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Practical Wireless

THE RADIO MAGAZINE

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LPM 144-3-180	2m, 3W in, 180W out, preamp	235.75	(2.50)
LPM 144-10-180	2m, 10W in, 180W out, preamp	235.75	(2.50)

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HANSEN			
FS200	1.8-150MHz 20/200 Pep	55.95	(1.00)
FS210	1.8-150MHz 20/200 Auto SWR	59.80	(1.00)
FS5E	3.5-150MHz 20/200/1000W HF	41.00	(1.00)
FS500H	1.8-80MHz 20/200/2000W Pep	77.80	(1.00)
FS7	145 & 432MHz 5/20/200	44.85	(1.00)
FS710H	1.8-60MHz 15/150/1500W Pep	97.75	(1.00)
FS711U	430-440MHz 5/20W Head	41.00	(1.00)
FS711H	2-30MHz 20/200 W Head	41.00	(1.00)
WELZ			
SP15	1.8-160MHz PWR/SWR	41.00	(1.00)
SP45	130-470MHz PWR/SWR	59.75	(1.00)
SP10X	1.8-150MHz PWR/SWR	28.75	(1.00)
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SP300	1.8-500MHz PWR/SWR	115.00	(1.00)
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SP600	1.8-500MHz PWR/SWR	106.00	(1.00)
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PS30	Systems p.s.u. 25A	229.00	(—)
SM6	Base microphone for 751/745	34.50	(1.00)
IC290D	2m 25w M/Mode	499.00	(—)
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IC271H	100W version of above	P.O.A.	(—)
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IC45E	70c 10w FM	345.00	(—)
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ICR70	General Coverage Receiver	565.00	(—)
ICR71	General Coverage Receiver	649.00	(—)
IC02E	2m H/Held	239.00	(—)
IC2E	2m H/Held	179.00	(—)
ML1	2m 10w Linear	69.00	(2.00)
IC4E	70cm H/Held	229.00	(—)
BC30	Base Charger	56.35	(—)
HM9	Speaker mic	16.50	(0.75)
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ICBP3	Std Battery Pack	25.00	(0.75)
BP5	High Power Battery Pack	48.00	(0.75)
CP1	Car Charging Lead	4.95	(0.75)
DC1	12v Adaptor	12.50	(0.75)

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SLNA 145sb	Preamp intended for 290	27.40	(1.20)
GLNA 432e	70cm Mast head preamp	149.90	(2.50)
RPCB 144ub	Front end FT221/225	74.90	(1.20)
RPCB 251ub	Front end IC251/211	79.90	(1.20)
BBA 500u	20-5000MHz Preamp	32.90	(1.20)
GFBA 144e	2m Mast head preamp	139.90	(2.50)
SBLA 144e	2m Mast head preamp	89.90	(2.50)
RPCB 271ub	Front end for IC271	89.90	(1.20)

Datong Products

PC1	Gen. Cov. Con.	137.40	(1.00)
VLF	Very low frequency conv.	29.90	(1.00)
FL2	Multi-mode audio filter	89.70	(1.00)
FL3	Audio filter for receivers	129.00	(1.00)
ASP/B	r.f. speech clipper for Trio	82.80	(1.00)
ASP/A	r.f. speech clipper for Yaesu	82.80	(1.00)
ASP	As above with 8 pin conn	89.70	(1.00)
D75	Manual RF speech clipper	56.35	(1.00)
D70	Morse Tutor	56.35	(1.00)
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AD270-MPU	Active dipole with mains p.s.u.	51.75	(2.00)
AD370-MPU	Active dipole with mains p.s.u.	69.00	(2.00)
MPU	Mains power unit	6.90	(1.00)
DC144/28	2m converter	39.67	(1.00)
PTS1	Tone squelch unit	46.00	(1.00)
ANF	Automatic notch filter	67.85	(1.00)
SRB2	Auto Woodpecker blanker	86.25	(1.00)

CW/RTTY Equipment

Tono 9000E	Reader/Sender	P.O.A.	(—)
Tono 550	Reader	299.00	(2.50)
MICROWAVE MODULES			
MM2001	RTTY to TV converter	189.00	(1.25)
MM4001	RTTY terminal	269.00	(1.25)
MM4001KB	RTTY term with keyboard	299.00	(2.00)
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HK703	Up down keyer	28.15	(1.00)
HK704	Up down keyer	19.25	(1.00)
HK705	Up down keyer	13.57	(1.00)
HK706	Up down keyer	15.90	(1.00)
HK708	Up down keyer	13.00	(1.00)
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HK808	Up down keyer	39.95	(1.00)
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MK705	Twin paddle keyer marble base	24.65	(1.00)
KENPRO			
KP 100	Squeeze CMOS 230/13.8v	77.05	(2.00)
KP200	Memory 4096 Multi Channel	165.62	(2.50)

Yaesu

FT1	HF Transceiver	P.O.A.	(—)
FT980	HF Transceiver	1329.00	(—)
SP980	Speaker	61.55	(2.00)
FT102	HF Transceiver	719.00	(—)
FC102	Tuner	185.00	(2.00)
FV102DM	VFO	239.00	(2.00)
SP102	Speaker	55.00	(2.00)
AM/FM	Unit	49.00	(1.00)
FT77	Mobile HF Transceiver	479.00	(—)
FP700	PSU	145.00	(5.00)
FC700	Tuner	103.85	(2.00)
FT77s	10w. version	449.00	(—)
FMU77	FM Board for FT77	28.55	(1.00)
FT757	HF Transceiver	719.00	(—)
FC757	Auto A.T.U.	245.00	(2.00)
FP757HD	Heavy Duty PSU	179.00	(2.00)
FP757GX	Switched Mode PSU	145.00	(2.00)
FT480	2m M/Mode Transceiver	399.00	(—)
FL2050	Linear Amplifier	119.00	(2.00)
FT290	2m M/Mode Port/Transceiver	279.00	(—)
FT290	With Mutek front end fitted	309.00	(—)
FL2010	Linear Amplifier	66.55	(1.00)
FT790	70cm M/Mode Port/Transceiver	259.00	(—)
MMB11	Mobile Bracket	28.19	(1.00)
NC11	Charger	10.55	(0.75)
CSC1	Carrying Case	4.45	(0.75)
YHA15	2m Helical	5.65	(0.75)
YHA44D	70cm ¼wave	9.00	(0.75)
YM49	Speaker Mike	19.25	(1.00)
FT230	2m 25w FM	269.00	(—)
FT730	70cm 10w. FM	239.00	(—)
MMB15	Mobile Bracket	14.65	(1.00)
FT208	2m H/Held	209.00	(—)
FT708	70cm H/Held	189.00	(—)
MMB10	Mobile Bracket	8.45	(0.75)
NC9C	Charger	9.20	(0.75)
NC8	Base/station Charger	56.75	(2.00)
PA3	Car Adaptor/Charger	16.00	(0.75)
FNB2	Spare Battery Pack	23.00	(0.75)
YM24A	Speaker Mike	22.50	(1.00)
FT726R	2m Base Station	775.00	(—)
430/726	70cm Module for above	259.00	(2.50)
FRG7700	HF Receiver 15-30MHz	385.00	(—)
FRG7700M	As above with memory	455.00	(—)
FRT7700	A.T.U. for above	48.25	(1.00)
MH1B8	Hand 600 8pin mic	15.70	(1.00)
MD1B8	Desk 600 8pin mic	56.00	(1.00)
MF1A3B	Boom mobile mic	18.95	(1.00)
YH77	Lightweight phones	12.50	(0.75)
YH55	Padded phones	12.50	(0.75)
YH1	L/weight Mobile H/set-Boom mic	15.75	(0.75)
SB1	PTT Switch Box 208/708	17.00	(0.75)
SB2	PTT Switch Box 290/790	14.50	(0.75)
QTR24D	World Time Clock	35.00	(0.75)
FF501DX	Low Pass Filter	28.99	(0.75)
YP150	Wattmeter/Dummy Load 150w	99.00	(1.00)

Power Supplies

DRAE			BNOS		
4 amp	34.00	(2.00)	6 amp	52.90	(2.50)
6 amp	53.50	(2.50)	12 amp	95.45	(3.00)
12 amp	79.50	(3.00)	25 amp	138.00	(4.00)
24 amp	110.00	(4.00)	40 amp	276.00	(4.00)

Aerial Rotators

9502B	3 core Lighter Duty	57.50	(2.00)
AR40	5 core Medium Duty	98.90	(2.00)
KR400	Med/H Duty	99.94	(2.50)
KR500	6 core Elevation	126.50	(2.50)
KR400RC	6 core Medium Duty	118.45	(2.50)
CD45	8 core Heavy Duty	149.50	(2.50)
KR600RC	8 core Heavy Duty	167.90	(3.00)
HAM1V	8 core Heavier Duty	264.50	(4.00)
T2X	8 core Very Heavy Duty	332.35	(4.00)

Switches

Sigma	2 way SO239	11.50	(0.75)
Sigma	2 way 'n' Skts	15.50	(0.75)
Welz	2 way SO239	20.75	(0.75)
Welz	2 way 'n' Skts	37.00	(0.75)
Drae	3 way SO239	15.40	(0.75)

Miscellaneous

DRAE	Wavemeter	27.50	(1.00)
T30	30W Dummy load	7.10	(0.50)
T100	100W Dummy load	28.00	(1.00)
T200	200W Dummy load	41.40	(1.50)
CT300	300W Dummy load	58.00	(2.00)
GT4	Digital World Time Clock	49.95	(2.00)
	Altai Dip Meter	49.00	(1.00)

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Practical Wireless

FOR THE Radio ENTHUSIAST ...

OCTOBER 1984 VOL. 60 NO. 10 ISSUE 931

Contents

We are sorry that Part 3 of "Introduction to Antennas" has had to be held over until next month

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LOWE SHOPS

Whenever you enter a LOWE ELECTRONICS' shop, be it Glasgow, Darlington, Cambridge, Cardiff, London or here at Matlock, then you can be certain that, along with a courteous welcome, you will receive straightforward advice. Advice given, not with the intention of "making" a sale, but the sort which is given freely by one radio amateur to another. Of course, if you decide to purchase then you have the knowledge that LOWE ELECTRONICS are the company that see the standard for amateur radio after-sales service. The shops are open Tuesday to Saturday and close for lunch 12.30 till 1.30pm.

In Glasgow the LOWE ELECTRONICS' shop (telephone 041-945 2626) is managed by Sim GM3SAN. Its address is 4/5 Queen Margaret's Road, off Queen Margaret's Drive. That's the right turn off Great Western Road at the Botanical Gardens' traffic lights. Street parking is available outside the shop and afterwards the Botanical gardens are well worth a visit . . .

In the North East the LOWE ELECTRONICS' shop is found in the delightful market town of Darlington (telephone 0325 486121) and is managed by Don G3GEA. The shop's address is 56 North Road, Darlington. That is on the A167 Durham road out of town. A huge free car park across the road, a large supermarket and bistro restaurant combine to make a visit to Darlington a pleasure for the whole family.

Cambridge, not only a University town but the location of a LOWE ELECTRONICS' shop managed by Tony G4NBS. The address is 162 High Street, Chesterton, Cambridge (telephone 0223 311230). From the A45 just to the north of Cambridge turn off into the town on the A1039, past the science park and turn left at the first roundabout. After passing a children's playground on your left turn left again into High Street. Easy and free street parking is available outside the shop.

Cardiff now has its own LOWE ELECTRONICS' shop. Managed by Richard GW4NAD, who hails from Penarth, the shop (our telephone number is 0222 464154) is located within the premises (on the first floor) of South Wales Carpets, Clifton Street, Cardiff. Clifton Street is easily found, being a left turn off Newport Road just before the infirmary. Once in Clifton Street, South Wales Carpets is the modern brick building at the end of the street on the right hand side. Enter the shop, follow the arrows past the carpets, up the stairs and the "Emporium" awaits you. Free street parking is available outside the shop.

MOVING . . . MOVING . . . MOVING . . From the 13th September 1984 the LOWE ELECTRONICS' London shop will be located at 223/225 Field End Road, Eastcote, Middlesex (the new telephone number is 01-429 3256). The new shop, managed by Andy G4DHQ is easily found, being part of Eastcote tube station buildings. Immediately behind the shop is a large car park where you can currently park for the day for 20p. There is also free street parking outside the shop.

Finally, here in Matlock, David G4KFN is in charge. Located in an area of scenic beauty a visit to the shop can combine amateur radio with an outing for the whole family. May I suggest a meal in one of the town's inexpensive restaurants or a picnic on the hill tops followed by a spell of portable operation.

SSB AND FM FOR £225, the **BELCOM** LS202E.

Until now, dual mode 2 metre transceivers have been designed for shack, car or shoulder operation. Mobile they may have been but convenient hand portables they were not. That situation has now changed. You will remember that I told you about the new BELCOM LS202E SSB/FM 2 meter transceiver in a previous edition of RADCOM; at the time I said the price would be around £1000. You will, therefore, be extremely pleased to learn that the transceiver is available for £225.00 inc VAT. Now for a few details; (if you want a colour leaflet to appreciate the full beauty of the LS202E transceiver then ring Beryl here at Matlock, alternatively you could always visit a LOWE shop).

- Full coverage of the 2 metre amateur band from 144 to 146 MHz in 5 MHz steps on both SSB (Upper and Lower) and FM, selection of frequency by means of rotary thumb wheel switches. In addition, a VXO control giving +/− 5KHz frequency shift and RIT with centre click stop are provided on the top panel. For night time operation the frequency readout and S meter can be illuminated by an internal LED.

- The use of hybrid IC's and a miniature SSB crystal filter has made the LS202E even smaller than some of the existing FM only handheld portables. The rig measures 62mm wide, 40mm deep and 165mm high, small enough for your jacket pocket and weighs only 520 grammes.

- RF power output SSB (PEP), FM 3.5 watts (at 10.8 volts)
2.5 watts (at 7.2 volts)
1.5 watts (at 6 volts)

- The LS202E is equipped for repeater operation having both frequency shift and 1750 Hz tone burst.

- A comprehensive range of accessories is available . . .

NP6. . Rechargeable battery pack (7.2 volts)	£22.65
NP9. . . Rechargeable battery pack (10.8 volts)	£31.40
CA910E. . . AC charger (for NP6)	£8.50
CA110E. . . AC charger (for NP9)	£8.50
CS912. . . Mobile charger (for NP6)	£6.90
CS112. . . Mobile charger (for NP9)	£6.90
SH1. . . Speaker/microphone	£14.95
SFT207. . . Soft case	£4.80
LA207. . . Mobile console with 25 watt linear	£118.00
AN2. . . $\frac{1}{4}$ wave BNC rod aerial	£8.50

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for **£168** inc. vat not only a 32K **COLOUR GENIE COMPUTER** but **£57** worth of **RTTY** receive/transmit hard and software

FREE!

plus 2 additional amateur radio programs, also FREE!

Many radio amateurs, very wisely, have not yet added a computer to their shack. Apart from the difficulty of which computer to choose, they consider it over expensive to purchase the necessary additional soft and hardware to transmit and receive RTTY, create logging facilities or compute distances between themselves and other radio amateurs. Things have now changed. LOWE ELECTRONICS have put together a substantial package which includes FREE OF CHARGE with every COLOUR GENIE sold from Matlock the following.

A RADSOFT RTTY FULL RECEIVE/TRANSMIT SYSTEM (afsk) with the following features . . .

Split screen . . . enables incoming message to be displayed together with status of machine whilst you 'type ahead' your reply.

Status line . . . displays the current baud rate, a tuning aid and the callsign of the incoming signal if it has been captured.

Screen re-scroll . . . no need to scramble for a pen as details disappear off the top of the screen, more than 6000 characters are stored for reappraisal.

Memory buffers . . . 10 × 255 characters enabling prepared messages to be stored, the pages can be pre-written and saved to cassette for future use. They can also be edited at any time.

Fixed buffers . . . incorporated into the program are a selection of messages often used by a RTTY operator, eg. RYRYRYRYRYRYR . . ., THE QUICK BROWN FOX . . ., QRZ DE (your call sign), DE (your call sign).

Callsign capture . . . on receive the incoming station's callsign can be automatically read from the screen and displayed on the status line. It can be transmitted at any time by the press of a key.

Baud rate . . . 45, 50, 56 and 75 bauds transceive can be selected from the keyboard whilst in receive mode.

Normal and reverse shift is keyboard selectable, the selected shift and baud rate being displayed on the monitor screen. To simplify operation an 'on screen' tuning aid is provided.

On transmit all the necessary carriage returns, line feeds, letter and figure shifts are built in, making operation simple.

Connections could not be easier . . . a cassette lead is used between the computer and the 3.5mm socket on the supplied terminal unit. To input an RTTY signal from the receiver requires a lead making up from the audio output of the rig to the 3.5mm socket of the terminal unit (one 3.5mm jack plug is supplied). Transmit audio is generated inside the COLOUR GENIE, a lead from the computer audio out to the mic input completes the connections.

A comprehensive instruction manual is included with the package.

The list price of the RADSOFT package is £56.00 inc VAT. With the LOWE ELECTRONICS computer the system is FREE!

In addition purchasers of the COLOUR GENIE will receive two other programs also FREE OF CHARGE. One is a log system enabling up to 700 stations together with their signal report and QRA locator to be stored, ideal for a contest. The second can be used to quickly tell you the distance between yourself and the station you are working. A map of the UK, or for the DX-er, Europe appears on the screen with flashing dots locating yourself and the other station.

Don't be carried away in your enthusiasm for RTTY, don't forget, you will own a COLOUR GENIE, a proven 32K home computer. This is a considerable advantage over the dedicated RTTY system. The COLOUR GENIE has a 'proper' keyboard just like today's electronic typewriters, not indefinite touch pads. It is not a games plaything but is capable of introducing the family to computing. **That's if you'll ever let it out of the shack.**

South Midlands

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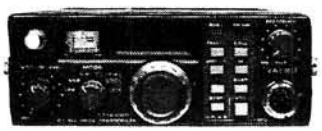
FT290R & FT790R MULTIMODE



432MHz PORTABLE SSB/CW/FM £259!

FT690R	Multimode Transceiver 6m	£259.00
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FL6010	6m 10W Amplifier	£49.00
FL2010	2m 10W Amplifier	£66.55

** FT709R Limited offer at £259.00*

FT726R MULTIMODE UHF, VHF, HF

FT726R	Transceiver Main Frame only	£619.00
FT726R(2)	Transceiver c/w 2m	£775.00
21/24/28	HF module	£209.00
50/726	6m module	£195.00
430/726	70cms module	£259.00
SAT726	Full duplex module	£99.95
XF455MC	600Hz CW filter	£41.85

FT230R & FT730R FM MOBILES

FT230R	2m Transceiver 25w	£269.00
FT730R*	70cm Transceiver 10w	£239.00*
MMB15	Mobile mounting bracket	£14.65

** Limited quantity available at this price*

FT203R & FT703R HANDHELDS

"THUMBWHEEL" TINY HANDHELD

Ultra compact 65W × 34D × 153H mm, synthesised handheld. Computer aided design and component insertion with chip capacitors and resistors has produced this modern marvel: 2.5W RF (10.8v) (3.5W RF (12V)). It has VOX (for use with YH-2 lightweight headset, and built in 'S'/PO meter. Supplied with tone burst, helical and appropriate case.

FT203R	c/w FBA5, CSC6 etc	£155.00
FT203R	c/w FNB3, CSC6 etc	£175.00
FT203R	c/w FNB4, CSC7 etc	£185.00
FBA5	7.2/9V Cell case only (6 × 'AA')	£6.50
FNB3	10.8V NiCad Pack (425mAH)	£33.50
FNB4	12.0V NiCad Pack (500mAH)	£38.25
CSC6	Soft case (FBA5 or FNB3 fitting)	£6.00
CSC7	Soft case (FNB4 fitting)	£6.85
YH2	Headphone/Microphone option	£14.80
MH-12A 2b	Speaker/Microphone option	£17.69
MMB21	Mobile mounting bracket	£8.00
SMC8.9AA	Charger (slow) 13A style	£8.05
NC15	Charger (quick) and Power Unit	£49.95

NEW FT209R HANDHELD—TWIN CPU's

KEYBOARD ENTRY – SCANNING COMPREHENSIVE LCD DISPLAY

Two 4 bit CPUs: 10 memories (independent Tx & Rx), reverse/simplex (either) by single key touch, scanning; manual-auto band (full or partial)-memory, clear-busy, skip-select, programmable power save system (10 selectable dwell times). Large LCD ½" Digits + 10 special functions, "any angle". Meter; S/battery condition, VOX. 65 × 34 × 169mm.

INCREDIBLE:–

FT209R (1.8W)	c/w FBA5, YHA14A etc. FREE CSC10	£225.00
FT209R (2.7W)	c/w FNB3, YHA14 etc. FREE CSC10	£239.00
FT209R (3.7W)	c/w FNB4, YHA14 etc. FREE CSC11	£249.00
FT209RH (2.3W)	c/w FBA5, YHA14 etc. FREE CSC10	£235.00
FT209RH (3.7W)	c/w FNB3, YHA14 etc. FREE CSC10	£249.00
FT209RH (5.0W)	c/w FNB4, YHA14 etc. FREE CSC11	£259.00
CSC10	Soft case (FBA5, FNB3 fitting)	TBA
CSC11	Soft case (FNB4 fitting)	TBA

For general accessories see FT203R list. FNB5, FNB3, FNB4, YH2, MH12A2b, SMC8.9AA, NC15, MMB21

6 METRE EQUIPMENT

FT680R

FT726R	Main frame unit less modules	£619.00 inc.
50/726	6M module for 726R	£195.00 inc.
FT680R*	6M mobile 10W O/P	£359.00 inc.
FT690R*	6M transportable 2.5W O/P	£259.00 inc.
FL6010	Matching 10W amplifier for 690R	£49.00 inc.
50TV*	6M module for FTV transvertors	£89.00 inc.
MMC 50/28S	6M down to 10M convertor	£34.90 inc.
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SP980	Ext. speaker with audio filter	£61.55
XF455.8MCN	300Hz CW filter (455KHz 8 pole)	£49.00
XF8.9HC	600Hz CW filter	£29.50
XF8.9GA	6KHz AM filter	£29.50
FIF**	Computer interface	(see FT757GX units)
D410004	Interconnect lead FT980 – FC757AT	£26.99
TST980	Technical Supplement FT980	£8.50

FT77 THE IDEAL MOBILE

100W P.E.P.
8 Band HF
SSB/CW/FM/AM
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FT77	8 Band Rx/Tx 100W output	£479.00
FT77S	8 Band Rx/Tx 10W output	£449.00
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FC700	Matching antenna tuner	£103.85
FV700DM	Digital VFO unit	£209.00
MKT77	Marker unit	£10.85
FMUT77	FM unit	£28.55
AMUT77	AM unit	£24.00

FT757GX THE BIGGEST SELLER

Every item normally sold as an extra is provided as standard, including AM and FM modes, a 600Hz narrow CW filter, iambic keyer with dot-dash memory, 25KHz marker generator, IF shift and width filters, effective noise blanker and AF speech processor... all at no extra charge.

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FRV7700	VHF Convertors, 8 models, each 3 bands. From	£85-£95 each

NEW KDK 2033 FM MOBILE, 144MHz

Sensitivity better than 0·2μV for 12dB SINAD

£239

144 MHz, 12VDC FM Transceiver.
25W/5W Hi/Lo (both adjustable).
Compact 2⅜ × 6⅜ × 7⅜".
12½ KHz steps (100 KHz fast QSY)
Amber LCD 'Sunlight View'. Side Lit Display; 100's of Hz + channel number.
Sensitivity <0.2μV for 12 dB SINAD
Single knob frequency control "Dial".
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Two 5 slot memories A, B, A + B, A × B.
11th memory instant "call" channel.
Memory simplex or duplex channels.
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Scan halts squelch + centre zero.
Pause on scan halt for 3 seconds.
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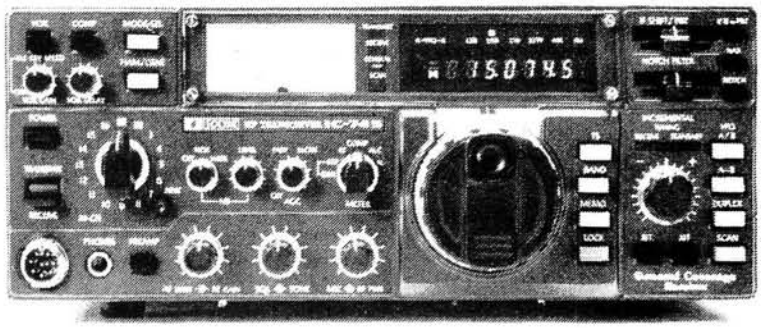
ICOM

FOR THE DX'er...

IC-745, £839.



ICOM's IC-745 is the all-in-one transceiver featuring an HF all band SSB, CW, RTTY, AM (receive only) ham transceiver, plus a general coverage receiver. Options for FM transceive and an internal power supply make the IC-745 the complete transceiver in an all-in-one package.

The receiver section features a 100KHz to 30MHz general coverage receiver, this allows access to all HF bands plus all the frequencies in between. The IC-745 has an adjustable AGC circuit and DFM (Direct Feed Mixer) giving a wide dynamic range of 103dB with an intercept point at + 18dBm. Exceptionally clean reception is achieved with a low noise PLL circuit and a 70MHz first IF.

The IC-745's features include IF shift, 16 programmable memories with lithium battery back-up, passband tuning, a noise blanker both wide and narrow, threshold level control, notch filter, receive audio tone control and an all mode squelch. Also available is a front end switchable receiver preamp providing 12dB gain. RIT has a ±1KHz range.

We could go on all day about the 745, get in touch with us and we will send you the full story.

IC-271H, £819.

The IC-271H is the most advanced 2 meter transceiver available today, it covers the spectrum from 144-146 MHz with FM, SSB, or CW using the most advanced 10PHz PLL system. The IC-271H is suitable for simplex, repeater operation, moonbounce or satellite work, and has features found on no other transceiver, including 100 Watt output.

Some standard features include 32 tunable memories, a high visibility fluorescent display, RIT readout, scanning, 12V DC operation with optional AC power supply.

The 271H has a speech synthesizer that announces the displayed frequency, ideal for blind operators, this is an optional extra along with the SM6 desk microphone and 22 channel memory extension with scan facilities.

As you can see from this brief description the IC-271H, (and its 430-440MHz brother the IC-471H) are very versatile sets indeed. More detailed literature can be easily obtained from Thanet Electronics Limited.

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IC-27E, £319.

This must be the smallest, 2M, FM mobile available today, measuring only 38mm H x 144mm W x 177mm D. It has all the features that you probably require included in this microprocessor controlled unit. In addition, if you feel lonely and can't find anybody on the band, just press "speech" and the optional built in speech synthesizer will tell you the frequency you are tuned to. This is a boon to the blind operator or to those that tuck their rigs out of sight.

Brief features:- 25/1 Watt output, green LED readout, scanning (memories and programmable limit band scan), priority scan, programmable duplex splits, 25 and 5Khz tuning steps, 10 memory channels with lithium back up cell, normal and reverse repeater switch, dual VFO, internal speaker and optional speech synthesizer. Just ask for a leaflet and we'll be glad to send you one. Price £319 and £25 for the optional speech synthesizer.

IC-02E, £239.

The new direct entry microprocessor controlled IC-02E is a 2 meter handheld jam packed with excellent features.

Some of these features include: scanning, 10 memories, duplex offset storage in memory and odd offsets also stored in memory. Internal Lithium battery backup and repeater tone are of course included. Keyboard entry is made through the 16 button pad allowing easy access to frequencies, duplex, memories, memory scan and priority.

The IC-02E has an LCD readout indicating frequency, memory channel, signal strength, transmitter output and scanning functions. New HS-10 Headset, with earphone and boom microphone, which operates with either of the following:- HS 10-SB Switch box with pre-amplifier giving biased toggle on, off and continuous transmit. HS 10-SA Voice operated switch box, with pre-amplifier, mic gain, vox gain and delay. The IC-2E continues to be available.

