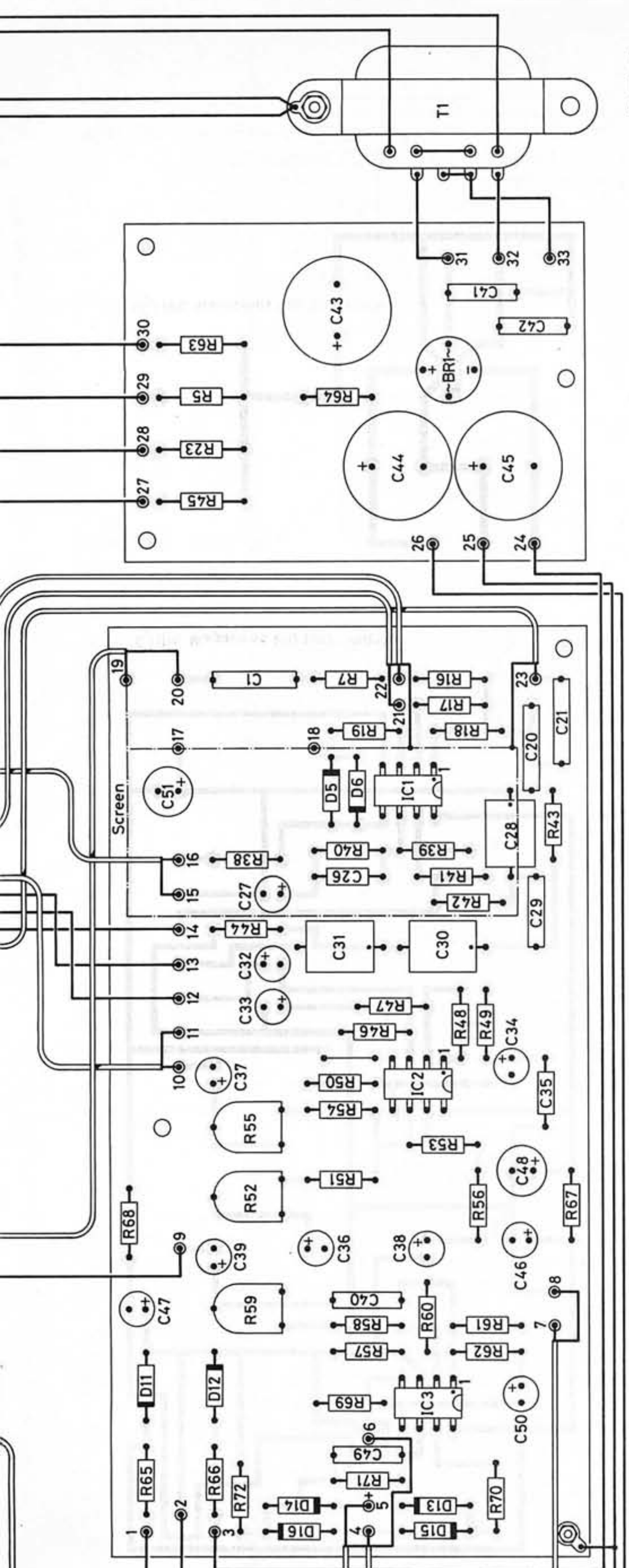
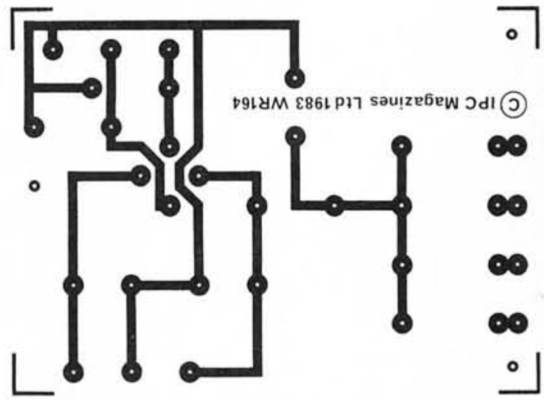
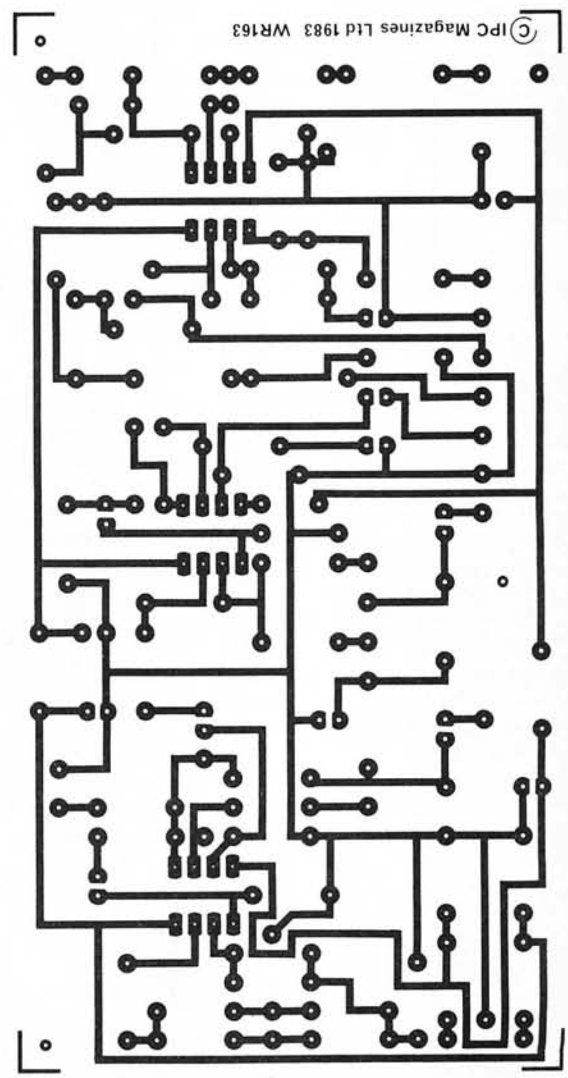
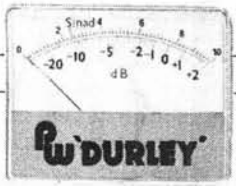


Fig. 2.1: Interconnecting wiring diagram, full-size p.c.b. track patterns and general layout details of the *PW* Durley. The rear view of the front panel is shown two-thirds full size





WRM760



Once the components have been assembled into the board, the tinplate screen (Fig. 2.3) can be fitted over the input end of the main p.c.b. It is held in place by soldering to the earth pins, numbered 17, 18 and 19. A strip of Sellotape is wrapped around part of its bottom edge to prevent possible shorts to the i.c. pins or components.

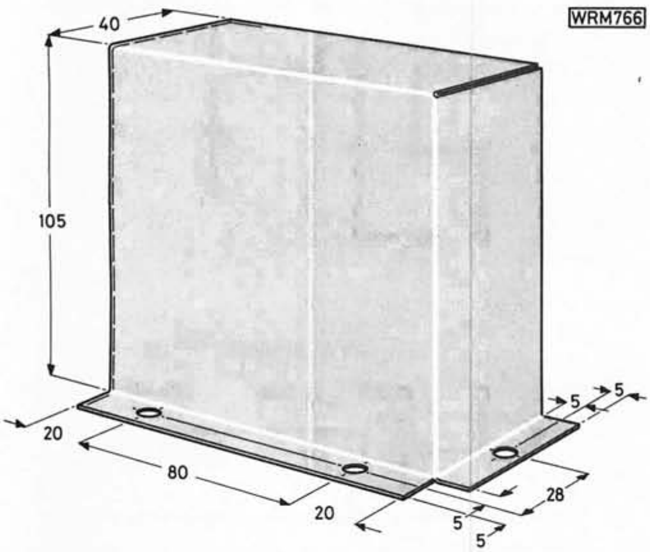
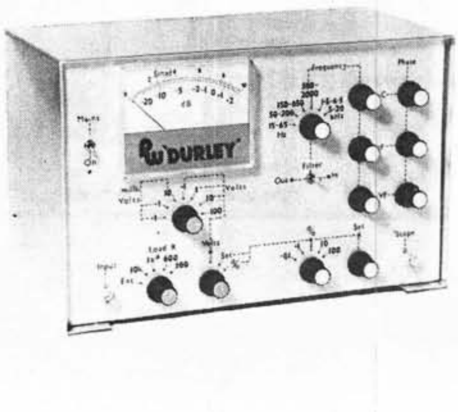


Fig. 2.2: Details of the 18 s.w.g. folded aluminium input section screen located over SK1, S1, 2 and 5

Final Wiring

As only low current is flowing, the wire gauge may be small and 7/0·2mm (0·22mm²) tinned copper wire with pvc insulation is suitable. A number of different colours will be found helpful in identifying the various circuits. The screened wire may be of the lapped braid type approximately 2mm diameter with a 7/0·1mm inner conductor.

The switches should have their components fitted before they are assembled onto the front panel and the layout and connections for these are shown in Figs. 3.1, 3.2 and 3.3 for the main switches. The layout for the other switches can be seen in the main wiring diagram, Fig. 2.1. **Warning:** When soldering components to the three main switches use only the minimum amount of heat and solder to ensure a good joint as the solder tends to flow along the switch contact into the centre and blocks the end. Once this has happened it is almost impossible to remove and the switch is ruined. A pair of long-nosed pliers used as a heat shunt will be found helpful. This is something else the author found out the hard way, so be warned!



It should be noted that certain screened leads only earth by their braiding at one end. Others are earthed to certain earth points which may not be the nearest to where the inner connects. This is done deliberately so as to avoid earth loops which could prevent low signal measurements.

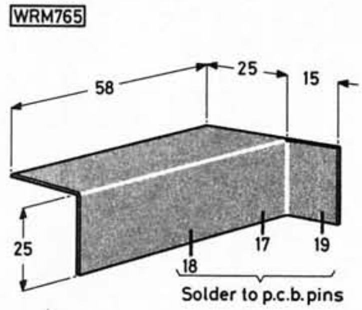


Fig. 2.3: The folded tinplate p.c.b. screen

Remember that properly constructed this instrument can measure signals as low as 20µV—this level of signal is often less than that arriving at the average radio antenna! Once wiring is complete it can be tidied up by the use of cable ties. The unit is now ready for testing.

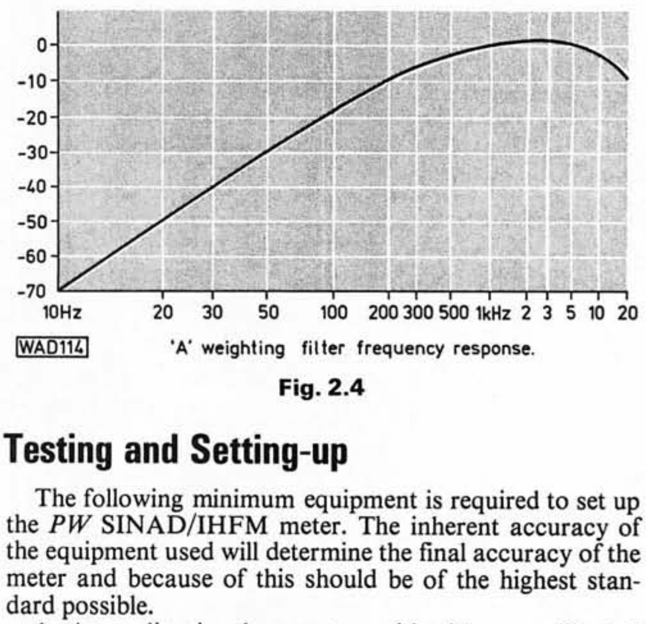


Fig. 2.4

Testing and Setting-up

The following minimum equipment is required to set up the *PW* SINAD/IHFM meter. The inherent accuracy of the equipment used will determine the final accuracy of the meter and because of this should be of the highest standard possible.

1: An audio signal generator with either a calibrated output attenuator or a calibrated output meter. The generator should cover the frequency range of at least 15Hz to 100kHz and be level to ±0·25dB over this range, or better. The actual voltage output level should also be known to within 0·25dB or better.

Alternatively, a lower quality signal generator could be used with an accurate voltmeter and frequency counter to monitor its output.

2: An oscilloscope with a sensitivity of at least 1V/cm (most are much better than this).

3: A multi-range meter for checking voltages around the circuit.

Part 3 — Setting-up, uses and test procedures.

RADIO COMMUNICATION & SUNSPOTS

by John Kennewell*

The radiations that we receive from our sun, catalogued by astronomers as a main sequence G2 type star, provide the right conditions for the existence of life on the earth. Its radiations also provide us with the ionosphere, a series of ionised layers from about 80 to 500km in altitude which allow us to communicate around the world on the h.f. (short wave) bands.

Solar Ionising Radiations

Both X-rays and hard ultraviolet (uv), with wavelengths from around 1000 to 1 Ångstrom (Å) (an Ångstrom is equal to one hundred millionth of a centimetre), are the main source of ionising radiation responsible for producing and maintaining the ionosphere.

The ionosphere consists of not one, but several different layers of ionisation, Fig. 1. The most important of these are the D, E and F layers, although by day the F layer splits in two: the F_1 and F_2 layers. The reason that different layers are formed is that the atmospheric composition changes with altitude and different wavelengths of uv or X-radiation interact with different molecules or atoms and thus a layered structure results. Ionisation occurs by the process of knocking one or more electrons off an atom or molecule in the atmosphere. The resulting free electrons form a conductive cloud which is able to reflect radio waves.

The larger the number of free electrons that exist in a particular layer, the higher the frequency that can be reflected by that layer. The maximum usable frequency (m.u.f.) for a radio circuit where the ground take-off angle is A (see Fig. 1) is given by the formula:

$$f_{m.u.f.} = \frac{9\sqrt{N_{max}}}{\sin A} \qquad \text{(Equation 1)}$$

where N_{max} is the maximum concentration of free electrons per cubic centimetre of the layer. The critical frequency for a layer is equal to the m.u.f. when the angle of incidence is 90 degrees. That is, when the transmission is directed vertically upwards. Although this situation is not particularly useful as far as communication is concerned, it does allow us to measure indirectly (via equation 1) the state of the various ionospheric layers.

The ionising radiations that produce the ionosphere arise in the upper atmosphere of the sun and increase with the number and extent of "active" regions on the sun. These regions are manifest in various spectral emissions from the solar chromosphere as light areas called **plage,** Fig. 2. One of these narrow bands of radiation is produced by hydrogen at a wavelength of 6563 Å and has a beautiful red colour which may be seen with the aid of an appropriate filter or a spectroheliosope. The underlying agency responsible for the active region is a system of concentrated magnetic fields. Usually at some stage during the lifetime of these active regions a phenomenon occurs which is visible in white light and that is the development and growth of a sunspot group on the solar disc. Sunspots are relatively cool areas which appear dark on the otherwise brilliant surface, Fig. 3(a). When examined with greater magnification it can be seen that the larger spots have an internal structure. The central dark region called the **umbra** is surrounded by a somewhat lighter filamentary area called the **penumbra,** Fig. 3(b).

We have written evidence that man has been aware of sunspots for at least two millenia, but it has only been since the development of long range communication that they have had a vital significance for us. Because sunspot groups are associated with solar active regions, and because these are associated with solar and X-ray emissions, which in turn produce free electrons in the ionosphere, we might naturally assume that there is some correlation between the number of sunspots on the solar surface and the m.u.f. over a given communication path. This is indeed so, if we choose the right "index" to represent the sunspot population on the sun at any one time.

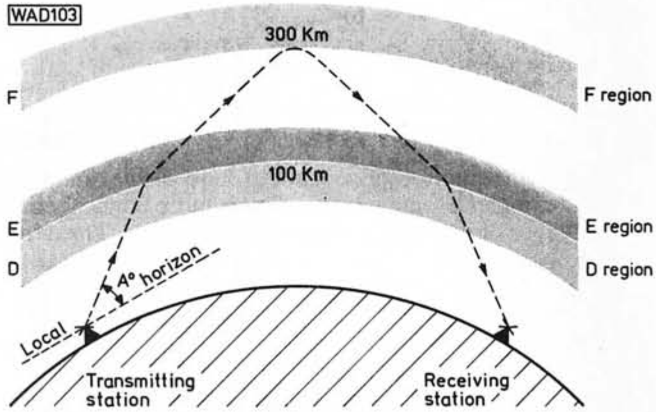


Fig. 1: Outline of the ionosphere. Region F, which reflects h.f. and is formed by uv radiation from 100 to 1000Å, contains the bulk of free ionisation. The E region reflects m.f. at night (when the D region does not absorb) and is produced by radiation from 10 to 100Å. Region D is an ill-defined layer which causes radio-wave absorption and is produced by uv wavelengths greater than 1000Å during quiet solar conditions or by 1 to 10Å X-rays from solar flares

The Sunspot Number

It is not sufficient simply to count the number of individual spots, because the surface area covered by each sunspot may vary enormously. It would, of course, be possible to measure the total area occupied by sunspots and it turns out that this method does in fact yield a good index of solar activity. However, the measurement of area requires accurate equipment, good drawing skill and a considerable amount of time — fortunately this is not necessary.

Around the middle of the last century Rudolph Wolf, the first director of the Zurich Federal Observatory,

* *Principal Physicist, Ionospheric Prediction Service Learmonth Solar Observatory, W. Australia*

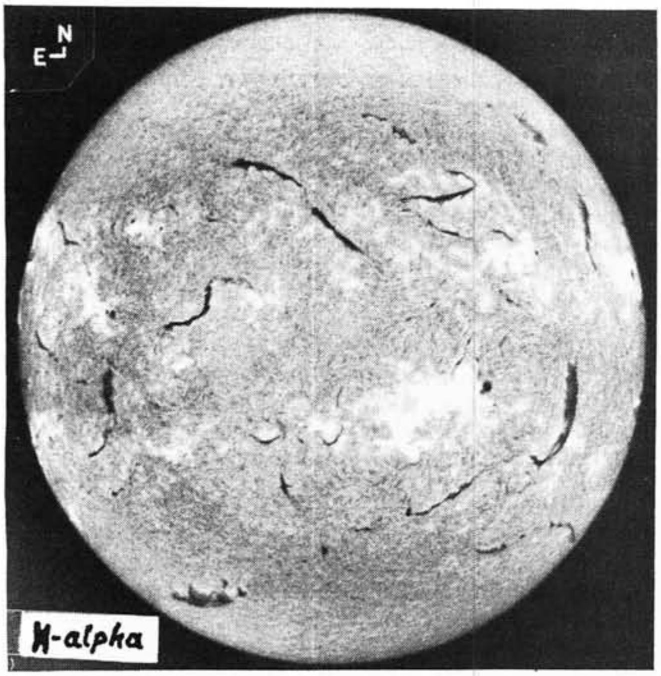


Fig. 2: Photograph of the sun as seen in the light of hydrogen at a wavelength of 6563Å. The light areas called plage indicate active regions on the sun. The dark ribbons are termed filaments and are huge clouds of gas suspended in the solar atmosphere by magnetic forces

Learmonth Solar Observatory Photograph

defined a relative sunspot number by the formula:

$$R = k\,(10g + s) \qquad \text{(Equation 2)}$$

where g is the number of sunspot groups visible, and s is the total number of individual spots, or more correctly the total number of umbra, comprising these groups. The term k is an observer correction factor, close to one which takes into account different observing equipment and observer efficiency or "overeagerness". An uncorrected relative sunspot number would use a value where $k = 1$. It can be seen that this formula gives more weight to the number of groups or in effect the number of active regions on the sun. Although the formula is really an arbitrary one, it is amazing how well this number, when averaged over a month, or a year, has stood the test of time in correlating with many varied geophysical events.

As discussed before, the m.u.f. for a particular circuit, at a given time of day, shows variation according to the value of the monthly mean sunspot number. The variation is not complete because of the influence of other factors, the largest being a superimposed annual cycle. This cycle is due in small part to the changing earth-sun distance throughout the year, but mostly due to the changing angle at which the sun's radiation is incident on the upper atmosphere — the same effect that gives us the seasons.

Even monthly mean values of the relative sunspot number can show large variations from month to month and so it is common to compute a smoothed sunspot number R_s for a particular month. This is produced by averaging together the monthly values from $5\frac{1}{2}$ months before to $5\frac{1}{2}$ months after the particular month in question. When this is done and the value is plotted over many years, the display shown in Fig. 4 is obtained. The well known solar cycle of approximately 11 years between successive peaks is clearly apparent. The value of R_s can drop to 10 at times of solar minimum and has risen to almost 200 during the peak of 1957-58. This was the highest value ever seen in over 300 years of record keeping and corresponded with m.u.f.'s that exceeded 70MHz over some communication paths.

There is one other index of solar activity that should be mentioned and that is the value of solar radio noise at 3GHz or a wavelength of 10cm. This value follows the smoothed sunspot number quite closely (Fig. 5) and has the advantage of being totally objective, as compared with the subjective element that exists in sunspot counting. However, the relative sunspot number is likely to be with us for a long time to come, particularly in amateur circles, due in part to the comparative difficulty of constructing equipment to measure accurately radio signals on microwave frequencies.

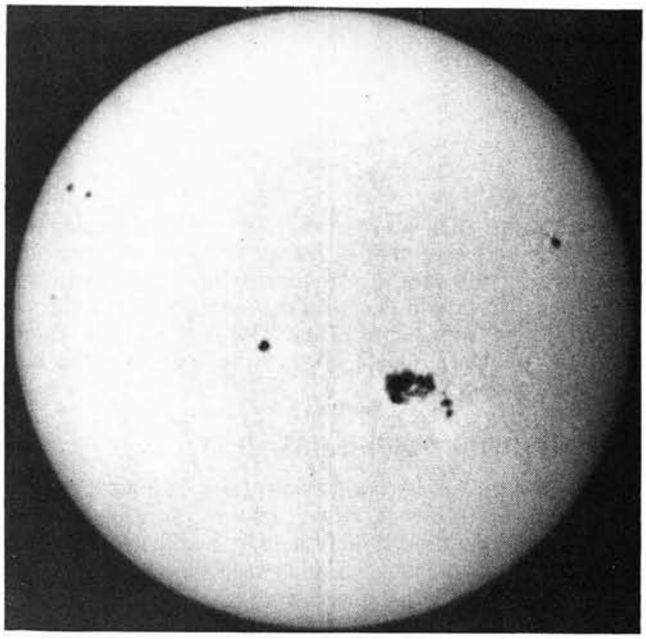
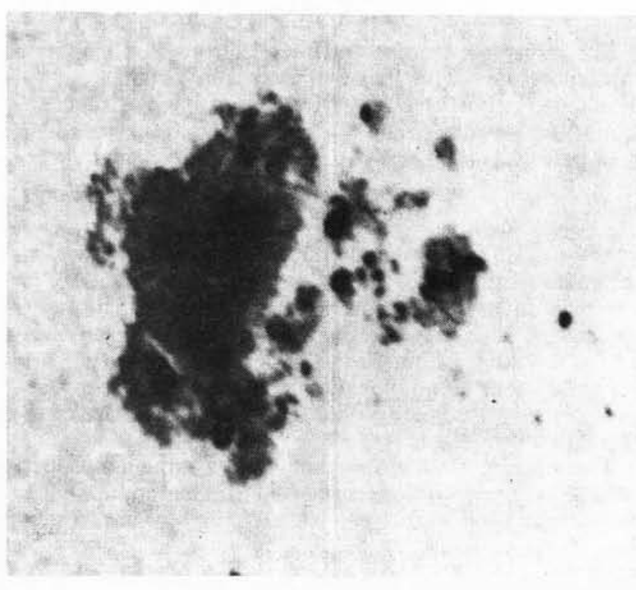


Fig. 3: Photographs of the sun taken in "white" light. (Above) Full disc shows a number of spots formed into groups dotted across the surface. (Below) An enlargement of a group shows that spots have an internal structure with dark central umbra surrounded by the lighter penumbra

Learmonth Solar Observatory Photographs



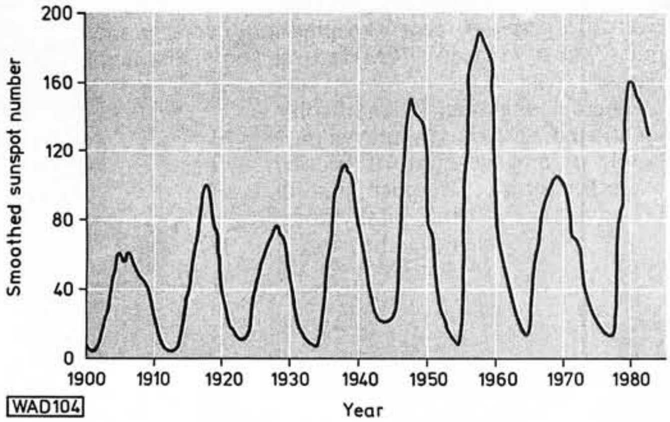


Fig. 4: A plot of the sunspot number over the years of significant long range radio communication clearly shows the approximately 11 year long solar cycle

Observation and Drawing

Counting sunspots is an activity that can be accomplished with reasonably modest equipment. **Never attempt to look at the sun directly, either through a telescope or with the naked eye.**

A small telescope or even a pair of binoculars can be used to project an image of the sun onto a clean white surface. It is usually necessary to shield this surface from direct sunlight and this is most easily achieved by placing a screening board at the objective lens or eyepiece of the telescope. A small hole of the appropriate size will let through the desired light, Fig. 6.

To trace the sunspots accurately it is almost essential to have some kind of motor driven tracking on an equatorial mount. However, accurate drawing is not really required for the calculation of sunspot number. Even so, it is still a good idea to attempt at least a rough tracing of the image; the reason for this will be seen later.

Whatever equipment is employed, a tracing sheet should be prepared beforehand. This should include a circle of appropriate size and identification as to date and time drawn. Comments regarding equipment used, and viewing conditions are also helpful. Where possible, the viewed image should be at least 100mm in diameter, although this may be difficult to achieve with small binoculars. A compromise is also necessary here in relation to image size and image movement — the larger the image, the faster it will appear to move across your tracing sheet. It is thus necessary to develop a technique of rapid sketching combined with frequent movement of the sheet. Even when a motor driven telescope is used and the tracing sheet can be stuck to the projection board, a small white card should be oscillated across a particular region just before drawing, in order to help distinguish real features on the sun from spots present in the manufacture of the drawing paper.

Once the sunspots have been traced, or at least a careful inspection of the solar surface has been carried out, it is necessary to determine the number of spot groups present. This is usually the most difficult part of the whole procedure, and even the definition of a group does not help us much here. A sunspot group is defined as being all those spots belonging to the same magnetic system. This is sometimes the only way that two close groups can be told apart, but it is not at all helpful to the observer who has no access to a solar magnetograph (and this even includes many specifically solar oriented observatories). How then, can we determine the number of sunspot groups at any time?

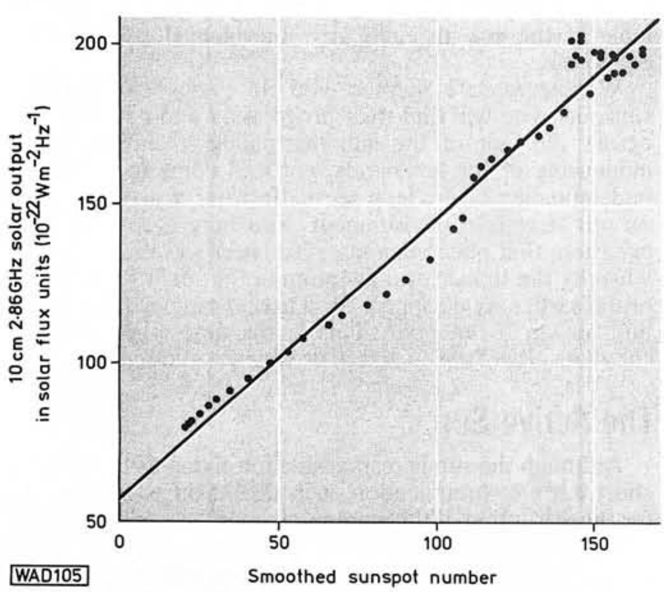


Fig. 5: This plot shows the degree of correlation between smoothed sunspot number and the radio output from the sun at 2·8GHz (for the current solar cycle)

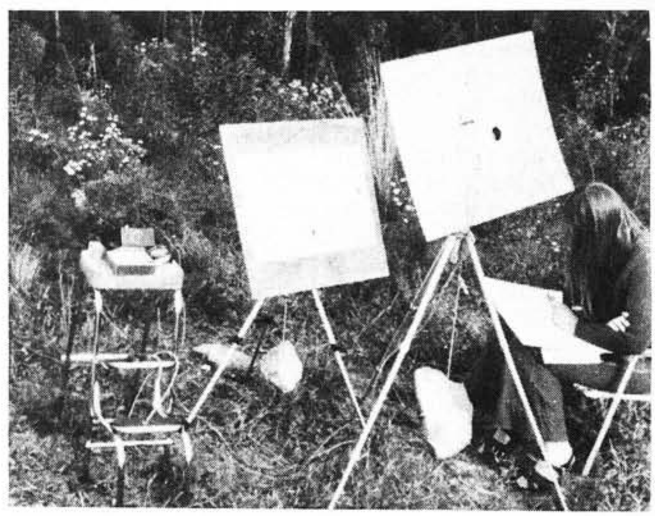


Fig. 6: A simple makeshift set-up for viewing projected solar images employs a pair of binoculars (only one monocular used), a shielding board and an imaging board. This apparatus was actually used to view a solar eclipse in 1976 high on top of a mountain in SE Australia. The author's wife records temperature and light values in the background. Eclipses historically helped identify the agencies responsible for producing the ionosphere

Sometimes the sun is kind to us and all the groups are well separated from one another, Fig. 7(a), thus providing no difficulty in identification. In the case where there are many spots fairly closely bound, Fig. 7(b), there are two main characteristics that may help us to decide whether there is one or more than one group present.

The first fact to remember is that all groups start life as a single or small group of black dots called **pores.** These may initially be only 2000km across and are very difficult to see on a small scale projection. They then proceed through several stages of the evolutionary sequence depicted in Fig. 8. Not all groups go through all stages. Some

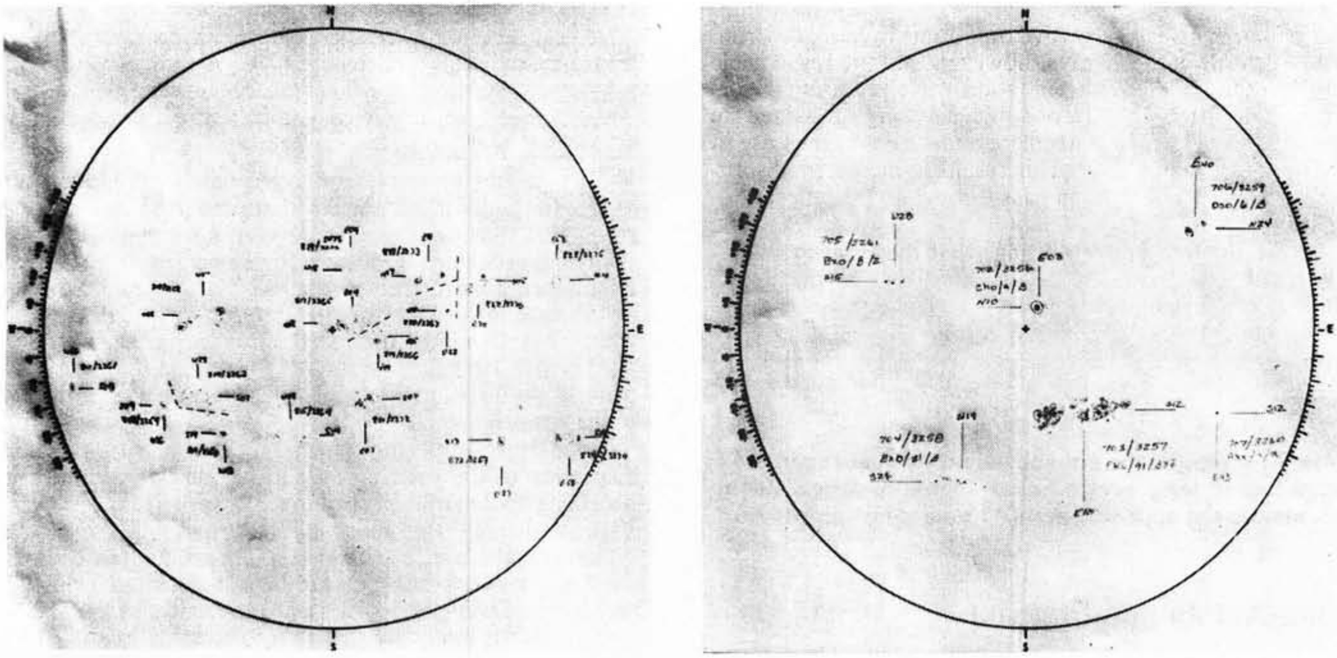


Fig. 7: Sunspot drawings illustrating cases where (left) six groups are clearly separated over the face of the sun and (right) a multiplicity of closely spaced groups makes identification very difficult

Drawings: Learmonth Solar Observatory

may start at A and develop right through to D and back again, while others may only go through the sequence A–B–A. When a large D group decays it may end life as an H-spot which slowly disappears. It is also possible for a group that has nearly decayed to reform again.

The second fact that may help us unravel the groups is the time factor. If two or more groups exist side by side, it is unlikely that they will be in the same stage of their life cycle. Observation of the sun over several days is likely to show the different groups developing at different times. Herein lies the importance of keeping your daily sketches. Comparison of records on a daily basis will resolve many group division problems. Of course, if two close groups suddenly rotate into view around the sun's east limb, it may be necessary to go back and correct your records of sunspot number after you have observed them decay at separate rates. Even with the foregoing knowledge, sorting out close groups can be a problem. The only consolation is to realise that even the professionals "get it wrong" on occasion.

After the groups have been sorted out, the total number of spots must be counted. This should be done a group at a time using the oscillating card technique mentioned before. When finished, your daily sunspot number can be calculated by substituting the appropriate values into equation 2. For the moment you should use a value for k of 1. When you have a whole month's data an average value for that month can be computed. Obviously there will be some missing observations due to clouds, etc. Remember when calculating the average, to divide only by the number of days that you could observe the sun and calculate R.

If you continue your observations over several months, it is possible to scale your observations so that they are in accord with the world accepted Zurich or International sunspot values (from January 1981 the Brussels observatory has taken over this function from Zurich). It is necessary to locate a source of these numbers for comparison with your own. Sunspot numbers are published regularly in the *Journal of Geophysical Research* and also in a number of amateur radio publications. Your observer correction factor k can then be found by dividing the Zurich (International) number by your sunspot number for the same month. For accuracy, this should be done for several months and the values of k so obtained averaged. This average k value can then be used at any time in the future in equation 2. It is, of course, not necessary to go through the above procedure in order to examine trends in sunspot number: the uncorrected value is perfectly adequate.

Before leaving the subject of observation and drawing, it should be pointed out that sunspots can be counted from a photograph. A student in an astronomy class that the author recently conducted obtained good sunspot photos using a 35mm camera, a telescopic lens and lots of neutral density filters. A note of caution should be issued here. The sun emits sufficient radiation in the visible and infra-red to be dangerous to the naked eye. When focused by an optical system it will quickly destroy any retina. **Never look at the sun through any unprotected telescope or equivalent.**

Whichever safe method you do choose to examine sunspots, you will find their progression and development across the face of the sun fascinating. Combined with monitoring of the h.f. bands, you will come to a greater understanding of the long term effect our nearest star has on our terrestrial environment. You may even notice on occasion, that phenomenon called short wave fade (s.w.f.) whereby the signal from a station in the sunlit hemisphere of the earth may disappear for a period ranging from a few minutes up to an hour. This is the time when the sun shows its other face — a face of violence and turmoil.

The Active Sun

Although the sun is responsible for giving us long-range short wave communication, it is also at times responsible for the disruption of this communication.

Occasionally the enormous energy stored in the solar magnetic field concentrations is released over a short time interval and large numbers of high energy, or hard, X-rays are produced. Simultaneous with this release it is usually possible to observe a sudden brightening, or flare at the red Hydrogen-alpha wavelength, and also an abrupt increase in the solar microwave output at wavelengths from 3 to 10cm. It is the X-rays, however, that are responsible for the radio fades. With very short wavelengths, in the order of 1 to 10 Å, they have sufficient energy to penetrate to the bottom of the ionosphere and cause an increase in ionisation of the D layer. This results in increased absorption of radio waves as they pass through to the reflecting F layer.

It may at first appear strange that the F layer reflects radio signals whereas the D layer absorbs. This can be understood by examining the way in which a cloud of electrons interacts with r.f. Basically, when the high frequency signal encounters the electrons, it sets them into oscillation at the frequency of the r.f. signal. In the process, the electrons have extracted energy from the wave. These oscillating electrons then act as miniature individual transmitters and re-radiate the signal. The relative phase difference between the electrons is such that the signals tend to reinforce each other in the direction of mirror type reflection and cancel elsewhere.

This process can only occur efficiently if there are a negligible number of neutral atoms or molecules in the surrounding atmosphere, as is typical at F layer heights. At the height of the D layer, the atmosphere is sufficiently dense such that collisions occur between the oscillating electrons and other molecules, before the electrons have a chance to radiate much energy. The net effect is an absorption of the exciting r.f. signal. The energy that is absorbed appears as heat energy (albeit small) at the height of absorption.

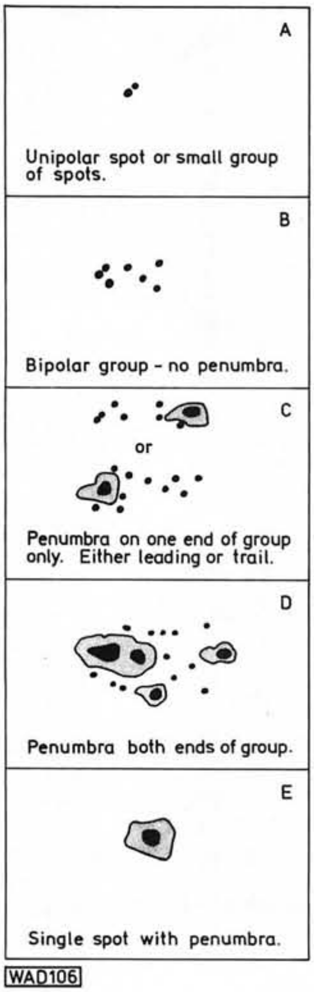


Fig. 8: Diagram roughly illustrating the various evolutionary or developmental stages through which a sunspot group may pass. The words unipolar and bipolar refer to the magnetic fields present

In very energetic solar flares, atomic particles, most importantly protons, are often released. These may reach earth in a matter of days or even hours, and cause further disruption to communications, especially at high latitudes around the polar regions.

Many questions have yet to be answered about processes occurring on the sun and about their effect on the earth. One field of particular interest to communicators is the ability to predict solar flares before they happen. Intensive research on this subject has so far provided no really satisfactory answers — only continued intensive observations, both on the earth and in space, can lead us toward more answers.

Additional Reading

For those who wish to pursue any aspect of this article more deeply the following texts are recommended.

Sun, Earth and Radio J A Ratcliffe, World University Library (1970)

The Face of the Sun H W Newton, Penguin (1958)

Skyshooting — Photography for Amateur Astronomers R N Mayall and M W Mayall, Dover (1968)

Introduction to Solar-Terrestrial Phenomena and the SESC S J Mangis, NOAA TR ERL 315-SEL 32 (1975)

This last reference contains a wealth of information and may be purchased from: Superintendent of Documents, US Government Printing Office, Washington DC 20402 as stock number 1978-0-777-067/1249. ●

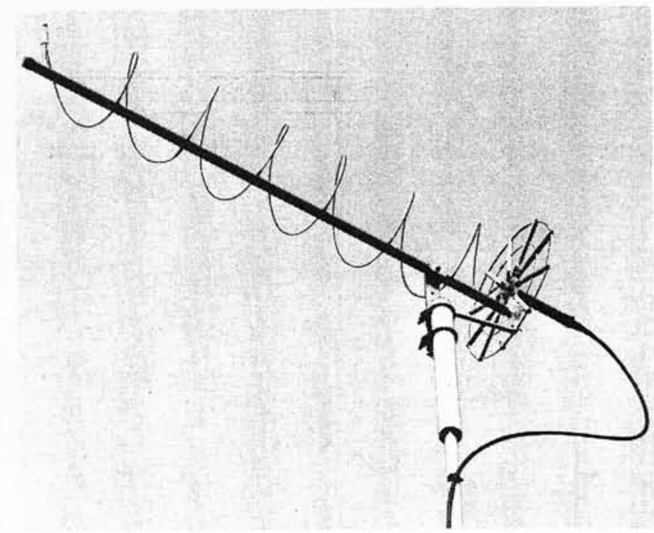


Fig. 3.1: The author's prototype six turn helical antenna

In the last part of this article we dealt with the basic function of the helical antenna and its relatively wide bandwidth characteristic.