Agent: Gordon G3LEQ, or telephone Knutsford (0565) 4040. Please telephone first, anytime between 0900 – 2200 hrs.

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70cm HANDHELD TRANSCEIVERS		£
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The brains behind the breakthrough belong to David Husband, and he's building Skywave Software on the strength of it. Already orders are flooding in and it's easy to see why.

The ZX81-FORTH ROM gives you a totally new system. In addition to multi-tasking and split screen window capability, you can also edit a program while three or four others are executing, schedule tasks to run from 50 times a second to once a year, and with a further modification switch between FORTH and BASIC whenever you like.

The ZX81-FORTH ROM gives you a normal keyboard with a 64 character buffer and repeat, it supports the 16k, 32k, 64k RAM packs, it is fig-FORTH compatible and it supports the ZX printer.

The price, too, is almost unbelievable. As a "fit it yourself Eprom", complete with manual, it's just £25+VAT.
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Return of post subject to availability.

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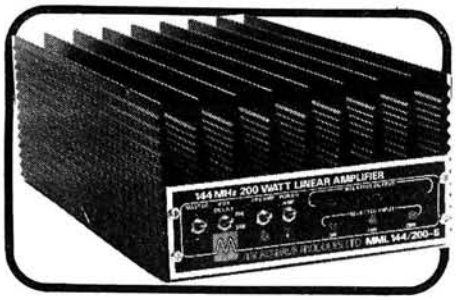

FEATURES

- ★ 200 watts Output Power
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- ★ Suitable for 3, 10 & 25 watt Transceivers
- ★ Ultra Low-Noise Receive Preamp – Front Panel Selectable
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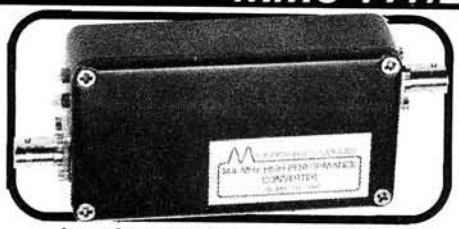
£245 inc VAT (p+p £4.50)

144 MHz HIGH PERFORMANCE RECEIVE CONVERTER: MMC 144/28 HP

NEW!



FEATURES

- ★ Excellent strong signal handling characteristics
- ★ Gasfet RF amplifier
- ★ High level double-balanced mixer
- ★ Harmonic-free, regulated oscillator

Input frequency range	: 144-146 MHz	**Image rejection**	: 60 dB
Output frequency range	: 28-30 MHz	**Input/output Impedance**	: 50 ohm
Typical gain	: 20 dB minimum	**Power requirements**	: 13.8V at 75mA
Noise figure	: 2 dB	**Power connector**	: 5 pin DIN socket
3rd order intercept point	: + 19 dBm (output)	**RF connectors**	: SO239 or BNC, please specify

Size : 110 × 60 × 31 mm (4⅜ × 2⅜ × 1¼")

£42.90 inc VAT (p+p £1.25)

1296MHz GaASFET PREAMPLIFIER — MMG1296

NEW!

This GaASFET 1296MHz preamplifier is constructed on high-quality Teflon glass-fibre pcb and includes a microstripline filter which provides excellent rejection to mixer image frequencies and out of band signals. It has a power gain of 15dB and a noise figure of 1.2dB. The power requirements are 13.8V at 35mA and the unit is fitted with 50 ohm type N sockets.

☆ Utilises NE72089 GaASFET.

£59.95 inc VAT (p+p £1.25)

MMC50/28-S — 6M CONVERTER

NEW!

This new converter has switched oscillators to provide coverage of 50-54 MHz on a 28-30 MHz receiver. The design utilises MOSFETs in the RF amplifier and mixer stages, and the local oscillator is requlator controlled.

INPUT RANGES : 50-52MHz 52-54MHz OUTPUT RANGE : 28-30MHz

OVERALL GAIN : 30 dB NOISE FIGURE : 2.5 dB

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Synthsiser Modulator	MOD 1	8.95	5.50
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PIN RF Switch	PSI 433	7.55	5.35
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Pattern Generator (Mains PSU)	TVPG1	42.25	36.50
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10W to 40W	70FM40	65.10	52.35
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3W to 10W (Auto Changeover)	70LIN3/10E	41.05	30.15
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350	23.47	2.70
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1000	53.00	4.00
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2000	82.27	5.10
3000	115.35	OA
6000	246.45	OA

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350	23.47	2.70
500	29.23	2.95
1000	52.98	4.00
2000	82.27	5.00
3000	115.37	OA
6000	228.75	OA

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12V	24V	Price	P&P
0.3	.15	2.41	.90
1	.5	3.19	1.20
2	1	4.25	1.20
4	2	4.91	1.60
6	3	7.69	1.60
8	4	8.98	1.60
10	5	9.82	1.80
12	6	10.89	1.90
16	8	12.97	2.12
20	10	17.46	2.44
30	15	21.69	2.64
60	30	44.45	OA
83	41	51.20	4.50

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72/96	36/48	P&P
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5	10	32.23	3.20
6	12	40.36	3.50
8	16	44.03	3.75

50/25V or 25-0-25V 2×25V Tap Secs. O/P
5, 7, 8, 10, 13, 15, 17, 20, 25, 30, 33, 40,
20-0-20 or 25-0-25V

50V	25V	Price	P&P
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1	2	5.03	1.50
2	4	8.69	1.84
3	6	10.36	1.90
4	8	14.10	2.12
6	12	18.01	2.20
8	16	24.52	2.70
10	20	30.23	3.00
12	24	36.18	3.20

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2	4	9.20	1.90
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4	8	15.15	2.20
5	10	19.16	2.20
6	12	21.86	2.65
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10	20	35.76	3.30
12	24	41.22	3.50

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Sec V	A	Pri	P&P
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6×2	1A×2	3.45	1.20
9-0-9	.1	2.59	.90
9×2	0.33×2	2.41	.90
8,9×2	.5×2	3.36	1.20
8,9×2	1A×2	4.27	1.40
15×2	.2A×2	2.41	.90
12-0-12	.05	3.11	.90
20×2	.3×2	3.39	1.20
20,12,0,12,20	.9	4.13	1.20
15,20×2	1A×2	5.60	1.60
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15,27×2	1A×2	7.30	1.60
50V 100V			3.20

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2	4	6.99	1.60
3	6	8.10	1.85
4	8	9.67	1.90
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6	12	13.52	2.00
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1500	28.17	3.20
2000	42.14	4.00
3000	71.64	4.80
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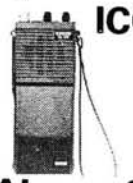

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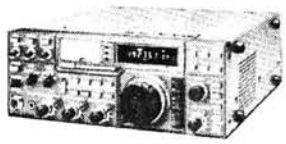

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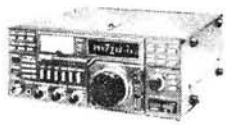

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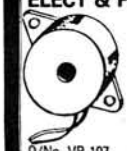

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Frequency: 4kHz approx.
Output: 70dB (A) @ 1, typ.
Power: 12Vd.c. 4mA.
Dims: 22 (dia.) × 11.5mm.
Fixing Centres: 26.5mm.
O/No. VP 107 **95p**

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Fixing Centres: 38mm.
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Dims: 22 × 16 × 15mm.
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Fixing centres: 26mm.
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6V 25mA: VP 83
12V 25mA: VP 86
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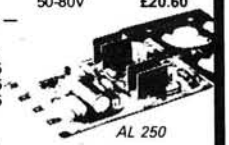
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O/No. VP99 **Once only price £9.95**

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FB4	2	14 × 4"	110	£2.00

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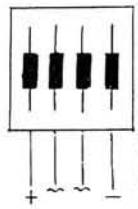

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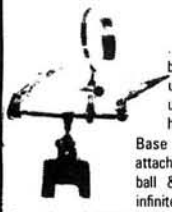

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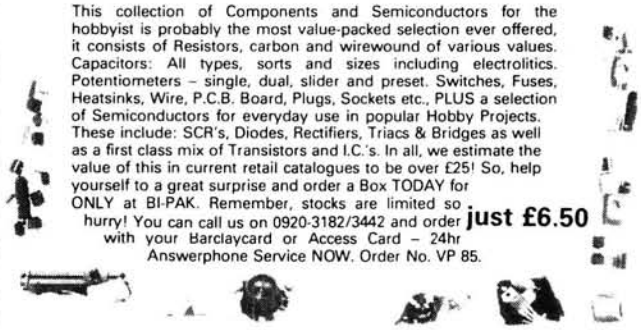

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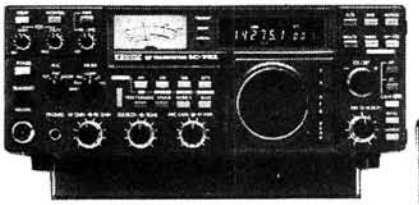

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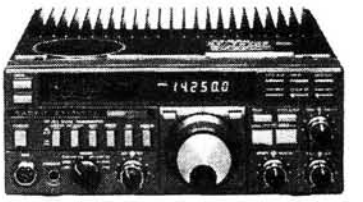

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Deregulation

AS THE NEXT STEP in reducing Government regulation of radio in the UK, proposals were announced in Parliament on 31 July to exempt from licensing four categories of low power radio devices. The consultative document, *Proposals for the Exemption from Licensing of Four Categories of Low Power Radio Devices,* calls for comments from manufacturers and distributors to be sent to the Radio Regulatory Department of the DTI by the end of September, with a view to bringing the exemptions into effect early in 1985.

The devices concerned include such diverse things as garage door openers, remote sensing and measuring systems, animal identification tags, radio microphones for lecture and entertainment purposes, radio aids for the deaf, induction systems for paging or for simultaneous translation facilities at conferences, intruder alarms, production line counters, traffic light controls, anti-shoplifting tags, and low-power emergency alarms for the elderly and infirm. In some cases, certain varieties of these devices will be excluded from the deregulation, because they use higher power or wider bandwidth.

There are some fascinating "throw-away" comments in the consultative document. One refers to low power (up to 1mW) telemetry and telecontrol devices operating in the band 26·96–27·28MHz. Four spot frequencies in this band are suggested as most suitable for low-power use, because "unlike the remaining frequencies in the band, they are not likely to be allocated to Citizens' Band radio when the new European CB specification is adopted". This must surely be one of the most positive statements from Government so far on the future development of CB radio in the UK.

One thing puzzled me. In the DTI Press Notice about the proposals, it was stated that over 20 000 licences are at present on issue for the devices listed. I accept the fact that there probably aren't too many radio-controlled garage doors in the UK—perhaps not surprisingly if the salesman who once button-holed me at an exhibition is anything to go by. He proudly explained the two systems his company offered, and showed me the hand-held controllers, saying: "That one's transistorised, but this is our latest—it's solid state!"

But if all the rest together produce only around 20 000 licences, it seems to me that there must be an awful lot of unlicensed systems around in our shops, theatres, factories and streets.

Geoff Arnold

QUERIES

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

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

PROJECT COST

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

INSURANCE

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

CONSTRUCTION RATING

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

Beginner

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

Intermediate

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

Advanced

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

SUBSCRIPTIONS

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

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

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How Much Will It Cost?

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

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

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

Address

Post Code

Occupation Age Phone No. (Home) (Work)

I/We hereby apply to insure the equipment detailed below

BLOCK LETTERS

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

Please continue list of equipment on a separate sheet if necessary

TOTAL SUM TO INSURE £

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

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GB3PS—1·3GHz Repeater

The latest newsletter from the Cambridgeshire Repeater Group contains a technical description of GB3PS, soon to be operational on RM3 (1291·075/1297·075MHz) from Barkway, Herts, AM71F.

A study of the block diagram of the repeater indicates that a triple conversion receiver system has been adopted, using 70 and 10·7MHz and finally 455kHz. The high first i.f. was chosen to give a good image response—144MHz was considered but this unit is co-sited with the Group's 144MHz repeater (the UK's first) GB3PI(R6).

Signals received by the omnidirectional, horizontally polarised slot antenna pass via LDF550 coaxial cable to a five-section interdigital filter, which gives good immunity from the blocking effect of the TX and provides the required image frequency rejection. The first r.f. stage is formed by a GaAsfet amplifier constructed on a Teflon p.c.b., providing good sensitivity with a low noise contribution. Several additional stages of selectivity are incorporated before the first mixer. The first l.o. uses a high stability crystal operating at approximately 100MHz which is multiplied by a factor of 12 to obtain the l.o. after filtering of 1221·075MHz.

Output of the first mixer is at 70MHz which from then onwards is processed using conventional v.h.f. receiver techniques until the 10·7MHz second i.f. is reached. At this point the signal is routed to two separate stages having different selectivities—one has a nominal ±7·5kHz and is used to feed the logic audio relay circuitry whilst the other at ±15kHz feeds the toneburst decoder and RX a.f.c.

The repeater group reasoned that many stations would be using GB3PS as a first hand "starter" on 1296MHz—probably using a tripler from 430MHz to obtain the outgoing r.f. This technique is fine (providing that the output is adequately filtered) but unfortunately the transmitted deviation (if not compensated) would be three times that of the 430MHz driver. With the toneburst usually running at full deviation a normal repeater "over deviation" detector circuit would ignore all these "first time" experiments with the probable result that 1296MHz was branded as being unworkable!

To avoid these problems and to encourage experimentation, the logic has been arranged to allow such signals through but resulting in a synthesised speech announcement to the user saying for instance "You are over-deviating". Input frequency errors are also accommodated by the repeater a.f.c. resulting in "you are over 15kHz low" etc. Both announcements occur after carrier drop and will allow the user to adjust his/her system accordingly.

The TX side of the repeater uses a PYE T461 u.h.f. transmitter to drive a commercially built varactor tripler incorporating a two-section interdigital filter. Then a five-section i.d. filter further cleans-up the signal before it is passed to a circulator, which is a unidirectional device allowing r.f. to flow to the omni-directional antenna but blocking any r.f. that may be introduced via the antenna from mixing within the essentially non-linear tripler stage and producing spurious outputs. An output power of two watts is available at the base of the TX antenna feeder.

Logic functions are obtained by use of an 8085 m.p.u. and two p.i.a.'s with the program control stored in plug-in EPROM. The synthesised speech generator uses a National Semiconductor Digitalker.

When not in talkthrough service GB3PS reverts to beacon mode sending a constant carrier with f.s.k. modulation giving the callsign and QTH locator every 15 seconds—a K being used to tailend as an indication of available repeater facilities/invitation to transmit. When accessed a 100Hz subaudible tone is transmitted with the normal audio and can be used to operate a tone squelch on the user's receiver if continuous beacon monitoring is not required.

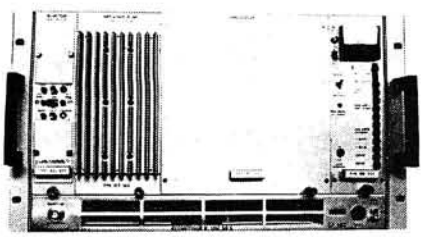
Our thanks for this detailed information go to Chris LOREK G4HCL to whom all reports or requests for details of the Cambridgeshire Repeater Group's projects should be made.

Police Appeal

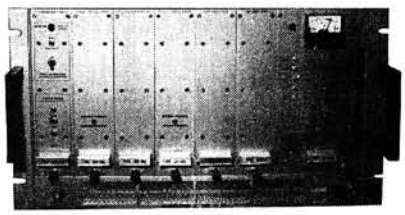
The Devon and Cornwall Constabulary would like to appeal to *Practical Wireless* readers for assistance in recovering stolen TV relay equipment that could be used by criminals operating a pirate TV station.

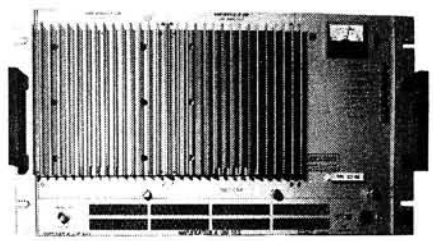
The burglary, at the remote Ivybridge TV Relay Station, near Ermington, Devon, took place during the night of 2/3 June 1984, when the thieves stole a Channel 4 Transmitter and an ITV Transmitter with a combined value of £20000.

The stolen equipments were manufactured in France by L.G.T. and comprise:



Channel 4 Transmitter, one unit weighing 45kg, Serial No. 92, which receives on Channel 32 and transmits on Channel 49 at 50 watts.





ITV Transmitter, two units (i) a Low Power Transposer, Serial No. 9, which receives on Channel 25 and transmits on Channel 42. (ii) an Amplifier, Serial No. 238, providing an r.f. output of between 2 and 50 watts.

If you have any information concerning this equipment, please contact the officer in charge: *Detective Inspector John Alford, Devon and Cornwall Constabulary, Police Station, Plympton, Plymouth PL7 3AJ. Tel: (0752) 336471.*

Change of Address

The Sinclair Research Limited's public relations' team has moved from 23 Motcomb Street.

They are now located at: *Berkeley Square House, 7th Floor, Berkeley Square, London W1X 5LB. Tel: 01-499 2666. Telex: 265212.*

News

NBTV Convention

The 10th Annual Convention of the Narrow Bandwidth Television Association held at Clifton, Nottingham, confirmed that this "fringe" area of TV activity is gaining in popularity.

The NBTVA was formed in the early 70s to link amateurs' work in applying modern techniques to low definition and mechanical TV, originally employed by the Baird/BBC/Medium wave transmissions during the late 20s and early 30s in the UK. Its many members throughout the UK and Europe are exploring the possibilities of continuous moving-image TV, but using audio channel bandwidths of under 15kHz. The demonstration run at the Convention shown here, used a 32 line, 12·5 frames per second format that can be tape-recorded for storage and is a viable amateur radio mode capable of reproducing remarkable detail within its small (6–9kHz) bandwidth. The camera used was designed and built by NBTVA member Deryck Aldridge, using a rotating drum perforated with 32 holes spaced to scan the scene onto a

silicon solar cell light pickup. The camera generates a 32-line signal with composite sync. If you are interested in further details of the NBTVA and a TV system that requires less than one hundredth the bandwidth of conventional fast scan TV, send an S.A.E. to: *Mr Doug Pitt, 1 Barnwood Drive, Wollaton, Nottingham.* Membership is open world-wide on the basis of an annual subscription of £2.00.

AMSAT News

The next amateur satellite in the Phase III series will hopefully be launched during 1986/7 on board an ARIANE 4 test vehicle, which is a new rocket launcher developed by ESA and capable of carrying a payload of 4 tonnes. If all goes to plan the Phase III-C device to be built by AMSAT-DL will provide similar r.f. facilities to the current OSCAR-10 but will feature a completely different apogee motor arrangement. This all new propulsion device will be a hydrogen motor, providing some four Newtons of thrust as a product of the electrolysis of ordinary water. The big advantage of such a system is that the current use of highly explosive/toxic propellant, involving a heavy cost in specialist ground personnel, can be dispensed with and a completely self-contained satellite can be delivered ready for launch. The 'fuel' amounts to 40 litres of ordinary H_2O.

Improvements to the on-board L-band transponders, as a result of OSCAR-10 operational experiments, will be made principally in the areas of sensitivity and linearity. Josef Koeferl DC9RK is building an S-band (2·4GHz) beacon which will be capable of being modulated by all modes used by the main transponders.

If all this work is to bear fruit however, a considerable sum of money is needed during the next three years—the current cost of the project is around £250,000, half of which is being provided via AMSAT-DL, for the rest it's up to us all.

JAS-1: The JAS-1 amateur satellite project under construction by members of Japan's JAMSAT organisation is reported to be progressing well and on schedule for final acceptance test in February 1985. This device will contain conventional transponders and a PACSAT, packet switching facility.

However, the launch date is by no means certain due to the premature demise of the travelling wave tube (TWT) amplifiers on-board BS-2a, the prototype Japanese 12·6GHz DBS-TV satellite. The replacement for this commercial device is ready for launch, but will apparently not be deployed until the cause of the failures has been satisfactorily established. Consequently all subsequent Japanese launches have been re-scheduled including the one to carry JAS-1 (originally planned for February 1986).

Conventions

The guest speaker at this year's Welsh Amateur Radio Convention on 30 September will be Dr Anthony W. England, PhD W0ORE, who will be a Mission Specialist on Space Shuttle flight 51 F in April, 1985, during which time he will be operational on both the h.f. and v.h.f. amateur bands. Admission to Dr England's illustrated talk will be by ticket only.

The Convention, which will be opened by Mr R. Barrett GW8HEZ, President of the RSGB, will be held at Oakdale Community College, Blackwood, Gwent (exit 27 off the M4).

In addition to the usual trade stands, there will be a tape/slide presentation on County Hunting, and a video film of Dr Owen Garriott's W5LFL Space Shuttle mission. Admission will be £1 at the door and there will be talk-in on S22.

Further details from: *R. B. Davies GW3KYA, Convention Secretary, 16 Vancouver Drive, Penmain, Blackwood, Gwent NP2 0UQ. Tel: (0495) 225825.*

The 1984 Midlands VHF Convention will be held at the British Telecom Training College, Yarnfield, Near Stone, Staffordshire, on Saturday 13 October, starting at 10.30am. Admission £1.30.

There will be all the usual attractions, plus extensive measurement facilities for visitors' rigs (unfortunately it is not possible to measure noise performance under convention conditions); there will be two measurement streams, one offering simple measurements on demand and the other, which requires booking, offering more comprehensive facilities. Additionally, outdoor space has been set aside for visitors to set up their own demonstrations. A lecture programme will include G8VR talking on Improving Your 144MHz DX, G3SEK talking about Yagi Antenna Design and there will also be a v.h.f. Forum. Talk-in will be available on S22 and SU8.

In the evening there will be a buffet (price £4) and licensed bar, and booking for this is essential. Details from: *G3UBX, 18 Langley Road, Merry Hill, Wolverhampton WV3 7LH.*

The Yeovil Amateur Radio Club have organised a QRP Convention for Sunday 14 October 1984, at Preston School (Preston Centre), Monks Dale, Yeovil.

Admission will be 50p, which includes lucky draw programme, and the convention will open at 9.30am, with a series of lectures starting at 10.00am.

Light refreshments will be available during the lunch break and for those requiring something stronger, the Preston Plucknett public house is conveniently nearby. The two YARC club stations G3CMH and G8YEO will be on-air during the day and there will be equipment displays and a junk stall.

For further information, contact: *Hon. Sec., Eric H. Godfrey G3GC, Dorset Reach, 60 Chilton Grove, Yeovil, Somerset BA21 4AW. Tel: (0935) 75533.*

Telecommunications Act 1984

The far-reaching provisions relating to wireless telegraphy in Part VI and Schedule 3 of this Act became operative on 16 July 1984. Amongst the many revisions and additions to the original 1949 Wireless Telegraphy Act, the following extracts would seem to be of most interest to the radio enthusiast.

Section 75 increases the penalties for sending false or misleading messages likely to prejudice the efficiency of the emergency services and/or causing deliberate interference to radio. Both offences will be triable summarily with a maximum 6 months' imprisonment or a fine not exceeding the statutory maximum, or both. Additionally, the offences will now be triable on indictment with (on conviction), a maximum of 2 years or an unlimited fine or both.

Section 76 gives the police powers of arrest without warrant for certain offences within the 1949 Act involving the installation or use of a radio transmitter where a constable cannot obtain the suspected offender's name and address or where there are grounds for doubting this is correct or that he would not remain at the address given long enough for a summons to be served.

Section 77 extends the Secretary of State's powers to restrict the manufacture* and importation of specified wireless telegraphy equipment to include the sale, advertising and possession of such equipment. Also covered is apparatus designed or adapted for use in connection with this equipment.

* "Manufacture" includes construction by any method and the assembly of component parts.

Section 78 allows for the introduction of regulations covering the ability of wireless and related apparatus to resist interference by rejecting unwanted signals. Sale of non-complying items will be an offence.

Section 79 extends the scope of search warrants to include powers to seize radio equipment and items which appear to have been used in conjunction with certain wireless offences, both for illegal transmission or any apparatus contravening the provisions of Section 7 of the 1967 WT Act. A constable or authorised person may also seize without warrant within the powers conferred under this section of the new Act.

Sections 80–83 detail the powers of forfeiture of restricted equipment both before or following conviction and basically instruct the Courts to order forfeiture if a conviction is involved.

Sections 84 and 85 cover the Secretary of State's power to carry out and charge for type approval testing of wireless and certain related apparatus together with the marking and provision of information and instructions relating to apparatus. The supply of unmarked apparatus would be regulated or prohibited with the sale of contravening apparatus made a summary offence.

Section 86 empowers the Secretary of State to make Orders that specified types of advertisements (including catalogues, circulars and price lists) for wireless telegraphy and related apparatus should contain, or refer to, information relating to the apparatus or its installation or use. They can thus be made to show clearly and unambiguously if the equipment is approved for use in the UK, e.g. if it complies with relevant interference regulations. Contravention of the Order would be a summary offence.

Section 90 authorises the payment, out of money provided by Parliament, of any expenses incurred by the Secretary of State in providing a "radio interference service", the definition of which is also included. "Radio interference service" means a service consisting of the giving of advice and assistance (whether free of charge or otherwise) to persons complaining of interference with wireless telegraphy.

RMG Open Meeting

There will be an Open Meeting of the Repeater Management Group, in Hull, on Saturday 6 October 1984, starting at 13.30hrs.

A talk-in station will be provided on GB3HS (R2) and/or S22, and a buffet will be available at an approximate cost of £3 per head.

The meeting will be held at: *The Crest Hotel, Ferriby High Road, North Ferriby, Hull, North Humberside HU14 3LG.*

Uniden Takeover Bearcat

Contained within a report in the July 1984 issue of *Monitoring News,* was news of the Uniden Corporation acquiring the Bearcat Division of the Electra Company.

Although international business movements would not normally attract a mention in this column, this particular purchase will probably have considerable effect on many radio enthusiasts, as one of the results is expected to be the discontinuation of some current models, including the BC-250, BC-350 and CompuScan 2100.

Morse Code Classes

A Morse Class will commence at Wigan College of Technology on Wednesday 19 September, starting at 7.00pm.

The classes will be in three groups of ten lessons. The fee will be approximately £10 per 10 lessons, with substantial reductions for senior citizens and the unemployed.

For further information, contact: *Mr E. J. Fox G3AVJ, 5 Belfield Crescent, Huyton, Merseyside L36 5TR, tel: 051-489 3325, or apply direct to the college.*

Beckenham, Kent—*Beckenham Adult Education Centre, 28 Beckenham Road, Beckenham, Kent. Tel: 01-650 1383 & 01-464 5745.* Commencing 18 September between 7.30 and 9.30pm. Course Tutors are Steve Palmer and Peter Grant.

The 1984 Girl Technician Engineer of the Year

The search is now on to find the 1984 Girl Technician Engineer of the Year. Sponsored by the Caroline Haslett Memorial Trust and the Institution of Electrical and Electronics Incorporated Engineers, the Girl Technician Engineer of the Year Award has already established itself as a worthwhile and successful competition, increasingly well supported by the electrical and electronics industries.

The aim of the Award—in the realisation that the engineering industry needs to attract more young people of the highest calibre—is to focus attention on electrical and electronic engineering as a worthwhile professional career for women. By selecting the most outstanding girl Technician Engineer—who will have successfully undertaken the necessary education and training, and have proved herself capable of holding a responsible job—it is the Award sponsors' express hope that she will, by her example, encourage more girls to enter the electrical and electronic engineering profession.

Nominations for this electrical and electronic engineering Award, with its £250 prize, are required no later than 8th October 1984.

For further details and copies of the 1984 Award nomination form, please apply to: *The Secretary, IEEIE, 2 Savoy Hill, London WC2R 0BS. Tel: 01-836 3357.*

More News on page 39

Uncle Ed

PROTECTION—1

Returning from holiday looking tanned and fit (pink and overweight would be nearer the truth) I popped into the Editor's office to deliver the customary bottle of "duty-free" and asked if he had any particular topic he'd like me to talk about. "Protection," he said. I thought he meant a hat to shade my peeling forehead from the sun, but no; "Receiver protection," he continued.