A helical antenna is, of course, circularly polarised and reception/transmission, to and from a linear antenna, either vertically or horizontally polarised, produces an inherent loss of effective transmitted power or effective received signal of 3dB. Circular polarisation has, however, at least one advantage and a useful one at that. Considerable fading over a distance of 50 or 60km can occur when the polarisation of the wave from a linear antenna, horizontal or vertical, becomes twisted. This effect is not unknown over even shorter distances and can frequently be permanent due to other local or environmental causes. The use of a circularly polarised antenna can obviate this effect to a very marked degree in that regardless of polarisation changes to the wave from a linear antenna, the signal received with a helical antenna will never be more than 3dB down.

Helical antennas are widely used for satellite operation because of the often constantly varying polarisation that can occur on signals transmitted from orbiting satellites. It must be remembered, however, that circularly polarised waves revolve in the direction of the turns/pitch (or thread) of the antenna helix and that a right-hand orientated wave will be very poorly received by a helical antenna with a left-hand orientated helix. The loss due to circularly polarised waves orientated in opposite directions, i.e. one clockwise and one counter-clockwise, is in the region of 30dB. It can be said fairly simply that helical antennas can be "left or right-hand threaded".

Helical Antenna for 432MHz

A six or seven turn helical antenna with a circular plane reflector having a diameter of approximately $\lambda/3$ has an input impedance in the region of 140 ohms and therefore requires a matching transformer to provide a direct connection with a normal 50 ohm coaxial feed cable. This matching section can take the form of a $\lambda/4$ section (Ztr) of coaxial line with a self-impedance of approximately

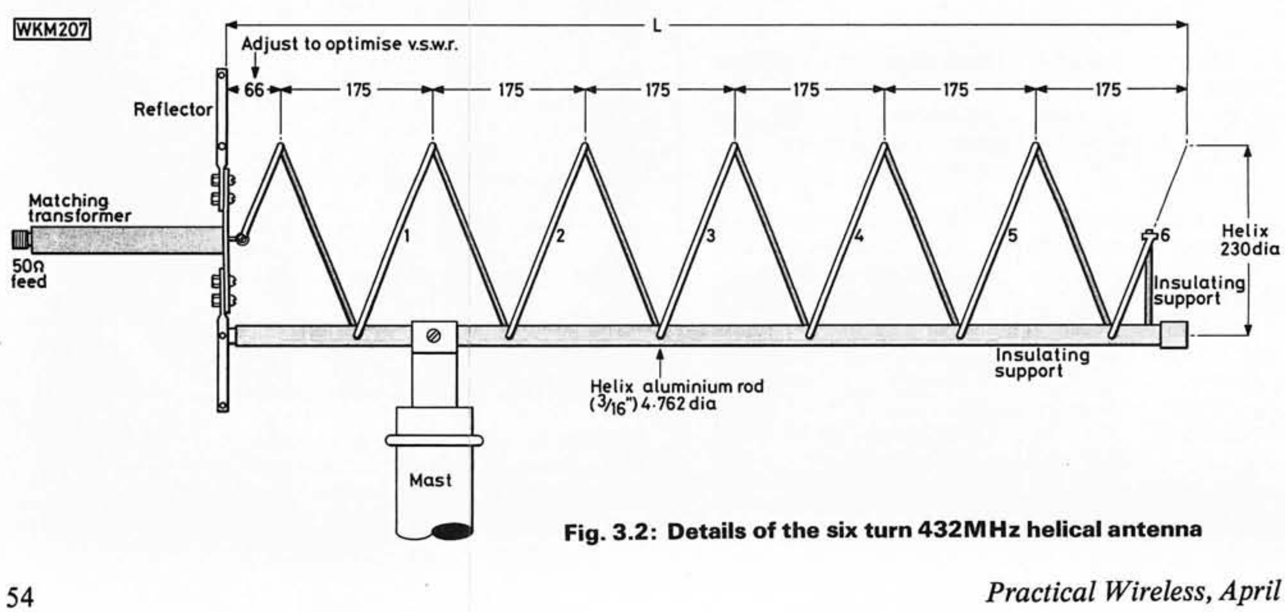


Fig. 3.2: Details of the six turn 432MHz helical antenna

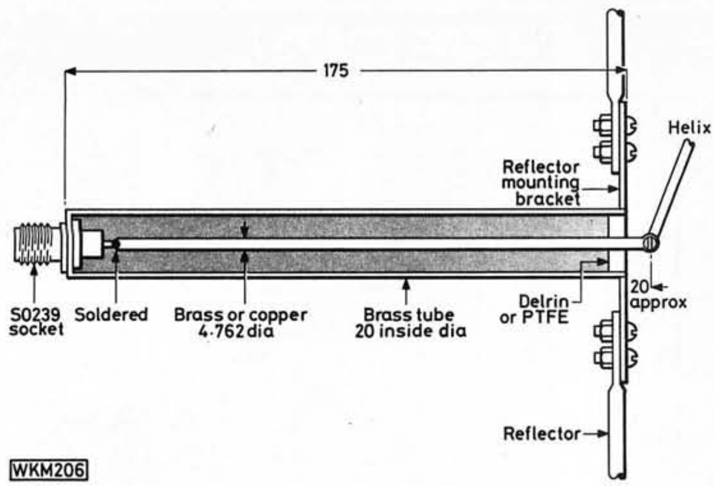


Fig. 3.3: Constructional details of the $\lambda/4$ matching transformer which has an impedance of approximately 86 ohms to provide a match between the 50 ohm coaxial feeder cable and the 140 ohm characteristic impedance of the helical antenna. The line impedance is derived from the formula:

$$138 \, \mathrm{Log}_{10} \frac{D}{d}$$

where D = internal diameter of the tube and d = the centre line diameter

$\sqrt{Zo \times Za}$, where Zo = 50 ohms and Za is the drive impedance of approximately 140 ohms to the helix. This gives a value for Ztr as $\sqrt{50 \times 140} = 83{\cdot}6$ ohms. The nearest obtainable impedance to this value using standard dimensioned materials, is shown in Fig. 3.3 and using the formula Ztr = $138\log_{10}D/d$, is 86 ohms. The small amount of mismatch is not critical and no problem was experienced in obtaining a v.s.w.r. of between 1·2 and 1·3:1 across the 432MHz band with the matching section shown in Fig. 3.3.

The Six Turn Helix

Axial mode helical antennas necessitate three major dimensions, of which none are that critical. These are the overall length (L), the diameter of the helix (D) and the pitch between turns (P). Length is more or less determined by (P) which is $\lambda/4$ and (D) which is constant at λ/π and gives each helix turn a circumference of λ at centre frequency. The physical dimensions for a six turn helical antenna for 432MHz are given in Fig. 3.2.

The insulating support for the helix turns used in the prototype was of pvc tube of approximately 20mm diameter secured at one end to the reflector. The helix was threaded through holes along the pvc tube, spaced 175mm apart.

The completed antenna is shown in the photo, Fig. 3.1. The longest direct contact made during moderate lift conditions was about 210km with the antenna mounted only 4m above ground.

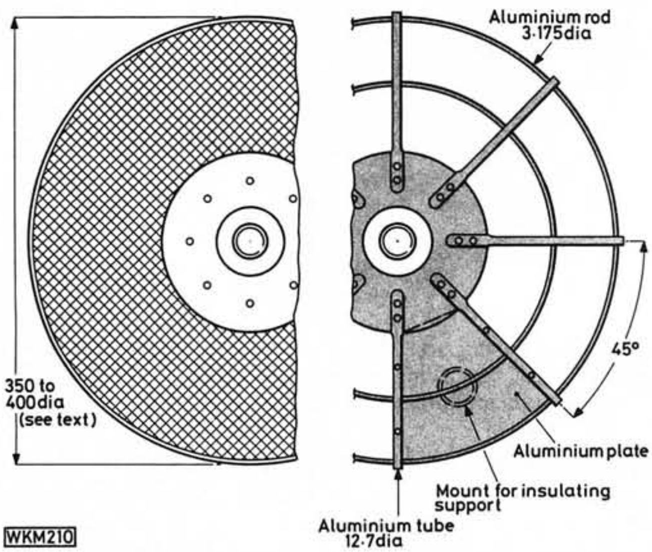


Fig. 3.4: Alternative reflector construction methods using either wire mesh or open spokes

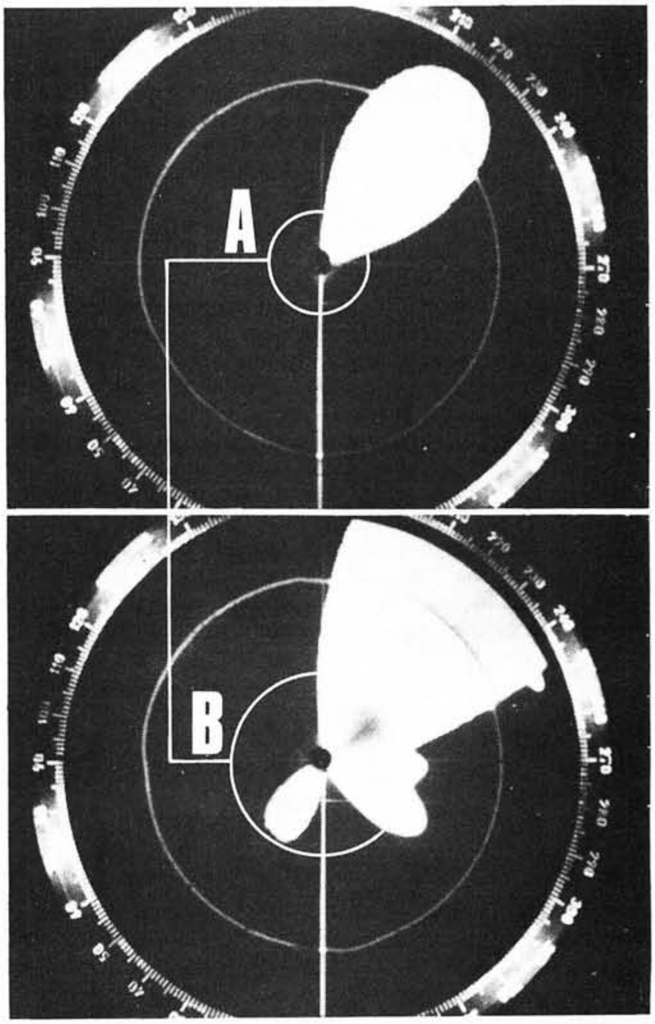
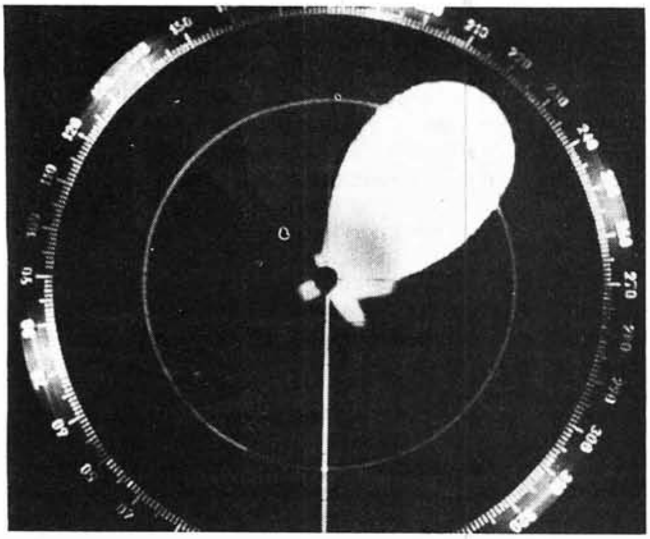


Fig. 3.5 (A): Prototype radiation pattern at mid-frequency (from horizontally polarised wave). Fig. 3.5 (B): Amplified rear section showing low level back lobes



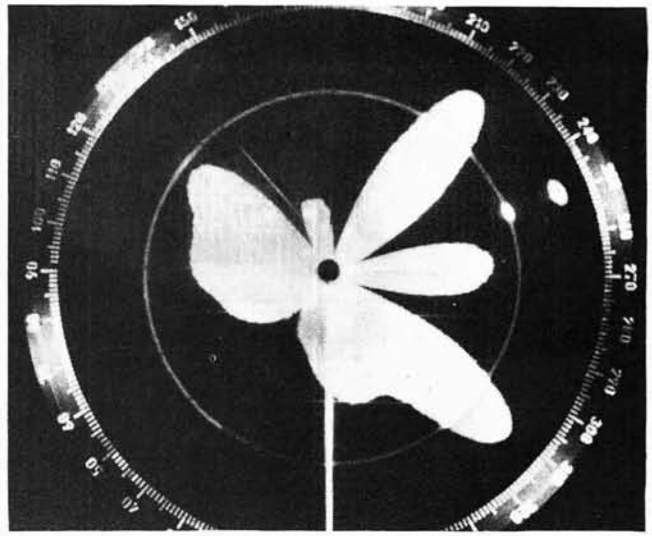


Fig. 3.6 (a): (left) Six turn helical antenna radiation pattern at mid-frequency from vertically polarised wave. Fig. 3.6 (b): (right) Break-up of uniform radiation pattern at extreme limit of frequency coverage

The circular plane reflector may have a diameter of between 0·5 and 0·8λ although the smaller is recommended to comply with the main band of operation, in this case 420 to 440MHz. There are various ways of making this but two suggested ideas are given in Fig. 3.4.

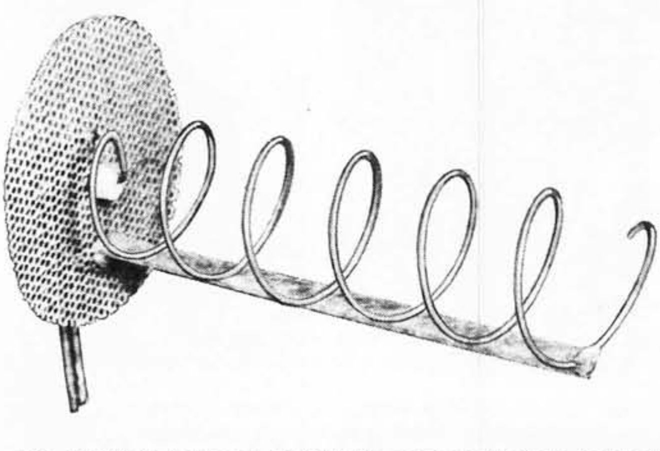
Radiation Patterns

At around the centre frequencies the forward radiation patterns remain fairly constant as shown in Fig. 3.5 and regardless of whether receiving from, or transmitting to, a linear antenna, either vertically or horizontally polarised. As a further check on this a half-scale model was made of the 432MHz design outlined in this article. Its centre frequency was therefore 435 × 2 = 870MHz, with end frequencies of 840 and 880MHz.

At centre frequency a clean and symmetrical lobe as in Fig. 3.5 (A) was obtained, with very little back radiation. Even with the main lobe greatly amplified, as in Fig. 3.5 (B), the minor rear and side lobes now visible are of little consequence. In this case the radiating antenna was a linear type and horizontally polarised; the helical model antenna was operating in receive mode.

The next pattern, Fig. 3.6(a) was obtained with the radiating linear antenna in vertical mode. These patterns maintain reasonable uniformity and the gain of the model antenna over the frequency range 840 to 880MHz is the same as that for the full size 432MHz version. At the extreme ends of the test band the uniform pattern breaks up as shown by Fig. 3.6(b), but these points are far beyond the normal working range. For a further study of these patterns the antenna bandwidth and v.s.w.r. etc. refer to Part 2 of this series.

To show just how accurate scale model antennas can be Fig. 3.7(a) shows a helical antenna modelled for a frequency of 3000MHz and Fig. 3.7(b) the radiation pattern obtained at centre frequency. Compare this with Fig. 3.6 of this article.



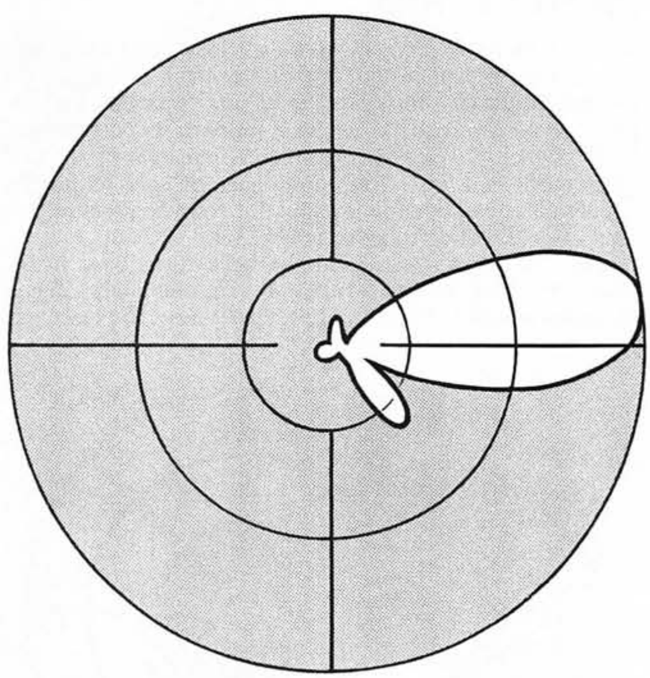
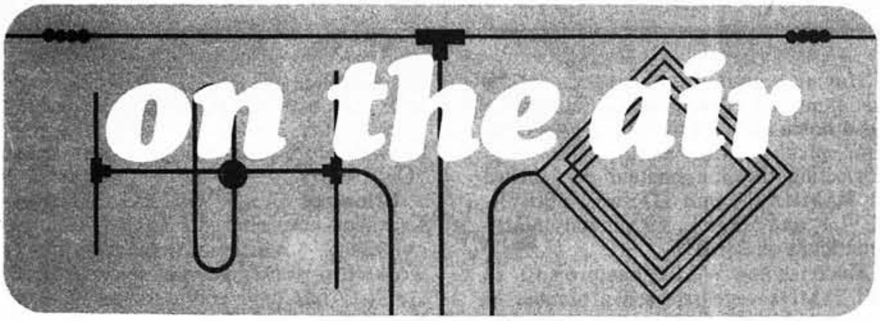


Fig. 3.7 (a): (above) 3000MHz model six turn helical antenna. Fig. 3.7 (b): (right) Model Radiation pattern

In the next part of this series we will be examining methods of specifying antenna gain and comparing these with various manufactured antenna specifications.

Information on Helical Antennas

ANTENNAS. J. D. Kraus. McGraw-Hill USA publication.
Amateur Radio Handbook. Third Edition, or later. Available from the RSGB.
ARRL Antenna Handbook. ARRL Staff. Available from the RSGB.



Amateur Bands

by Eric Dowdeswell G4AR

Reports to: Eric Dowdeswell G4AR
Silver Firs, Leatherhead Road,
Ashtead, Surrey KT21 2TW.
Logs by bands in alphabetical order.

Some more discussion now on the a.t.u. described last month, as promised, with the six permutations of the coil and capacitor repeated here for convenience, Fig. 1. Whatever the arrangement tried the procedure is always to go from one end of the coil to the other, swinging the tuning capacitor from maximum to minimum at each switch position, finding the combination that peaks the signal strength and makes the length of antenna wire resonant at any given frequency.

If a low frequency is involved then start with all the coil in circuit and gradually decrease the number of turns in use. Conversely, at high frequencies start with a minimum of turns and increase until resonance is reached. Once the optimum positions have been found for a given band, **note the readings,** for future use, finally making up a table for all the bands.

Circuit (a) will prove best for antennas around 10 to 20m long. If not then try (b) by adding the tuning capacitor by means of the plugs. Position (c) will be found useful for loading wires on the lower frequency bands such as 3·5 and 1·8MHz or even 7MHz, depending upon the length of the wire. Note that in (d) the tuning capacitor is across the coil, making sure that point 3 is not still left earthed.

Arrangement (e) is simply a method of electrically shortening a wire to obtain resonance using only the capacitor. A wire antenna some 50m long will prove an excellent antenna on Top Band (1·8MHz) when tuned with circuit (e). Finally circuit (f) will enable quite short wires to be used on the l.f. bands. Be assured that the improvement in signal strength that results when the a.t.u. is tuned properly is quite significant. False positions may be met where the peak is very shallow in which case continue to try other combinations.