He'd just had a query from a reader about the loop antenna plus differential matching amplifier (d.m.a.) arrangement that Charles Molloy described in *PW,* September 1980. The reader was using it to receive on Top Band (1·8–2MHz) with a separate transmitter and receiver set-up. It had worked extremely well for several months, but had suddenly started blowing up the f.e.t.s in the input stage of the d.m.a. He was running the d.m.a. continuously, even whilst transmitting, and not protecting it in any way against damage from r.f. energy picked up from the adjacent transmitter. Whether that was the reason why he's suddenly started getting trouble, I don't know, but it does highlight the need to protect your receiver against possibly several volts of r.f., a fact which is forgotten in these days of transceivers, where the manufacturer has (or should have) taken care of it all in the original design.

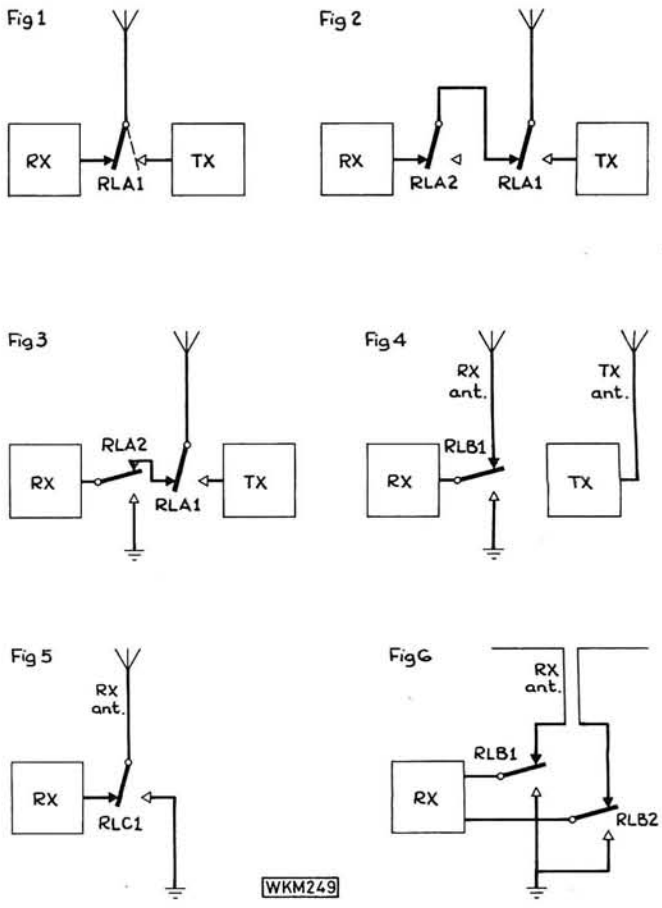
If you're using a single antenna for both transmission and reception, the simplest arrangement is that shown in Fig. 1. The relay contact RLA1, when in its "rest" or de-energised position (solid line), connects the antenna to the receiver. When the coil of RLA is energised by switching the installation to "transmit", the contact changes over to the position shown by a dashed line, connecting the antenna to the transmitter and isolating it from the receiver input. Sometimes, you'll find this relay actually built into the transmitter.

Depending on the relay design, there can be quite a capacitance across the open relay contacts, and if so, a fair bit of power would be "leaked" into the receiver from the transmitter. To get over this, the arrangement of Fig. 2 is used, so putting two contact gaps in series between the transmitter and receiver antenna connections when transmitting. Better still is the circuit of Fig. 3 which has RLA2 turned round so that the receiver antenna input connection is earthed whilst transmitting. A real case of "belts and braces"!

The relay coil can be controlled by the p.t.t. line in the case of a telephony transmitter. For a c.w. (Morse code) transmitter it can be controlled by a send/receive line or better still by the Morse key itself, so that you can listen for the distant station between your signals (called variously QSK, BK or break-in operation). The problem here is that a relay that will handle maybe several hundred watts of r.f. and follow Morse code at perhaps 25 words per minute is a fairly special animal, and an expensive one, too. Things are a little easier if you can guarantee that the transmitter is always going to see a nice, well-matched, resistive load of 50Ω or whatever, because there aren't such high r.f. voltages to worry about then.

The alternative approach is to use separate antennas for transmitting and receiving. In general, this is not looked upon with favour in amateur radio, because of what's called the reciprocity theorem which says that anything an antenna will do when transmitting, it will do when receiving, too. So, particularly if you've spent a lot of money putting a big h.f. beam on top of a tall tower, you might as well reap the benefits of a good antenna in both directions. There are times though, and our friend with his loop and d.m.a. is a case in point, when it can be an advantage to separate the transmit and receive functions.

You'll still need to protect the receiver, unless you're running low power (another advantage of QRP) and have the antennas spaced a reasonable distance apart. In this case, the arrangement of Fig. 4 is commonly adopted. But **don't** connect the relay contacts up like Fig. 5, for if there is very much r.f. picked up by the receive antenna, the contacts of RLC1 will soon weld themselves together in the "energised" position, permanently earthing the antenna, and leaving you with a very deaf receiver! Reed relays, which have the advantage of very high-speed operation, are especially prone to this fault.



All the arrangements shown so far have been for single-wire feeders—the long-wire or random-length wire brought straight into the shack. If you've got a coaxial cable feed, either from a matched antenna or from an antenna tuning unit (a.t.u.) then the inner conductors of the coaxial cables are switched by the relay(s) and the outer screen conductors are all bonded together.

If you've got a balanced antenna, such as a dipole with flat twin feeder, you need to double up on the relay contacts, as in Fig. 6. The same applies to the loop and d.m.a., though here the relay contacts are between the loop and the d.m.a., rather than at the actual receiver input.

Just what lengths you'll need to go to in order to keep your receiver input safe from damage will depend on many factors. These include: how much transmitter power you're running; what transmit antenna and feeder system you're using and how efficient your shack earthing system is; if you're using separate antennas, how far apart are they and how big is the receive one; what sort of receiver are you using? From the point of view of not damaging the receiver front-end tuned circuits, the modern design with bandpass filters seems less troublesome than traditional ganged and tracked tuned circuits, probably because the input circuit *Q* is lower.

Early transistorised receivers with gang-tuned front ends were also very prone to burning out the r.f. amplifier transistor due to excessive r.f. pick up.

NEXT MONTH—STOPPING THE CRASHING IN YOUR EARS

Swap Spot

Have Akai SX-38D stereo Dolby tape deck worth £150. Would exchange for v.h.f. scanning receiver with 10 or more channels covering 144MHz band, preferably hand-held. Tel: Uxbridge 32476. *V927*

Have oscilloscope Airmec Televet type 259, also Sentinel 144MHz converter. Would exchange for good range air-band receiver. Tel: Holbeach, Lincs 22649 (between 5 and 6pm). *V931*

Have Yaesu FT-102 complete line-up. Would exchange for fishing boat and motor. Tel: 0792 873718 after 6.30pm (Swansea). *V955*

Have *Practical Wireless* May 1981 to present, *Radio Communications* March 1979 to present, *Short Wave Magazine* November 1977 to April 1984, all immaculate. Would exchange for anything of interest in radio, hi-fi, photography or astronomy. Tel: Langport 250235. *V968*

Have 4·8m Starcraft aluminium planing hull dinghy with 20h.p. Johnson, steering and remotes on Snipe trailer valued £1175. Would part exchange with cash adjustment for 144MHz and/or 430MHz base/mobile rig(s). Aspinall, 132 Sea Street, Herne Bay, Kent. Tel: 02273 3511. *V969*

Have DX200 and Sony ICF7600 both in v.g.c. Would exchange for SRX30 or DX160 or w.h.y. Leslie Taylor, 1 Cadley Close, Blandford, Dorset. *V970*

Have *Television* magazine mono portable project complete and working, no cabinet. Would exchange for analogue multimeter or w.h.y. Graham Smith, Moulinearn, Pitlochry, Perthshire, Scotland. *V976*

Have HW100 TX/RX plus p.s.u. and manual, 100W out, no mic. Recently spent £100 on complete overhaul, have receipt. Would exchange for 144MHz 100W linear plus p.s.u., in good working order. G.R. Perry. Tel: 0222 731926 (Cardiff). *V977*

multiple choice... multiple choice... QUESTIONS multiple choice... multiple choice...

If you are an aspiring RAE candidate or just feel like testing your knowledge of amateur radio these multiple choice style questions will fill your needs. The questions are typical of those appearing in both the RAE papers, but they are not taken from these papers. For the answers, together with explanatory notes to help you, please turn to page 48.

Paper 1 Section 1. Licensing Conditions—log keeping

Question 1–1

When should you fill in the log of the station at the main address?

- ☐ **a.** at the time of sending and receiving
- ☐ **b.** immediately following the period of operating
- ☐ **c.** within 30 minutes of the transmission
- ☐ **d.** within 24 hours of the commencement of operating

Paper 1 Section 2. Transmitter Interference

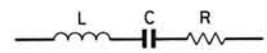
Question 1–2

Why are oscillators in transmitters usually followed by a buffer stage?

- ☐ **a.** to avoid any variation in the load affecting the frequency
- ☐ **b.** to give the correct output frequency
- ☐ **c.** to modulate the r.f. with audio from the microphone
- ☐ **d.** to limit unwanted radiation from the oscillator

Paper 2 Section 2. Electrical Theory—series resonant circuit

Question 1–3



This series resonant circuit is in resonance when its reactance is

- ☐ **a.** negative
- ☐ **b.** zero
- ☐ **c.** at minimum
- ☐ **d.** at maximum

Paper 2 Section 5. Transmitters—methods of modulation

Question 1–4

A single sideband suppressed carrier transmission is designated

- ☐ **a.** A3E
- ☐ **b.** D3E
- ☐ **c.** J3E
- ☐ **d.** V3E

World-Wide Satellite Com

The first part of this article examined the history and development of INTELSAT. This final part looks at the future developments

Traffic Demand

It is expected that some 58 000 Atlantic channels and a world total of some 92 000 channels will be required by 1985. Although predictions are difficult to make farther into the future, provisional estimates of some 190 000 Atlantic, 63 000 Indian and 50 000 Pacific Ocean channels have been made for the year 1993. Satellites will have to be designed to provide an adequate number of channels.

The most severe requirement is in the Atlantic Ocean region where a "primary" satellite is used to provide communications between all countries in that region with a capacity of perhaps 75 000 channels by the 1990s. In addition, a "major path" satellite will be used in the same region by those countries which have at least two earth antennas to work with the Atlantic satellites.

The number of channels which can be provided by a satellite link is limited by the frequency bandwidth available for the radio signals used. The INTELSAT IVA craft employ spot beams directed towards certain areas of the earth so that the same frequencies can be used in both beams, thus raising the channel capacity from 3750 of the INTELSAT IV series to 6250.

A much higher capacity of 12 000 channels is made available in the INTELSAT V craft by using each frequency in the 4 and 6GHz bands four times. Each spot beam transmits and receives separate types of signals, which are left-hand and right-hand circularly polarised. In addition, frequencies in the 11 and 14GHz bands are each used twice by means of suitable spot beams directed to different regions. It is expected that few countries will use these higher frequency bands in the near future.

The carrying capacity of a satellite is further increased by special techniques known as Frequency Division Multiple Access (FDMA) and Time Division Multiple Access (TDMA) which assist in the packing of the signals into the available radio frequency bands.

INTELSAT VI

In order that the rapidly growing demand for international communications can be met, INTELSAT have placed orders for the even more advanced INTELSAT VI satellite. The initial contract is for five INTELSAT VI spacecraft, with an option for an additional 11. It is planned that the first of these craft will be launched in early 1986 using either the Space Shuttle or the European Ariane rocket (depending on the state of development of these launching systems and the relative cost). It is hoped to launch further INTELSAT VI craft at four monthly intervals using the two alternative launching systems for various craft.

Unlike the INTELSAT V, the INTELSAT VI series will be spinners rotating at 30 revolutions per minute throughout the whole of their 10 year working *life to* provide gyroscopic stability. The prime contractor for INTELSAT VI is the Hughes Aircraft Company of California, but a team of top international electronics and aerospace companies will be involved in designing and building this next generation of international communications satellites. The work will involve 2400 space specialists, including 1000 people at Hughes Aircraft. British Aerospace is designing and building the complete shuttle cradle and carrier, the power and signal interface units between the shuttle and the INTELSAT VI craft and the antenna reflectors for the C and K bands. Some 80 people at British Aerospace at Stevenage and Bristol are working on the project.

Spar Aerospace of Canada is providing the C band communications receivers, driver amplifiers and travelling wave tube amplifiers, together with bus hardware and digital electronics. In France, Thomson CSF has 200 people allocated to the INTELSAT VI programme where they will design, manufacture and test much of the C and K band receivers and the travelling wave tubes, etc. The solar panel array will be designed and fabricated by

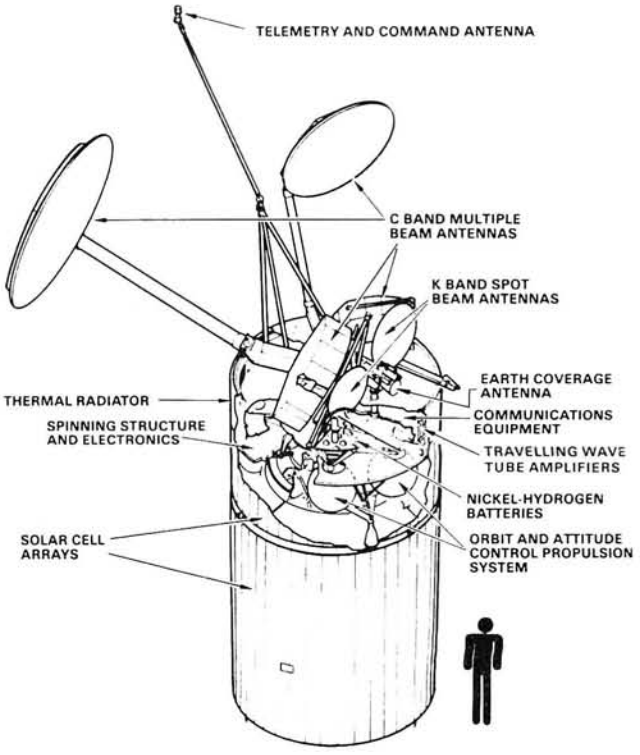


Fig. 2.1: INTELSAT VI spacecraft configuration

by Brian Dance

Part 2

munications

Messerschmitt-Boelkow-Blohm (MBB) of Germany, involving 250 staff, while AEG-Telefunken also of Germany will supply cells for the forward panel of the solar array. Selenia of Italy has been made responsible for the telemetry transmitters and command receivers, the K band beacon horn and the spot beam antennas. In Japan 400 employees of the Nippon Electric Company (NEC) will develop and manufacture the K band communications receivers, up-converter amplifiers, master oscillators and solid state power amplifiers.

Each INTELSAT VI spacecraft will carry 33 000 speech circuits (equivalent to a capacity for carrying 33 000 two-way telephone calls) as well as four television channels. Thus each will have well over twice the capability of an INTELSAT V craft. Each INTELSAT VI craft will have 50 transponders operating over the C and K band portions of the frequency spectrum. The transponders will be interconnectable using either static-switch matrices or a network which provides satellite switched time division multiple access (SS/TDMA) capability—a major new technology being sponsored by INTELSAT. This interconnection provides channel-to-channel connection flexibility.

An INTELSAT VI solar panel array had to be designed for substantially more output power than any of the earlier craft, but in order to reduce the size of the vehicle at launch, the solar cell panels had to be reduced in size so that the craft could be economically accommodated on the available launch vehicles. This will be done by using a technique developed for other satellites by Hughes in which the solar panel is divided into two cylinders, the upper one having a slightly smaller diameter so that it will fit into the lower one at launch. In other words the solar panels can be closed up just like a telescope during the launching period, but once in orbit the panels open up to provide an output of 2·6kW or more at the beginning of the anticipated 10 year life.

When the sun is eclipsed by the earth (as seen from the satellite), battery power is required. Special high reliability nickel-hydrogen cells have been developed for this application and each INTELSAT VI craft will have two such batteries to power the craft through the earth's shadow.

Each INTELSAT VI craft will weigh 1781kg. When the solar panels are stowed for the launching phase, the satellite will be 5·3m in height with a diameter of 3·6m. When the solar panels are deployed in orbit and the antennas are unfolded ready for use, the craft will have a height of approximately 11·7m—as high as a good house!

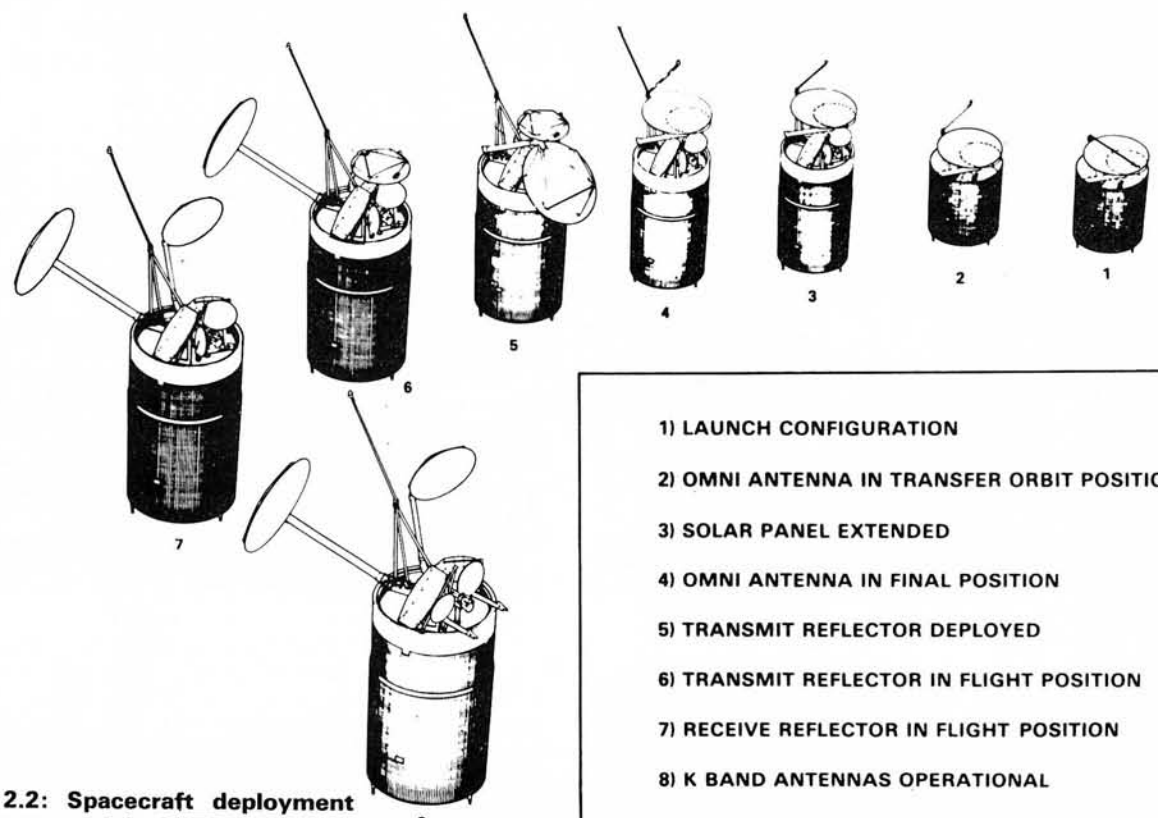


Fig. 2.2: Spacecraft deployment sequence of the INTELSAT VI

INTELSAT VI Systems

The INTELSAT VI spacecraft configuration is dominated by the C band hemi/zone antennas and their two large graphite reflectors. These systems are mounted on the large de-spun shelf together with the communications repeater equipment, so that the antennas can always point towards the earth as the solar cell panel revolves. Each hemi/zone antenna provides two fixed beams for hemispheric coverage and four isolated beams for zone coverage. Every satellite must be able to operate in any one of the three INTELSAT ocean service regions. The antenna re-configuration required for the different service areas is effected by means of a single, redundant mechanism which allows switching of the distribution networks in orbit.

The hemi/zone transmit reflector is a circular aperture 3·2m in diameter with a 4·2m focal length; this large, rigid reflector is stowed for launch and deployed in orbit. There are 149 individual feed horns in the transmit feed array. Four sets of microwave signal distribution networks are used, three of which can be switched in orbit.

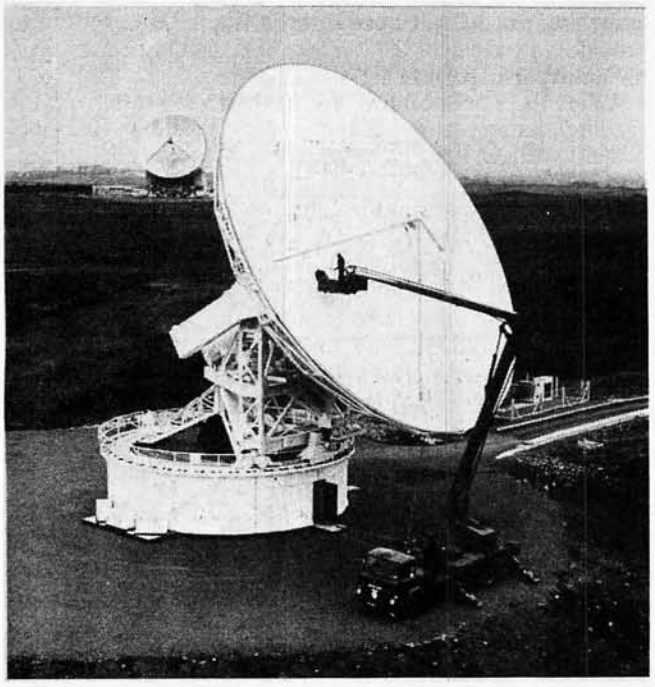


Fig. 2.3: British Telecom's Goonhilly 4 antenna being prepared for 11/14GHz operation *British Telecom*

INTELSAT VI craft also carry two K band spot beam antennas which can be steered in orbit. C band earth coverage horn antennas together with telemetry and command antennas are also included.

A total of 20 receivers are employed on each craft; they are arranged in five groups of four-for-two redundancy (since the reliability of an extremely expensive craft is vital). These groups serve the spot, hemi, zone and global repeaters. All receivers are solid state units; gallium arsenide field effect transistors (GaAs MESFETs) are used to achieve noise figures of 3·2dB at 6GHz and 5dB at 14GHz.

The power amplifier sections contain drive amplifiers, up-converters, travelling wave tube amplifiers and solid state power amplifiers in various combinations. In the 4GHz channels, travelling wave tube amplifiers with power levels from 5·5 to 16W are used for the hemi, large zone and global repeaters. The small zone repeaters employ solid state power amplifiers, since their power requirement is much smaller. The K band travelling wave tube amplifiers used by INTELSAT V will be modified from 10W to 18·5W for the 11GHz spot repeater. Power amplifiers are three-for-two redundant in all C band channels and four-for-two redundant in K band channels. The output multiplexers for all repeaters use contiguous channel multiplexing with invar filters.

Each switching unit consists of a dynamic microwave switch matrix with its associated digital control logic, and an input ring redundancy network with a bypass switch matrix. The dynamic switch is operated by redundant distribution and control units, each with three memories and a very stable timing source.

A liquid bi-propellant subsystem will be used in INTELSAT VI; it will be used for both apogee boost and to keep the satellite in position in geosynchronous orbit, since even in such orbits satellites tend to stray from their allocated positions with time. The two hypergolic propellants employed are nitrogen tetroxide and monomethyl hydrazine. Four radial thrusters (each with 22 Newtons of thrust) are used for East-West station keeping and for spin up/spin down control. Two similar axial thrusters provide North-South station keeping and attitude control. Two 490 Newton apogee thrusters perform the apogee boost and re-orientation manoeuvres.

The attitude control electronics use microprocessor technology to provide precision pointing of the beams. This increases the "autonomy" of the spacecraft operation and design flexibility. Pointing accuracy of $\pm 0{\cdot}05°$ is maintained in the beacon tracking mode and $\pm 0{\cdot}10°$ in the Earth/Sun sensor mode. When the attitude error reaches preset limits, the microprocessor automatically fires thrusters to make the required corrections so as to eliminate the need for real time control of the craft from the ground.

The INTELSAT VI craft design caters for some expansion. For example, at some future date the output power from the solar cell array will probably be raised and there is space for additional communications equipment and antennas if these are felt to be desirable later. Thus the INTELSAT VI craft will meet our international communications requirements for quite a number of years ahead.

The Future

This article has been limited to the INTELSAT system, but we must remember that many countries are intending to employ their own communications satellite systems. Several such systems are in use in the USA, while Europe has been using the Orbital Test Satellite (OTS) for tests so that it can use a European Communications Satellite (ECS) in the not too distant future.

Sub-oceanic cables and satellites each have their own advantages and one should remember that the life of a cable is some 25 years (but often over 30 years), whereas the life of a satellite is considerably shorter than this. It is uneconomic to provide cable links to areas where there is low traffic density, so satellites are ideal for this application.

Security of communications is of vital importance, especially if there is a threat of war. Cables seem to be more vulnerable to attack, since they may have to pass near to other countries, but satellites can also be destroyed with some difficulty. Thus all major countries require both cable and satellite international links to provide for their security. It may well be that the development of fibre-optic sub-oceanic cables will have a profound effect on the relative economics of cable and satellite links; this may be very important as the equatorial region becomes saturated with geosynchronous satellites. ●

£icensed to $pend

by Janet Dugmore

So you think that the purchase of the FT-290R is the end of the expense, do you? I, and a few thousand other long-suffering wives throughout the country, have breathed what we bemusedly imagine to be the final sigh of relief.

The months of evening classes; the endless nights poring over mounds of scribbled notes which, to me, looked not dissimilar to Chinese or Arabic. It was patiently explained that they were mathematical formulae. (Clever stuff, this.) Then followed the weeks of nail-biting, floor-pacing, hair-tearing and sleeplessness until the results came through.

A pass slip and two credits later, my very own, brand-new radio amateur purchased his pride and joy—the FT-290R and a 5/8 wave antenna. At last, I could resume normal household duties and, even more important, allow the rather dented bank balance to recover.

How wrong can you be! It seemed that one antenna just will not do—within days, the 5/8 wave had grown to a 7/8 wave, and the roof of the house resembled a porcupine—antennas of assorted shapes and sizes were sprouting everywhere! (Hopefully, the planning department of the council wouldn't notice.) Not only that, a receiver managed to sneak its way into the "shack". How, I really don't know, as looking at its monstrous dimensions, knobs and dials, it should at least be capable of making tea.

After a few days listening to two stations at once and what sounded like very fast, high-pitched Morse, my other half decided that a computer was an absolute must to disentangle what to the normal ear seemed absolutely unintelligible—RTTY signals. This remarkable means of communication also seemed to need a screen on which it could be read—and thus was installed a new portable television **and** a home computer. That's not to mention an interface and tone generator, a tape recorder and tapes on which to store all the duly translated RTTY.

That had to be it. I studied the bank statement for the last time (or so I thought), and settled down complacently, leaving G6XUM (it arrived at last) to play radio/computers/RTTY to his heart's content—and my unfailing admiration.

At this point I had to shuffle past the bank with my coat collar turned up and wearing dark glasses. I drew the line at a false moustache—after all, it would look pretty silly with stiletto heels and a handbag.

Unfortunately, I entered the sanctum of the "shack" a few days ago to listen to what all the fuss was about, and I do wish I hadn't. There he was, as cool as you please, saying to an enthusiastic unseen ear that really the next step was "70cms, only a couple of hundred pounds, old man!"

Of course, the suggestion had been made that I should take the RAE, so that I could talk to him while I was out in the car. Brilliant suggestion, apart from the fact that I don't know the difference between a watt and a volt. Visions of total financial collapse loomed around the next corner at the thought of buying another radio and probably the inevitable antenna, and so I declined, quite politely, I thought.

I did not stay to hear any more. I fled to the sanctuary of the lounge and threw the cheque book in the bin.