The receiver's "S" meter may be used to tune the a.t.u. but if done by ear switch off the a.g.c. otherwise an increase in signal strength due to the a.t.u. will be counteracted by the action of the a.g.c. circuits unless the signal is of a very low level, insufficient to activate the a.g.c.

On a quite different tack now, most readers will be aware that we are now moving down the curve of sunspot activity known as the 11-year solar cycle although, at times, the sun seems not to have been told about it, judging by recent bursts of activity! Nevertheless it will decline with a noticeable effect on radio propagation, or "conditions" as we say. In general the low frequency bands 7, 3·5 and 1·8MHz will become more and more useful over longer and longer periods and amateurs will go along with this trend by moving down the bands, in terms of frequency. The recent addition of the 10, 18 and 24MHz bands now means that the steps down are not quite so drastic, as changing from, say, 14MHz to 7MHz has meant in the past.

Our two lowest bands, 3·5 and 1·8MHz, will become better and better from the DX point of view and now that so many transceivers in use have Top Band included in their coverage so it will really begin to hum. Many countries have now obtained permission to use 1·8MHz to add to the number, making DXCC less of a remote dream. Top Band is dead except for UK or near European stations during daylight hours, coming to life at dusk and fading away at dawn or just after. A band well worth watching.

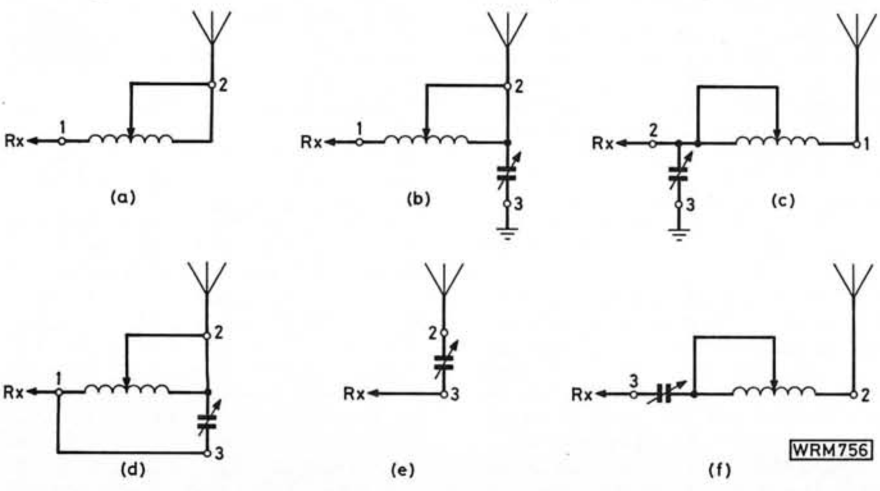


Fig. 1

In General

David Ackrill BRS50878 in Birmingham hopes to get something better soon than his present HAC rig if the RAE results are satisfactory although it may mean a period as a G6 before the G4 comes along due to pressure of work at college. David is another who finds some of the DX nets rather confusing, often not knowing who is calling whom!

Good news from regular writer **Dave Warr** down in Weymouth, Dorset, who had to wait only a couple of weeks after applying for his licence. Proudly he is now G4RQI instead of G6HRV and started off with a borrowed FT-7 and a wire 10m long, with QSOs on c.w. and s.s.b. in the log. We wish you plenty of good DX OM.

Royston Price in Haverfordwest, Dyfed, has forsaken his GW8YJN for GW4PCX after a lot of slogging at code sessions. He also has an FT-7, plus a full-size G5RV and Z-match a.t.u. for starters, the FT-7 being the result of swapping some 144MHz (2m) gear. Already, he says, he is working the world on the 28, 21 and 14MHz bands. He gets a bit annoyed with the c.w. ops who don't have the courtesy to slow down a bit for him. Don't worry OM you'll soon be up to their speeds if you keep at it. As a PS Royston says his son Andrew is now awaiting the results of the last RAE! Now, don't squabble over that rig!

A brief repeat of the late late item which I hope will have appeared in the March issue. **Bob Salmon** G4LJX, professional skipper, has room in the crew for another op, sailing a 12m cutter from the British Virgin Islands to the UK, around five weeks in April/May, with plenty of amateur gear aboard. Muck in and share some of the expenses is the general theme. Interested? Contact Bob on Plymouth (0752) 862558 and we'll all be listening for that /MM!

Paul Morrison is aged 15 and lives in Morpeth, N'thumberland and has caught the DX bug. "Having read thoroughly through your article on buying a s.w. receiver" he went and bought something from the local shop of a national network of electronics shops and promptly forgot all he'd read! I feel he may have been conned into something he didn't want and he could probably get his money back since it is not suitable for the purpose for which it was bought. So he can't copy s.s.b., which was the main idea. However, sticking to the job in hand he built an external b.f.o. and can now manage, after a style. All good experience!

Paul Martin lives at 18 Wilkinson Close, Temple Hill, Dartford, Kent, and is new to the game. He has a Lafayette HA700 receiver and would dearly love to get hold of a circuit diagram or any other info on this receiver.

Round the Bands

Not a lot of reports this month, probably a spinoff from the Christmas and New Year lethargy as we are dealing with January. Let's start with **Dave Coggins** of Knutsford in Cheshire with his FRG-7700 plus 20m-long wire plus a.t.u. Best catch was undoubtedly HZ1AB on Top Band both on c.w. and s.s.b. at 2100GMT, frequencies of 1820 and 1833kHz respectively. Like I say, this band is worth watching and is very productive after dark. On 3·5MHz EP2TY, J3AH and 7X2HM turned up on s.s.b. while 7MHz revealed VK6AJW and ZL4BO on the short path around 1900GMT, with 6W8DY the only other DX mentioned. On 10, 18 and 24MHz little was heard from outside Europe. More reports on these bands would be appreciated. For 28MHz Dave reports CR9CT, JT1KAI, KB7IJ/KH2 on Guam, 5T5RR, 6T1YP the Omdurman Club and QSL to DF3NZ, 9N38 reported as a DXpedition to Nepal.

Gordon Carmichael in Lincoln has a Realistic DX302 and dipole on 21MHz to find C6AEY, J73CB who said QSLs to POB 389, Roseau, Dominica, VP5WJR, 6W8AAD and 6W8HL, ending with TU2IF. On to 14MHz where an inverted "V" and a.t.u. helped with CT3DH, HP1XXO, KH6WU, XT2A, 5B4ES and 5Z4WD. **Anne Edmondson** BRS47285 is all excited as she is after the call GM4SYL having received credits in both parts of the RAE which won't mean waiting very long by the look of it. On her Realistic DX200 and indoor wire in Edinburgh she stuck to 3·5MHz (80m) with A71AD, CP1PRS (POB 2349, La Paz), FY7AN, HH5CB, 4Z4AB, VE3LRU/6Y5 and a couple of PTs.

As he says, nothing too exciting this time from **Jon Kempster** in Berkhamsted, Herts with his FR400SDX plus half-size G5RV and about 40m of wire in the form of a loop and a.t.u. (I should hope so) to log YS9RVE, TI2KD and ZS1CY on 28MHz. Then 9L1DR and SL1AH on 21 and sole 3A2EE on 3·5MHz.

Now that **Viv Doidge** down in Callington in Cornwall has got the DX bug he has started serious studies for the RAE but still spent some time copying the following on his FRG-7700 and matching a.t.u. with a wire 30m long. On 28 it was EL9A, HC1JQ, and J73DF, on to 21MHz and HH2JR, J6LKZ, J73CB, VP2MF, V2AC and PY0KA on Trinidade Island. For 14MHz there was FB8ZQ, FR7VE, S83H, 4K1D, 6T1YP and 7P8CR. Goodies on 7MHz included YK1AH, 5N3EC, 5T5TO, 6W8DY, 8P6OR, CR9CT, DU7RLC, FM7WS, ZL4PO/C which is Chatham Island, and 9Y4RD/SU which looks like a UN outpost. Finally to 3·5MHz and HH2BM, HP3FL, J88AW and 6W8DY.

Having a go on the s.w. bands for the first time **S. J. Dunsmore** in Scunthorpe has a homemade set recently presented to him, plus a wire about 40m long. Neglecting the non-amateur calls heard on 3·5MHz the best DX was YB0WR, FC9UP and HP3FL, with mainly North Americans on 28MHz.

Since the new WARC bands on 10, 18 and 24MHz were released a number of readers have asked where they can obtain suitable traps for these bands so that they can make up trapped dipoles to suit. The only source that I know of is G2DYM Aerials, a *PW* advertiser (albeit, he is shown as G2Dym in the Feb index!) and, if you haven't got your copy to hand, it is 03986 215.

In Colchester, Essex, **Andrew Durrant** is determined not to miss the fun of constructing his own gear so is busy with a one-transistor set although he sports an AR88 the only items noted on that being F8HB/EA6 and F9UW/3A, both on 14MHz (20m) and both on holiday I'd suggest! From Grimsby **Jim Willett** reports returning to the fold after some 20 years starting with a DX100L which was swopped for an FRG-7700 and a.t.u. Logs are promised very soon. Apart from Euros the 3·5MHz band came up with JA's mainly.

Club Time!

A note or two to secs, chairmen, PROs and all those who kindly send in info for this feature. Please include club meeting place and time and day/s in **each** letter. This will save me a tremendous amount of time looking up past records. The sensible thing is to send in one list of events and details for the rest of the year! Some hope! But there are the odd clubs that do just that and it is much appreciated. While in the griping mood, please do write to me direct, details at top of feature every month, rather than to *PW* where they have plenty to do without having to redirect mail. Ta!

Abergavenny & Nevill Hall ARC GW4GFL Registered C & G examination centre, the club reminds potential candidates that it can accept late entries for the May exam up to March 10 entailing a late fee. Interested? Contact Hon Sec via Aircom, Brecon Road, A'gavenny. RAE courses run every Tuesday at 7.15 in the Seminar Room, Nevill Hall Hospital with club night on Thursdays at 7.30 in the Penyful Hospital (above male ward 2). Sec is Dave Jones GW3SSY, 2 Dalwyn Houses, Llanover Road, Blaenavon, Gwent, or (0495) 791617.

Acton, Brentford & Chiswick ARC On Tuesday March 15 a talk will deal with an introduction to c.w., at the usual spot, the Chiswick Town Hall, High Road, Chiswick, London W4 at 7.30. So says sec Bill Dyer G3GEH, 188 Gunnersbury Avenue, Acton, London W3.

Biggin Hill ARC Get together at the Biggin Hill Memorial Library at 8pm, not missing the junk sale on March 22. Advance notice of G8CQE talking about and demonstrating construction techniques for the amateur at home, date unknown. More from G4NSD who says "QTHR".

Braintree ARS G4JXG G6BRH Excellent newsletter *BARSCOM* comes out monthly which must mean a lot of work for some people. New editor G8UUO has only one message. "Can I have some copy?" the eternal cry of editors everywhere! New sec is Mike Jones G6DFZ 26 Anson Way, Braintree, Essex or B'tree 44168. So it is the first and third Mondays at the Braintree Community Centre, Victoria Street, B'tree at 7.45 with the club rigs activated, tea and coffee flowing and books and Morse practice tapes available on loan.

Bournemouth RS G2BRS First and third Fridays by the look of it from the club's newsletter, at the Kinson Community Centre but for more info you'll have to call Arthur Bagley G4EKE on Ferndown 877945.

Bristol ARC G3TAD New PRO is Mark Goodfellow G4KUQ, 99 Somerset Road, Knowle, Bristol (0272) 716093, who says club location at the YMCA, Park Road, Kingswood, Bristol gives good results on the v.h.f. and u.h.f. bands with the full range of equipment held by the club. There are regular courses, code sessions, constructional projects plus the usual talks and visits. Meetings every Tuesday at 7.30 with the fourth devoted to computers, particularly their applications to AR.

Bromsgrove & District ARC Second Friday at 8pm, the Avoncroft Arts Centre while QRP holds sway at the same place on the fourth Friday. More immediately, the AGM on March 11. Constructors to note that their efforts will be judged at the April meeting. Details of forthcoming club picnic and other events from A. Kelly G4LVK, 8 Green Slade Crescent, Marlbrook, Bromsgrove, B60 1DS, otherwise 021-445 2088.

Bury RS Mosses Community Centre, Cecil Street, Bury every Tuesday at 8 the principal gathering being on the second Tuesday, such as March 8 when Trevor Hopkins G8TYY's subject is 1296MHz (23cm) and repeaters. Newcomers very welcome of course, says sec Malcolm Pritchard G3VNQ, 56 Shelfield Lane, Norden, Rochdale, Lancs.

Carlisle & District ARS Mondays at 7.30, White Quay Inn, Durdar, Carlisle. Sec is Paul Boyd G8RJA, 13 Stackbraes Road, Longtown, Cumbria, and that's that! Short but succinct.

Chichester & District ARC First and third Thursdays, 7.30, in the Green Room, Fernleigh Centre, 40 North Street, Chichester with a club net on S11 Weds at 7pm. On March 17 it's G8HY telling all on wartime radar. Note the AGM is on April 21. All this info on the first page of the club's newsletter, where it should be. Hon sec is T. M. Allen G4ETU, 2 Hillside, West Stoke, Chichester, Sussex otherwise West Ashling 463.

Conwy Valley ARC The second Thursday at 7.45 at Green Lawns Hotel,

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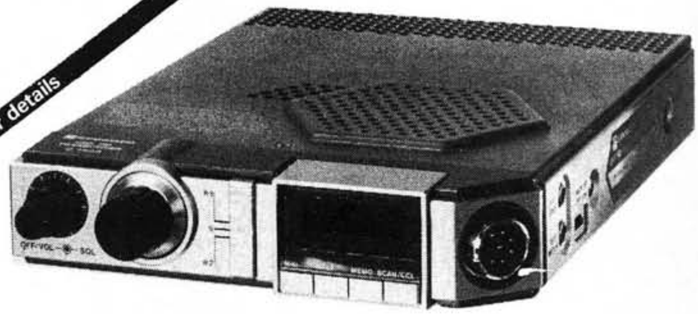

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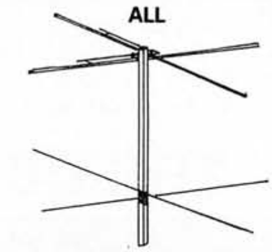

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Bay View Road, Colwyn Bay (sounds lovely!) with possibly top talk of the year on March 10 by Dr David Last of Bangor University, an eminent speaker but the subject remains a secret until the last moment. Sec is Norman Wright GW4KGI, 46 The Dale, Woodlands, Abergele. Also A'gele 823674.

Dartford Heath DF Club This specialist club meets at the Malt Shovel pub, Eynsford, Kent, on the Wednesday before a DF event to sort out the problems. That's their excuse, anyway! Like on March 2, which has probably gone, for the hunt on March 6 which probably hasn't. So had better give the dates for April which are the 6 and 10. Alan Birchmore G4BWV, 49 School Lane, Horton, Kirby, Dartford for more info.

Denby Dale & District ARS G4CDD G8KMK The club seems to be out and about on visits just as much as it spends on talks etc with coach trips to radio shows and other desirable places. However March 9 is devoted to OSCAR matters, all explained by G4JJ. Warning of the meeting on April 13 when Lowe Electronics have the floor, and of a visit by the RR. Could that be G4DAX again? Much further on but still worthy of note is the club rally on June 19, and G5RV on guess what on July 13. If there is any more you want to know then try Jack Clegg G3FQH, 8 Hillside, Leak Hall Lane, Denby Dale, Huddersfield.

Derby & District ARS Members gloating 'cos the RSGB "do" is at the NEC, literally just down the road! Wednesday meetings at 119 Green Lane, Derby starting at 7.30 with prospective members extremely welcome. Details from Jenny Shardlow G4EYM on Derby 556875 or drop a line to 19 Portreath Drive, Darley Abbey, Derby.

Echelford ARS Second Monday and last Thursday, 7.30, The Hall, St Martin's Court, Kingston Crescent, Ashford, Middx with club nets on 1930kHz Sundays at 10am and on 144·575MHz f.m. Weds at 8pm. Morse practice is handled by G3KKQ, G3MCK and G8ALB. Highlight of excellent Newsletter is Angela G4CKQ describing how to make scrumptious brandy truffles! Your contact is Anton Matthews G3VFB, 13a King Street, Twickenham, Middx also 01-892 2229.

Edgware & District RS G3ASR It's 145 Orange Hill Road, Burnt Oak, Edgware, Middx at 8pm on the second and fourth Thursdays, the main event in March being SKE, or straight key evening, with all the excitement on 3·5MHz (80m). If you have an SK I suppose you'd be welcome to call in. Club net on 1·875kHz Mondays at 10pm, plus slow Morse on 1·875 and 144·175 during the week from G3ASR. Secretary still is Howard Drury G4HMD, 11 Batchworth Lane, Northwood, Middx or N'wood 22776.

Farnborough & District RS March 9 is natter nite while on the 23rd G3OQB will handle satellite communications as a subject. Clear out the shack 'cos May 13 is bring-and-buy night. Place is the Railway Enthusiasts Club, Access Road, off Hawley Lane, Farnborough with PRO Chris French G8ZAJ, 26 Wood Street, Ash Vale, near Aldershot, Hants waiting to welcome new members and visitors, or buzz him first on Aldershot 29469.

Flight Refuelling ARS Sunday meetings see G4JET (I don't believe it!) describing power supplies on March 6 and 13, with an informal meeting with G8MCQ on the 20th. Visitor from the South Dorset RS G8EOJ discusses DF hunting on the 27th. So it's the Sports and Social Club, Merley, Wimborne, Dorset. The Society's sec is still Mike Owen G8VFY, "Hamden", 3 Canford View Drive, Canford Bottom, Wimborne, likewise (0202) 882271.

Fylde ARS Queens Hotel, Central Beach, Lytham, at 8, on second and fourth Tuesdays with G4AHZ describing aircraft instrumentation on March 8, an informal meeting on the 22nd, the usual pattern of the meetings. April 12 is worth noting when G3WGU deals with the logic and logistics of repeaters. Harold Fenton G8GG, 5 Cromer Road, St Annes, Lytham St Annes, as programme secretary can fill you in.

Hastings Electronics & RC G6HH All but third Wednesday of the month is micro night at the Ashdown Farm Community Centre. The third Wed is dedicated to the main meeting of the month at the West Hill Community Centre, that on March 16 being AGM time. On Tuesdays it's RAE course or code practice at the Farm at 7.30 and chat night there on Fridays. When does one get on the air?! More from George North G2LL, 7 Fontwell Avenue, Little Common, Bexhill-on-Sea where telephone Cooden 4645 is installed.

Inverness ARC Still wet behind the ears the club would love to welcome new members or visitors on Mondays and Thursdays at the Cameron Boys' Club, Planefield Road, Inverness, with an RAE course running on the Mondays with more practical work like club projects on the Thursdays, says club sec R. H. Brown GM8VIZ, The Flat, 21 High Street, Dingwall, Ross-shire, Scotland.

Ipswich RC First notice of the annual East Suffolk Wireless Revival taking place on Sunday May 29 at the Civil Service Sports Ground, The Hollies, Straight Road, Ipswich, running from 10am with new attractions the Fleamarket and a Car Boot Sale (anyone want to buy a car boot?). Other features not to be missed include a transceiver clinic and an antenna test range, plus all the trade stands and family attractions and displays. Much more info from Jack Tootill G4IFF, 76 Fircroft Road, Ipswich, Suffolk. Callsign for the special event will be GB4SWR if you can't get there but would like to call in.

Lincoln SWC G5FZ G6COL Pam Rose G8VRJ (Pinchbeck Farmhouse, Mill Lane, Sturton-by-Stow) wants me to tell you of the Hamfest '83 organised by the club on Sunday May 8 from 1100 to 1730 at the Lincolnshire Fairground with trade stands, raffles, model aircraft display and bring and buy stalls. And you could win an FT290R if you've got the lucky programme number. Try Pam for the more mundane details of the regular club meetings at the City Engineers Club, Central Depot, Waterside South, Lincoln.

Midland Amateur RS Seems from club newsletter *Probe* that the club room is in use just about every night, but I know not where! But, in particular, March 15 is booked for G4KZH to talk on the new Midlands repeaters. Club net is on Thursdays from 8pm on 145·425MHz, while the club President monitors S17 from 10am to 10pm seemingly and he, surely, will have all the answers. Tom Brady G8GAZ, 57 Green Lane, Great Barr, Birmingham or try 021-357 1924.

Norfolk ARC G6NRC Meetings at 7.45 at the Crome Centre, Telegraph Lane East, Norwich on Wednesdays says Paul Gunther G8XBT who answers on N'wich 610247. VHF FD will be discussed on March 9, with a junk sale on the 23rd.

North Bristol ARC G4GCT Flourishing is hardly the word for this progressive club with 162 members on the books with some 50 per cent turning up at meetings. Sad note was the passing of Geoff Manning G2IK "father" of the club running the RAE classes and general training programme. It's every Friday, at 7pm, Self-Help Enterprise, 7 Braemar Crescent, Northville, Bristol. More from Ted Bidmead G4EUV, 4 Pine Grove, Northville, Bristol.

Northern Heights ARS G2SU Newsy newsletter *NHARS News* plus fixture card for the rest of the year shows that someone has been doing their homework up there! Meetings at 8pm at the Bradshaw Tavern, Bradshaw, Halifax, on Wednesdays. J. Fish G4MH (heard that somewhere) talks to the club on amateur radio on March 9 and there is a visit to the Bradford Police HQ on the 23rd while the AGM on April 6 should not be overlooked, with G4DAX of the RSGB reaching the club on April 20 in the course of his rounds. Chairman Geoff Milner G8NCK sent me all the info but I really think you should contact sec Brian Aspinall G6CJL, 11 Buck Street, Denholme, Bradford, also B'ford 834442 for more details.

North Wakefield RC Note that sec Steve Thompson, G6ELC last month, is now G4RCH, so congrats OM. He resides at 3 Harlington Court, Morley and will be pleased to see visitors and potential members at the Carr Gate Working Men's Club at around 7.45. He is also (0532) 536633. Make it Thursdays like March 10 when G8PUT talks on comPUTers! Or the 17th when it's off to visit the BBC TV studios in Leeds. Note visit by G4DAX honourable RSGB RR on April 14, not to be missed when you can put all your grizzles and grumbles to him, poor chap.

Reading & District ARC "Alternate Tuesdays" but "RF hazards and the radio amateur" by G3SEK of the NRPB on March 15 is a good datum point. The Clubroom, The White Horse, Peppard Road, Emmer Green, Reading will be filled for a chat on the work of the RI department of BT by Don Franklin on March 29. Sec is Chris Young G4CCC, 18 Wincroft Road, Caversham, Reading.

Rhyl & District ARC Remember the new meeting place on the second and fourth Thursdays is the 1st Rhyl Scout HQ, Tynewydd Road, Rhyl, with rigs for all bands available for members on the first occasion plus constructional projects, while fourth Thurs are devoted to talks, film shows etc with March 24 being named RSGB film night. B. N. Jones GW8OYT lives at 6 Rhofa Maes Hir, Rhyl, Clwyd (this is worse than the Morse code!) or try (0745) 37284, and he'll bring you up to date.

Rossendale Valley ARC Still settling down in its new premises at 4 Bacup Road, Rawtenstall but not averse to getting a few more members. Celia Adams G6GZM, 373 Bury Road, Rawtenstall, Rossendale, Lancs (or Rossendale 220935) is your guide to the club's activities.

Southdown ARS Meets first Mondays, 7.30, at Chaseley Home for Disabled Ex-Servicemen, South Cliff, Eastbourne but you'll not miss the junk sale on March 7 I hope. Note that the April meeting is on April 11 due to intervention of the Bank Holiday. New sec is Tom Rawlance G4MVN, 18 Royal Sussex Crescent, Eastbourne.

South East Kent ARC G3YMD G8YMD An excellent press release tells all about the club and its activities and is ideal for the visitor or potential member. An idea that most other clubs could well emulate, helping to dispel the rather parochial attitude found in some clubs. Also known as the Dover Radio Club, meetings are held at the Dover YMCA, Leyburne Road, Dover every Wednesday at 7.45 with earlier arrivals getting their hands on the FT101ZD. As well as RAE courses by Pete G4EGQ also handles correspondence courses with the same object in mind. Right, March 9 with a talk on old Dover, then on the 16th a junk sale, construction contest on the 23rd, and G3LCK chats on the 30th, subject as yet unknown. Don't forget the AGM on April 6, and presentation of club awards. Club sec is Alan Moore G3VSU, 168 Lewisham Road, River, Dover or 'phone (03047) 2738 at home or (0304) 207670 at the salt mine.

Southgate ARC Second Thursdays at St Thomas' Church Hall, Prince George Avenue, Oakwood, London N14 with doors open at 7.40. March's event is a demo of amateur radio colour TV by G8FSL while the April date is the traditional junk sale. More from G8EWG, 16 Kent Drive, Cockfosters, Barnet, Herts.

Spalding & District ARS Second Friday at the Maples Room, White Hart Hotel, Market Place, Spalding, around 7.30 with a treat on March 11 when the Planning Officer of the South Holland District Council will deal with the planning aspects of antennas and masts. From the horse's mouth, as it were, and who better? April 8 has G3CCH telling all about slow scan TV. Ian Buffham G3TMA, 45 Grange Drive, Spalding, Lincs will fill in the details.

Stevenage & District ARS First and third Tuesdays at the TS Andromeda, Shephall View, Stevenage, Herts at 8 or 7.15 if you want to participate in the code classes. Note that the AGM is on March 15. Your contact is Les Mather G8OKI, 63 Woodhall Lane, Welwyn Garden City, Herts or try Terry Bailey G6CRF on Stevenage 62860.

Sutton Coldfield RS Second and fourth Mondays, 7.30, at the Central Library, SC. Nice list of events down to July but for the moment it's a natter nite on March 14 and Derby stalwart Fred Ward G2CVV telling how to set up an amateur radio station on March 28. Who better? For the diary, a Spring cleanout junk sale on April 25. PRO is Reg Smith G3XXJ, 29 Colestream Road, Warmley, or 021-351 2370.

Swansea ARS First and third Thursdays in Lecture Room "N" at the Applied Sciences Building, Swansea at 7.30 for code classes, otherwise make it 8pm. In the shack is a Trio TS530 put to good use after every meeting. Important note for April: On the Sunday April 10 an Amateur Radio Trade Rally in the Patti Pavilion hard by the St Helens County Cricket Ground with all the usual fun of the fair including RSGB bookstall, operational stations on h.f. and v.h.f., S22 talk-in from GB2SWR, and refreshments, all from 1030 to 5pm. Roger Williams GW4HSH is your man, at 114 West Cross Lane, Swansea, otherwise 404422.

Torbay ARS G3NJA G8NJA The club is mourning the loss of G3OTP, Fred Leeder, member for many years. Note now the AGM on April 30 but much earlier is the annual dinner on March 12. Club nights every Friday at Bath Lane (rear of 94 Belgrave Road) Torquay, says PRO Les Mays G2CWR, Atlantis, Clennon Avenue, Paignton.

Vale of White Horse ARS First Tuesdays, 7.40, The White Hart Inn, Harwell Village, with up-to-date info on club activities from the net on Thursdays at 7.30pm on 28·750MHz s.s.b. or at 8.15 on 145·2MHz f.m. Sec is Ian White G3SEK, 52 Abingdon Road, Drayton, Abingdon, Berks also (0235) 31559.

Wakefield & District RS "Alternate Tuesdays" makes it March 8 for a film show and an on-the-air cum natter nite on the 22nd. All at Holmfield House, Denby Dale Road, Wakefield at 8pm, says sec Dick Sterry G4BLT, 1 Wavell Garth, Sandal, W'field, W. Yorks.

West Kent ARS The Adult Education Centre in Monson Road, Tunbridge Wells, first and third Fridays with informal meetings on the intervening Tuesdays at the Drill Hall in Victoria Road. On March 18 Charlie Newton (could this be G2FKZ, I ask myself) deals with AR research projects. Note the AGM on April 29. More from Brian Castle G4DYF, 6 Pinewood Avenue, Sevenoaks, Kent or (0732) 456708 with the office answering on 01-739 3464.

White Rose ARS G3XEP G8LVQ Rally '83 for the club is on March 27, a Sunday, at Leeds University with talk-in on 144MHz (2m) S22 and 432MHz (70cm) SU8 plus repeaters GB3NA (R3) and GB3WF (RB14), details from G4NDU or G4DZL, but where they hang out I haven't the faintest idea! Normally the club is open on Wednesday evenings at 8 at the Moortown RFC, off the Avenue it seems, where a well-equipped shack is enjoyed by members. Hon sec is Dave Coomber G8UYZ, 43 King Edward Avenue, Horsforth, Leeds, LS18 4BG.

Wimbledon & District RS 8pm, St John Ambulance HQ, 124 Kingston Road, Wimbledon, London SW19 second and last Fridays. On March 11 it's Morse practice and natter nite, but on the 25th G3EPU gives his views and advice on DF hunts. Your man in Wimbledon is Geoff Mellett G4MVS, 26 Paget Avenue, Sutton, Surrey, or try 01-644 8249.

Wirral ARS G3NWR Chatty newsletter *News & Views* reveals the club's main events way on until October but for the moment it's an inter-club QSO session on March 16, but don't miss the sale of surplus equipment on April 6. From which you may deduce that the club meets on the first and third Weds, at the Minto House School, Birkenhead Road, Hoylake, at 7.45. Newsletter editor Cedric Cawthorne G4KPY for the last five years is the new hon sec, at 40 Westbourne Road, West Kirby or 051-625 7311, so you can plague him now instead of G3UJX who becomes the editor.

Worthing & District ARC The Amenity Centre, Pond Lane, Worthing, W.Sx will find the club gathering around 8pm every Tuesday according to the comprehensive club newsletter from editor Stan Williams G3LQI. Let's see . . . page 15 for Diary Dates . . . March 8 when G4ILY will be expounding on slow scan TV matters, no doubt with a demo too, nosh time on the 15th when it is the annual dinner, at another place. Construction contest judging time on March 22 with the month's activities ending with G4EFO describing radio comms in the Fire Brigade. There is just not enough space to describe the multifarious activities of this club so get on to Joyce Lillywhite, 41 Brendon Road, Worthing for full information.

Medium Wave Broadcast Band DX

by Charles Molloy G8BUS

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

Obtaining a QSL from a medium wave station requires a rather different approach to that used on the short waves. Some stations respond readily enough but it is worth remembering that they are doing you a favour as you are not one of their listeners. You are outside their target area and are eavesdropping into local broadcasting in another part of the world. Your report has to do two things: you have to convince the station that you really did hear it and you have to persuade it to reply.

Reception Reports

The report should start off by saying that you picked up their broadcast on . . . kHz, then you quote the time and date in operation at the station. For example, if you were listening to North America at 0200GMT on the 24th of the month, this corresponds to 2100EST on the 23rd in New York. Eastern Standard Time (EST) is five hours behind GMT (UTC) and of course the date can be one day earlier. If in doubt give the time in GMT as well, but you will be able in many cases to obtain the correct local time from station announcements.

It is very important to supply enough evidence to convince the station that you really did pick it up, this means listening, if you can, long enough to collect some programme details. The five minutes before the hour and again before the half hour is often productive as this is the period when programmes change and station identification is given. News bulletins usually start on the hour, followed by a weather report. Always give details of commercials. With small stations it could mean your letter being shown to the advertiser with the comment "we are even heard as far away as the UK!"

Give the exact time to the nearest half minute if possible of each programme detail you report e.g. 2155 commercial for . . .; 2155½ "This is radio . . . in New York"; 2200 News read by . . .; 2203 Weather "temperature 65 degrees"; and so on. The names of announcers, telephone numbers of commercials or even the station itself if you heard a phone-in, temperatures from weather reports, items of local news, these are the meat of the reception report as they are items that are easily checked.

The report now gives brief details of your receiver, antenna and signal strength. Reporting codes such as SINPO or SIO are inappropriate and may not even be understood by small broadcasters. Say in words what their signal sounded like — weak, good, fading, interference from other stations etc. The station does not intend being heard in your area so your report would normally only be of interest.

The Personal Touch

The closing part of the report can be crucial, it may even determine whether you get a reply. Many DXers recommend that the report should take the form of a personal letter which gives details of the DXer, his equipment and his home town and the end of the report is the place for this information. Finally always enclose return postage. International Reply Coupons (IRCs) are useful but probably inconvenient for some stations to cash and some station personnel may not even know what they are. If you have made a really good catch then it is worth the effort to go to your local stamp shop for unused stamps of the country concerned. Say what you want them for and you may get advice on how many are required. Send off your reception report promptly by airmail. Surface mail can take weeks even to North America. Address the report to the Chief Engineer, followed by the name of the station e.g. Radio WINS, then the city, state and country and **request** a verification of reception.

Reporting Cards

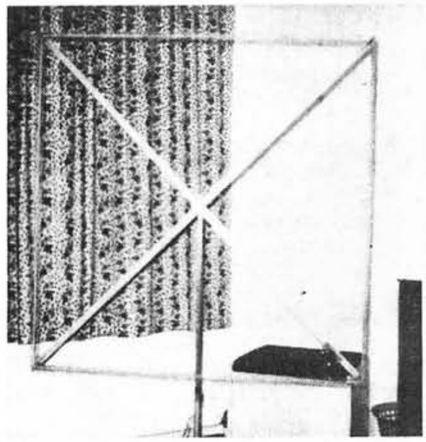
PW reader **Brian Russell** enclosed one of his reporting cards when writing to me recently. This card is designed for reporting to radio amateurs, the BRS number being issued by the RSGB to non-transmitting members. Such a card could not be used as a substitute for a full reception report when writing to a medium wave station but it does give the personal touch. Even the photograph alone, which is in colour, would be a very useful addition to any report. You could have a photo of yourself at the controls at the top of your stationery if you are prepared to find the outlay and this really would make an impact.

Mediterranean DX

Radio Mediterranean, located in Malta, is now on 1557kHz for three hours every evening using the 600kW transmitter at Cyclops belonging to the Deutsche Welle relay station. Test transmissions were made in January and came in quite well at my QTH after 2300 when France-Culture was off the air. The schedule of R. Mediterranean is now 1800 to 1900 in English, 2130 to 2230 in Arabic, 2230 to 2330 in French. The address is Radio Mediterranean, PO Box 2, Valetta, Malta. In an interview on Radio Netherland's *Media Network*, the manager said this schedule may be extended to include an English programme later in the evening.

Brian Russell's reporting card

From the same area listen for the Voice of Free Sahara on 927kHz. It is located in Beni Abbès in Algeria and can be heard regularly after 2300 when Brussels is off the air for the night. Programming, which is in Arabic, is intended for West Sahara, which was part of Spanish Sahara before Spain pulled out of the area. The easiest North African is Algiers on 891kHz which is often the dominant station on this channel in the evening and can easily be separated from any co-channel QRM by a loop or by rotating a portable receiver to make use of the directional properties of the internal antenna.



A photo of Brian Russell's loop antenna

According to a report from *Sweden Calling DXers* a station calling itself Radio Mediterranean International located in Morocco has been testing on 173kHz on the longwaves. At one time the Voice of America Tangiers used this frequency. I haven't heard the tests myself but the only other occupant of this channel is the USSR so it should not be too difficult to pick out Morocco when it is on the air. At the other end of the l.w. band listen to Tipaza in Algiers on 251kHz. It relays the international service and includes a daily programme in English at 2000. The address is RTV Algerienne, 21 Boulevard des Martyrs, Algiers, Algeria.

Origins of the Loop

My request for information about early loop antennas brought an interesting reply from **Douglas Byrne** G3KPO who is Hon. Curator of the National Wireless Museum. "I have been glancing through the Museum archives, for it is truly fascinating to find out how origins are quite often almost lost in the mists of antiquity" writes Douglas. He goes on to say that C.E. Prince converted the four open antennas of the Marconi Adcock system to a pair of closed loops in 1912. These loops would be used with a radiogoniometer so I suppose it would be a natural progression to move to a single rotatable loop when space was at a premium.

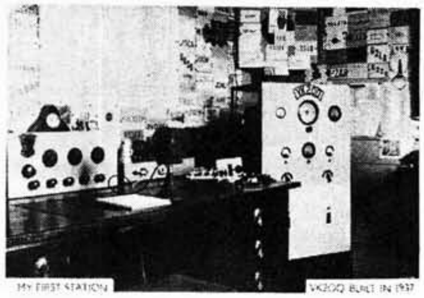
"The battle of Jutland was the first time that radio direction finding was used in warfare when British battleships fired over the horizon at the German fleet, guided by means of DF on their transmitters. Shades of Woodpecker!" concludes G3KPO. The National Wireless Museum which has the callsign GB3WM is located at Arreton Manor, Near Newport, Isle of Wight and Douglas can be contacted in advance by would-be visitors at Arlington House, 34 Pellhurst Road, Ryde, IOW, PO33 3BW. Tel: Ryde 62513.

G3KPO QSL card shows the site of Marconi's test near the Needles

A Problem with the DX160

A cry for help from down under comes from old-timer **Harry Capsey** VK2OQ who has acquired a secondhand DX160 receiver. This set works very well until the main tuning control is adjusted then the set starts to drift (wander in frequency) and it takes about 15 minutes to settle down again. Then it functions normally, even the bandspread can be used, but once the main tuning control is moved the drift starts again.

All the obvious checks have been made. Switch cleaner has been used, a check made for dry joints, the printed board examined with a magnifier, the main tuning capacitor including the wipers examined and an outboard local oscillator tried. "Boy this is the best trap I have ever had in my 46 years in ham radio, even three 'experts' have given it up hi!" concludes Harry.



Harry Capsey's first station

On the face of it the fault is in, or around, the main tuning capacitor but this seems not to be the case. Percussion testing is a good way of stirring up an intermittent fault. Use a home made "hammer" consisting of a pencil and eraser and tap gently round the suspect area. Has anyone come across this fault on the DX-160? If so, please write to Harry at 58 Elliston St, Chester Hill 2162, NSW, Australia . Let us know what the trouble was Harry if you track it down.

Short Wave Broadcast Bands

by Charles Molloy G8BUS

Reports: as for medium wave DX, but please keep separate.

"Can you recommend a good receiver? Which is the best buy?" Every month brings in letters from readers who, bewildered by the varied selection on offer, seek advice. Unfortunately, there isn't a simple answer since there is no standard, or best receiver. Not only do sets differ in appearance, they also offer different facilities to the user who will, or should, select the model most suitable to his needs. Not an easy task for the newcomer to the hobby, so perhaps it might be useful to have a look at the problem.

If you are interested in listening to short wave broadcasting then your receiver should be able to tune over the range 5·9MHz to 26·1MHz or the greater part of it. If you are a DXer you will want to try the Tropical Bands which lie in the range 2·2MHz to 5·1MHz. The amateur bands are found between 1·8MHz and 29·7MHz and to listen you will need a receiver capable of resolving single sideband (s.s.b.) and Morse (c.w.). Medium wave DXers will want a receiver that does not have its own medium wave antenna so that it can be used with a m.w. loop.

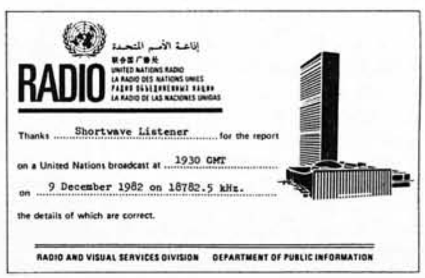
If you want to put up an outdoor antenna, make sure your receiver can cope with it. Power supplies too are important. Dry batteries are expensive, so if you intend listening a lot at home then a receiver which operates from the mains is an obvious asset. It is an advantage, though, to have a set that operates on batteries as well as the mains. You may on occasion want to listen away from home, in a caravan or boat, and you can sometimes reduce electrical noise at home by operating on batteries.

Communications Receivers

This would be my personal choice. A communications receiver will cover the whole range from the l.f. end of the medium waves at 540kHz to the upper end of the short waves at 30MHz. It will resolve s.s.b. and Morse and sets currently on offer, such as the FRG7, FRG7700, SRX30D, DX302, R600, R1000 can be used with a m.w. loop. Most receivers in this category will have a noise limiter, r.f. gain control or attenuator, an "S" meter, provision for connecting a dipole antenna and on the more expensive models, digital readout which displays the frequency you are tuned to on a pocket calculator-type display.

There are two problems with this type of set. One is cost. You will have to spend the best part of £300 for a new communications receiver. Not a great deal perhaps compared with the outlay required for other hobbies and pastimes. If you look after your set it will maintain its value and you will be able to trade it in, in part exchange for amateur gear if you move in that direction. If you decide later on that radio is not for you, then you can always realise on the set in the second-hand market or exchange it for something else (*Swap Spot*).