What comes next? I really dread to think! Who said moon bounce and satellites? ●

Modifying The FRG-7

by Peter D. Rouse
Part 2

Switched selectivity filtering for the FRG-7 using a special 2kHz s.s.b. filter provides options for narrow/wide selectivity with options to use either the existing 6kHz filter or fitting a 4kHz type. No holes need be drilled in the front panel and optional switching arrangements are given.

The Problems

As was mentioned in the first part of this series, the FRG-7 does suffer rather badly from excessive i.f. bandwidth. The existing filter is a ceramic type, designated LFC6, and it has a 6kHz bandwidth. This may be fine for general listening but it is of little use to the DXer trying to winkle-out weak signals amongst the "megawatters" or narrow-band s.s.b. amongst the crowded amateur bands.

In the FRG-7, the selectivity is decided at the last i.f. of 455kHz and there is no attempt in any of the receiver's preceding stages to determine bandwidth characteristics. However, alternative filters for this i.f. frequency are fairly easy to obtain and so it is not too difficult to design a unit which will allow us to switch in different filters.

Why Two Filters?

If we are to solve the selectivity problem mentioned above then we need to look at an i.f. passband of about 2kHz, which is generally considered to be near the ideal for s.s.b. However, the same bandwidth will cause distorted reception of an a.m. signal, particularly music. Having made that point though it must be stressed that the 2kHz filter can provide exceptional a.m. performance in terms of trying to sort out weak signals from amongst adjacent strong ones. In fact, with the circuit suggested it is frequently possible to hear stations which cannot be heard at all with the 6kHz filter.

The system adopted here uses the existing filter in conjunction with a mechanical 2·1kHz filter, and in the author's view this presents a reasonable cost-effective solution. The circuit board will also accept alternatives to the LFC6, should a 4kHz filter be preferred and of course there is no reason why the circuitry should not be extended to a 4-filter system with even wider filters for high quality a.m. or 144MHz band converter use. If this is tried though some thought must be given as to where a 4-way switch can be fitted.

The re-lettered front panel of the FRG-7

How it Works

When contemplating this project, the author was aware that several different methods had already been published. These fell into two categories, the first being to actually bring the i.f. signal out to the MODE switch, switch it to the appropriate filter, then switch it out of the filter and back to the circuit. This method was discounted on the grounds that it restricted the use of the 2kHz filter to s.s.b. and the author considered it dubious engineering practice to route i.f. signals out to the front panel and back.

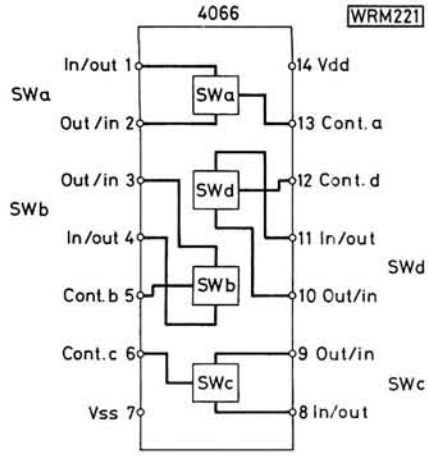
The second method, which seems to have been far more popular, involves the use of switching diodes, using switched d.c., to block or pass the signals. The commercial unit from Cirkit (formerly Ambit International) uses such a method and the author's initial design work was along these lines. However, the method does suffer from drawbacks. There is signal attenuation through the switching diodes and this, coupled with the insertion loss through the 2kHz filter and its matching transformers, does make the set rather deaf to weak signals.

At this stage the author gratefully acknowledges the advice of Nigel Curzon at South Midlands Communications who not only provided background notes for this series but also suggested trying c.m.o.s. switching. This was done using a 4066 quad-bilateral switch and the results were very pleasing.

CMOS Quad Switches

Several versions of quad switches are available and at the cost of little more than a transistor, this is a remarkable device that has clearly been overlooked by many constructors if articles in the hobbyist magazines are anything to go by. It would seem appropriate at this point therefore to give a brief description of the device.

The i.c. chosen for this application is the 4066, which consists of four solid-state switches in a 14-pin d.i.l. package. Each switch has a control pin which when held low causes the switch to open. In effect it exhibits a resistance equal to 10TΩ ($10^{13}\Omega$). When the same pin is pulled high the switch closes and, in the case of the 4066, exhibits only 120Ω when 10 volts are applied. In the case of the somewhat cheaper 4016, the "on" resistance is slightly higher. Crosstalk between switches is quoted at −50dB and the i.c.s will work with both single and dual



The internal circuit of the 4066 c.m.o.s. quad switch

rail supplies. Bandwidth is quoted at 40MHz and it is possible to strobe the control pins at up to 10MHz. Yet a third variant, the 4416, offers double-pole, double-throw (d.p.d.t.) switching by having two switches normally closed and two open. The only points to be watched with all these switches is that the voltage being switched should not exceed the supply rail voltage and of course the normal precautions should be observed for handling c.m.o.s. devices.

Circuit Description

The circuit uses the existing LFC6 filter (FL-1), which must be removed from the circuit board and the Toko MFL45501L (Cirkit) which is supplied with two matching transformers, only one of which, the red-cored one, is used. Signal is taken from the pad which was the input point for the existing filter (FL-1) and fed to the new switching board, shown in Fig. 2.1.

Here, it is coupled to pins 2 and 4 of XIC1 which are the inputs to two of the switches. The outputs of the same two switches are on pins 1 and 3 and so depending on which switch is on, the i.f. is passed to either XF2 or XT1. The same switching arrangement is extended to the output of XF2 and the output of XFL1 via the f.e.t. amplifier. These outputs appear at pins 8 and 11 of XIC1 and are switched to the circuit's output at pins 9 and 10, then back to the IF-AF unit to the pad that was the existing filter's connection point. The f.e.t. amplifier has been included to provide extra gain to make up for the loss through the narrow filter as this is higher than through the LFC6 (FL-1). In fact, whereas the LFC6 has only 7dB loss, the MFL455 (XFL1) and its transformer has about 12dB. The blue-cored output transformer for XFL1 has been discarded in this application as it is only necessary for the narrow filter to see about 500Ω termination and this is provided by XR1.

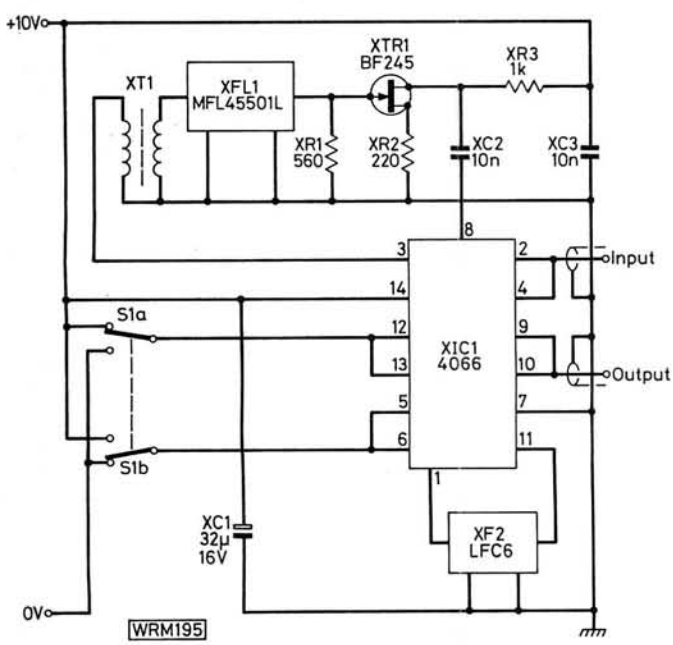


Fig. 2.1: The circuit diagram of the new switching board

Construction

All construction should be done on a single-sided p.c.b. according to the layout shown in Fig. 2.2. First remove FL-1, the LFC6 filter, from the IF-AF board of the FRG-7. This should be done with care using either a proper de-solder pump or de-solder wick. Minimum heat should be applied to the device or damage could result to its elements even though ceramic filters are fairly hardy.

Work on the new printed circuit board will be made easier if the filters and XT1 are fitted last. Beware c.m.o.s. handling and use an i.c. socket, only fitting the 4066 when the circuit has been finally wired into the set. The next stage involves fitting the screening and mounting panel and this is spaced from the bottom of the IF-AF board on two threaded stand-off pillars.

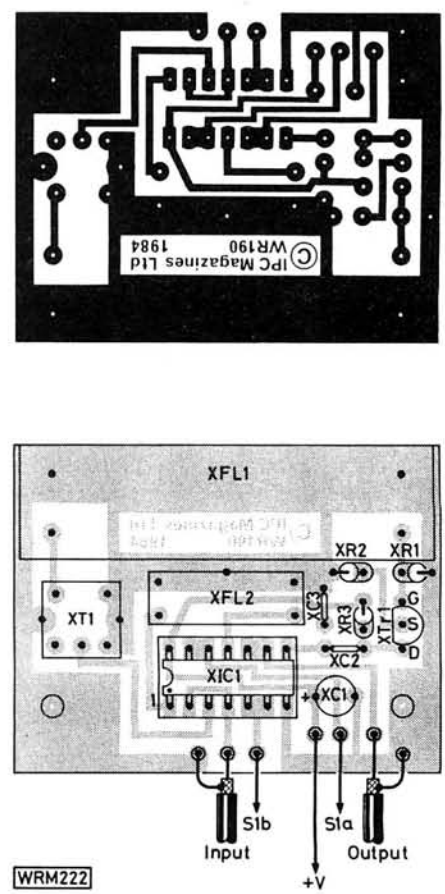


Fig. 2.2: The track pattern and component layout of the new switching board, shown full size

Work should proceed as follows:
i) Remove the screw that holds the voltage regulator heat-sink bracket at the end near the regulator. Replace this with a 4BA screw from the component side of the board (you may have to enlarge the hole) and on the foil side of the board screw a 12mm threaded stand-off pillar. Next locate a point just below the a.f. i.c. (Q410). Here there is a large area of ground foil and a second stand-off should be soldered directly onto this, 48mm away from the first pillar. These two stand-offs now provide the support for the bracket as shown in Fig. 2.3.

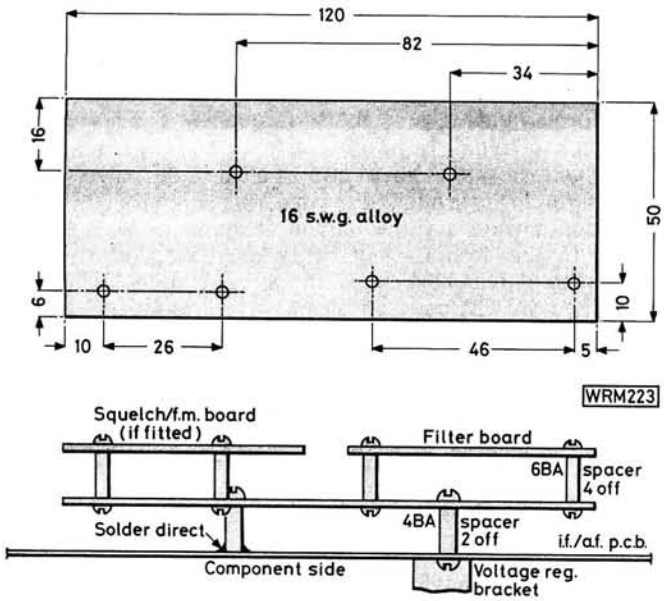


Fig. 2.3

ii) Before fitting the bracket, the four remaining holes on it should be fitted with stand-off pillars facing away from the IF-AM circuit board. If the f.m./squelch board is to be fitted, then fit all four pillars at this stage.
iii) Connect two short lengths of miniature coaxial cable to input and output points formerly occupied by the filter. Locate a suitable point to run two leads for the 10 volt supply.
iv) Fit the panel to its support pillars.
v) Make necessary connections to the new circuit board, as shown in Fig. 2.2.
vi) Carefully plug-in XIC1.

At this point it is necessary to decide which switching method to use. If the f.m. circuit is not going to be incorporated then two options are open.
a) The record socket can be re-located on the back panel next to the loudspeaker output and the hole vacated can be filed open slightly to take a standard miniature 2-pole double-throw switch.
b) Spare wafer connections on the MODE switch can be used to provide narrow filter switching at SSB and AM/ANL switching positions. This latter method involves sacrificing the noise limiter but in the author's view this has little effect anyway.

If f.m. with squelch is going to be fitted then yet a third method should be adopted as the AM/ANL position on the MODE switch will be needed for the f.m. and the record socket hole will be needed for the squelch control.

The squelch potentiometer for the f.m. unit will be a 10kΩ log with push-pull switching and a suitable device is made by Alps and available from Cirkit. Once fitted the two wires from the light switch should be transferred to the appropriate switch tags on the back of the potentiometer so that lights come on when the switch is pulled.

The LIGHT switch is now free to be used for switching the filters.

Finally, it only remains for the board to be screwed onto its pillars and the front panel switch labelled in a suitable way. In the author's case, dark grey card with white rub-down lettering was made up and stuck over the existing lettering with light glue.

Testing and Alignment

Switch on the set and select the wide filter position. Normal reception should be possible. Now switch to the narrow filter position and check that it is operating. Whatever setting the core of XT1 is at, reception should be possible and if not the likely faults will be a wrong connection or the 4066 damaged by handling.

Assuming all is well, find a fairly weak signal at around S-2 or 3 and trim XT1 for maximum deflection of the meter. This is all that is necessary for aligning the actual switched-filter unit.

The new switching filter board and squelch/f.m. board (Part 3)

Re-tuning the BFO

Because the narrow filter has a different centre frequency to the original wide one it is necessary to re-tune the b.f.o. The Toko filter centres on 453·3kHz and so the b.f.o. will need to tune to 452·0kHz for u.s.b. and to 455kHz for l.s.b. If a digital frequency counter is available this is an easy task, merely re-tune i.f. style transformer T406 for l.s.b. and then trimmer capacitor TC404 for u.s.b. (both are located close to the audio i.c. and TP405 is the measuring point).

If a d.f.m. is not available then the following procedure should be followed in the exact sequence shown:
i) Select the wide filter and switch to a.m. Tune into any a.m. station that gives a clear indication on the S-meter that the tuning is centred.
ii) Without touching the tuning, select l.s.b. Now trim T406 until you hear the b.f.o. tone go to zero beat.
iii) Tune to any amateur transmission above 10MHz, switch to u.s.b. and select the narrow filter. Ignore the audio and instead tune the set for maximum S-meter deflection. Then resolve for the best audio by trimming TC404.
iv) Now repeat procedure (i), then select l.s.b. and note if the b.f.o. is still zero beating. If it does or if it is only slightly off frequency then you do not need to go any further. However, if it is obviously off frequency then you will have to re-trim T406 and then repeat procedure (iii).

Keep repeating procedures (i) to (iv) until you are able to set TC404 for u.s.b. without upsetting the l.s.b. tuning. This can be rather tedious but because of the interaction between the transformer and trimmer capacitor it is necessary if fairly accurate b.f.o. settings are to be obtained.

★components

Resistors

¼W 5% Carbon film

220Ω	1	XR2
560Ω	1	XR1
1kΩ	1	XR3

Capacitors

Ultra miniature disc ceramic

10nF	2	XC2,3

16V Electrolytic (radial)

32µF	1	XC1

Semiconductors

Transistors

BF245	1	XTr1

Integrated Circuits

4066	1	XIC1

Miscellaneous

Toko MFL45501L (1); transformer RMC41996; p.c.b.

DFM Discrepancies

When using the narrow filter with a receiver fitted with digital frequency readout, allowance must be made for the fact that the Toko filter's passband centres on 435·5kHz and not 455kHz.

In practice this means that although the meter will read correctly for lower sideband, 1·5kHz must be added to the readout when tuning u.s.b. or a.m.

Operating

When switching between narrow and wide positions it will be noticed that there is a slight drop in the signal meter reading on the 2·1kHz position. This is perfectly normal as is the slightly "middish" sound. This latter effect is because of the restricted audio bandwidth which removes the lower and upper audio frequency range of the transmitted signal. In practice any signal that is readable in the wide position should also be clear in the narrow one. When tuning through crowded bands, broadcast or amateur, always try the narrow position as well as the wide. In the author's experience some weaker stations which are often masked by the stronger ones, will suddenly appear whereas with the 6kHz filter it was not possible to tune them in at all.

CONTINUED NEXT MONTH

Swap Spot

Have new and unused grid dip meter, 100kHz-100MHz signal generator and Minolta Hi-Matic F 35mm camera. Would exchange for a linear amplifier above 30W with pre-amp and mobile mounting bracket for an FT-290R. K.B. Haynes, 15 Alderley Terrace, Dukinfield, Cheshire. *V689*

Have Philips video recorder, good heads, needs adjustment. Would exchange for 144MHz—430MHz TX/RX portable, Icom, Trio, Liner 2 or w.h.y. G1BTG. 15 Cemetery Road, Bradford BD12 0EU. *V701*

Have 16K ZX81, 20in black and white TV, tape recorder, £80 of software, books, blank tapes, *ZX Computing* and *Sinclair Programs* mags. All worth £200. Would exchange for SX200N or equivalent scanner, or hand-held type. Richard Hughes. Tel: 01-445 7093. *V714*

Have Chapman valve tuner a.m./f.m. stereo six-stage, variable selectivity sensitivity 2 microvolt all bands. Coverage 175–570, 43–140, 13–43 metres, bandspread 11,13.16,19,25,31m and 88–108MHz, with manual. Would exchange for Weston exposure meter, Practiflex. Tel: 07917 62437 (Shoreham, Sussex). *V727*

Have Eagle RF45 field strength indicator (unused). Would exchange for Ferrograph 8¼in clip-on spoke type metal spools or Ferrograph mic transformer TA/30/ML (30/50Ω to med. impedance). Tel: 021-458 5374 evenings (Birmingham area). *V728*

Have Drake SSR1 s.w. RX as new with handbook. Would exchange for good 10MHz c.r.o., 95mm display or larger. Would prefer solid state. Tel: Redbrook Maelor 218 (Shropshire). *V743*

Have Trio TR-9000 144MHz multimode in good condition, low power s.s.b. mod. Would exchange for FT-221, any condition if working ok. Cash adjustment if necessary. Chris Walker G6ELH. Tel: Watford (0923) 30254 evenings. *V770*

Have Rotel *RVC240* CB rig, antenna and d.c. power unit for mains use. Would exchange for MK123 TX/RX. D.T. Price G3LYU, 16 Dorset Ave., Glenfield, Leics LE3 8BB. Tel: 0533 876459. *V771*

Have 16K ZX Spectrum (issue 2), software—including aspect assembler and *Spectrum Machine Language for the Absolute Beginner*. Would exchange for c.r.o. or v.h.f./u.h.f. gear (e.g. 144MHz TX) or TVDX equipment. Steve McGuigan G8MFI. Tel: 01-852 8265 (Blackheath, London). *V772*

Have Bearcat 100FB 16-channel synthesised hand-held scanner including case, NiCads, charger, cost £345. Would exchange for FT-208R or similar hand-held 144MHz TX/RX. Mike. Tel: 061-736 5422. *V773*

Have C-Scope metal detector (discriminator, ground exclusion, a.d.c.) hardly used—value £200+. Would exchange for Racal RA17L or other good communications receiver with cash adjustment if necessary or Morse/RTTY reader. R. Robbins. Tel: Lymington 22342 (Hants). *V791*

PW "SWAP SPOT"

Got a camera, want a receiver? Got a v.h.f. rig, want some h.f. gear to go with your new G4? In fact, have you got anything to trade radio-wise?

If so, why not advertise it FREE in our new feature SWAP SPOT. Send details, including what equipment you're looking for, to "SWAP SPOT", *Practical Wireless,* Westover House, West Quay Road, Poole, Dorset BH15 1JG, for inclusion in the first available issue of the magazine.

A FEW SIMPLE RULES: Your ad. should follow the format of those appearing above; it must be typed or written in block letters; it must be not more than 40 words long including name and address/telephone number. Swaps only—no items for sale—and one of the items MUST be radio related. Adverts for ILLEGAL CB equipment will not be accepted.

Remote-tuned MF Loop Antenna

by
A. J. Cawthorne T.Eng(CEI), FSERT, G3TDJ

The author has been interested in long distance m.f. reception for many years from both international and local radio stations. Added to this has been the fascination of using the "null" effect of balanced loop antennas to aid reception where co-channel interference and/or local noise is a problem.

However, the author has insufficient space in the shack to seriously experiment or use loops of any size. This article describes a solution to this problem by remotely tuning a relatively large m.f. loop which is mounted in the loft space some distance from the operating position.

The loop design for this application is not critical and can be built in size and style to individual preference. The article in reference 1 discusses the background, design, construction and use of m.f. loop antennas and is well worth reading.

The author chose the spiral loop design as this type, properly constructed, can return a better null. A diamond configuration was used simply because this fitted the available loft space profile and the centre post provided an ideal means of fixing. Each side of the diamond is 0·762m long resulting in a cross of 1·066m overall. This is mounted on a small rotator of the type used for turning v.h.f./amateur beam antennas. As the loop described is extremely lightweight almost any small motor and drive system can be used provided a suitable turning speed is available with control and some means of repeating approximate position is relayed to the operating position. For a loop of course only 180 degrees of travel is required. The precise method of turning the loop is left to the individual constructor. Motorised turning is of course not essential and some simple "handraulic" drive may be equally applicable.

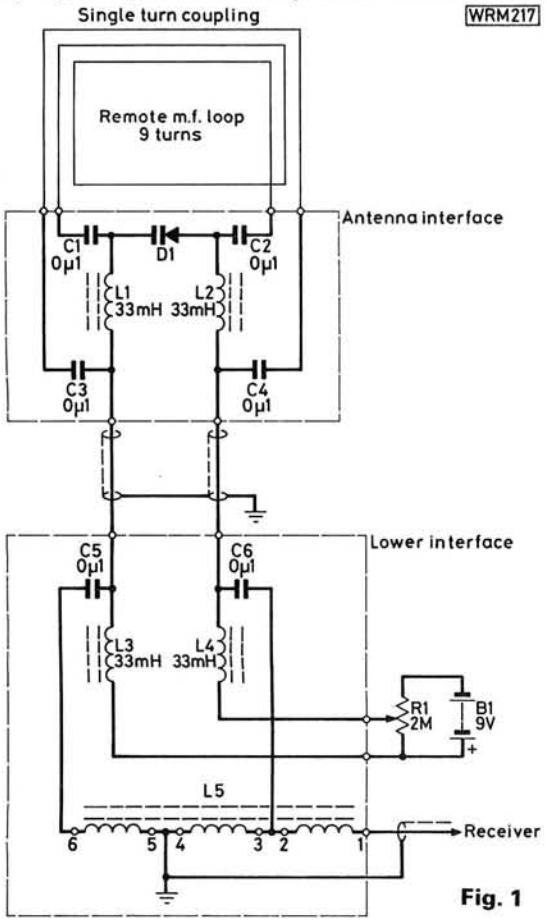


Fig. 1

To tune the loop remotely the Toko 9 volt range of Varicap diodes was chosen. These provide a capacitance swing of approximately 30 to 500 picofarads, with excellent *Q*, for a 1 to 9 volt change in tuning voltage. Tuning the loop is accomplished using a potentiometer at the operating position.

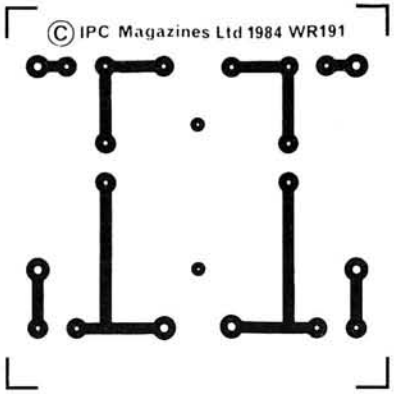
Nine turns were used on the loop described which tunes from 500kHz to 2·3MHz. To make the most of the loop's inherent balance and null properties a single turn balanced coupling winding was added to connect the loop to the receiver. Two parallel lengths of coaxial cable, with screens joined at one end, provide balanced feeder to the shack. This arrangement minimises feeder pick-up particularly from local noise sources.

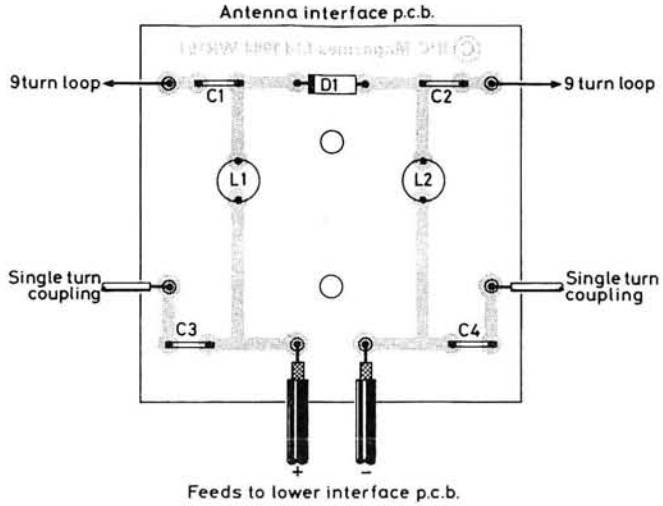
To minimise cable requirements, polar pattern distortion and stray pick-up of signal and noise, the Varicap diode tuning voltage was fed up the balanced feeder using capacitors and r.f. chokes for d.c. blocking and r.f. isolation. The overall system and the detailed circuitry is shown in Fig. 1. A simple ferrite balun is used to convert the balanced feed to unbalanced for the receiver input. Small interface printed circuit boards were used to mount the isolation components and connect the loop and feeder. Fig. 2 and Fig. 3 show the layout of the upper and lower interface boards.

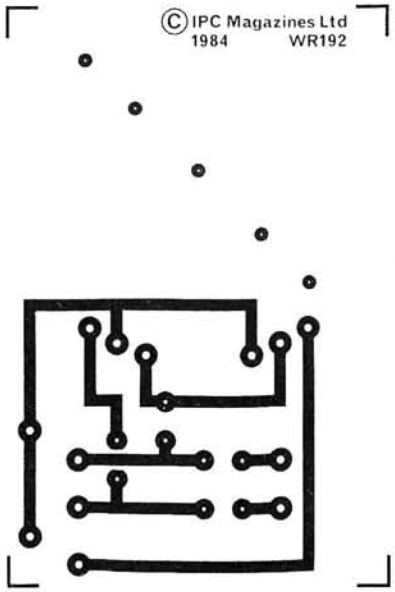
The ferrite ring balun is strapped to the lower interface printed circuit board as shown. The balun is trifilar wound using three identical lengths of single core insulated wire twisted and wound as one on the core. Separate coloured conductors will help identification when connecting up. About twenty turns should be wound on the core, the widely available 38mm ferrite ring sold as a television interference aid is suitable. Fig. 4 shows the balun construction and wiring.

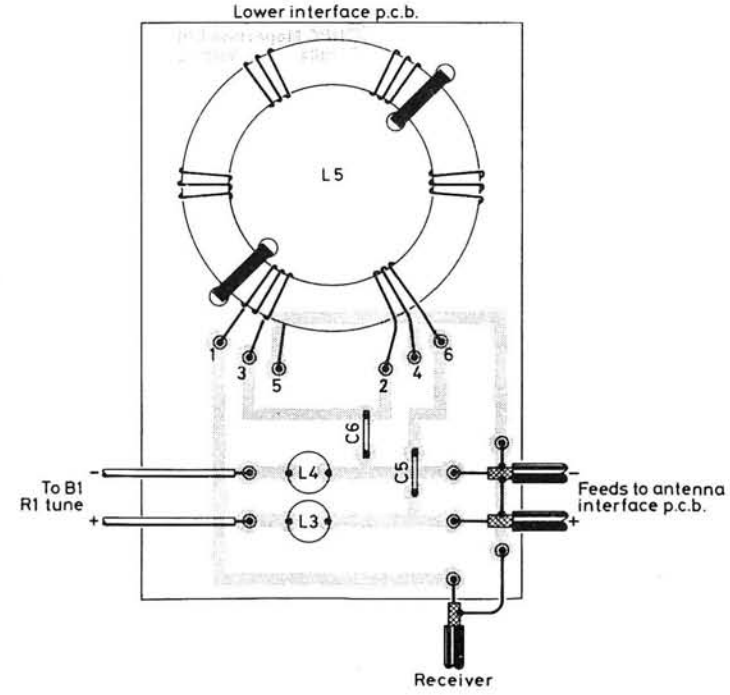
The antenna interface printed circuit board was attached to the centre post of the loop and the lower interface p.c.b. was mounted in a small diecast box complete with the tuning potentiometer and a 6–F22 (PP3) battery. The balanced feeder was wired directly in as was the flying lead to the receiver. The author has not found it necessary to switch off as the battery drain is around 5µA, an ON/OFF switch can of course be fitted if so required. As the relationship between the tuning voltage and the Varicap capacitance is inherently non-linear, a logarithmic tuning potentiometer can be used to go some way towards correcting the tuning potentiometer swing versus frequency relationship.