The second problem has to do with antennas. A communications receiver does not have an antenna of its own so you will have to provide one. A metre of wire hanging from the back will not do because the set would be operating on maximum gain on moderately strong signals and a poor signal-to-noise ratio would result. A short outdoor random wire, say 5 to 10 metres in length, is ideal for general short wave listening. So is a vertical antenna mounted on the chimney stack and a TV antenna is a good sub-


RADIO
UNITED NATIONS RADIO
LA RADIO DES NATIONS UNIES
LA RADIO DE LAS NACIONES UNIDAS

Thanks Shortwave Listener for the report on a United Nations broadcast at 1930 GMT on 9 December 1982 on 18782.5 kHz. the details of which are correct.

RADIO AND VISUAL SERVICES DIVISION DEPARTMENT OF PUBLIC INFORMATION

Radio United Nations

ELECTROVALUE

- 24 HOUR NORMAL DESPATCH TIME
- ESTABLISHED 1965
- ALL GOODS GUARANTEED BRAND NEW AND TO SPECIFICATION
- APPOINTED SIEMENS DISTRIBUTORS

I.Cs – DIGITAL & ANALOGUE

DIGITAL

74LS

Type	Price	Type	Price	Type	Price	Type	Price
74LS00	11	74LS161	36	7413	18	74157	30
74LS02	11	74LS163	36	7414	20	74190	45
74LS04	12	74LS164	30	7420	15	74191	45
74LS05	12	74LS165	50	7430	14	74192	45
74LS08	12	74LS166	60	7440	14	74193	45
74LS10	12	74LS173	55	7442	32	74393	95
74LS11	12	74LS174	45	7443	60		
74LS14	25	74LS175	40	7444	60	**CMOS**	
74LS20	13	74LS191	36	7447	36	4000	10
74LS30	12	74LS193	40	7448	40	4001	10
74LS32	13	74LS195	39	7450	14	4002	12
74LS37	14	74LS196	48	7451	14	4006	50
74LS38	14	74LS197	60	7453	14	4007	14
74LS42	28	74LS221	48	7454	14	4008	32
74LS47	36	74LS240	55	7460	14	4009	24
74LS51	14	74LS241	55	7470	24	4010	24
74LS73	18	74LS242	55	7472	24	4011	11
74LS74	16	74LS243	55	7473	26	4012	16
74LS75	18	74LS244	55	7474	30	4013	20
74LS76	15	74LS245	70	7475	25	4014	46
74LS85	40	74LS251	30	7476	25	4015	40
74LS86	16	74LS253	30	7480	35	4016	20
74LS90	22	74LS257	30	7482	65	4017	32
74LS92	30	74LS259	55	7482	65	4018	45
74LS93	22	74LS266	20	7483	38	4019	25
74LS107	20	74LS273	55	7485	60	4020	42
74LS112	20	74LS279	30	7486	18	4021	40
74LS123	34	74LS299	150	7489	159	4022	39
74LS125	24	74LS367	30	7490	20	4023	14
74LS126	25	74LS368	28	7491	35	4024	32
74LS132	34	74LS373	60	7492	25	4025	13
74LS136	23	74LS374	55	7493	25	4026	80
74LS137	90	74LS378	60	7494	35	4027	20
74LS138	25	74LS393	45	7495	35	4028	39
74LS139	27			7496	34	4029	45
74LS145	70	**7400**		74100	80	4030	15
74LS148	75	7400	11	74104	45	4041	40
74LS151	40	7401	11	74107	20	4042	40
74LS153	40	7402	11	74121	24	4043	40
74LS153	40	7403	12	74123	34	4044	40
74LS155	30	7404	13	74125	34	4046	46
74LS156	36	7405	15	74126	33	4049	23
74LS157	27	7406	20	74141	51	4050	23
		7407	20	74151	40	4060	45
		7408	14	74154	60	4069	13
		7409	14	74155	39	4070	13
		7410	14	74156	40	4071	13

Type	Price	Type	Price	Type	Price
4072	13	LM382N	115	TAB1041K	187
4081	13	LM3900N	50	TBA120AS	62
4082	13	LM3914N	250	TBA120U	72
4093	20	LM3915N	200	TBA800	75
4510	45	NE555V	23	TBA10S	75
4511	45	NE556A	45	TBA820	75
4514	110	NE567N	104	TBB1458	62
4516	53	RC4151NB	80	TBB1458B	40
4518	40	S041E	290	TCA105	120
4520	50	S041P	121	TCA105B	108
4543	75	S042E	364	TCA105G	140
4583	90	S042P	138	TCA250A	185
All above prices are NET and shown in pence		S89	11.23	TCA205K	200
		S178A	16.60	TCA335A	66
		S187	13.28	TCA345A	109
		S566B	214	TCA345W	177
ANALOGUE		S576A	235	TCA671	131
709C5	49	S576B	235	TCA780	211
709C14	44	S576C	235	TCA871	114
723C14	36	S576D	225	TCA955	228
741C5	57	S1469	468	TCA965	136
741C8	16	SAB0600	302	TCA965K	170
741C8/S	56	SAB3209	429	TCA971	92
741C14	47	SAB3210	311	TCA991	80
747C14	65	SAB3211	168	TCA991K	100
748C8	35	SAB3271	329	TDA2002	120
741S	56	SAB4209	497	TDA2003	126
1458C5	62	SAB8256C	35.40	TDA2030	150
1458C14	40	SAD1024	9.00N	TDA4050B	144
7106	450	SAJ131	238	TDA4290	169
7107	500N	SAJ141	278	TDA4600	184
555	18N	SAJ205	810	TDA4700A	546
7555	80N	SAS231W	261	TDA4713A	435
556	45	SAS251	142	TFA1001W	252
CA3046	70N	SAS580	198	TL071CP	25N
CA3080E	70	SAS590	196	TL072CP	45N
CA3130E	90N	SDA5680A	15.55	TL074CN	100N
CA3140E	45N			TL081CP	25N
LM301AN	25N	TAA761	104	UAA170	165
LM308N	60	TAA761A	49	UAA170L	152
LM317K	295N	TAA765A	62	UAA180	165
LM324N	32	TAA861	103	UAA190	141
LM348N	65	TAA865A	59	XR2206	200N
LM380N	66	TAA2761A	72	ZN414	80
LM380N8	80	TAA4761A	113	ZN424P	99
LM381N	145	TAA4765A	120	ZN425E	350

CRYSTALS

(in MHz)			
		4.433	128
0.032768	102	4.915	157
0.100000	453	5.000	157
1.000	453	5.026	128
1.8432	320	6.000	157
2.000	268	6.144	157
2.4576	268	6.5536	128
3.2768	188	8.000	1.88
3.579	128	8.867	128
4.000	102	10.000	157
4.194	128	18.432	188

ZENER DIODES

400mW/2.7-30V	7p
1-3W/3.3-100V	15p
20W/7.5-75V	£1.98

CONNECTORS

DIN AUDIO

Pins	plug	skt
2	8p	8p
3	14p	8p
4	17p	14p
5 (180°)	17p	11p
5 (240°)	20p	8p
6	18p	20p
7	19p	30p

JACK PLUGS SKTS

MONO ¼"
chrome P1 53p 34p 42p
plastic P2 32p 14p 20p

STEREO ¼"
chrome P3 81p 52p
plastic P4 60p 15p 20p

MONO
3.5mm 18p 14p
Stereo 23p 42p

D – SERIES

	Plug	skt	hood
9	64p	96p	92p
15	88p	140p	96p
25	128p	205p	110p
37	176p	298p	122p

IDC Connectors

DIL

14 way	103p
16 way	117p
24 way	170p
40 way	265p

PARALLEL TYPE

	plug	skt
16 way	1.10	1.30
20 way	1.25	1.45
26 way	1.50	1.70
34 way	1.65	1.95
40 way	1.85	2.10

Plugs have retainers. Sockets have strain relief

IC SOCKETS

Pins	Each	25 for
8	6	120N
14	8	160N
16	9	180N
18	11	220N
20	12	240N
22	14	280N
24	15	300N
28	18	360N
40	25	500N

REGULATORS

						7818	40	7918	50
7805	40	7905	50	7824	40	7924	50		
7806	40	7906	50	78L05	32	79L05	50		
7808	40	7908	50	78L12	32	79L12	50		
7812	40	7912	50	78L15	32	79L15	50		
7815	40	7915	50	78L24	32	79L24	50		

CAPACITORS

Polystyrene, Siemens 5% Tolerance 160V
5, 7, 10, 12, 15, 18, 22, 27, 33, 39pF **15p**; 47, 56, 68, 82, 100, 120, 150, 180, 220, 270, 330, 390, 470, 560, 680, 820pF, 1n, 1n2, 1n5, 1n8, 2n2, 2n7, 3n3, 3n9, 4n7, **10p**; 5n6, 6n8, 8n2, 10n, **13p**

Ceramic Very small 1.8, 2.2, 2.7 etc, up to 1n **5p each**. 1n5, 2n2, 3n3, 4n7, 6n8, **5p**; 10n, 22n, **6p**; 33n, 47, **7p**; 100n, **8p**

Polyester, Siemens Layer Type 7.5mm lead spacing 100V
1n, 1n5, 2n2, 3n3m **6p**; 4n7, 6n8, 8n2, 10n 12n, 15n, 18n, 22n, 33n, 47n, **7p** 56n, 68n, **7p**; 82n, 100n, **9p** 120n, 150n, **15p**; 180n, 220n, **12p**; 270n, 330n, 330n, 390n, 470n, **15p**; 560n, 680n, **24p**; 10mm spacing 1uF **25p**; 15mm spacing 2u2 **35p**; 22.5mm, spacing 1uF 400V **50p**; 3.33uF 100V **69p**; In depth stocks.

ELECTROLYTICS

1/63	9	1000/10	19
2.2/25	13	1000/16	26
2.2/63	9	1000/25	36
4.7/63	9	1000/40	44
4.7/100	14	1000/63	76
6.8/40	9	2200/6	9
10/6	13	2200/16	44
10/25	10	2200/25	60
10/40	11	2200/40	73
10/63	12	4700/16	72
10/100	15	4700/25	90
22/10	10		
22/25	11	**TANTALUM**	
22/40	14	**BEADS**	
22/63	15	0.1/35	13
22/100	16	0.22/35	13
47/3	9	0.47/35	13
47/10	11	1.0/35	13
47/25	10	2.2/16	13
47/40	15	2.2/35	16
47/63	15	4.7/16	16
47/100	18	4.7/35	18
100/3	3	6.8/16	16
100/10	12	6.8/25	24
100/16	12	10/6.3	16
100/25	12	10/16	18
100/40	15	10/25	18
100/63	20	22/6.3	18
100/100	27	22/16	30
220/10	16	22/25	30
220/16	16	33/6.3	24
220/25	16	33/10	30
220/40	20	47/6.3	30
220/28	28	100/10	66
220/100	42		
470/10	19		
470/16	19		
470/25	19		
470/40	27		
470/63	45		
470/100	73		

For full ranges of very many other types please see Cat 82 and/or current price list.

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180	120	65	21038	£4.40
180	120	90	21039	£4.69
155	85	39	21040	£3.31
155	85	60	21041	£3.31
155	85	80	21042	£4.30
125	65	30	21047	£2.48
125	65	39	21048	£3.15
125	65	50	21049	£3.56

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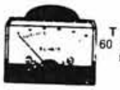

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1N914B	10	2N3820	40	AA119	13	BO226	45N
1N916	52N	3823	60	AC126	25	B1906	38
1N4007	06	2N3904	15	AC127	25	BA379	25
1N4148	03	2N3906	15	AC128	25	BAS40-03	36
1N5402	14	2N4036	46	AC151R	55	BAS70-03	41
1N5407	18	2N4058-62	09	AC153K	20	BAT14-036	11.75
2N697	23	2N4124	25	AC176	25	BB409	33
2N706	18	2N4126	25	ACY17	156	BC107A,B	16
2N930	20	2N4284	30	ACY18	120	BC108A,B,C	16
2N1132	23	2N4286	18	ACY19	99	BC109B,C	18
2N1302	110	2N4289	23	ACY20	90	BC121W	30N
2N1303	58	2N4291	24	ACY21	85	BC122Y	100
2N1304	62	2N4292	21	ACY39	170	BC125	20
2N1305	62	2N4991	62	ACY41	10	BC125	20
2N1306	90	2N5062	32	AD136	530	BC140	25
2N1307	67	2N5192	110	AD142	90	BC141	30
2N1308	147	2N5195	106	AD149	88	BC147A	10
2N1309	99	2N5457	32	AD161	35	BC149	10
2N1599	100	2N5458	32	AD162	35	BC154	25
2N1613	25	2N5459	36	AF114	37	BC160	25
2N1711	25	2N6050	380	AF115	37	BC161	30
2N1893	32	2N6057	375	AF116	57	BC167A	09
2N2218A	31	6F40	152	AF117	110	BC167B	09
2N2219A	25	16F40	165	AF124 AF125	37	BC168A	09
2N2222A	25	40HF40	225	AF126	37	BC168B	09
2N2369A	21	40361DIS		AF127	37	BC169B	09
2N2484	25	40362	65	AF200	10	BC169C	09
2N2646	45	40406	71	AF239	114	BC177B	16
2N2904	26	40408	95	AF279	30	BC178B	16
2N2904A	25	40412	108	AFY12	204N	BC179B	18
2N2905A	25	40430	100	AFY16	327N	BC182	09
2N3053	23	40594	123	AFY180	310N	BC182L	09
2N3054	56	40595	123	AFY18E615N		BC183	09
2N3055	48	40636	147	AFY42	461N	BC183L	09
2N3405	64	40673	146	AU106	240	BC184	09
2N3663	15	A9903	18	AU111	(use	BC184L	09
3702-11	09	AA113	13	AU116)		BC202Y	120
2N3771	180	AA116	9	AUY22	10.96	BC212	09
2N3794	21	AA117	13	BO140	25N	BC212L	09
						BC213	09
						BC213L	09

Type	Price	Type	Price	Type	Price
BC214	09	BFR39-41	23	E1210	76
BC214L	09	BFR79-81	23	E2506	154
BC238C	09	BFT65	119	EB383	20
BC239C	09	BFT66	192	MJ2955	90
BC258B	09	BFX29	24	MJE340	55
BC267B	16	BFX84	24	MJE2955	95
BC300	32	BFX85	24	MJE3055	70
BC301	24	BFX87	28	MPF102	40
BC303	30	BFX88	26	MPS6531	40
BC327	16	BFY50	24	MPS6534	42
BC328	11	BFY51	24	MPSA12	36
BC337	14	BFY52	24	MPSA63	38
BC338	11	BFY90	143	NAS206S5	81
BC413	09	BR34	70	OA47	12
BC414	09	BR64	110	OA90	10
BC477	24	BRY39	45	OA91	10
BC546	10	BSX20	22	OA95	DIS
BC547	09	BSX26	22	OA202	14
BC548	09	BSX63	769N	OC28	75
BC549	09	BT106	147	OC29	75
BC550	10	BT108	136	OC35	75
BC556	10	BU105	170	OC36	90
BC557	09	BU124	85	OC84	25
BC558	09	BU208	180	PM7A2	373
BC559	09	BUX26	350N	PN70	10
BC560	10	BUX28	545	PN72	05
BC879	38	BUX81	744	Q4006LT	104
BC880	43	BUX85	249	Q4010LT	115
BCY31A	157	BUZ10A	478	Q4025H	450
BCY58	18	BUZ15	12.27	T2700D	189
BCY70	18	BUZ20	523	T2800D	104
BCY71	18	BUZ23	787	TAG3-400	100
BCY72	18	BUZ24	12.50	TAG209-400	85
BD130	45N	BUZ32	625	TAG209-600	130
BD131	48	BUZ33	844		
BD132	48	BUZ41A	637	TIC106D	48
BD135	27	BUZ44A	9.67	TIC106M	56
BD136	27	BUZ45	12.76	TIC126D	64
BD139	30	BUZ48	18.94	TIC206D	54
BD140	32	BUZ50A	763	TIC226D	61
BD644	42N	BUZ54A	21.43	TIC236D	96
BD679	62	BUZ80	739	TIC246D	105
BD680	64	BUZ83	11.29	TIP31A	36
BF115	35	BUZ83A	11.96	TIP32A	36
BF167	25	BUZ84A	12.75	TIP41A	45
BF173	25	BY164	48	TIP41C	60
BF177	25	C106D1	45	TIP42A	45
BF178	25	C0326	460N4	TIP42C	60
BF244B	40	C0340	490N4	TIP150	75
BF254	14	C407	17	TIP2955	55
BF255	14	C0546	126N1	TIP3055	55
BF420	31	C762	40	TIS43	50
BF421	34	C1406	77	U763	50
BF457	35	D4 clip for		VN10KM	55
BF458	35	C1406 and		VN46AF	93
BF459	35	E2506	10	VN66AF	105
BF597	12N	D1046	88	VN88AF	123
BFR34A	84	E1110	76	W02	25

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yellow **19**
green **16**
Mountings, B65 **3**

DISPLAYS

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Common anode
MAN72A red **75**
MAN82A yellow **110**
MAN52A green **110**
Common cathode
MAN74A red **85**
MAN84A yellow **110**
MAN54A green **110**
5V filament
3015F 8 mA **255**
3015F 15 mA **256**

KNOBS

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K2 as K1, 35mm **21**
K3 pointer **15**
K7 19mm knurled **23**
K8 as K7 + skirt **23**

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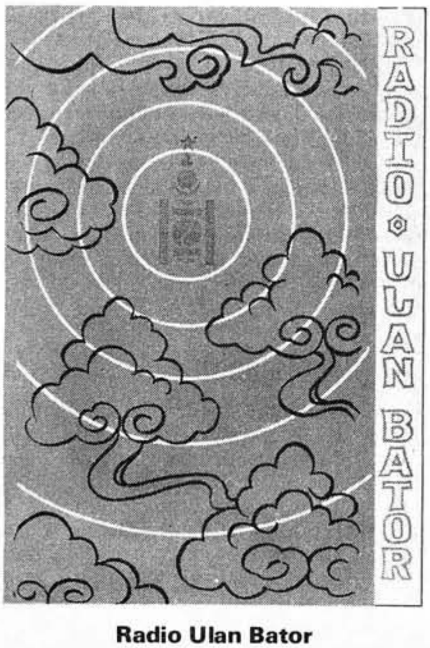
stitute. Indoor antennas are to be avoided, for as well as picking up more signal they may also pick up more electrical noise. Many DXers have to use an indoor antenna but there can be problems with them.

Self-Contained Table Receivers

By self-contained I mean a set that uses a telescopic antenna for short wave reception and a ferrite rod antenna for the medium and long waves and perhaps for the tropical bands as well. You will pay nearly as much for a top priced receiver in this category as you would for a communications receiver, but you will be getting a really marvellous product of modern technology. This is the receiver for the short wave programme listener who can listen to the world. Multi-band receivers with digital readout and even keyboard frequency selection are available and is it not a luxury to know what you are listening to and to be able to go back to a station with certainty. Typical are the Sony ICF 2001, Panasonic RF2900 (DR29), Grundig Satellit at one end of the price range. The Grundig Ocean Boy is an example at under £50 of the other end.

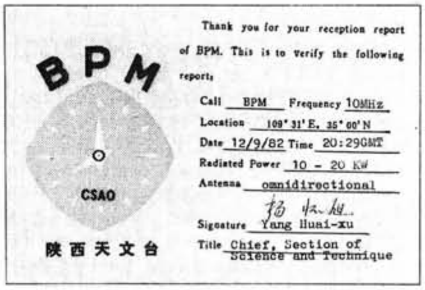
This type of receiver is remarkably immune to the addition of accessories, as someone aptly put it. Even the ubiquitous antenna tuning unit (a.t.u.) has no place with a set that uses a telescopic antenna. Even if there is a socket for an additional antenna, it is likely to be coupled to the receiver in such a way that only a small fraction of the energy from the external antenna is used. If there isn't an antenna socket then clearly the maker does not intend one to be used and you invite problems if you try to connect one by twisting the antenna lead round the whip or joining it to the end via a low value capacitor. A few of these sets will receive s.s.b. but it is not feasible to modify one that does not. Tropical band DXing is possible but you really need a good external antenna to DX on these bands. This type of set is rarely of much use to the medium wave enthusiast as a loop cannot null out a signal picked up by the receiver's own antenna.