Although printed circuit board layouts and components are appended, values and layout is not at all critical, construction is straightforward and *should* present no problems. Care should be taken to ensure that polarity connections are correct so that the Varicap diode is reverse biased.









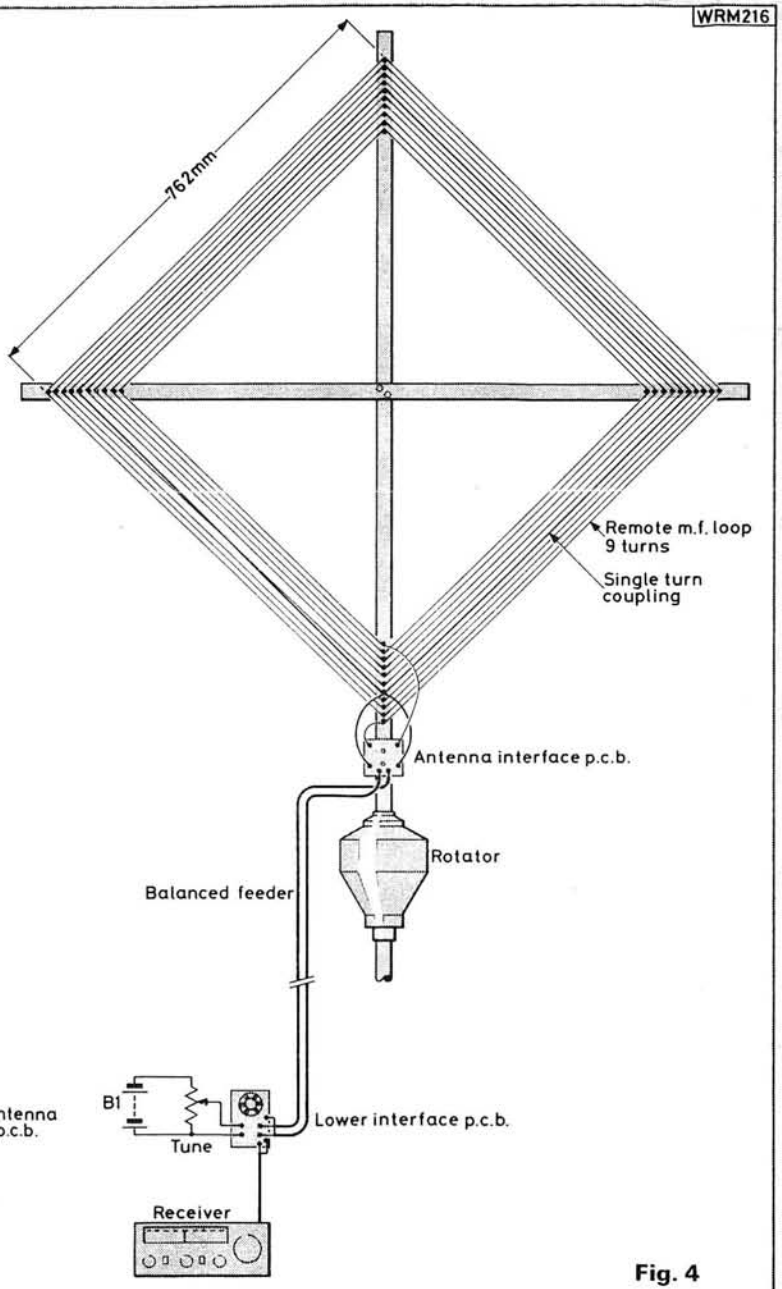


Fig. 4

★ components

Resistors
Logarithmic potentiometer
2MΩ 1 R1

Capacitors
Miniature ceramic disc
0·1μF 6 C1–6

Inductors
33mH 4 L1–4 Toko 187LY–333

Semiconductors
Diodes
MVAM115 1 D1 Maplin

Miscellaneous
38mm television interference aid ferrite ring; p.c.b. (2); coaxial cable.

BUYING GUIDE

Readers constructing this project should have no difficulty obtaining the components from advertisements in PW. Note the approximate cost does not include any costs for the actual loop itself.

Approximate Cost £10

Construction Rating INTERMEDIATE

It is recognised that the use of a 2MΩ tuning potentiometer may not represent an appropriate value to compensate for temperature coefficient and reverse leakage current effects in the Varicap diode. However, in this application, where the diode is not subject to rigorous environmental conditions, or since a change of capacitance of a few picofarads will have no noticeable effect, the use of the high value is more than justified as it dictates the overall current drain by the unit.

The advantages of the tuned loop antenna are well known and will not be enlarged on here as it has been adequately covered in such articles as reference 1. Suffice to say that in the author's case the ease of using remote turning and tuning has been most rewarding. The loop has allowed interference free daytime reception from a distant local radio station (Severn Sound in the author's home county) 225km from Cornwall, while co-channel with BBC Radio 4 Plymouth 56km distant. ●

References

1. *MW/LW Loop Aerials* by Charles Molloy. *Practical Wireless* November 1979. Also *Out of Thin Air* a *Practical Wireless* publication.

Letters

Signal Boost

Sir: I read with interest Douglas Byrne's letter, Valve Doubler (*PW* June 1984). Having reached almost three-score and ten, it was nice to see someone having an interest in valves.

There was once for sale a two-terminal device for increased sensitivity, etc., which according to F. J. Camm consisted of nothing more than a 0·1μF capacitor inside a fancy cylindrical container. It had a high voltage rating so that r.f. could be picked up from the mains wiring. Where overhead wiring is used, as in many developing countries, this system worked well on medium waves. In fact, wired radio communications via the mains was a favourite way of dispensing with the telephone. Distances up to several miles could be easily covered and were only stopped by a distribution transformer! But not ALWAYS! Even these had by-pass capacitors for transmission of the supply company's own signals!

Hugh Wagner
Kuala Lumpur
Malaysia

Twilight Locator

Sir: I have just received from my newsagent, the March 1984 copy of *Practical Wireless.*

I am interested in John Greenwood's article on his "Twilight Locator". Unless I have missed something in the reading of the article, I am writing to suggest a further improvement which he might consider worthwhile.

In order to assist the Amateur in determining the direction in which he should set his beam on the great circle path chosen, I suggest a small disc graduated clockwise 0-360 degrees stuck on the globe with its centre at the location of the transmitting antenna and with its 0-180 degree line on the true meridian at that site. Having determined that the distant Amateur is likely to be workable at that time, he would know within a degree or two the correct direction for his beam.

With good wishes for the continued success of your interesting publication.

A Franklin Pain VK2DYP
Belrose, N.S.W.
Australia

Novice Licence?

Sir: The commendable thing about the American Novice licence is, precisely, that it allows the beginner to get hands-on experience on the h.f. bands, with the opportunity to increase code speed by operating, and the possibility of using home-built equipment. The UK "B" licence has a different role and does not offer anything like the same opportunity for training in-service. There is also the odd anomaly that a returning expatriate with an American Novice licence, who will have worked exclusively on h.f.-c.w., will get a "B" licence which confines him to unfamiliar bands and phone.

Ham radio covers many skills and will cover more in the future. CW is one of the most rewarding of these. While I do not think it should necessarily be compulsory, there is a lot to be said for giving the keen beginner a mode of entry which will let him or her sample it. We need brass-pounders and constructors to leaven the buy-a-Japanese-box brigade.

Alex Comfort MB KA6UXR
Santa Barbara

On the Key

Sir: I was interested by the article by G. P. Stancey, called *Hints for the First CW QSO* (*PW*, August 1984). I use a Labgear LG300 on c.w. only, coupled with a Hammarlund SP600 which appears to make a good combination.

Listening on the bands, especially 144MHz, where one often hears a discussion on the best method to learn the Morse code, one hears a great deal of the blind leading the blind, and I think that it is very necessary that the more experienced operators, especially those with professional experience, should intervene to break the bad sequence of events. Recently I heard one of the RSGB stations conducting tuition, on an electronic keyer, and it took me all my time to read it. This bad and incorrect keying was directed to a group of inexperienced operators, all striving for their G4 licence. It is recommended to the RSGB that these selected operators should undergo a test to check the standard of sending, before letting them loose on operators who are not really in the position to judge good or bad sending. One of our local stations runs an RSGB net, and sends extremely good Morse, which is a pleasure to listen to, and is sent with the correct spacings, which are as important as the correct letters.

I was in the Royal Corps of Signals in 1938, and attended the "Eddy" Company in Kemmel Lines, which was responsible for turning out wireless and line Morse operators. (R/T was seldom used due to the limited range of the No. 1 set, which was probably about 3 miles.) R/T spoilt good Morse operators, as the war proved.

In the classroom, all operators were taught by the "Iddy-Umpty" method, and called out the letters from the blackboard, at the same time using the key, which was disconnected from the oscillator or sounder, and I consider that this method is probably the best method of learning the code. Each operating position had a key, screwed to the desk to the right of the operator, and the gap was adjusted by him. The important thing about the gap between the contacts, is that it does not feel spongy (contacts dirty, or the gap set too fine) and that the key clicks can be heard by the operator. A key should click, not clunk. All the movement should be from the wrist, not the arm, or fingers. The rule was "Two fingers on top, and thumb underneath, with the key knob held loosely". Before sending, manipulate the fingers and exercise the wrist loosely, as the whole operation is relaxed, not tense.

One particular point should be made. One hears on the air that a key should not be touched until around 12 words a minute is reached on reception. Personally, I consider this a load of bull, because sending on the key gives interest to the learning procedure, which can be boring, and it is not always possible to find slow sending, especially of the correct quality, and sending to oneself breaks the monotony.

The learning of the Morse code is no mystery, literally millions of operators have been trained in the art, for a century, and in most nations. It requires initial interest, dedication, consistent practice, preferably on a daily basis, and hopefully, an experienced operator somewhere down the line to do some polishing, and to eradicate any bad habits before they become entrenched.

May this letter give some new operators the heart to continue their efforts to attain the "A" licence, and have the world as their oyster.

R. L. Mailey G3BEY
ex D2BO (Berlin 1945)
Gt. Yarmouth, Norfolk

Products

New Handie from Yaesu

According to red-hot information from SMC, the very latest contenders in the 144MHz f.m. hand-held transceiver market are the FT-209R and its higher powered brother the FT-209RH.

The FT-209R delivers 3·5W r.f. power out on High and 350mW Low, whilst the FT-209RH will provide 5W High and 500mW Low, all other functions and features are identical.

At the heart of the transceiver are two 4-bit CPUs and lithium-backed RAM circuitry provides enormous programming and functional flexibility. Synthesised coverage between 144 and 145·9875MHz in 12·5 or 25kHz channel spacing is available. Nineteen soft-rubber keys allow frequency selection either directly or from any of the ten memory channels, which can store standard +/– shifts or independent transmit/receive frequency shifts. Single key operation allows instant reverse repeater or simplex operation. Comprehensive scanning capabilities include step programmable, full or partial band, or memory scanning for clear or busy channels, plus many other options.

Incorporated into the transceiver is Yaesu's Power Saver System, which only activates the receiver to check the selected channel momentarily at programmable intervals. A comprehensive choice of NiCad packs are available together with a full range of other optional extras, which includes a VOX operated headset, speaker/microphone and mobile mounting bracket. A front panel multimeter indicates battery condition, received signal strength and relative transmitter output power-frequency and operational status are indicated on a large 6mm l.c.d. display.

The receiver is a double-conversion superheterodyne with i.f.s at 10·7MHz and 455kHz, quoted sensitivity is 0·25µV or 12dB SINAD, with audio output at 450mW.

Both models are supplied complete with helical rubber antenna, soft case and Ni-Cad battery pack—10·8V, 425mAh (FNB-3) with the FT-209R and 12V, 500mAh (FNB-4) with the FT-209RH. Prices are, respectively, £239 and £259 which includes VAT and carriage in both instances.

For further details, contact: *South Midlands Communications, S.M. House, Rumbridge Street, Totton, Southampton, SO4 4DP. Tel: (0703) 867333.*

SSTV via the 48K Spectrum

Scarab Systems announce that they are now marketing an SSTV Receive Program, which should prove of particular interest to our computer orientated readers, who possess a Sinclair 48K Spectrum home computer.

This brand new program allows the 48K Spectrum to decode SSTV transmissions, whilst requiring absolutely no additional hardware, other than an appropriate radio receiver. Basically, once the program is loaded into the Spectrum and audio tones fed to the EAR socket, the computer will then decode the SSTV signal and display the picture onto either a TV receiver or standard Sinclair printer.

Other program features include: up/down scrolling; user adjustable grey scale and sync.; save picture to tape; recall picture from tape; help menu; input analysis routine; fully machine coded; recall last picture from memory; memory and screen wipe; negative picture display; and selectable border colour.

The SSTV Receive Program costs £15.00, which includes VAT and p&p, and is supplied with a demonstration tape containing "off-air" pictures.

Scarab Systems, 39 Stafford Street, Gillingham, Kent ME7 5EN. Tel: Medway (0634) 570441.

MET 430MHz Antenna

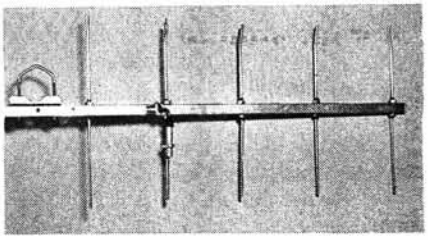
Metalfayre, the makers of the MET range of NBS Yagi antennas, have introduced a compact five element beam, specifically designed with the 430MHz band repeater user in mind.

Entitled the 432-5B "repeater basher", the antenna follows the expected MET quality construction, utilising low-corrosion all aluminium components, solid elements and gamma matching network, fed by a silver-plated N-type socket. Overall boom length of the antenna is 730mm, with an all-up weight of just over 0·5kg thus allowing direct cantilever mounting to a vertical mast.

The increasing number of repeaters on the 430MHz band certainly warrants the use of directional base station antennas, thus reducing considerably co-channel interference to both input and output channels. Furthermore, the 432-5B unit with its 9·2dBd forward gain should considerably enhance overall system performance, particularly when replacing an omni-directional colinear device.

Naturally, the antenna will also be equally useful for horizontally polarised modes using other sections of the band.

The 432-5B antenna costs £16.95, which includes VAT, plus £1.95 p&p, and is available from: *MET Antennas, 12 Kingsdown Road, St. Margarets-at-Cliffe, Dover CT15 6AZ. Tel: (0304) 853021.*



News

Royal Visit to Chalk Pits

After much hard work and planning, the industrial narrow gauge railway at Chalk Pits Museum, Amberley, Sussex, became a reality on 5 June when it was officially opened by Prince Michael of Kent.

Among those present were the Earl of March, who presented the Prince with a pottery urn made in the museum, the constituency MP, dignitaries from the local authorities, government departments, industry and members of the museum.

During the morning, Prince Michael arrived by helicopter and was welcomed by the museum chairman and music from the Christ's Hospital School brass band. Following the ceremony to open the railway, the Prince was taken on a tour of the museum and was shown around the radio building by *PW* columnist Ron Ham, where he met Gerry and Margaret Brownlow G3WMU and G4LCU, who are responsible for the museum radio station GB2CPM, and

L to R, John Warren, Prince Michael and Ron Ham

Joan Ham—who made the silhouettes in memory of G2YL and G2NM.

Photographers were everywhere and Monika Smith, one of the museum's staff, captured the moment when Ron was showing Prince Michael and John Warren, museum chairman, the silhouettes in the vintage shack (see *News*, July issue). Later Prince Michael, patron of the Transport Trust, drove the train from Amberley station to Brockham station at the far end of the museum's 36 acre site.

Rallies and Events

Lincoln Short Wave Club are presenting their "Hamfest 84" on Sunday 23 September at the Lincolnshire Showground and Exhibition Centre, which is four miles north of the city on the A15 Scunthorpe road.

In addition to stands of interest to the radio amateur and computer enthusiast, there will be arena events, fairground, model aircraft display etc., in fact everything to entertain the whole family. Entry will be by 50p lucky programme (children free) and there is ample parking, refreshments and licensed bar.

Further information from: *LSWC, c/o City Engineers Club, Central Depot, Waterside South, Lincoln.*

Vange Amateur Radio Society will be holding their Mobile Rally on Sunday 16 September at St Nicolas School, Nicolas Lane, Basildon, Essex.

Talk-in will be available through the special event station GB4VMR and for further details, contact: *G4IFD, QTHR.*

Way-Back Issues

Readers who may be interested in purchasing sets of Practical Wireless and Radio Constructor, dating from the 1940s and 50s, should contact: *Mrs K. Waterworth, 310 Welcombe Avenue, Park North, Swindon, Wilts SN3 2PE.*

Test Equipment Auction

Basildon Marconi Amateur Radio Society (BMARS), are holding an auction of redundant test equipment (the majority of which is in working order), on 16 September at the Marconi Sports Club site, Gardiners Lane South, Basildon, Essex.

Beginning at 10.00am, the auction will include such goodies as: oscilloscopes, signal generators, power meters etc., and to help you get there a talk-in station on 145·550MHz (S22) will be on the air from 7.00am onwards.

A full list of the equipment for auction (approximately 100 items) can be obtained in advance, by sending an s.a.e. to: *Mr C. E. Mitchell G8PKM, QTHR.*

Cavity Wavemeter

It seems that a few readers have misinterpreted the price information given in the *Products* mention of the above equipment on page 49 of the August issue.

The ready-built v.h.f./u.h.f. cavity wavemeter costs £32.50 inclusive, and a self-assembly 10GHz cavity wavemeter costs £14.75 inclusive.

Both units are available from: *Paul Sergent G4ONF, 6 Gurney Close, Costessey, Norwich NR5 0HB. Tel: (0603) 747782.*

BATC

The British Amateur Television Club was founded in 1949 to inform, instruct and co-ordinate the activities of amateur radio enthusiasts with television transmission. The Club is affiliated to the RSGB.

A quarterly magazine entitled *CQ-TV* is issued to all members, and features circuits, constructional articles, news of ATV activities etc. The club also provides various membership services, including p.c.b.s for club projects, many of which are now "classics" in the ATV field.

The club holds an annual convention where members can see the latest commercial ATV equipment and exchange ideas and discuss problems with other members. Additionallly, the club organises regular ATV contests to stimulate activity and challenge for the more serious operators.

Full details of membership can be obtained, along with a sample copy of *CQ-TV,* by sending 50p to: *D. Lawton G8ANO, "Grenehurst", Pinewood Road, High Wycombe, Bucks HP12 4DD.*

An ATV Repeater for GM-Land — Amateur TV enthusiasts in Central Scotland who would be willing to contribute financially or help with the construction of a 1·3GHz ATV Repeater for the area are asked to contact: *Norrie Macdonald GM4BVU, 3 Townhill Road, Earnock, Hamilton, Lanarkshire ML3 9UX.*

The Leicester Show

Once again the Leicester Amateur Radio Show will be held at The Granby Halls, Leicester on Friday 26 and Saturday 27 October 1984, between 10.00am and 6.00pm.

Admission to the show will be £1.00, where there will be numerous trade and club stands. Talk-in will be available on SU8 and S22. Further information from: *Frank Elliot G4PDZ, Elliot Electronics, 26/28 Braunston Gate, Leicester. Tel: (0533) 553293.*

RAE Courses

Caterham, Surrey—*Caterham Adult Education Centre, Beechwood Road, Caterham, Surrey. Tel: (0883) 45398.* Commencing Wednesday 26 September at 7.30pm, enrolment Monday 10 September between 7.00 and 9.00pm. Further details from the Tutor R. McEwan Reid G4GTO, tel: 01-660 2532.

Lymm, Cheshire — *Lymm Adult Centre, Grammar School Road, Lymm, Cheshire.* To be held on Tuesday evenings between 7.00 and 9.00pm, enrolment 17 and 18 September. The Tutor will be John McKae G4ILA.

by Graham Moore G4DML

Bug Key With 528-Bit Memory

Many radio amateurs are either interested or have participated in communication on the v.h.f. bands using meteor scatter (m.s.). Although it is possible to make contact using s.s.b. via m.s. this usually results in a sore throat and a very warm tape recorder before a successful contact is made. High speed c.w. offers a much more reliable way of communicating under these circumstances, this being due to the proportionally smaller bandwidth required and hence the much improved signal to noise ratio.

This article describes a Morse keyer with an integral memory that will replay any Morse that is input at any selected speed. Thus with a 3-speed tape recorder you will be able to communicate at, say, 400 letters per minute (approximately 80 w.p.m.), even if you can only send and receive at 20 w.p.m.

Circuit Description

The keyer consists of a standard "el-bug" circuit around IC3, gated to both the keying relay, RLA, and to the recirculating shift register memory. This is made up of eight 4031 64-stage static shift registers, designed so that the data once entered shifts continuously around the loop formed by these i.c.s and their associated circuitry.

Both keyer and memory are clocked by the continuously variable c.m.o.s. oscillator formed by IC1. The clock drive to the shift register can be disabled so that the keyer can be used as a standard el-bug without storage. This method of storing the data was chosen as it alleviates the problem of generating the address encoding and decoding that would be required if RAM type memory was used.

The data is read in purely as a serial data stream and read out in exactly the same way; note however that the data is stored inverted in order to simplify start and stop bit identification. In order to locate the start of the message a synchronising pulse of eight blanks is left at the beginning of any data entry. The circuitry that detects this pulse, IC8 and IC10, is also used at the other end of the memory, IC9 and IC11, to enable any large blanks in the stored message to be run through at very high speed. This is done by automatically switching oscillator speeds by IC2 and IC7 when more than eight blanks are detected by IC9 and IC11. When the first data bit is detected by IC8 and IC10 the clock is switched back to normal speed and keying continues.

The recirculating shift register format is also convenient if only a small memory is required. Thus if only 128 bits of storage are required only two of the 4031 devices need be inserted and the output pin (pin 6) bridged to TP1.

The complete keyer is constructed using c.m.o.s. logic to enable it to be used for long periods on NiCad batteries. A sidetone is included on the keyer p.c.b. but as most transceivers nowadays have integral sidetone a switch is fitted on the keyer to disable the tone. A socket is fitted on the rear of the keyer for an external 12 volt d.c. charging/operating supply.

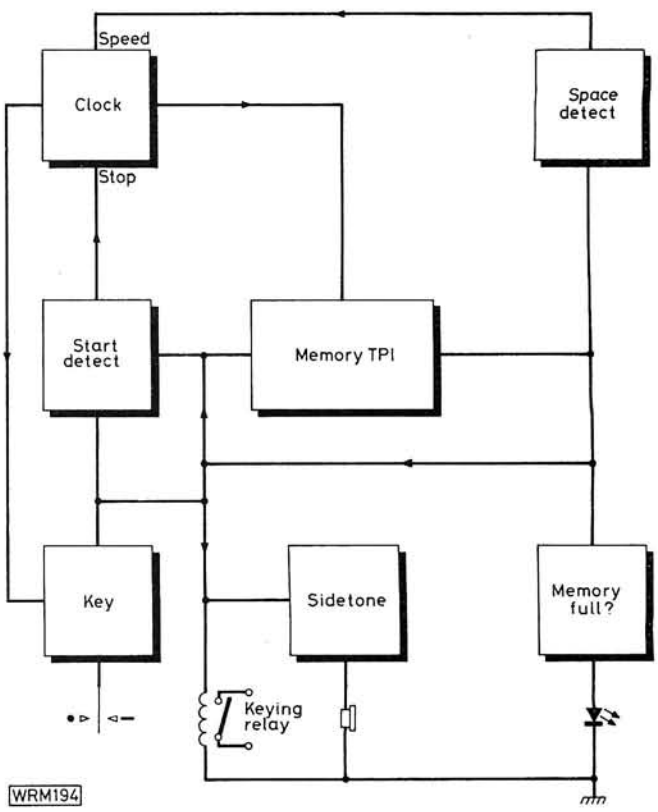


Fig. 1: Block diagram of the Memory Keyer

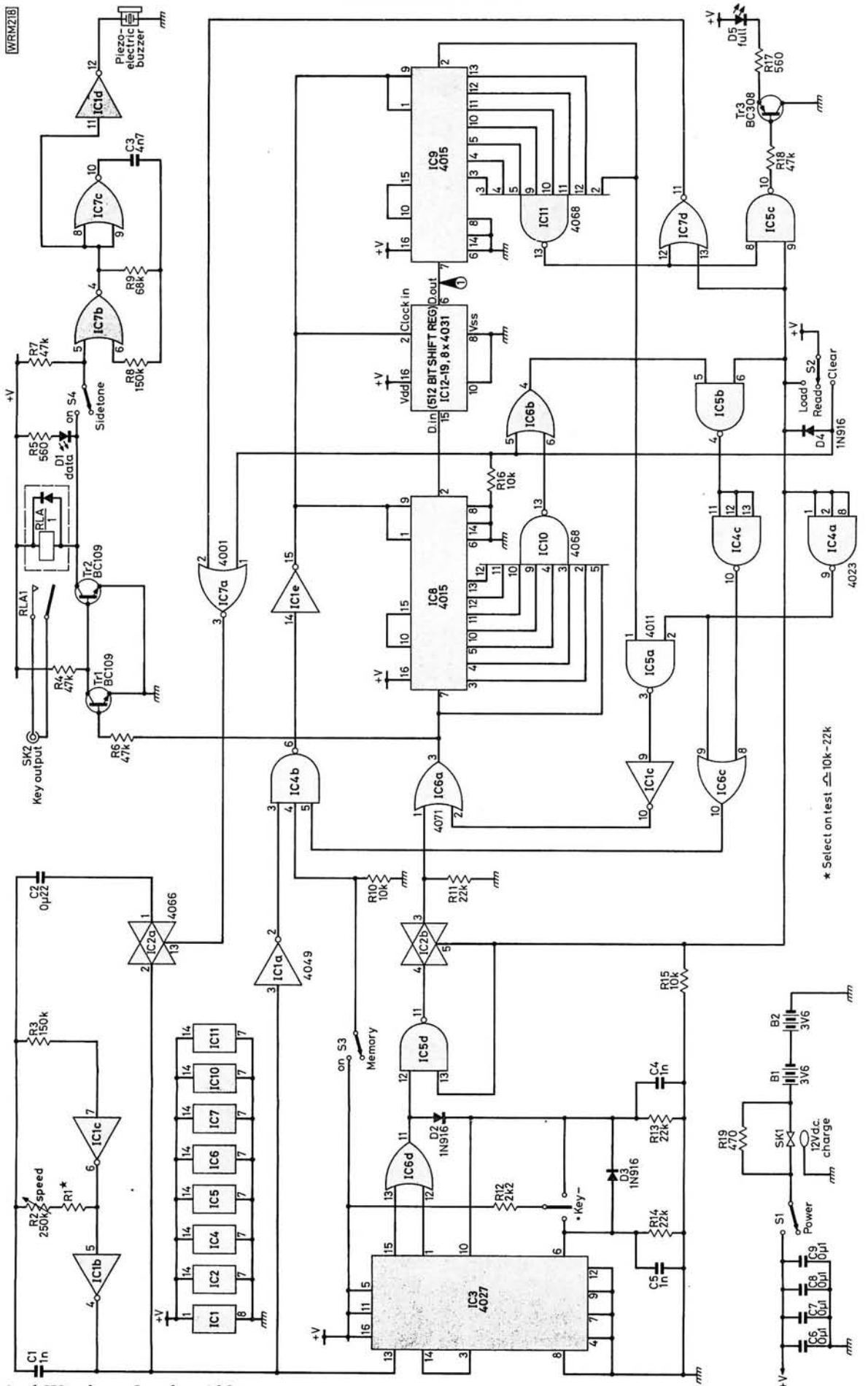
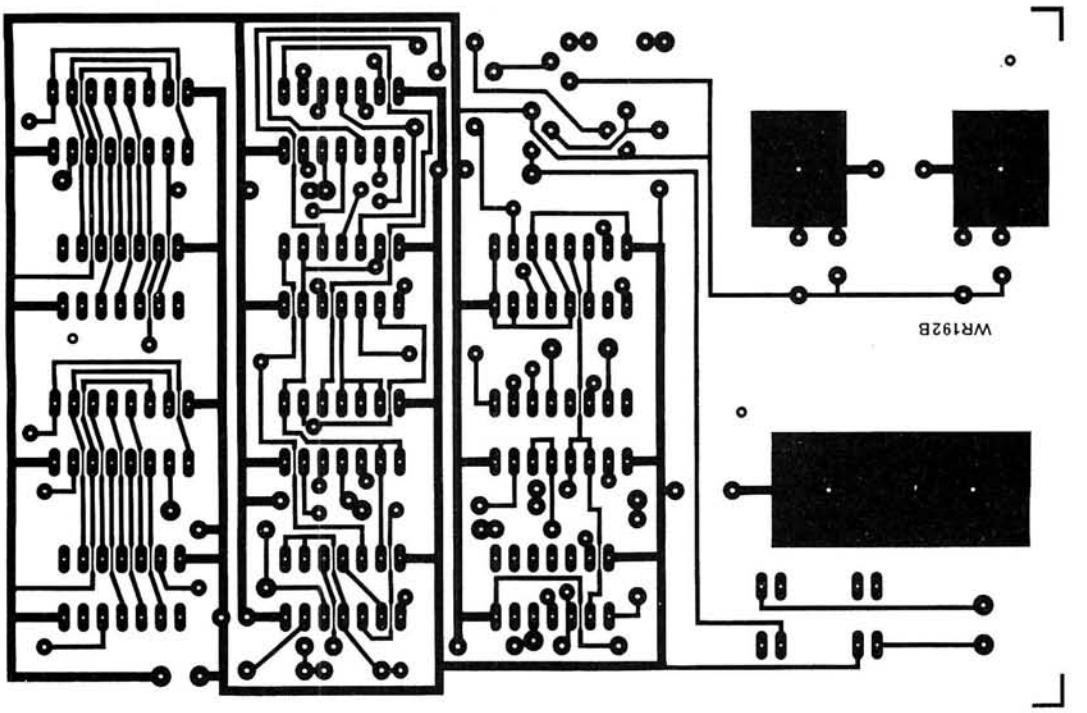