Radio Ulan Bator

Portables

There is no clear division between table models and portables as portability can mean all sorts of things. I am thinking of small battery operated sets that can be carried around. You can obtain good short wave reception from a portable but make sure that it covers all or most of the



The Chinese Frequency and Time station BPM

short wave bands. These sets usually start at 6MHz and if you get one that goes up to 22MHz you will be doing well. More common is a top frequency of 18MHz which misses out 21MHz (13m) which is a good daytime band. A few sets will only tune as high as 12MHz and I have even seen one that only covers the 6MHz band (49m). These are to be avoided as you will miss 15MHz (19m) which is the main long distance band for daytime and evening reception. The Vega Spidola or Selena is a good example of a receiver at the bottom of the price range around £20, which covers the short waves adequately. I have a Vega 204 which performs very well and although this model is no longer available the Vega 308 is currently on offer in the small ads columns of *PW*.

Short Wave Broadcasting

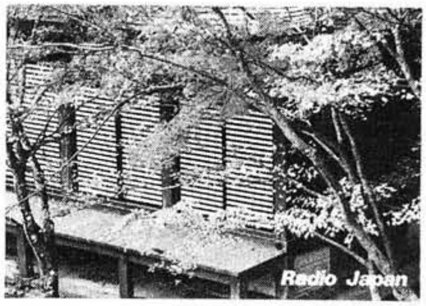
During the evening you can hear broadcasts in English from all over the world. The peak listening time in Europe is around 2000 which is the hour for foreign broadcasters to beam-in their programmes. The peak listening time is not always the best time for reception on some paths so there is a tendency to use relay stations to get round the problem. A relay station picks up and re-transmits a broadcast.

Holland is a major international broadcaster whose evening transmission to Europe is from 2030 to 2120UTC. The format is news, commentary, a feature programme. I try not to miss *Media Network* on a Thursday. The *Happy Station* programme, originated by Eddie Startz, has been on the air for many years.

Listen on 17·695MHz and 21·685MHz and prepare for a surprise. Although the programme is coming from Holland the transmitters are in Bonaire in the Caribbean as we are too close to Holland for night-time reception on the short waves. The signal goes from Holland to the Bonaire relay station by satellite link and is re-transmitted back to Europe. If you can listen during the day, try 5·995MHz or 6·045MHz at 0930 and 1330 for the same programme. This time you will be listening to Holland direct. The address of the station is Radio Netherlands, English Section, PO Box 222, 1200 JG Hilversum, Holland.

QSL Cards

The QSL cards this month are from the collections of **R. McDonald** (UN Radio and Ulan Bator) and **Philip Hodgson** (BPM and Radio Japan). The address of UN Radio is United Nations, New York, NY 10017, USA and the sta-



Radio Japan

tion transmits mainly from USA and the Philippines. Ulan Bator in Mongolia is on 12·07MHz in English at 1200, 1400 and 1445 daily except Sunday. Reports should go to PO Box 365, Ulan Bator, Mongolia. I picked up BPM on 10MHz at 1830 on July 30 last year and the entry in my log reads, "Clock pulses, BPM is Morse, YL in Chinese." The address is Shaanxi Astronomical Observatory, Chinese Academy of Sciences, PO Box 18, Lintong, Xian, China. Radio Japan comes in well in the morning on the h.f. bands. Listen on 21·61MHz and 17·785MHz and write to Radio Japan, Nippon Hoso Kyokai, Tokyo, Japan for a QSL.

VHF Bands

by Ron Ham BRS15744

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

To all us radio enthusiasts those two important letters "DX" simply means rarity and/or long distance and to many of my readers, that's what their radio is all about. No matter what the band, amateur, broadcast or citizen's, or what mode, a.m., c.w., f.m., RTTY, satellite or s.s.b. is favoured, there is always that unexplainable thrill and sense of achievement, when that special bit of DX, previously thought impossible, is safely in the station log.

Solar

Although the sun was low in the sky, which may have affected sunspot visibility, **Ted Waring,** Bristol, counted 10 sunspots on December 22, 16 on the 28th and 24 on January 8 and observed active areas on the central meridian on December 28 and January 3 and 9. As far as radio observation on 136 and 143MHz was concerned, **Cmdr Henry Hatfield,** Sevenoaks, and I, recorded several individual bursts of noise on December 25, 29 and 31 and January 1, 5 and 18 and noise storms on December 26, 27, 28 and 30.

Readers often ask, "What does solar noise sound like?". Well, I can best describe an individual burst as a very definite rise in receiver background noise "whooOOoosh!", untuneable and covering several megahertz and sometimes strong enough to blot out normal radio traffic on the band. An individual burst of solar radio noise may last several minutes, but when there is a noise storm in progress, this may continue for several days and the receiver noise is fluctuating all the time, in fact, it sounds like the waves breaking against the seashore. These events are sometimes heard in the 28MHz (10m) band but the main area of activity is between 120 and 160MHz, depending on the intensity of the particular disturbance.

The 50MHz (6m) Band

"On December 18, the DL3ZM/YV5 beacon on 50·045MHz was heard at 1226 and **Trevor Brook** G3WBQ, Farley Green, Surrey, had a cross-band 50/28MHz QSO with PJ9EE at 1300 on c.w. and s.s.b.," writes **David Newman** G4GLT, Leicester. Around 1415 on the 19th, **John Wilson** G3UUT, Great Shelford, Cambridge, heard signals from the Colombian repeater on 50·075MHz, the 6Y5RC beacon on 50·025MHz and an HI8 station. During this opening, SM6PU worked PJ9EE and **Gordon Pheasant** G4BPY, Walsall, worked TI2HL and TI2JIC, all cross-band and heard HK0BKX and numerous stateside stations on 50MHz. Between 1542 and 1554, David made c.w. cross-band contacts with K2OVS, WA1OUB, WB2RYY and W1RJA, all around 559 with some QSB.

Five members of the "6m GROUP" heard VE1YX on the 26th and between 1450 and 1515 on the 27th, David made brief c.w. cross-band QSOs with K1EM, K2MUB, WA1OUB, W1GCI, W1QXX, W1RJA and W3JO, with signals varying from 539 to 579 accompanied by some deep QSB. During the afternoon of the 28th, David was among the first stations to receive signals from the Anglesey 50MHz beacon GB3SIX 50·020MHz, when it began running continuously, beaming west and giving 20 watts to a 3-element Yagi, 15m a.g.l. at a QTH some 50m a.s.l. Prior to the 28th, this beacon was limited to operate between 0100 and 0830GMT and now, like the beacon keeper, **Alan Mills** GW3NNF, we are all delighted by this big step forward. Signals from the beacon FY7THF 50·038MHz were heard briefly in Leicester on the 30th and January 1 and David Newman tells me that three Californian 50MHz enthusiasts went on a DXpedition to the Azores between January 3 and 9, using high power, a big beam and the callsign W6JKV/CT2 on 50·110MHz. At 1514 on the 8th, they had a DX QSO with K8MMM in Ohio, who uses a 20-element array, 4 × 5 element 6m Yagis, at 30m a.g.l.

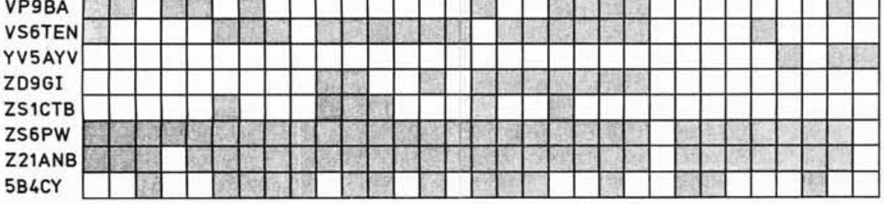


Fig. 1: Distribution of beacon signals

The 28MHz (10m) Band

"Quite an interest in 28MHz f.m. is developing in Hampshire in particular and also in Surrey, with G3TUX, G4PSX, G4RRA and G4GGZ known to be active," writes **Norman Hyde** G2AIH, Epsom Downs, Surrey. He told me that on December 19, **Arthur Dorsett** G4PSX, worked JE6QJV in Tokio on 28MHz f.m. with a power of 4 watts and on January 6 Arthur worked LA0DT/MM, Bergen, via the US repeater in Boston on 29·620MHz. On the same theme, **John Coulter,** Winchester, writes, "f.m. boys are fairly active on 29·260, although there is deep and frequent fading—one eastern England ham was working southern England through a 9600km path via a Maryland repeater." That's amateur radio John and a credit to all concerned.

Harold Brodribb, St Leonards-on-Sea, Sussex, is a regular 28MHz buff and noted a variety of harmonics, between 28 and 35MHz, from lower frequency broadcast stations on December 19, 20, 21, 26, 28 and 31 and identified the Alma Ata I and II stations on several occasions. Harold also keeps an eye on the m.u.f. and between December 19 and January 5 he found the extremes were 37MHz at 1220 on the 28th and 46MHz at 1130 on the 30th. On most days during this reporting period there seemed to be plenty of signals from Canada, the USA and USSR on 28MHz, but the band went through a quiet patch between January 9 and 12. "Absolutely dead," said **Fred Pallant** G3RNM, Storrington, who was looking for some DX from his new QTH; "nothing heard at all," writes Henry Hatfield in his 28MHz beacon log for the 10th; "conditions poor around December 22 and 23 and band flat on January 10 and 11," comments Norman Hyde and when I checked the band at 0830 and 1500 on the 10th and 0920 and 1310 on the 11th, there was only local ignition interference above the receiver noise to prove my FR-101 was alive to the signals.

28MHz Beacons

Many of my readers who want to know about the prevailing condition of the 28MHz band make routine daily checks on the beacon frequencies which are mainly found between 28·2 and 28·3MHz. Most of these beacons, which usually transmit 24 hours per day, have been organised on an international basis by the RSGB and others by clubs and private individuals for the study of radio wave propagation throughout the world. Among the regular beacon observers who have contributed this time to the list of beacons heard, Fig. 1, are **Susan Beech** RS50969, Dollar, Scotland, John Coulter, Henry Hatfield, Norman Hyde, Ted Waring and I, which all adds up to a reasonable report for scientific study in the years to come.

Congratulations to David Newman who heard his 45th and 46th 28MHz beacons early in January when he logged KA1YE/B at 1303 on the 6th and WB1GWS/B at 1419 on the 8th, on 28·284 and 28·280MHz respectively.

Tropospheric

Late on December 19, my barograph showed the atmospheric pressure well down at 29·2in (988mb) and still falling. At 0200 on the 21st a huge rise began from 29·1 (985) to 30·1 (1019) by 1000 on the 23rd, on up to 30·4 (1029) by noon on the 26th and peaking at 30·5 (1032) by midnight on the 29th, where it remained until 0200 on the 31st. At this point a gradual fall set in and the pressure hovered around 30·0 (1015) until 2200 on January 6 when it rose gradually to settle around 30·4 from 1800 on the 8th to midnight on the 11th, then falling slowly to 30·0 at 0600 on the 13th, when it began fluctuating between 29·9 (1012) and 30·1 until midday on the 16th where it settled at 30·3 (1026), only to commence falling again at 1400 on the 17th.

The barograph chart, Fig. 2, covering the period December 27 to January 2, shows a text book change in atmospheric pressure, which, coupled with associated tropospheric changes, gave us the lift at the end of 1982. I have placed an "X" on the chart to indicate the point in time where a v.h.f. disturbance is most likely to begin.

Susan Beech has been listening on the 144MHz (2m) band with an IC290E and during the mild lift over Christmas she heard signals through the 144MHz repeaters GB3AR, MP, RF, and WT and EI and GI signals through a repeater she could not identify on R3. The range of many 144MHz repeaters was extended by another mild tropo opening at the turn of the year and at 0848 on December 31. I heard PD0LUI have consecutive QSOs with G6DAY and G8YGK through the Belgian repeater ON0BT, situated in QRA square CK31b on R3.

With the barometric pressure over Southern Europe just beginning to descend from a record high of 1050mb it was not surprising that both 144MHz and 432MHz "opened-up" during January 21/22. Many UK stations contacted countries as far apart as EA and LA which was exceptionally widespread even for tropo.

Down in Dorset **Jim Marshall** G4MHF worked EA1KC in XD square at mid-day on the 21st, exchanging 5/5 reports. The Swiss beacon HB9HB on 144·865MHz in DH square peaked at 5/6 at this time, with the German beacon DL0PR on 144·910MHz in EO square also present. **John Fell** G8MCP reports working several PA, F, DL and long haul G stations during this lift. A personal first for John on January 22 was an exchange with OK1AIU/P (HK square) with several other Czechoslovakian stations heard but quickly disappearing in QSB. Jim G4MHF was also pleased with his recently re-engineered feeder system, which is now low-loss Heliax and no doubt helped him to work OE, HB and Y22—this time on 432MHz.

No doubt your reports, which are still coming in, will provide further insight into the nature and extent of this first big 1983 season tropospheric opening.

Band II

Judging from reports and the number of French and Dutch broadcast stations I heard between 88 and 102MHz on December 31, the change of year opening also disturbed the normal paths of signals in Band II.

Between 2030 and 2045 on December 30, **Simon Hamer,** Presteigne, heard signals from Belgium BRT II, Egem, France TDF Culture from Abbeville, Caen, Lille, Perpignan, Reims and Vannes and Holland NOS-I from Goes, between 87 and 103MHz. Harold Brodribb counted 14 French stations in Band II at 0930 on December 30, 16 at 1130 on the 31st and again at 0930 on January 1. The situation changed on January 8 and 9 because although Harold's barometer was reading high, he only logged 8 French stations. This often happens Harold, especially when the opening is on specific rather than general paths. Simon noted that the lift on the 12th seemed confined to stations within the UK, borne out by the fact that his DX during the event amounted to BBC Radios Cambridge and Solent and ILR Thames Valley. I think that **Michael Welch,** London, hit the nail on the head by saying, "Knowing the band in one's own area, one can tell when something appears that normally isn't there." Michael uses an Aiwa 9700 tuner and a 23-element antenna for his DXing and at present is not too pleased about the lack of response from some broadcast stations to whom he sent detailed reports. Last June and November he sent tape recordings to overseas broadcasters, heard around 96MHz via sporadic-E, but as yet there is no reply. I have experienced the same thing after sending photographs of television pictures to some overseas stations, so don't be too downhearted Michael, many of my readers, as well as myself, have received QSL cards, personal letters and programme schedules from station engineers and managers in answer to DX reception reports.

Following my report about Radio Boulogne Littoral on 103·7MHz, in our February issue, Michael tells me that he heard this station last October and again at 2300 on December 25 when they were transmitting pop music played by Jingle Joe and Carl. "I can get Boulogne on a Roberts 505 portable with its own rod antenna," writes Harold Brodribb; "it takes only a slight lift for me to be able to hear this station," says **Martin Messias** G4JCN, London, who uses a Rotel-925 tuner with an outdoor dipole antenna and heard a mixture of French and English programmes from RBL over the Christmas period.

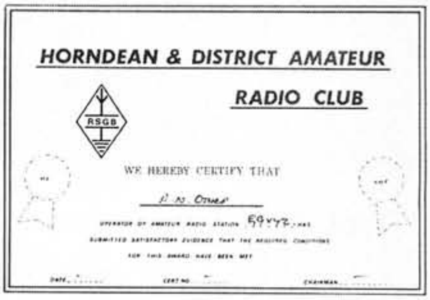


Fig. 3: Horndean Award Certificate

RTTY

I see from the December 1982 issue of the BARTG newsletter that the Sunday news service on v.h.f. is transmitted under the callsign GB2ATG on 144·600MHz at 1130 for the Brighton area, 1200 Manchester, 1230 London 50 bauds, 1330 Northern Ireland, 1800 London 45·45 bauds, 1930 Wisbech and Glasgow and 2000 for the Blackpool area. Readers wishing to join the British Amateur Radio Teleprinter Group should write to Mrs T Crane, "Greta Woods", Bromley Road, Ardleigh, Colchester, Essex CO7 7SF.

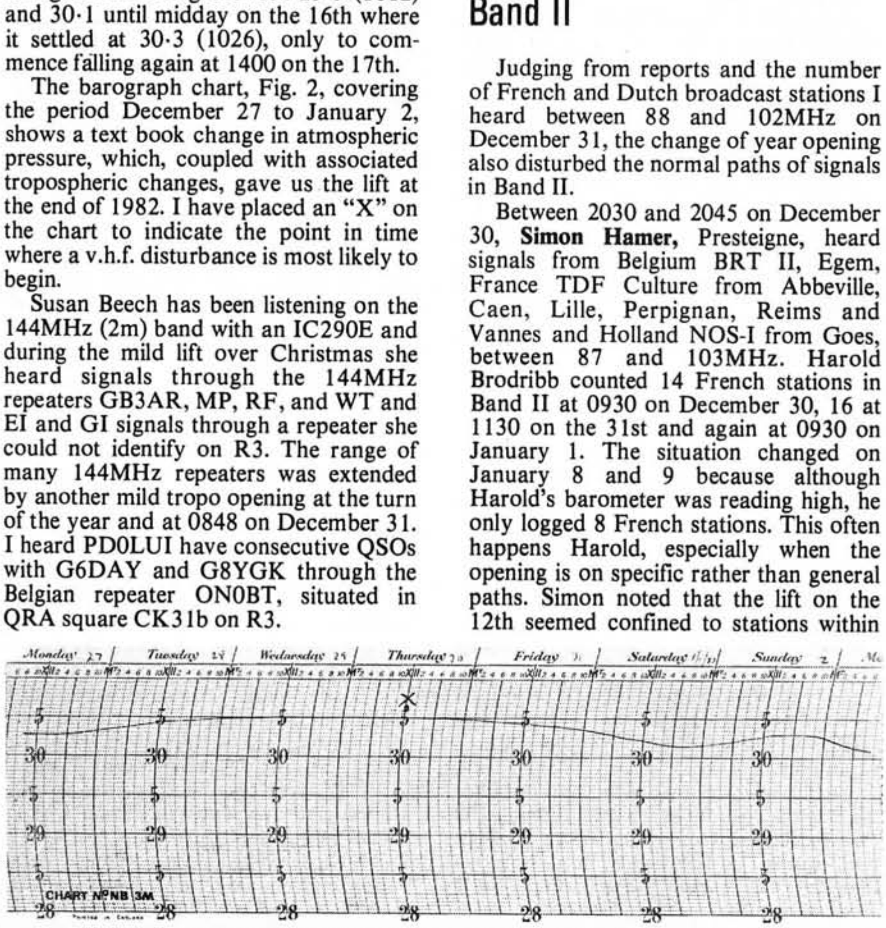


Fig. 2: Atmospheric pressure recorded by the author

Peter Lincoln BRS 42979, Aldershot, is now using an Icom IC-R70 receiver and a Datong FL2 filter for his RTTY reception and is very pleased with the performance of both units. During the month preceding January 6 he copied signals on 14MHz (20m) from most European countries and signals from Africa including 5N0HGB and 5N7HKB, Asia including OD5GN and 9K2KA, South America with CE3CBG and CE3FCF, and North America including AK2H and KX8E.

Although I did not get the usual listening time I would have liked during the period of this report, I did copy RTTY signals from 13 countries, EA, DK, F, HB9, I IT9, OE, OH, OK, OZ, SM, YU and YV on 14MHz and WB2JAB working into G at 1740 on January 16 on 28MHz.

Norman Jennings, Rye, did very well on December 10 when he copied RTTY stations in TU2, XT2, 8P6, 5B4 and plenty of VEs and Ws on 14MHz, JA1, VEs, YV1, PP5 and 9Y4 on 21MHz and CT2, ZS6 and a few Europeans on 28MHz. Between December 9 and January 10, Norman logged RTTY stations from 23 European countries including IT, LX and SV, which all goes to show there is a great deal to be had from RTTY.

Readers often ask where to find RTTY signals in the wavebands quoted. Well, most of the h.f. traffic is around 14·090MHz, 21·090MHz and 28·090MHz and do make sure that you only tune to one clear signal at a time, because if there is interference from another printer, c.w. or man-made sources on the wanted signal, then your equipment may only print garbage.

Station Information

For those readers interested in the weather, which plays a major role in v.h.f. DX, I have just finished building the Heathkit Digital Rain Gauge to replace my "manual" affair. The new instrument, with its automatic self emptying rain collecting unit, works very well and saves my XYL Joan a lot of work.

The Horndean and District Amateur Radio Club G4FBS, has introduced a two class h.f./v.h.f. operating award open to both licensed amateurs and s.w.l.s. The certificate, Fig. 3, will be awarded for the required numbers of contacts, or in the case of s.w.l.s for callsigns heard, with bona-fide members of the HDARC. Readers interested in more details should send an sae to Jonathan Kay G6DWT, 109 Drift Road, Clanfield, Portsmouth, Hants.