Fig. 2: Circuit diagram of the 528-bit Memory Keyer



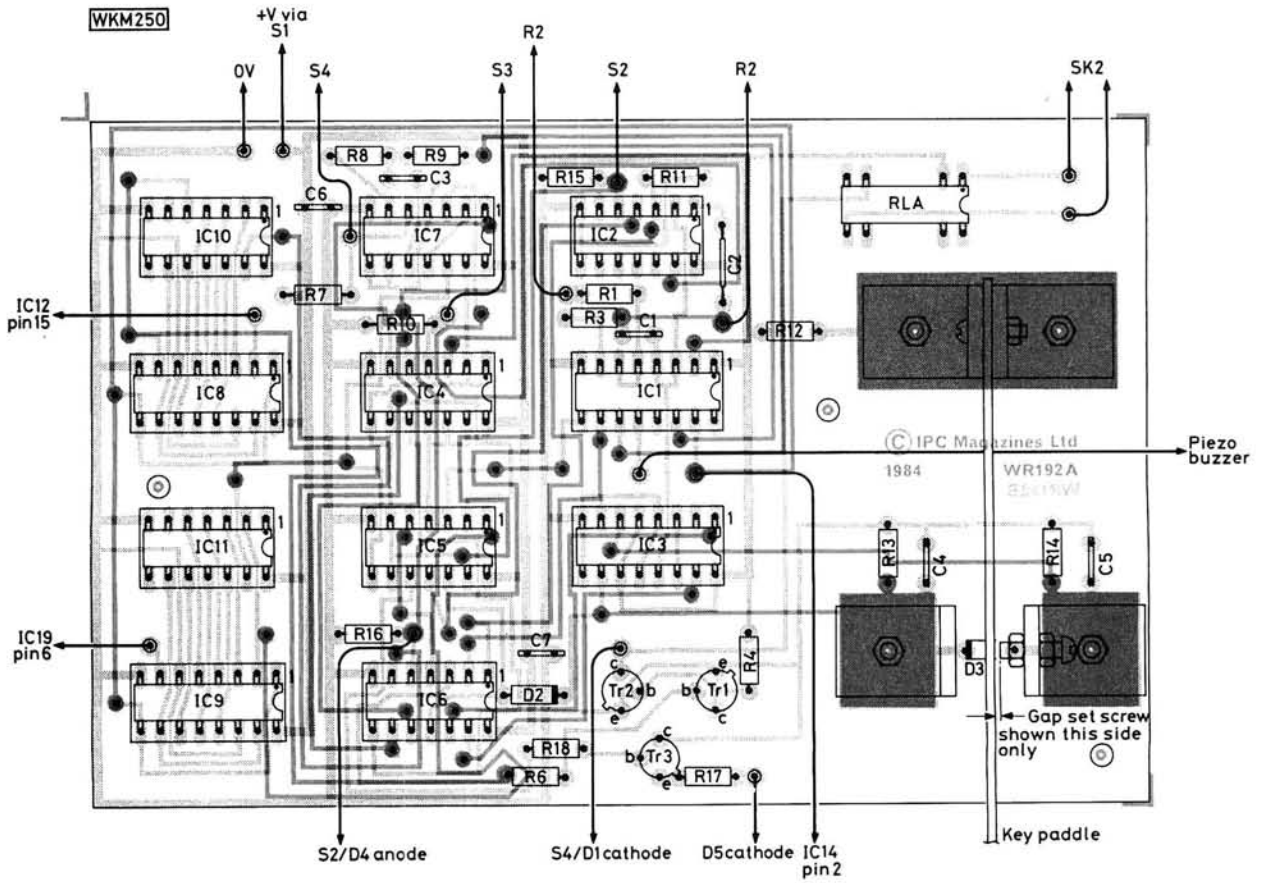
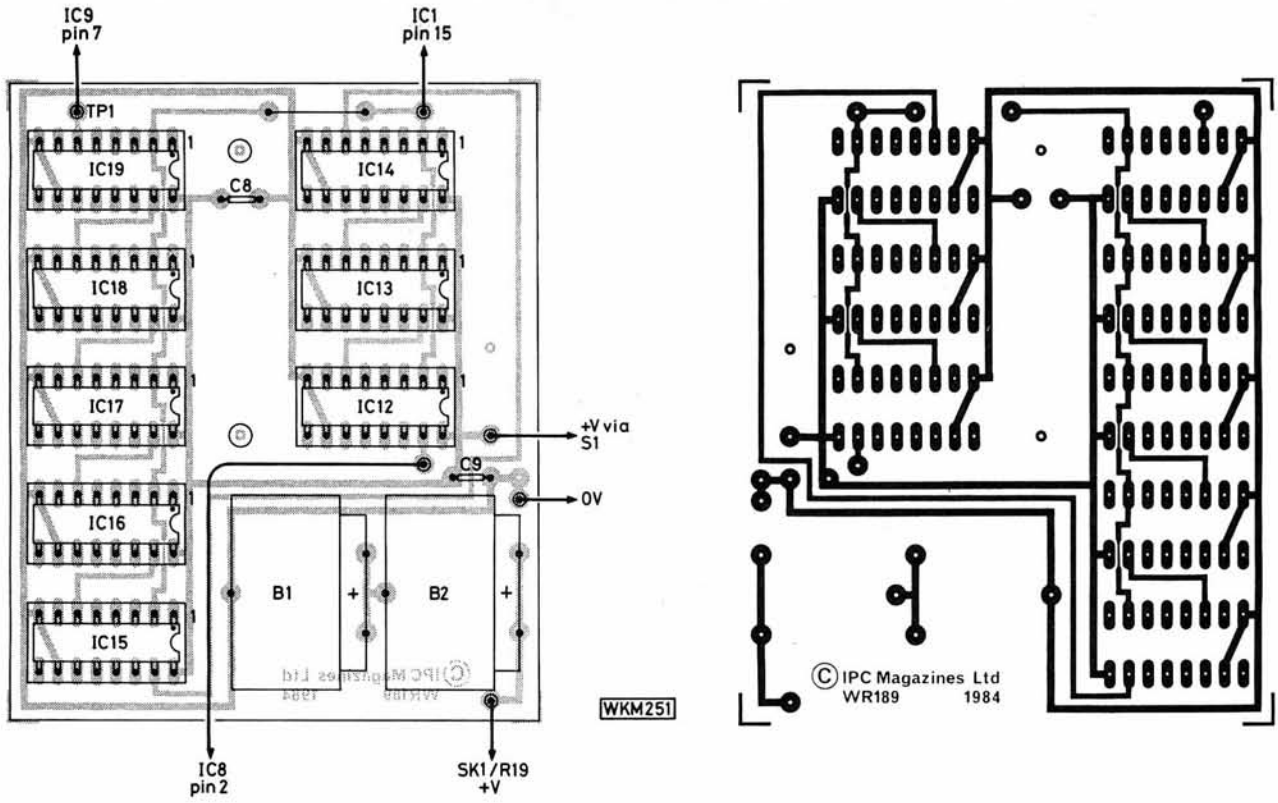


Fig. 3: Full size p.c.b. track pattern (lower non-component side) and component placement diagram of the double-sided control board. Ensure all through-board links are soldered to the pads provided, taking particular care with those located underneath i.c. sockets which are virtually impossible to check once the sockets are installed



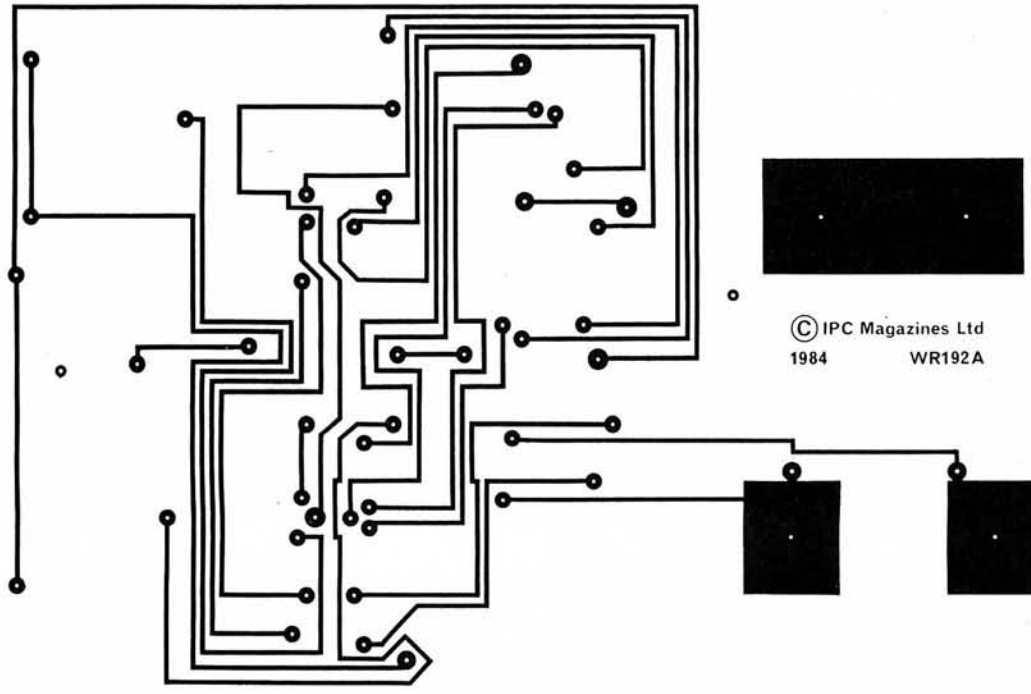


Fig. 4: (Top) Full size p.c.b. track pattern and component placement diagram of the single-sided memory board. (Below) The upper (component side) track pattern of the control board

Functional Description

MEMORY ON/OFF: This enables the clock to the re-circulating memory. When in the OFF position the keyer can be used as a normal el-bug with no storage facility.

LOAD: When used in conjunction with MEMORY ON, any keyed data is loaded into the memory. The clock is automatically disabled when no keying is present so as not to run through the memory filling it with blanks. Note that this switch must be in the LOAD position to enable the paddle to operate the keyer.

CLEAR: When used in conjunction with MEMORY ON the entire memory space is cleared in approximately two seconds. It must be pressed and held down until the memory FULL l.e.d. extinguishes at the start of every load cycle.

READ: In this position with the memory switched ON, information stored in the memory will be read out to the keying relay and DATA l.e.d.

DATA and FULL l.e.d.s: These two indicators are included on the keyer so that an eye can be kept on the operation of the unit.
The DATA l.e.d. indicates the information being sent to the keying relay.
The FULL l.e.d. indicates when there are eight more empty memory locations left. Normally unless the data entry can be completed in this time, the memory will then have to be cleared and a shorter message input.

The SPEED control is self-explanatory, allowing data to be keyed in at one speed and output at another. A rate of 400 letters per minute is the normal speed used for m.s. contacts.

BUYING GUIDE

Most components used in this project are readily available through stockists advertising in *Practical Wireless*. The d.i.l. relay is available from Cirkit stock No 46–61500 or alternatively RS 349–383. The c.m.o.s. 4031 i.c. is stocked by Maplin Electronics.

Approximate Cost £40

Construction Rating Intermediate

★components

Resistors

¼W 5% Carbon film

560Ω	2	R5,17
2·2kΩ	1	R12
10kΩ	3	R10,15,16
22kΩ	3	R11,13,14
47kΩ	4	R4,6,7,18
68kΩ	1	R9
150kΩ	2	R3,8

1W 5% Carbon film

470Ω	1	R19

Potentiometers

¼ inch spindle, ½W carbon track

250kΩ	1	R2

Capacitors

Ceramic

1nF	3	C1,4,5
4·7nF	1	C3
0·1µF	4	C6–9
0·22µF	1	C2

Semiconductors

Diodes

1N916	3	D2,3,4
Red l.e.d.	2	D1,5

Transistors

BC109	2	Tr1,2
BC308	1	Tr3

Integrated circuits

4001	1	IC7
4011	1	IC5
4015	2	IC8,9
4023	1	IC4
4027	1	IC3
4031	8	IC12–19
4049	1	IC1
4066	1	IC2
4068	2	IC10,11
4071	1	IC6

Miscellaneous

Switched 3·5mm jack (1); phono socket (1); 5V d.i.l. reed relay (1); 3·6V, 100mAh p.c.b. mounting NiCads (2); Miniature s.p.s.t. toggle switch, S1,3,4; s.p.d.t. centre-off, one side biased (RS 317-112) S2; 155 × 115 × 65mm case (Cirkit DX1); 16 pin d.i.l. sockets (12); 14 pin d.i.l. sockets (7); Piezo buzzer PB2720; p.c.b.'s (2); Veropins; paddle materials; control knob; nylon stand-off pillars (6).

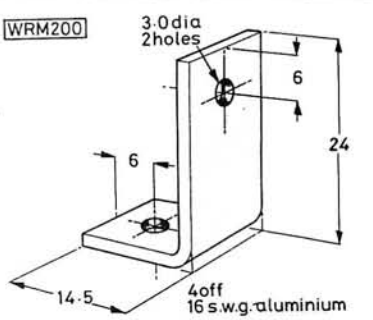
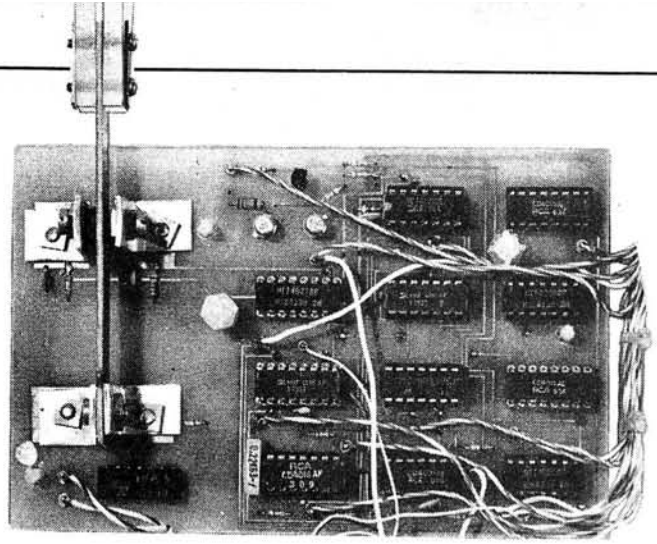
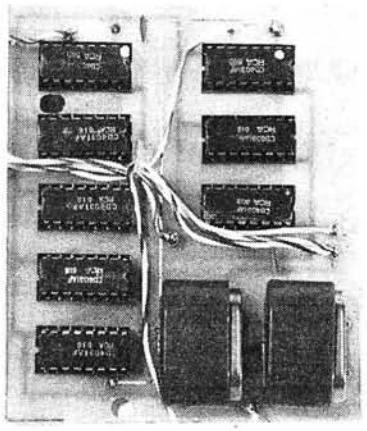


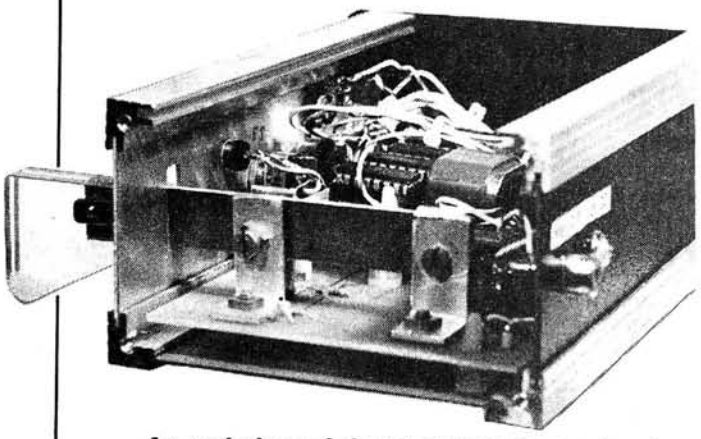
Fig. 5: Details of the four bug key mounting brackets



The author's prototype control board



The memory board together with 7·2V NiCad supply



An end view of the prototype keyer showing the bug key. The movable wiper is formed from a 100 × 12mm piece of 1·5mm double-sided p.c.b.

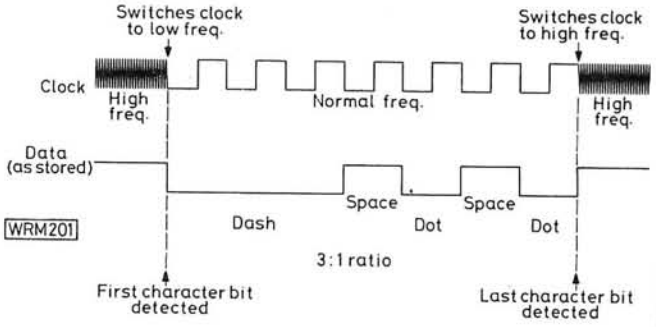


Fig. 6: The timing diagram

Construction

No special instructions are necessary other than the usual warning about handling c.m.o.s. devices. Even though most of these are now statically protected it is still not advisable to shuffle across a synthetic carpet on the way to the workbench!

Make sure all through holes are soldered on both sides of the board including those under the i.c. sockets. The "select on test" resistor R6 is to enable any range of speeds to be selected—22kΩ being the nominal value.

Testing the Keyer

After constructing the unit and confirming that there are no shorts or dryjoints, check that each NiCad battery measures between 3 and 3·9 volts.

Switch on and leave the memory switched OFF. Using either an oscilloscope or a logic probe, confirm that a squarewave clock is present on both IC3 pin 13 and IC4 pin 3. Ensure that this clock varies in frequency as the SPEED control is turned. Connect the same probe to pin 2 of any 4031 device on the memory p.c.b. Switch the memory ON and confirm that the clock now is present at this pin.

Next switch to LOAD and turn the memory OFF. Confirm that as the paddle is moved the keying relay and sidetone operate. Switch the memory ON and depress CLEAR for about two seconds—the FULL l.e.d. should extinguish. Now switch to LOAD and key in some data and then switch to READ and confirm that the keyer repeats faithfully the data that was input, at any speed set by the SPEED control.

Once again CLEAR the memory and with the speed set to maximum hold the paddle so that a continuous stream of dots is loaded into the memory. After approximately 15 seconds the FULL l.e.d. should illuminate indicating that there is no more memory available.

Conclusion

The prototype of this keyer was built a while ago and has been in constant use since. Several dozen m.s. contacts have been made and once operating the keyer has been mastered it should perform for many hours on a single recharge. Several more of these keyers have been built and all have worked first time with not a single problem. Happy QSOing and Gd DX. ●

Antennas And

Part 2 by J. J. Fields

In this final part we take a look at some actual case histories and how they may affect you.

Landlord

Of course planning permission is not the end of all your problems. Landlord's permission is necessary to make a fixing to the building for the antenna support or in an extreme case even to operate the equipment. Presumably in modern conveyances you could have a restrictive covenant operating in favour of the rest of the property owners on the estate, although I haven't come across this one yet.

During 1983 a gentleman of mature age and stentorian voice wished to operate a CB rig. He obtained his licence to operate and acquired a letter from his local Planning Officer stating that he would not need planning permission for his modest size antenna. He erected it and commenced the only hobby open to young and old, feeble and strong, fit and lame, keen of sight and blind. Unfortunately he lived in a county council sheltered home which has a warden and an excellent, sensitive safety system manufactured and installed by a specialist contractor. Any person falling sick has only to crawl to an emergency cord and pull. This alerts the warden, logs details on the computer at Social Services HQ printing out details of the person living in that flat or bungalow, and also alerts his doctor. It also enables the warden using the sensitive two-way intercom system to hear the *slightest* groan or whisper for help.

Unfortunately, the warden is able to leave her set on "listen" at any time. This may well be for safety monitoring reasons or of course may be for less laudable reasons. Likewise, a tenant living alone may be elderly and frightened and may elect to leave her set on "listen" so that any sound reaching any of the many microphones will give her comfort with the thought that other people are around.

Our mature gentleman was accused of causing r.f. breakthrough into the system and peremptorily told to remove his equipment. He contacted the local CB club and it is believed that they changed his transmitter and antenna position. Still accusations of breakthrough came in. Luckily the occupier had arranged a holiday for a week or two and the CB Club had time to investigate more thoroughly. They discovered that with the new set up, it was his voice getting into the system via the microphone which had already been "desensitised" by the supplier. If the warden and the neighbour did not leave the system on "receive" all the time there was no problem. The CB club members could even cause problems on the system by speaking loudly outside the house *without* the transmitter on!

However, I have recommended earlier to try to live in peace with your neighbours. The damage was done. Again the local club stepped in and as I write this, arrangements are being made for the elderly man and his wife to move to another house where they can start afresh with no r.f. break-through, perhaps a slightly quieter voice and, hopefully, no-one who leaves the safety equipment on "listen" unnecessarily.

A Recent Planning Appeal

An example of a recent case relating to a planning appeal goes somewhat like this: A "breaker" caused problems with a neighbour—this was never forgiven. His CB activity was both mobile and from an antenna on the gable end of his house. He then received planning permission for a 7·5m mast on the back of the house. Eventually he obtained an amateur class A licence, but the antennas atop the 7·5m mast couldn't easily be maintained as it was rigidly fixed. Due to an earlier accident his leg was bad and would deteriorate; he couldn't easily climb ladders and later would be totally unable to.

With this in mind he purchased and erected (without planning permission) a 9·5m tilting mast complete with rotator. He felt that with no guy ropes this would be neater than an increased height fixed mast and could be lowered for easier maintenance of the antennas and probably left tilted when not in use.

He subsequently made application for planning permission for the 9·5m mast but by then the damage was done and he had stirred up a hornets' nest of problems—from his previous break-through into his neighbour's audio coupled with his fait-accompli action with the new installation. The neighbours feared that he was irresponsible and would ride roughshod over them. Where would it end? It was no good pointing out that British Telecom had, on request from him, vetted his radio station and certified it f.f.i. (ex-servicemen will recognise that abbreviation with fond memories of the MO's ruler or pencil and a command "touch your toes"). It was no good pointing out that he was an active member of the local Raynet Group. No good producing evidence as to quality of the examination procedure—how he would be silenced if his equipment went wrong and his licence taken away for flagrant breaches of his licence conditions. Nay—it was too late, officials and district councillors were forced to take notice of the objections lodged, visit the site and refuse his application to retain his new mast. Furthermore they resolved to take enforcement action requiring him to remove it.

It was inevitable that he must appeal. The cost would be little compared to the cost, inconvenience and hobby frustration which would arise from the removal of the mast. He delivered his case himself, advised by a gentleman from the RSGB. His opposition was the Council's solicitor plus his planning witness and a few local residents. One, the next door neighbour with whom he had exchanged no friendly word for two years, spoke strongly in opposition. The inspector was not the fearsome Judge Jeffreys type but a fair-minded representative of the Secretary of State whose purpose was to drag out all relevant

Planning Law

evidence to enable him to prepare his report and formulate his decision letter. Lastly, the Press were there.

Reference was made by the amateur to other masts or permissions for masts in the same district council area and by both parties to previous appeal cases which they thought may help to prove a point or destroy the opposition. The amateur also offered the removal of various offending antennas including the one for which planning permission had already been obtained.

The Public Inquiry finished with a visit to the appellant's house, views from the gardens or rooms of other interested parties and trips to observe the similar cases which had been approved and/or erected. The amateur made out an excellent case.

Two months later the bombshell came. The Inspector clearly had sympathy with the amateur's problem and took particular note of his offer to leave the mast tilted sideways when not in use. This, however, would be difficult to enforce if included as a condition of consent. He pointed out that it was open to the amateur to put in a planning application for a new 7·5m mast (the same height as the mast on the house for which he already had consent) and so required the existing unauthorised mast to be reduced to a height of 3m—the height to which it could be erected *without* consent.

It seems to me that everyone is the loser in this case. Our radio amateur can't really take kindly to a reduction of his 9·5m mast to a mere 3m so he must remove it altogether. He will probably get permission for a 7·5m mast of a similar design. The inoffensive original installation will be removed I expect, but, of course, if the offer to lower the 9·5m mast when not in use could not be accepted, as it could not be conditioned and enforced, it follows that no similar condition can be imposed on a 7·5m mast. In other words the objecting neighbours will be left with a permanent 7·5m mast in place of a 9·5m one not always vertical. The situation is not actually as simple as that. There is no doubt in my mind, however, that there can be little difference between a 9·5 and 7·5m mast so far as visual objection is concerned. The neighbours are, therefore, the winners and the losers. C'est la vie!

Kirklees

We used to think that breakthrough and visual amenity were two different things but since the Kirklees planning appeal decision in June 1981 a new situation seems to have arisen. This case related to the retention of an antenna for the control of taxis which was approximately 5m high and attached to a chimney.

I will quote from the decision letter what I consider to be a key change in planning law relating to antennas from visual amenity consideration only, to a law to include interference also. ". . . *I am of the opinion that the principal issue to decide is whether the use of the aerial causes serious damage to the amenities of nearby residents by reason of interference to the output of domestic Television, radio and hi-fidelity equipment.*"

Going on to the crux; the key sentence dismissing the planning appeal:

". . . *I recognise that the appellant has taken all reasonable steps to ensure that his equipment is not faulty. I also recognise that the aerial is essential to his small business . . .*". The appeal was dismissed with a recommendation that the council give the appellant adequate time to make alternative arrangements so that his business could continue without interruption.