The input and output frequencies of the 1296MHz band (23cm) repeater GB3WX (RM9) are 1291·225 and 1297·225MHz respectively. In addition to the repeater facility, GB3WX transmits site weather telemetry, at present atmospheric pressure and local temperature, with more to come later, on RTTY 45·5 bauds, 170Hz shift, 1275–1445Hz tone using a.f.s.k. The carrier runs continuously with callsigns and QTH identification, in c.w., every 3 minutes and telemetry every 30 minutes if the repeater is not in use.

GB3WX is located in ZK20j at the Sussex Repeater Group's site in Brighton and radiates 3W of r.f. from four horizontally polarised dipoles, with the main lobe westwards.

TV

by Ron Ham BRS15744

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

With the news that one of my readers was seen on Swedish television, pictures from Scandinavia and Spain via meteor pings, vintage literature found by DXers in Australia and Gloucestershire and a new antenna catalogue to review, is there any wonder why I look forward to your letters when I have items like this to consider for this column.

Tropospheric

George Garden, Bracknell, always keeps an eye on the prevailing weather and noted that he received the colour pictures from Central Television's u.h.f. transmitter, at Waltham, much stronger during the freezing fog and high humidity on December 13 and the hard frost and fog patches on the 22nd, than he normally does. Good observation George, I am sure other readers can add to this especially where u.h.f. DX is concerned. Knowing that readers are interested in TV captions which help to identify stations, George sent two of his DX pictures, Figs. 1 and 2, which he received from Germany on Ch. 21 during a tropospheric opening last September.

Between 2100 and midnight on December 30, **Tim Anderson,** Stroud, logged a weak picture from Radio Telefis Eireann, RTE 1, in Band III and some French sound on Ch. F5 around 175MHz. Conditions were up as the old year ended because at 1335 on the 30th I received a test card from Belgium, BRT TV1 and at 1945, I watched a film review programme, in colour, on Ch. E10. While the high atmospheric pressure continued falling on the 31st as shown in Fig. 2 in v.h.f. bands, the lift continued and around 0840 there were strong test cards from Holland PTT-NED 1, on Chs. E4 and 5 and at 1830 a clock appeared on Ch. E8 showing 1930. During the early evening I watched a bingo type programme, in colour and captioned "Lotto" on Chs. E7 and 10 most likely from Holland.

Band I

During the 1982 sporadic-E season, **Roger Wallis,** Solihull, received pictures from Austria ORF FS1, Fig. 3, on Ch. E2, Hungary Budapest, Fig. 4, on Ch. R1, Spain, Fig. 5, on Ch. E3 and at 1530 on May 3 he received a picture on Ch. R1, Fig. 6, that he could not idenify, any ideas? Roger uses a 20 year old Ilford Sportsman camera with HP5 film, a shutter speed of 1/25 and a stop of f4 to take his TV pictures and judging by the results Roger, you seem to have the settings spot on.

Although well away from the sporadic-E season it is always worth running the rig periodically on Chs. E2 48·25MHz and R1 49·75MHz and by doing just this between December 19 and January 18, I easily identified many bursts of test card, especially in the mornings, from Austria, Czechoslovakia, Hungary, Norway, Poland, Spain and the USSR and around 1900 on January 7 strong pictures appeared on Ch. R1 which looked like a comedian with an audience and then a male announcer. In mid-January, **Dave Cawser,** Burton-on-Trent, kept an eye on Band I and between 1300 and 1307 on the 11th he saw an advert for Ariel washing powder and YL news reader on Ch. E3, short bursts of test card from Portugal RTP 1, a cartoon film and a group of people in track suits doing keep fit exercises between 1743 and 1917 on the 12th and more pictures from Portugal at 1040 on the 14th.

Meteor Scatter

On January 2, **Brian Renforth,** Torquay, received many strong bursts of pictures and identified a YL singer and a male announcer, via meteor scatter on either Chs. E2 or R1 and because these channels are so close together in frequency one cannot be sure of the station unless a test card or caption is seen. During the peak of the Quadrantid meteor shower, which Tim Anderson found between 2300 on January 3 and 0200 on the 4th, many "pings" of signal were seen in Band I and as high as Ch. E10 in Band III. Among the signal pings that Tim identified, while using his Plustron TVR5D, were test cards from a Swedish station and Norway Gulen, on Ch. E2 and RTVE Spain on Chs. E2, 3 and 4. **Dave Cawser** also kept a meteor scatter watch and caught a glimpse of the TVE revolving caption at 2244 on the 3rd and the RTVE test card at 0943 on the 4th.

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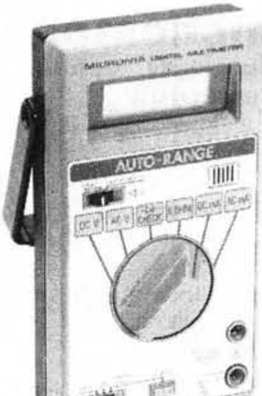

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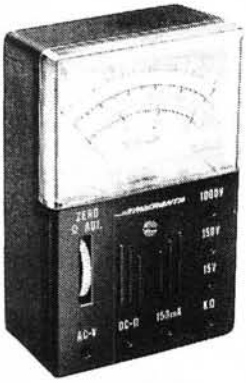

Keep one in your glove compartment. Has 2" meter, mirrored scale to prevent parallax, pin jacks for all ranges. AC and DC Volts: 0-15-150-1000 Current: 0-150 mA, DC. Resistance: Rx1000 (100,000 ohms, full scale). 3½ x 2⁵⁄₁₆ x 1¼". Requires "AA" battery. **22-027** **£7.95**

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Food For Thought

Throughout the 1982 sporadic-E season, Tim Anderson noted the best events in Band I often occurred on sunny days with high pressure systems and cloudy days rarely produced a major disturbance. Tim thought this was a coincidence until he found an old booklet, with a long title, *How to Receive Foreign TV Programmes on Your Set by Simple Modification*, in which, says Tim, "the author seems to imply that sporadic-E is best with fine weather and high pressure". I don't go along with this Tim, but you have the best idea when you say "I shall certainly take more notice of weather conditions during the sporadic-E this summer". I will look forward to hearing about the results Tim because I feel that we still have a lot to learn about all modes of propagation.

On the subject of old journals, **Wenlock Burton,** Victoria, Australia, sent an article from the magazine Radio, Television and Hobbies (now Electronics Australia), dated March 1957 with a report about BBC television sound being received by an amateur in Sydney on 41·5MHz in October 1956 and some sync pulses on the vision channel of 45MHz.

SSTV

"There has not been too much DX that I could find on SSTV this month" writes **Peter Lincoln** from Aldershot, on January 6, who logged EA5AWK working an Italian station, Fig. 7, HB0AWQ calling CQ, Fig. 8, along with signals from 4X4 and 5B4. During the previous month, Peter copied a CQ from what looks like DJ3OGF, Fig. 9 and on December 24, a picture of a building, Fig. 10, taken during a transmission by possibly a German station who stopped transmitting before Peter could get his callsign.

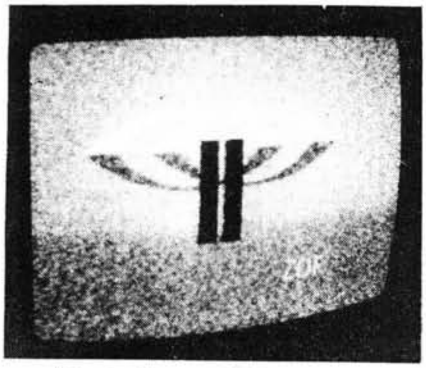

Fig. 1: German TV caption *(George Garden)*

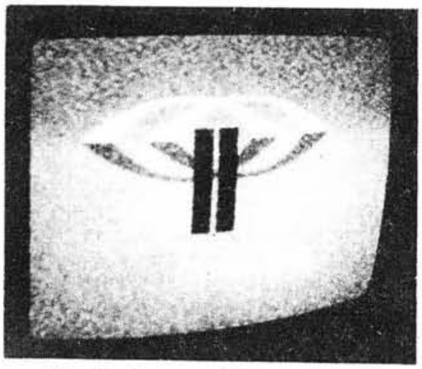

Fig. 2: German ZDF caption *(George Garden)*

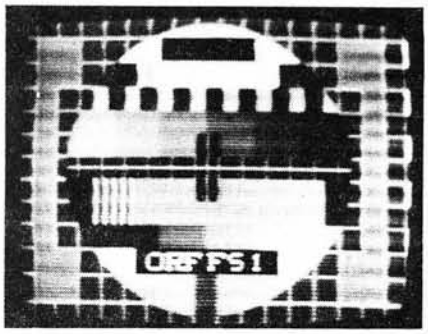

Fig. 3: Austrian test card *(Roger Wallis)*

Fig. 4: Hungarian test card *(Roger Wallis)*

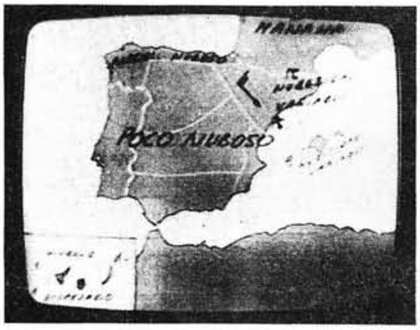

Fig. 5: Spanish weather *(Roger Wallis)*

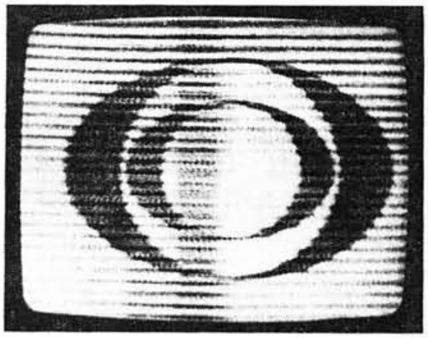

Fig. 6: Mystery picture *(Roger Wallis)*

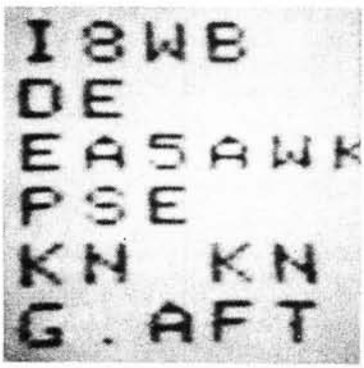

Fig. 7: Spanish SSTV picture *(Peter Lincoln)*

Fig. 8: SSTV CQ *(Peter Lincoln)*

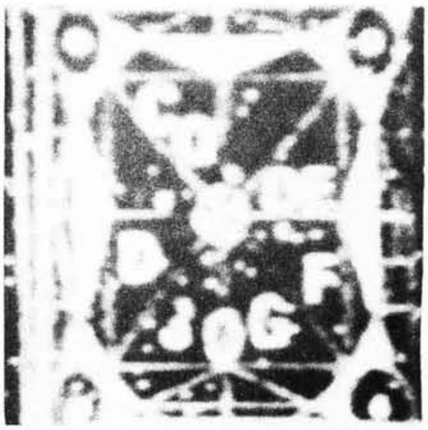

Fig. 9: SSTV CQ from a German station *(Peter Lincoln)*

"My SC422A SSTV converter is now fitted with Volker's 25 seconds single-frame colour board and I have exchanged excellent such colour pictures with I3XQW" writes **Richard Thurlow** G3WW, March, Cambridge. During 1982 Richard made first time two-way SSTV QSOs with 144 stations worldwide including 3 new countries, FM7CD, ZE1EK and 5B4CV, bringing his two-way SSTV score up to 112 countries worked. "The American 14MHz (20m),

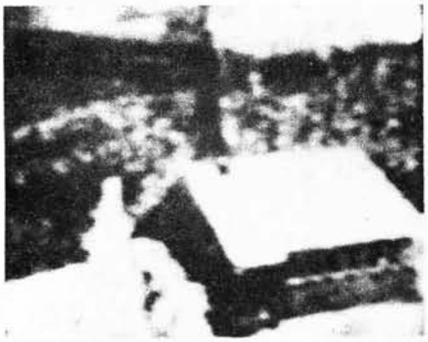

Fig. 10: SSTV picture *(Peter Lincoln)*

Saturday 1800GMT SSTV net around 14·228 and 14·230MHz, is always worth viewing/listening in to/or working with, to learn the latest SSTV news, activity, or just gossip", says Richard who in January 1983 added 2 DJs, 2 EAs and WB8UHZ to his new stations list. In our September 1982 issue, I reported one of Richard's many achievements during a QSO with a Swedish station, which resulted in the following letter from one of my readers in Sweden. "We all saw how Richard Thurlow transmitted a picture of a table laden with delicious food and how SM5EEP responded with a photograph of the Swedish royal couple and a small Swedish flag attached" writes **David Appleyard** from Uppsala, who during the evening of January 9 watched an hour long programme about amateur radio, on Swedish Television, which covered most aspects of the hobby including such items as moon-bounce and SSTV. Many thanks for the gen David, I know that Richard will be pleased to hear about it.

Other Stations

Brian Renforth has moved to Torquay and has been busy modifying and repairing valve type TV receivers to get his DXTV station back on the air. When complete his antenna installation will have a Plemi-Margon 103-element array for u.h.f. and a 3-element beam antenna for Band I, driven by a Stolle/Hischmann rotator and a 6-element Yagi in the loft for Band III.

Two well known TVDXers, Roger Bunney and David Martin, directors of South West Aerial Systems, sent me their firm's latest catalogue which, as well as many useful technical tips, contains a wide range of antennas, pre- and distribution amplifiers, filters, masts, rotators, up and down converters and a variety of accessories for the Band II and TVDXer. Readers interested should write to: SWAS at 10 Old Boundary Rd, Shaftesbury, Dorset, SP7 8ND.

In April 1981, Roger Wallis, purchased a Thorn 850 TV receiver, a Hugh Cocks up-converter and with a 3-element beam this set-up gave good results in Band I during the sporadic-E season. In May 1982, Roger purchased a working Bush TV183 and with the aid of some technical literature, made both sets switchable between v.h.f. and u.h.f., 405 and 625 lines and positive and negative video modulation. During the 1982 sporadic-E season, Roger's 10 year old son was the envy of his school friends, because he was able to see some of the World-Cup football matches that were not on British television.

I must once again warn readers not to attempt to modify old or new television receivers unless you know what you are doing, because of the high voltages and often live chassis employed and the great risk of electric shock.

swap spot

Have heavy duty p.s.u. suitable for communications receiver, 300V h.t., 7V l.t. and dB meter in portable case. Would exchange for stereo tape deck. A. L. Holdsworth, 149 Blenheim Chase, Leigh-on-sea, Essex, SS9 3HJ. Tel: 76211. *Q653*

Have Raleigh Caprice ladies cycle 26in wheels, 3-speed and dynamo, as new, value £70. Would exchange for Trio-310 receiver or similar. Please collect and deliver. Walker, 35/37 Brighouse and Denholme Road, Queensbury, Bradford, Yorkshire, BD13 1NA. *Q669*

Have Tandburg 15 reel tape recorder with group trainer facilities, Ferguson tape recorder, Avo valve voltmeter etc. Would exchange all or part for h.f. receiver or transmitter, non-working OK. Cain, 18 Oaky Balks, Alnwick, Northumberland. Tel: 602487. *Q670*

Have 240V-115V p.s.u. converter, high quality Aiwa AD 1800 stereo cassette deck top loader DIN 455500, cost £172. Realistic twin bass reflex speakers 70W each, 5 months old, cost £140. Would exchange for any amateur radio equipment. Northampton 0604 719233. *Q710*

Have Canon 814 super 8 cine camera. Would exchange for R216. Everall, 36 Eleanor Road, Waltham Cross, Herts, EN8 7DL. *Q739*

Have 140 amp welding kit complete with all leads, masks, brazing attachment, supply of welding rods. Would exchange for Sinclair ZX81 and 16K memory pack. 46b Musgrove Road, New Cross, London SE14. Tel: 01 639 3530. Anyone interested must collect. *Q579*

Have Pye Bantam and Pocket-phone, both in good and original condition (will crystal any reasonable channel of your choice). Would exchange for military radios or accessories, anything considered. G8MQT, 07073 27233 (Welwyn Garden City). *Q740*

Have mint 144MHz handheld f.m. transceiver with band/memories scanning, l.c.d. readout, charger, Nicads etc., one or three watts output, one owner, model Azden PCS300. Would exchange for mint unmodified Trio R1000 RX with cash adjustment. Tel: 0373 64694 (Warminster area). *Q741*

Have Lafayette HA-600A solid state receiver 150kHz to 30MHz a.m./s.s.b./c.w. 220V/12V, operating manual. Would exchange for Sinclair ZX81 with 16K RAM or similar. 22 Murray Ave., Kilsyth, Glasgow. Tel: 0236 823424. *Q810*

Have Tektronix 543 oscilloscope with type B plug in unit. Would exchange for any 144MHz (2m) transceiver or w.h.y. Tony G6PDA. Tel: 0777 707698. *Q839*

Have h.f. mobile linear, 3-30MHz, switchable up to 200W p.e.p., still in box, with 13·8V 10A power supply. Also Amstrad CB900 f.m. CB and other items. Would exchange for 144MHz (2m) multimode in very good condition. Tel: Gravesend 59346. *Q857*

Have Grundig 1400 SL receiver one year old in mint condition. Would exchange for good f.m. scanner or Yaesu FRV7700D converter or w.h.y. M. Clapham, 99 Fairfax Avenue, Harrogate. Tel: 886627. *Q858*

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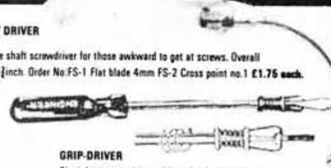
All with insulated handles

FLEXEY DRIVER

A flexible shaft screwdriver for those awkward to get at screws. Overall length 8¼inch. Order No:FS-1 Flat blade 4mm FS-2 Cross point no.1 **£1.75 each.**



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8inch long screwdriver with spring loaded grip on end to hold screws in position while reaching into those difficult places. Order No:SD-1 Flat blade 4mm SD-2 Cross point no.0. **95p each**

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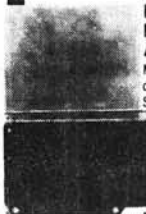

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Made with Bright Aluminium folded construction with deep lid and screws

SIZE " L	W	H	Order No.	Price
5¼	2¼	1½	159	83p
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4	2½	2	163	83p
3	2	1	164	57p
8	6	3	166	£1.68
6	4	2	167	£1.12

Plastic Boxes

Coloured Black. Close fitting.
Flanged Lid, fixing screws into brass bushes.

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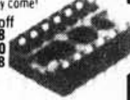

Pin	10 off	50 off	100 off
8 pin	85p	£3.58	£6.08
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28 pin	£2.50	£11.00	£20

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Positive +	Negative +
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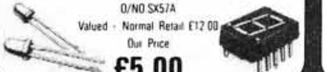
Types like MEL11, FPT100 etc. Plus Cadmium Cell ORP12 and germ. photo transistor OCP71. **TOTAL OF 25 pieces.**

O/NO SX57A

Valued - Normal Retail £12.00

Our Price



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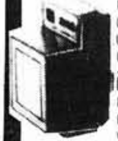
Guaranteed Value over £10 at Normal Retail Price

yours for only **£4·00** Data etc in every pak Order No SX56

MW398 NI-CAD CHARGER



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Power supply fits directly into 13 amp socket. Fused for safety. Polarity reversing socket. Voltage switch. Lead with multi plug. Input — 240V AC 50HZ Output -3 4.5 6 7.5 9 & 12V DC Rating — 300 ma MW88

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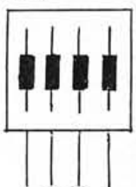

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Size: 1 inch square
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1,000 opv Including test leads & Battery.
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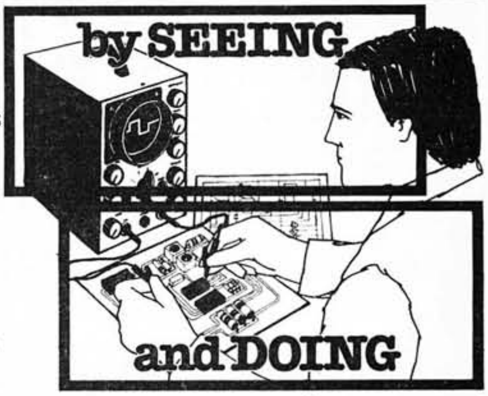

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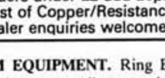

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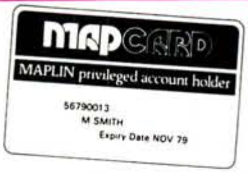

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