If a relatively small antenna on a chimney, essential to a man's business, is required to be removed (albeit with a temporary stay of execution) just because the equipment of the neighbours is unable to reject legitimate signals, what chance you may ask has the hobbyist to have a 9·5m mast in his garden when, despite a certificate of radio spectrum cleanliness from the Radio Interference Service, breakthrough is claimed as well as destruction of visual amenities. **Do not despair.** Every case is different, every neighbourhood, every planning witness and every Inspector and Planning Committee. Each has its weakness and strength.

I am of the opinion that Planning Law should be used only to cater for those environmental problems (and let's face it breakthrough is one if you are on the receiving end) which cannot be catered for by other legislation. It may be that in 1981 (the time of the Kirklees disaster) the Radio Interference Service had inadequate powers to deal with breakthrough and thus relied on the Planning Authorities to fill the gap. By the time this article is published, the new stricter legislation may well be able to fully cope with the problems in a technical manner and not using an Inspector who probably doesn't know the relationship between frequency and wavelength. If, therefore, after the advent of this legislation another "Kirklees" hovers on the horizon I would strongly recommend that the RSGB or one of the professional magazines, or even a consortium of all the interested parties, challenge the decision in the High Court. Meanwhile, follow the advice given earlier and avoid the appeal system like a plague.

One case has been drawn to my attention which seems to contradict the Kirklees case. It was in the Kirkcaldy District Council area and dealt with by the Scottish Office. The District Council, acting on an allegation of interference (Kirklees?) required a mast to be removed when its temporary permission had expired. It is usual for Planning Authorities to grant temporary consents to enable them to assess the effect on the neighbourhood during the temporary period. A large number of this nature are later given an unrestricted permission.

My view in the case of the taxi-firm in Kirklees was made quite clear—other legislation should have been sought to deal with the breakthrough. Read on for those heartening words of wisdom dropped like cake crumbs for us from the Recorder (Gaelic for Inspector perhaps?) "*I consider that the Planning Authority should indeed have concerned itself only with the planning merits, which in*

Antennas And Planning Law

this case relate to the visual amenity aspects of the development, having accepted in their observations that they are unable to pinpoint the source of interference and having regard to the fact that there exists an alternative complaints procedure to a body which has the necessary investigative equipment and expertise."
The appeal was allowed.

Resume

The following points based on the details given in this article should be borne in mind when considering a planning application:

1. For any decent antenna system you are bound to need planning permission and probably permission from your landlord also.
2. Choose your QTH carefully to give you the best chance of succeeding with your planning application.
3. Live in peace with neighbours if at all possible.
4. Don't put up expensive masts/towers without permission. Neither Planning Committee nor Inspectors on appeal recognise a fait-accompli—you may be instructed to remove it/them forthwith.
5. Before making application explain to your neighbours and the Planning Officer what your chosen system will be and why it is needed.
6. If, despite all your precautions, you obtain a refusal contact the RSGB, if you are a member. If you are not a member, your local club may help. Good luck and good DXing. 73 AR ●

References

The Town & Country Planning Act 1971 Sections 22(1); 291(1); 36; 88(2) (a) to (g) as amended by the Town & Country Planning Act, 1981.
The Town & Country Planning General Development Orders 1977–1981 Article 3 and Schedule 1 Class 1(3).
The Ministry of Housing and Local Government Circular No. 29/68.
Appeal Decision at 34 Purlwell Hall Road, Batley, West Yorkshire (the Kirklees Appeal) ref.T/APP/S113/A/80/16092/G5.
Appeal decision at Kirkcaldy, Scotland ref. P/PPA/FB/128 (Scottish Office Inquiry Reporters).

the things people say

"CQ, CQ, CQ WA2BJW de ZS1CT KN"
. . . heard on 14MHz by G4PVN

"This is the first time I have tried transmitting on this receiver."
. . . . heard on GB3DA by G3LUI

multiple choice... multiple choice... ANSWERS multiple choice... multiple choice...

Are you cheating? If you are reading this page before page 23 then you are. Please turn to page 23 for the questions.

Question 1–1. Answer-a.

The log at a fixed station "shall be made at the time of sending and receiving". (Clause 6 (1) (f) of the Amateur Licence). But the rule for a Mobile Station or as a Pedestrian is different:

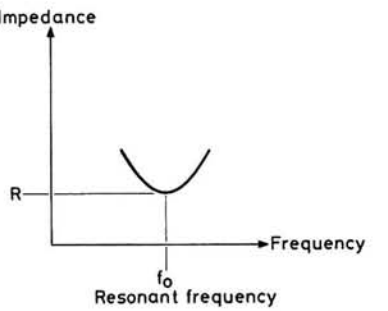
"Entries made in respect of calls made when operating from a vehicle or vessel, or as a pedestrian should be made as soon as practicable after the end of a journey." (Clause 6 (1) (g)).

Question 1–2. Answer-a.

Variations in load, especially when keying, could affect the frequency of the oscillator and so cause chirp. Hence the oscillator is isolated by a buffer stage.

Question 1–3. Answer-c.

A10



If R represents the total resistive losses in the inductor and the capacitor, then at resonance (f_o)
—the reactances of L and C cancel out,
—the impedance of the circuit equals R.

Question 1–4. Answer-c.

The meaning of each of the three symbols in the transmission code is explained in *Passport to Amateur Radio* pages 4 and 5. It is worth committing to memory the most common ones:

A1A	*continuous wave (c.w.)*	*Morse code*
F3E	*frequency modulation (f.m.)*	} *speech*
J3E	*single sideband suppressed carrier (s.s.b.)*	}

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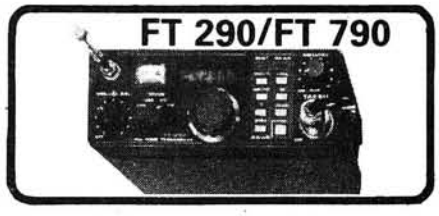

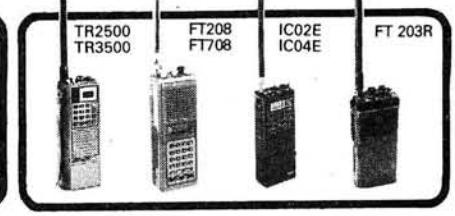

STOP PRESS

NEW RANGE FROM TRIO

Trio have just introduced a comprehensive new range of products for the latter half of 1984. The line-up includes 4 new handhelds. The **TR-2600E/TR-3600E** (2m/70cm) pair are both compact and lightweight yet feature extremely advanced technology. Key features include **DCS***, LCD display with built-in S meter, 10 memories, memory scan, programmable band scan and much, much more. The **TH-21E/TH-41E** (2m/70cm) handhelds are ultra-compact (57w × 120h × 28dmm) but still combine maximum performance and operating convenience. Features include switchable RF output (1W Hi-150mW Lo), thumbwheel frequency selection, repeater offset/simplex switch and an optional headset with VOX. Read the spec on this and you will see that it is an incredible performer in a tiny package.

The **TR-50** is a portable FM transceiver for 1200 MHz. It is microprocessor controlled to give maximum flexibility combined with a host of features; 1 Watt output, 5 memory channels, memory scan, programmable band scan, priority channel, 5 digit LCD display with S/RF meter, repeater offset and reverse switch and R.I.T. A remarkable radio!

The **TM211E/TM 411E** (2m/70cm) pair have been designed specifically for the mobile environment. They are very compact and lightweight but still deliver 25 Watts. Their front panels can be tilted upwards for greater visibility and the controls are designed for ease of operation. Other features include dual VFOs, 5 memories, memory scan, programmable band scan, priority watch, a highly visible yellow led display, a high quality external speaker (supplied), microphone test function, repeater offset and reverse repeater switches and **DCS.***

Last but definitely not least, the **TS 711E/TS 811E** (2m/70cms) pair. These all mode transceivers feature ease of operation combined with a compact size. Some of the key features are:– **DCS***, 10Hz step dual VFOs, multi-function fluorescent tube digital display, 40 multi-function memory channels (that store frequency, mode, repeater offset and tone), memory scan, programmable band scan, mode scan, channel 'quick-step' tuning, I.F. shift, speech processor and an optional voice synthesizer unit.

NEW HANDHELD FROM YAESU – THE FT-209R

By blending the best qualities of the FT-207R and the FT-208R with the latest advances in microprocessor design and microminiature manufacturing, the **FT-209R** offers a wealth of features in a package that is smaller and lighter than any previous CPU controlled transceiver. It provides 3.5W RF output or 350mW in the low power mode. There are ten memory channels which will store the frequency and a standard or non-standard repeater shift. Simplex or reverse repeater is available at the touch of a button. Scanning capabilities include step programmable full or partial band or memory bank scanning for busy or clear; skip or select channel exclusive scanning; calling channel, select memory or dial priority scanning monitoring. Plus many other keypad programmable unique and useful features. The operating status is shown at a glance on the fat ¼ inch LCD display. The **FT-209R** also features Yaesu's Power Saver System, a programmable facility that momentarily activates the receiver at selected intervals to check a selected channel. This greatly extends battery life over standard squelched reception, a major consideration with handheld operation. The S/RF meter on the front panel doubles as a battery condition meter. Several optional extras are available for this model, including a headset that will work with the set's built-in Vox system.

All of these radios are so new that we don't have pictures of them yet, but by the time you read this, we should have sets in stock. They all have far more features than we have been able to squeeze into the space available – so call in and try them for yourself.

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NAMES from the PAST

Sir Charles Wheatstone

by Tony Smith G4FAI

(Telegraphic Journal, 1876)

Many projects published in *Practical Wireless* have used the Wheatstone bridge. It is generally assumed that this ingenious circuit, used for various electrical measurements, was devised by the man after whom it is named, but this is not the case.

Professor Wheatstone described the bridge in a lecture he gave to the Royal Institution in 1843. S H Christie, Professor of Mathematics at the Royal Military Academy, Woolwich, had published the results of experiments using the bridge principle ten years previously, and Wheatstone now demonstrated it as a practical apparatus. Calling it a "Differential Resistance Measurer", he freely acknowledged Christie's work before him, but despite this the device subsequently became known as the "Wheatstone" bridge.

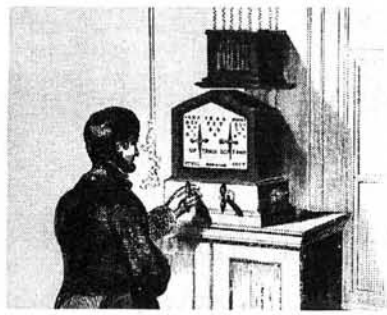
The paper he delivered was, *An Account of several new Instruments and Processes for determining the Constants of a Voltaic Circuit,* and a second, even more famous, concept was referred to in this paper—Ohm's law.

G S Ohm had published his mathematical analysis of an electrical circuit in 1827, and it had been published, in translation, by the British Association in 1841, although it was still little known outside Germany. Wheatstone referred to Ohm's "beautiful and comprehensive theory", and the eminence of the occasion brought it to the attention of many scientists then experimenting with electricity. Wheatstone, himself, used Ohm's law to determine the number and sizes of batteries needed for an effective telegraph, thus solving one problem which had caused much difficulty for its early pioneers.

One other matter referred to in the 1843 lecture also remains in familiar use today. Wheatstone defined a number of new terms, all based on the Greek word **Rheo**, meaning a stream or current, to assist in the description of his experiments. The term surviving is **rheostat**, originally meaning a device for adjusting the resistance of a circuit to keep the current constant, and later changed by Wheatstone to refer to a variable resistance used for any purpose.

With his brother William, Charles Wheatstone had inherited an uncle's business in 1823, and had become a musical instrument maker. He invented several new instruments, including the concertina, and carried out many experiments on the transmission of music through solid materials. His work came to the notice of the scientific community through lectures he prepared for the Royal Institution. These were given, on his behalf, by Michael Faraday as Wheatstone experienced difficulty in speaking in public.

In 1834, King's College, London, created a Chair in Experimental Philosophy (i.e. Physics). Wheatstone was invited to take the post, and, whilst retaining his interest in the family business, spent the next forty years devoting himself to research and invention in the spheres of electricity and the telegraph, sound, optics, and various other matters.



Cooke & Wheatstone telegraph used on the Croydon Railway, 1845 (Pictorial Times, 1845)

He was a leading scientist of his time, but his name became a household word mainly because of his work on the telegraph with W F Cooke. Whilst Samuel F B Morse was still trying to get his telegraph and code accepted in the United States, the Cooke & Wheatstone needle telegraph was installed alongside various railways in Britain, and in Europe, providing fast reliable communications which became the wonder of the age.

The needle telegraph was finally replaced by the Morse system in the field of public communications. It was, however, retained on the railways, where it was developed to a fine degree, to provide efficient and safe railway traffic control.

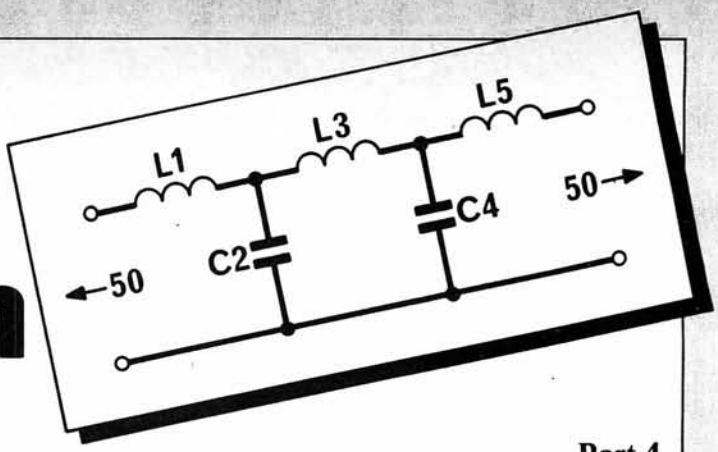
Wheatstone's association with Cooke ended in public dispute over who had first invented their telegraph, but he continued to work in this field. He invented other telegraphs, including a direct-reading ABC system, which dialled out individual letters as required. His high speed, punched tape, automatic Morse system, of 1858, was so successful that it became the mainstay of Britain's telegraph system, remaining in use in the Post Office until the 1930's.

He was an early pioneer of the submarine telegraph cable. He invented the stereoscope and the polar clock. He worked on spectrum analysis, constructed a linear motor, typewriters, electric clocks, and developed early telemetry—in this case automatic transmission of meteorological information from specially made instruments, via the telegraph. He became an expert on ciphers, and helped the British Museum decipher a coded letter signed by King Charles I. He introduced a successful, self-excited, electrical generator at the same time as Siemens, both having worked independently on the same idea. He received a knighthood in 1868.

When he died, in 1875, King's College named a physics laboratory after him, and set up a special gallery to display his scientific apparatus—much of which is now to be found in the Science Museum, London.

Largely forgotten today, his major contributions, in the field of electricity and the telegraph, were often to develop the ideas and theories of others to enable them to be used in useful and practical ways. In this sense, the Wheatstone bridge, still in use over 140 years later, is an appropriate memorial, both to the man, and to his work. ●

Practical LC Filter Design



by Edward Wetherhold W3NQN

Part 4

In previous parts of this article, the principles of standard value capacitor (SVC) filter design were explained. Tables were given for 5- and 7-element Chebyshev filters to work in 50 ohm circuits, with cutoff frequencies in the range 1–10MHz.

This month, ways in which the design data can be scaled for use at other frequencies and impedances are explained.

Frequency Scaling

Although the tables in Part 3 are arranged for cutoff frequencies ranging from about 1 to 10MHz, it is possible to scale the tabulated data by inspection to other frequency decades by shifting the decimal points to the right or left. To find the frequency and component values for the 10–100 or 100–1000MHz decades, multiply all tabulated frequencies by 10 or 100, respectively, and divide all *C* and *L* values by the same number. The v.s.w.r. data remains unchanged. For example, designs 3.1-7 and 3.1-85 are the same except they are separated by one frequency decade.

To scale the filter tables to cover the 1–10kHz, 10–100kHz or the 100kHz–1MHz decades, divide the tabulated frequencies by 1000, 100 or 10, respectively, and multiply the component values by the same number. For example, the tables are easily changed from the 1–10MHz decade to the 1–10kHz decade by mentally changing the frequency headings in MHz to kHz and the capacitor and inductor headings in pF and µH to nF and mH, which is a factor of 1000 in each case. In this way, the table values may be read directly for the 1–10kHz frequency decade. Because the impedance level still is 50 ohms, the capacitance values will be inconveniently large and the inductance values will be inconveniently small. This can be corrected by increasing the impedance level by ten times or more using the impedance scaling procedure explained next.

Impedance Scaling

All tabulated designs can be scaled to impedance levels other than 50 ohms with a simple scaling procedure while maintaining the advantages of standard-value capacitors and keeping the convenience of the "scan mode" of filter design selection. If the desired new impedance level differs from 50 ohms by a factor equal to an integral power of ten (such as 10 or 100), the 50 ohm design tables are scaled by inspection by shifting the decimal points of the component values. The frequencies and v.s.w.r. values remain unchanged. For example, if the 50 ohm impedance level is raised to 500 ohms (a factor of ten), the tabulated capacitance and inductance values are scaled to 500 ohms by dividing the capacitor values by ten, and by multiplying the inductance values by ten. The reverse is true if the impedance level is lowered from 50 to 5 ohms.

When a desired impedance level differs from the standard 50 ohm value by a factor equal to a non-integral power of ten (such as 1·2 or 1·5), the following scaling procedure must be used:

1. Calculate the impedance scaling factor, $R = Zx/50$, where Zx is the desired new impedance level in ohms.
2. Calculate the cutoff frequency of a "trial" 50 ohm filter using the equation: $F50co = R \times Fxco$, where R is the impedance scaling factor and $Fxco$ is the desired cutoff frequency of the filter at the new impedance level.
3. From the 50 ohm tables select a design having its cutoff frequency closest to the calculated $F50co$ value. The tabulated capacitor values for this design are used directly, and the frequencies and inductances will be scaled to the new impedance level.
4. Calculate the exact values of $Fxco = F'50co/R$, where $F'50co$ is the tabulated cutoff frequency of the selected filter. In a similar manner, calculate all the other frequencies.
5. Calculate the inductance values for the new filter using the equation: $Lx = R^2 \times L50$, where $L50$ is the tabulated inductance value of the trial filter design, and Lx is the new inductance value after scaling.

As an example of how this scaling procedure is used, assume that a 60 ohm, 1MHz, 5-element, *C*-in/out lowpass filter design is desired in which C1, C3 and C5 are all standard 10 per cent values. Using the same previously-numbered steps:

1. $R = 60/50 = 1{\cdot}2$.
2. $F50co = 1{\cdot}2\ (1{\cdot}0\text{MHz}) = 1{\cdot}20\text{MHz}$.
3. From Table 3.1 design No. 8 has a cutoff frequency closest to the $F50co$ value, and the C1, C3 and C5 values are all of the 10 per cent tolerance group. Also, the attenuation and v.s.w.r. values are satisfactory. Design No. 8 will therefore be scaled to the required 60 ohm impedance level. The tabulated capacitor values are copied directly. Thus, for the 60 ohm filter, C1 and C5 are 1800pF and C3 is 3900pF.
4. The exact values of Fxc, $Fx3$, $Fx20$ and $Fx40$ are calculated by dividing the tabulated frequencies of 1·23, 1·65, 2·34 and 3·55MHz by 1·2. The scaled frequencies are, respectively, 1·025, 1·375, 1·95 and 2·96MHz. Note that although a cutoff frequency of 1·0MHz was desired, we will be satisfied with a cutoff frequency of 1·025MHz.
5. The L2 and L4 inductance value of the 60 ohm filter is calculated by multiplying the 50 ohm inductance value by the square of the impedance ratio:

$L2 = (1{\cdot}2)^2 \times 8{\cdot}19\mu\text{H} = 11{\cdot}8\mu\text{H}$. This concludes the impedance scaling procedure.

TABLE 4.1

5-ELEMENT 60-OHM, LOW-PASS CHEBYSHEV SVC-FILTER DESIGNS

NO.	-----FREQUENCY (MHZ)-----				MAX.	C1,5	L2,4	C3
	F-CO	3-DB	20DB	40DB	VSWR	(PF)	(UH)	(PF)
1	1.03	1.37	1.95	2.96	1.076	1800	11.8	3900
2	1.19	1.62	2.31	3.51	1.068	1500	10.0	3300
3	1.47	1.73	2.35	3.47	1.238	1800	8.94	3300
4	1.42	1.97	2.83	4.31	1.057	1200	8.25	2700
5	1.83	2.13	2.88	4.26	1.268	1500	7.17	2700
6	1.79	2.42	3.47	5.26	1.068	1000	6.68	2200
7	2.20	2.59	3.52	5.21	1.238	1200	5.96	2200
8	2.19	2.96	4.24	6.43	1.069	820	5.46	1800
9	2.75	3.20	4.32	6.39	1.268	1000	4.78	1800
10	2.61	3.55	5.08	7.72	1.067	680	4.56	1500
11	3.24	3.80	5.16	7.64	1.241	820	4.06	1500
12	3.38	4.47	6.34	9.60	1.083	560	3.61	1200
13	4.09	5.37	7.61	11.5	1.087	470	3.00	1000
14	4.05	6.41	9.46	14.6	1.023	330	2.53	820
15	5.06	6.57	9.28	14.0	1.095	390	2.45	820
16	6.24	7.97	11.2	16.8	1.110	330	2.01	680
17	7.52	9.66	13.6	20.5	1.105	270	1.66	560
18	8.66	11.4	16.2	24.5	1.085	220	1.41	470
19	10.3	13.7	19.5	29.6	1.076	180	1.18	390

TABLE 4.2

5-ELEMENT 60-OHM, HIGH-PASS CHEBYSHEV SVC-FILTER DESIGNS

NO.	-----FREQUENCY (MHZ)-----				MAX.	C1,5	L2,4	C3
	F-CO	3-DB	20DB	40DB	VSWR	(PF)	(UH)	(PF)
1	1.19	.880	.615	.405	1.068	3300	6.40	1500
2	1.21	1.03	.758	.511	1.238	2200	5.74	1200
3	1.53	1.10	.768	.504	1.057	2700	5.09	1200
4	1.42	1.22	.904	.612	1.268	1800	4.88	1000
5	1.79	1.32	.923	.608	1.068	2200	4.27	1000
6	1.77	1.50	1.11	.748	1.241	1500	3.93	820
7	2.18	1.61	1.13	.742	1.069	1800	3.50	820
8	2.64	1.94	1.36	.894	1.067	1500	2.90	680
9	3.10	2.34	1.65	1.09	1.083	1200	2.41	560
10	3.66	2.79	1.97	1.30	1.087	1000	2.03	470
11	4.35	3.35	2.37	1.57	1.095	820	1.69	390
12	5.03	3.93	2.80	1.86	1.110	680	1.44	330
13	6.42	4.06	2.75	1.78	1.023	820	1.39	330
14	6.19	4.82	3.42	2.27	1.105	560	1.18	270
15	7.86	5.96	4.20	2.78	1.085	470	.947	220
16	8.07	6.86	5.05	3.41	1.238	330	.860	180
17	9.76	7.31	5.13	3.39	1.076	390	.771	180
18	9.47	8.15	6.03	4.08	1.268	270	.732	150

TABLE 4.3

5-ELEMENT 75-OHM, LOW-PASS CHEBYSHEV SVC-FILTER DESIGNS

NO.	-----FREQUENCY (MHZ)-----				MAX.	C1,5	L2,4	C3
	F-CO	3-DB	20DB	40DB	VSWR	(PF)	(UH)	(PF)
1	1.17	1.38	1.88	2.78	1.238	1800	14.0	3300
2	1.13	1.57	2.26	3.45	1.057	1200	12.9	2700
3	1.47	1.71	2.31	3.41	1.268	1500	11.2	2700
4	1.43	1.94	2.77	4.21	1.068	1000	10.4	2200
5	1.76	2.07	2.81	4.17	1.238	1200	9.32	2200
6	1.75	2.37	3.39	5.14	1.069	820	8.54	1800
7	2.20	2.56	3.46	5.11	1.268	1000	7.47	1800
8	2.09	2.84	4.07	6.18	1.067	680	7.12	1500
9	2.59	3.04	4.13	6.12	1.241	820	6.34	1500
10	2.70	3.58	5.08	7.68	1.083	560	5.65	1200
11	3.27	4.30	6.09	9.20	1.087	470	4.69	1000
12	3.24	5.13	7.57	11.7	1.023	330	3.95	820
13	4.04	5.26	7.42	11.2	1.095	390	3.83	820
14	4.99	6.38	8.95	13.5	1.110	330	3.15	680
15	6.01	7.73	10.9	16.4	1.105	270	2.60	560
16	6.93	9.14	13.0	19.6	1.085	220	2.21	470
17	8.21	11.0	15.6	23.7	1.076	180	1.84	390
18	9.53	12.9	18.5	28.1	1.068	150	1.57	330

TABLE 4.4

5-ELEMENT 75-OHM, HIGH-PASS CHEBYSHEV SVC-FILTER DESIGNS

NO.	-----FREQUENCY (MHZ)-----				MAX.	C1,5	L2,4	C3
	F-CO	3-DB	20DB	40DB	VSWR	(PF)	(UH)	(PF)
1	1.23	.883	.614	.403	1.057	2700	7.96	1200
2	1.14	.978	.723	.490	1.268	1800	7.63	1000
3	1.43	1.06	.738	.486	1.068	2200	6.67	1000
4	1.41	1.20	.886	.599	1.241	1500	6.14	820
5	1.74	1.29	.900	.593	1.069	1800	5.47	820
6	2.11	1.55	1.09	.715	1.067	1500	4.53	680
7	2.48	1.87	1.32	.873	1.083	1200	3.76	560
8	2.93	2.23	1.57	1.04	1.087	1000	3.17	470
9	3.48	2.68	1.90	1.26	1.095	820	2.64	390
10	4.02	3.15	2.24	1.49	1.110	680	2.26	330
11	5.13	3.25	2.20	1.43	1.023	820	2.17	330
12	4.95	3.85	2.74	1.82	1.105	560	1.84	270
13	6.29	4.77	3.36	2.22	1.085	470	1.48	220
14	6.46	5.49	4.04	2.73	1.238	330	1.35	180
15	7.81	5.85	4.11	2.71	1.076	390	1.21	180
16	7.58	6.52	4.82	3.26	1.268	270	1.14	150
17	9.54	7.04	4.92	3.24	1.068	330	1.00	150
18	9.69	8.24	6.06	4.09	1.238	220	.896	120

The four abbreviated 5-element SVC tables, 4.1–4.4 for 60 and 75 ohm filters can be used for checking your calculation procedure when scaling a 5-element lowpass or highpass filter to a different impedance level.

Summary

It is important that the radio amateur be able to conveniently and accurately design lowpass and highpass filters over a wide range of cutoff frequencies. The precalculated 50 ohm filter designs presented in Part 3 of this article provide a wide selection of designs for virtually any cutoff frequency between 1 and 10MHz. By using these designs, the likelihood of calculation error is eliminated, and the filter construction is simplified because only standard-value capacitors are required. Although the designs are based on equal 50 ohm terminations in the 1 to 10MHz range, designs for any equal termination impedance and for any frequency decade are easily calculated with a simple scaling procedure while maintaining the advantages of standard-value capacitors and of the "scan-mode" convenience of filter selection.

NEXT MONTH—ELLIPTIC (CAUER) FILTER DESIGN

on the air

AMATEUR BANDS by Eric Dowdeswell G4AR

Reports to: Eric Dowdeswell G4AR, 57 The Kingsway, Ewell Village, Epsom, Surrey, KT17 1NA.
Logs by bands in alphabetical order.

Once again I would ask correspondents to note my correct QTH as above, as a large amount of mail is still being addressed to my old Ashtead QTH. On top of which the new RSGB call book still has the Ashtead address although plenty of notice of the change was given to the licensing authority.

I seem to have stirred up a bit of interest in the idea of adding a suitable unit to an ordinary domestic radio receiver having a short wave (s.w.) band, or bands, in order to be able to resolve single-sideband amateur transmissions which otherwise appear as an unintelligible garble (July 1984). A typical circuit is shown in Fig. 1 and is easily constructed on a piece of Veroboard or plain insulating board.

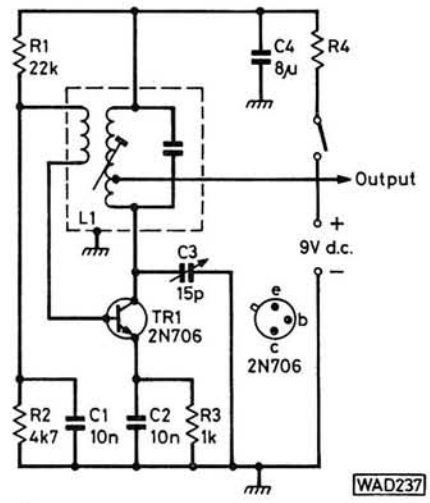
To begin with, however, a repeat of the reason why such a unit is needed in the first place. With very few exceptions amateur telephony signals are in the s.s.b. or single-sideband mode on the h.f. bands (1·8 to 30MHz) which means that the carrier and one sideband of the signal are suppressed at the transmitter leaving only a single sideband to be received at the distant point. In order to be able to convert this signal to an audio one it is necessary, in the receiver, to insert a locally generated carrier to replace the one that has been suppressed. This facility is part of a normal communications receiver and is also used to receive c.w. or Morse code signals.

A typical line-up with this unit, generally known as a beat frequency oscillator (b.f.o.) or carrier insertion oscillator (c.i.o.), feeding into the detector stage where the level of the injected signal can be set precisely for best results is shown in Fig. 2. With a much simpler domestic type receiver this b.f.o. unit can only be placed alongside the set to provide the necessary coupling. But more of that later. In addition it is really necessary to know the intermediate frequency (i.f.) of the receiver so that the b.f.o. can be adjusted to about the same frequency. This frequency is likely to be around 455 to 475kHz and the tuned circuit formed by C3 and L1 in Fig. 1 must tune to this i.f. If a service chart of the receiver is available the i.f. will be shown. Such charts are available from advertisers in *PW* and other magazines.

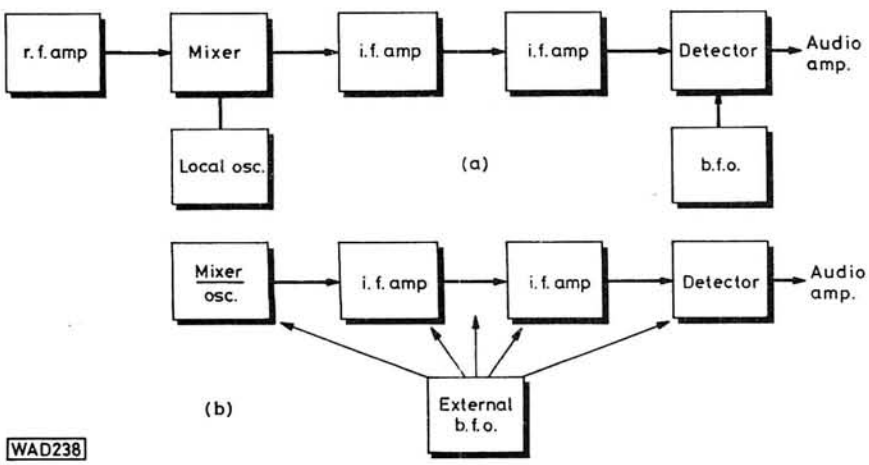
For best results the b.f.o. should be built into a metal case with a tuning knob on the capacitor C3 and access to the core adjustment of L1. Assuming that access to the innards of the receiver is not a practical proposition then the output lead should be twisted for one or two turns round the antenna lead. **NO** electrical connection should be made between the two wires or the injected signal will swamp the receiver. If an internal ferrite rod antenna is used then just drape the output lead near to the receiver.

To adjust the b.f.o. switch it on (it must be off for normal broadcast reception) and tune in a BC signal on the m.w. or l.w. band. Set C3 to its centre position (half way in/out), adjust the core of L1 until a beat note is heard and continue until the zero beat position is reached. Seal the adjusting screw with a spot of wax or glue.

Now tune the receiver to a spot on the h.f. (s.w.) bands where suspected amateur s.s.b. signals have been heard. Pick a signal and adjust the b.f.o. tuning control until the speech can be resolved clearly. Simultaneously adjust the receiver's tuning for most natural speech. Then mark this spot on the dial of the b.f.o. tuning. Now, it is a world-wide agreement that s.s.b. stations use lower sideband (l.s.b.) for carrier frequencies below 10MHz and upper sideband (u.s.b.) above 10MHz. So try to check the amateur band being used and mark the b.f.o. dial accordingly, u.s.b. or l.s.b. If it was the 3·5MHz (80m band) try to find the 14MHz (20m) band where there are plenty of s.s.b. stations, adjust the b.f.o. for best speech as before and then mark the spot on the b.f.o. dial with u.s.b. Adjust both the b.f.o. and the receiver tuning **VERY SLOWLY** for best results, especially the receiver.



▲ **Fig. 1: A suitable circuit for a b.f.o. unit that may be stood alongside a domestic receiver to copy s.s.b. signals on the s.w. amateur bands. Tuning capacitor should have a spindle to take a knob and the adjustment core of L1 must be accessible through the metal box in which the b.f.o. is constructed**



◀ **Fig. 2: Typical stage arrangement of a communications receiver (a) in which the output level of the integral b.f.o. can be carefully adjusted for optimum reception of s.s.b. signals. In (b) the b.f.o. has to be stood near to the domestic receiver in order to inject the b.f.o. signal, a makeshift arrangement at best**

On the receiver the whole of, say, the 14MHz (20m) amateur band may only occupy a few millimetres or less whereas communications sets frequently have one band over the whole dial length. Once the two b.f.o. positions have been marked it is only necessary to return to one position or the other, depending upon the band in use, to tune in s.s.b. stations fairly easily. This method of using a separate receiver and b.f.o. should only be considered as a makeshift arrangement but it may inspire the user to obtain a much better and more suitable communications set.

Morse code signals or c.w. are to be found at the low frequency end of each h.f. amateur band and may be copied using the b.f.o., the position of the b.f.o. tuning not being particularly important but start with the b.f.o. tuning at the zero point between the u.s.b. and l.s.b. positions and adjust the beat note to suit the ear. Once again, the average domestic receiver is not very good as far as selectivity and sensitivity is concerned, especially on the s.w. bands, so do not take what you may hear on the h.f. amateur bands as being good reception although some distant stations may still be heard on the odd occasion.

I have not been able to find any advertiser who sells a suitable b.f.o. kit but *Cambridge Kits* who advertise in *PW* and elsewhere have said that they are considering marketing such a kit, which will make readers' lives a lot easier!

General Notes

Graham Feaver of Whitegates, Bunces Lane, Burghfield Common, near Reading, would like some information in the way of a circuit diagram of the old R1155 receiver which he wants to get going, plus any ideas on a suitable power supply unit.

Some years back **G. H. Butcher** of Seaford, E. Sussex, used to write in regularly and has now re-surfaced after a long interval. Welcome back. In the interim he has progressed to a Yaesu FRG-7700 and matching a.t.u. but has now moved to a bungalow QTH with little prospects of a decent outdoor antenna. A wire in the loft only brings in lots of local electrical interference and he wonders what would be best in his circumstances. Well, I presume he must have a bit of garden of some sort and have suggested a very thin single pvc-covered flex around his fence trying to make it a multiple of 9·7m which is better accommodated by the a.t.u. on the amateur bands, and easily led through a window frame without having to drill holes in it. Alternatively a vertical antenna might prove successful although these do tend to pick up local QRN.

It could be made from aluminium tubing or from the many ex-Government surplus whips available from advertisers, often of copper-plated tapered steel construction. Suitable bases are sometimes obtainable from the same sources. G. H. Butcher also likes to listen on the m.w. band so such an antenna would need to be coupled to the receiver via an a.t.u. which resonates in the m.w. band. I am not sure but maybe the FRG-7700's a.t.u. is suitable.

Information on the new Telecommunications Act 1984 which came into force on July 16 is given in the RSGB's *Council Letter* for July. Provisions include powers for the police or persons authorised by the Secretary of State, such as members of the Radio Investigation Service (previously Radio Interference Service), to seize apparatus or other things used in connection with alleged offences for the purpose of legal proceedings. Plus power for courts to order the forfeiture of certain apparatus without initiating criminal proceedings and a limited power of arrest without warrant for the police in cases involving the illegal use of radio transmitters where a question of identity arises.

The Act also gives the Secretary of State power to restrict the sale and possession of specified wireless telegraphy equipment and related apparatus plus powers to carry out approval of equipment and to require marking of apparatus and the provision of specified information in advertisements.

So, about 10 years too late, we have some teeth in the law to apprehend the many illegal stations still operating in this country.

QRP Corner

A very interesting letter from **Dr Dave Dhuglas** GM4ELV of Brucefield Park, Glasgow, recites his achievements with QRP with his Argonaut 509 and a trapped dipole at 15m with a location height of 155m a.s.l. With just 5W he has worked 203 countries, 129 with 1W and 46 using just 0·5W. Most of his DX is worked using c.w. but to give an idea of his s.s.b. prowess he worked 9J2BO, TJ1AF, A1IR/VP2M, ZS6MK, CT0BI, A4XJQ, JY9TS (QSL WA3HUP), J28DX, ZY5EG (PY5EG), VE1, 2, 3 and W1, 2, 3, 4, 8 all on 21MHz. On 14MHz s.s.b. contacts included JW5NM. QSOs on 21MHz c.w. included UA9, UM8, UI8, VE, W and CN8. Dave found last year's conditions better than at present, when he worked 15 VK's against only one this year. He also comments on the lack of s.w.l. reports which he would welcome so keep an ear open for Dave on the QRP frequencies.

A reminder of the 14th Cray Valley RS SWL contest from 1800Z Saturday September 8 to 1800Z on the Sunday with up to 18 hours operating in that period. There are c.w. or telephony sections for single or multi-op entries on the 1·8 to 28MHz bands but excluding the new WARC bands. Log sheets from organiser Owen Cross G4DFI, 28 Garden Avenue, Bexleyheath, Kent DA7 4LF. Many QRP stations can be expected to be active on this occasion.

Advance notice of a QRP Convention run by the Yeovil ARC at Preston School, Monks Dale, Yeovil, with a lucky programme draw and running from 9am to 5pm on October 14. Light refreshments available with a pub close at hand. There will be a display of equipment and a junk stall with the club running two stations G3CMH and G8YEO. QRP presumably! More info from **Eric Godfrey** G3GC, Dorset Reach, 60 Chilton Grove, Yeovil.

Bill Stevenson G4KKI in Swinton, Manchester, has been off sick but managed to build a new transceiver for the 3·5MHz band using a direct conversion circuit for the receiver and a 2N3904 driver and BTF39 p.a. running 3W input. He has also managed to get up an outside wire 20m long which is a big improvement. He worked fellow contributor G4RAW and they have now set up a regular exchange of ideas by mail. Also worked were GI3PDN, G3NSA, GM3MXN, G2NJ, G8JR all using low power, plus LA5SAA who was running 600W: A session of kite flying after being able to get out and about again resulted in a QSO with G3HKR of Harrogate but by this time the 46m of wire was flat on the ground! Like me, Bill is interested in a source of balloons that can lift, say, 46m of fine wire plus safety line, and of the necessary gas cylinders. Anyone with any ideas?

Phil Dykes of Poole, Dorset, was pleased to see the start of this QRP Corner as this is his main interest. After 30 years of s.w.l.ing he is now G4XYX and runs a converted CB rig on the 28MHz band and a 7MHz one based on the *PW* "Severn" design of G3RJV. He admits problems getting on the air at first but working on the principle of "when in doubt make a cup of tea" he got going. On 28MHz a QSO with EA5CDK on s.s.b. resulted in the disappearance of Coronation Street on the XYL's TV! A dipole at the end of the garden solved that problem. Phil is virtually at sea level and only about 18m from the sea! Should make an excellent ground plane OM! The lack of G stations on 28MHz is due to the very short skip distance at that frequency but apart from that he has worked CE3HFI, EA8AMT, PY2ZJ with a solid 20 minute QSO, EA1CJJ, EA4CMF, HB9FT, Y27GL, CT1UP, DL8BH/HB0 and C30AAU (QSL F5HX), all with about 4W of s.s.b. Most stations worked were also using QRP. A jolly good start OM!

DX Corner

So far this month very few logs or reports to hand with the fine, hot weather to blame no doubt. Still, if you've all been out lending a hand at the various field day events then you are forgiven! **Marcus Walden** (Harrogate, N. Yorks) sends a log but say he is off to DL-land for a few weeks, staying with relatives, with no chance of any DXing. With his DX302 and a 20m-long wire in the attic he logged C30AAU in Andorra for a rare one on 3·5MHz, with A92P and 9H1ED plus 9K2BE on 7MHz. Not much on 14 ex-

cept A92DY, 3X4EX and 9Y4VU but much better on 21MHz finding CX5CQ, HC2AIR, KC7UU/5N6, OE8AJK/YK, TI2EY, YC0BYZ (QSL Box 96, Djakarta), 5B4MF, 5H3JR, and 5N8HEM. Only catch on the otherwise dead 28MHz band was DJ8BD/HB0!

In London W6 **Denis Norton** now has his 14AVQ multiband vertical antenna operative in addition to his 20m-long wire, with a Datong FL2 audio filter when the going gets rough. This time it's 14MHz only with A92NH, CR6GSE (QSL CT1MV), FM7WD, JYI otherwise King Hussein and QSL direct, J37AH, OD5VD (QSL Box 62, Groumana), VU2GI, VS5MK (QSL OD5GB), 6Y5AR, 9L1SL and 9Y4VU to finish with. I was pleased to have a personal QSO with Dennis recently and hope I have persuaded him to have a go for the RAE in the not so distant future.

Although Top Band tends to be deserted during the summer months, apart from NFD, there are still some interesting catches to be made if one is interested in building up the countries total. In New Malden, Surrey, 16-year-old **Robert Parsey** BRS85875 has a Trio 9R59D receiver fed from a quarter-wave horizontal wire at about 4·5m, plus an a.t.u. and managed to copy the following on 1·8MHz s.s.b.: OH1XX, OK1KRG, 4U1ITU, RQ2GHU, UZ6AWJ, UT4UO, UV9FM, EA5ET, EA6KP, PA0KHS, LX1FJ, LX1JX, I4ZUW, I2BBJ and UZ1NWD plus SP3IBS. A gotaway was a G5 operating in OH0.

With no more than a dipole intended for reception on f.m. Band II stuck to the wall and feeding a Hallicrafters SX140 **Michael Newell** of Kenilworth, Warks, does well to log such as CW0EEU, J6ABM, JD3CPR, OX1AA, T4TRF said to be in Cuba, 5B4JA and 9M2DF all on 14MHz s.s.b. Only catch of interest on 21MHz was YC2YBV, plus a few Canadians. Michael awaits the RAE results as do a few thousand others! He says he'll get his G1 licence and not worry about the code for the time being. Personally, I think this is wrong. It is much easier to learn the code while one is young and in the exam frame of mind, as I have remarked before. Michael has now left school and is out of work so he ought to have time available now to get the code cracked, as it were, and then he will be set up for life as far as amateur licences are concerned.

Club Time

By the time that this issue appears in print thoughts will be turning to the autumn and winter club activities and AGMs and the like. NOW is the time to let your committee know what YOU want to see in the way of events, RAE courses and code tuition at your club so that a decent programme can be drawn up well in advance, with copies to me for proper advance coverage in these columns.

308 ARC A big junk sale at St Mark's Church Hall, Church Hill Road, Surbiton, Surrey, is scheduled for Tuesday October 9 so make a note of this advance notice. Tea and coffee will be laid on so make the most of this bring-and-buy occasion. Otherwise meetings at the Coach House at the same location every Tuesday around 8pm, with code practice laid on. Contact is Dave Davis G6YQD, 13 Maple Road, Surbiton, Surrey.

Abergavenny & Nevill Hall ARC RAE courses start on Tuesday September 11 but for those who think they are ready for the RAE can register with the club which is a registered exam centre, with applications for the December '84, March and May '85 exams welcome. This December's exam registrations take place in September and October. Meetings and code tuition plus talks, etc., at the Pen-y-fal Hospital, above Male Ward 2 at 7.30 every Thursday according to sec Dave Jones GW3SSY, 80 Croesonen Parc, Abergavenny, Gwent, whose station photograph appears elsewhere.

Acton, Brentford & Chiswick ARC G3IIU The Chiswick Town Hall, High Road, Chiswick, London W4, sees a discussion on members' problems at 7.30 on Tuesday September 18, with new members and visitors most welcome. Hon. sec is W. G. Dyer G3GEH, 188 Gunnersbury Avenue, Acton, London W3.

Axe Vale ARC The AGM and the judging for the constructors trophy take place on November 2 so there is plenty of time to get that treasured project all polished up for the judges. September 7 has a talk about "Your RSGB" and I must tell you now of the chat about microwave matters on October 5. So, first Friday of the month at 7.30, the Cavalier, West Street, Axminster, with PRO Roger Jones G3YMK at 10 Oak Tree Close, Upottery, near Honiton, Devon, to answer any queries or try (0404) 86 468.

Banbury ARS Don't forget the DF hunts on both 1·8 and 144MHz during the summer generally on a Friday evening with details from G4DLB on (0295) 65492. Otherwise last Thursday for ordinary meetings at St Paul's Church Hall, Banbury. Sec is John Burrell G80ZH, 6 Blenheim Croft, Brackley, Northants on (0280) 702900.

Bangor & District ARS G13XRQ Next meeting is on Friday September 7 at 8pm, the Sands Hotel, which is on Bangor's seafront. A full and intersting series of events is promised for the coming season according to sec Stewart Mackay GI4OCK, 11 Dellmount Park, Bangor, Co. Down, and available also on Bangor 454049.

Basingstoke ARC G3TCR G8JYN AMTOR and packet radio is the theme on September 11 discussed by G3NRW, with the AGM on Tuesday October 9. Second Tuesday of the month finds the club at the Swan Inn, Sherbourne St John, Basingstoke, Hants, starting at 7.30pm. Hon sec is Eddie Thompson G4SQZ, 21 Wigmore Road, Tadley, B'stoke, Hants.

Biggin Hill ARC G4RQT G6TBH Don't overlook Louis Varney G5RV and his antennas on Tuesday September 18 at 8.30, St Mark's Church Hall, Church Road, Biggin Hill, Kent, nor forget the construction competition on October 16. So it seems to be the third Tuesday of the month. Ian Mitchell G4NSD, Greenway Cottage, Tatsfield, Westerham, Kent, is also on (09598) 376 and is the club's hon sec.

Braintree ARS G6BRH First and third Mondays, from 7.30, the B'tree Community Assoc. Centre, Victoria Street, with an informal junk sale during the first half-hour. On non-meeting Mondays a net is run from G6BRH on S15 (145·375MHz) around 8pm. It may not be too late to mention the Test Gear and Operational Aids evening on September 3, with practical demos, while the 17th could be about guns and clay pigeon shooting but this is provisional. Up-to-date info from Pat Taff G6TAF on (0376) 26487.

Bridgend & District ARC First important note is a change of venue to the YMCA, Angel Street, Bridgend, with meetings now on first Friday, a natter night, and third Friday, at 8.30pm. Secondly, the club's constitution comes up for review on September 7, so be there, or don't complain afterwards. Sec is Trevor Morgan GW4SML, 4 Rhin Tremaen, Brackla, Bridgend, Mid-Glamorgan.

Bury RS The Mosses Community Centre, Cecil Street, Bury, every Tuesday at 8, with the principal meeting being on the second Tuesday. "Remote inspection—Video v Photography" is the subject for September 11. Now is the time to note the constructional competition on October 9. A second edition of the club's magazine *Feedback* deals with the conversion of 27MHz CB rigs to the 10m f.m. band, especially sets with the 7137 synthesiser and LCL2740 and DNT M40 models. Copies from the club at the above address for £1·25 which includes p/p. PRO is Malcolm Pritchard G3VNQ, 56 Shelfield Lane, Norden, Rochdale, Lancs.

Carmarthen ARS Second and fourth Fridays at the West Wales Hospital Social Club, The Quay, C'marthen, but note the foxhunt starting at 1pm on Sunday September 16 dedicated to the memory of club chairman Allan GW3SWQ, now a silent key. Sec is Milly Meredith, 50 Caecoed, Llandbie, Ammanford, Dyfed.

Cheltenham ARA G5BK Fridays at the Stanton Room, Charlton Kings Library, C'ham, with a talk on vertical antennas by Alan Dick & Co on September 7, the 14th being a natter night. Gillian Harmsworth G6COH can help further, on C'ham 525162.

Cheshunt & District ARC G4ECT G6CRC Wednesdays at 8, Church Room, Church Lane, Wormley, with a junk sale on September 12, a natter night on the 19th, and a discussion chaired by G4OAA on the subject of a club project, on the 26th. The East Herts College at Turnford starts an RAE course in September with details from chairman Jim Sleight G3OJI on Ware 4316 who can also supply details of an RAE course due to start in the area about the same time. Jim can also fill in with details of the club, as can sec Roger Frisby G4OAA, 2 Westfield Road, Hoddesden, Herts, otherwise (0992) 464795.

Chester & District RS G3GIZ G8GIZ Tuesdays, except for the first in the month, at the Chester RU FC, Hare Lane, Vicars Cross, Chester, at 8pm with Morse code classes for half an hour beforehand by G4MOU. On September 11 G3EWZ will deal with h.f. antennas, and ATV will be the subject on the

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18th. Two video tapes will be shown on the 25th, the W5LFL space shuttle saga, and *Two Pioneers of Radio*. More from PRO Dave Hewitt G8ZRE, 31 Broadmead, Vicars Cross, Chester, or buzz (0244) 316673.

Chichester & District ARC First Tuesday and third Thursday in the Green Room of the Fernleigh Centre, 40 North Street, C'chester, at 7.30, with a club net on S11 on the 144MHz band Wednesdays at 7pm. September events include the running of special event station G2NM, commemorating that illustrious amateur, on Sunday the 9th, at the Chalk Pits Museum in the Radio Collection. Needless to say a special QSL card will be available for contacts or s.w.l. reports. The sec is C. Bryan G4EHG, Maxmanet, Salthill Road, Fishbourne, Chichester, or try C'chester 789587.

Colchester Radio Amateurs Second and fourth Thursdays at the Colchester Institute, Sheepen Road, C'chester, at 7.30 with visitors most welcome. The WAB Award will be the subject for September 20 and be advised of the AGM on October 4. More from sec F. R. Howe G3FIJ, 29 Kingswood Road, C'chester, otherwise (0206) 851189.

Cornish RC Meets at the Church Hall, Treleigh, on the old Redruth bypass, on the first Thursdays at 7.30 while the Computer Section makes it on the second Monday which is a change from previous arrangements. Thursday September 20 is down as a foxhunt. A new club net is on 144·247MHz s.s.b. Sunday mornings at 10.30. The sec is S. Rodda G4PEM, Cliff Hotel, Penrose Terrace, Penzance, Cornwall.

Coulsdon ATS G4FUR Seems to foregather second Mondays and last Thursdays at St Swithun's Church Hall, Grovelands Road, Purley, Surrey, at 8 sharp. September 10 is construction contest time with prizes for the best three entries, and there will be a morse code class on the 27th. Further info from sec Richard Goring G6VYT, 54 The Glade, Old Coulsdon, Surrey, or telephone him on Downland 54319.

Crawley ARC Normally meets at the Trinity Church Hall, Ifield, Crawley, or more informally at the QTH of a member but sec David Hill G4IQM can tell you more via Crawley 882641.

Dartford Heath DF Club Pre-hunt meetings Tuesdays at the Horse & Groom, Leyton Cross, Dartford Heath, Dartford, Kent, with the club participating in national d.f. hunts as well as its own events. Details of d.f. events including starting spots and frequencies from Peter G8DYF, the hunt organiser, on Greenhithe 844467.

Dudley ARC G4DAR Mondays at 7.45, the Allied Centre, Greenman Alley, off Tower Street, Dudley, with the latest info on activities available from Cheryl Wilding G4SQP on Codsall 5636.

Dunstable Down RC G4ARD G8DDC G4DDC Fridays at the Chews House, High Street South, Dunstable, Beds, at 8pm. RTTY, AMTOR and packet radio are subjects on September 14 courtesy G3NRW, with G4WYO divulging the secrets of colour offset printing on the 28th. Sunday September 23 the club will be participating in the National Car Boot Sale at the Shuttleworth Collection, Old Warden, Beds. Phill Morris G6EES is on D'stable 607623 with further info.

Edgware & District RS G3ASR Second and fourth Thursdays at 8pm, 145 Orange Hill Road, Burnt Oak, Edgware, Middx, with slow Morse practice at every meeting. On September 27 it's quiz time again, organised by G3PSP. Club net is on 1·875MHz at 10pm on Mondays, while G3ASR transmits slow Morse on both the 1·8MHz and 144MHz bands during the week. John Cobley G4RMD, 4 Briars Close, Hatfield, Middx, is the sec and also on Hatfield 64342.

Exeter RS Spectrum Communications will be demonstrating amateur gear on Monday September 10 at the Community Centre, St Davids Hill, Exeter, with more details from Roger Tipper G4KXR on (0392) 68065. The club's AGM is on Monday October 8, main meetings normally on second Mondays of the month.

Fareham & District ARC G3VEF G8KGI Wednesdays at 7.30, Porchester Community Centre, Westlands Grove, Portchester, Hants, with September 5 devoted to satellite communication and the 12th a natter and on-the-air night. The 19th has a talk on all-band antennas. Sec for details is Brian Davey G4ITG on Fareham 234904. Note that October 3 has an evening on v.h.f. propagation.

Farnborough & District RS Meets at the Railway Enthusiasts Club, Access Road, off Hawley Lane, Farnborough, Hants, second and fourth Wednesdays at 7.30. September 26 sees the judging at the annual constructional contest. Details from Peter Taylor G4MBZ, 12 Dunbar Road, Paddock Hill, Frimley, Camberley, Surrey.

Flight Refuelling ARS G4RFR G6SFR Meets every Sunday at 7.30 at FR Sports & Social Club Grounds, Merley, Wimborne, with visitors welcome at all meetings. September 2 is operating night, using the club's recently installed v.h.f. and h.f. antenna systems. The Sept 9 event is a v.h.f. foxhunt to be within walking distance of the club and its bar! For Sept 16 it's John Nelson G4FRX (of RSGB fame) on the uses and abuses of the 4CX250 valve—a must for all potential QRO linear constructors. With more Technical Rambles by G4WHO on September 23 that just about wraps up a packed month. Advance warning for October 7 when Chris Cartrum G4DGU is the guest lecturer, talking about how to access the h.f. bands on an FT-290R or similar v.h.f. multimode. Further details from Mike Owen now G4YTA on 0202 882271.

Fylde ARS First and third Tuesdays, the first gathering being a talk or suchlike, the second more informal for code classes and get-together, all at the Kite Club, Blackpool Airport, with the facilities of the club being available to members. The now famous Aerial Circus of G6CJ visits the club on September 4 in the shape of a video tape presentation, at 7.45. If I don't tell you now it will be too late, so note David Gregson talking on British Telecom, on October 2. Club sec is H. Fenton G8GG, 5 Cromer Road, Lytham St Annes or St Annes 725717.

Glenrothes & District ARC GM4GRC GM3ULG AGM on Sunday September 16 at 7.30pm, the Clubrooms, Provosts Land Centre, Leslie, Fife. New antennas and rotators for the v.h.f. and u.h.f. bands are being installed and the h.f. antennas overhauled. Both v.h.f. and h.f. stations should be operational again by now. Tuesday evenings see code tuition of classes at the Balwearie School. The club's ordinary meetings are on Wednesdays and Sundays. Details from R. Lamont GM4LYQ at the club QTH above.

Halifax & District ARS G2UG Third Tuesday of the month at 7.30, Running Man, Pellon Lane, Halifax, with the AGM slated for September 18 with visitors welcome at all meetings. PRO is G. M. Towned G4SDX, on (0422) 248542.

Hastings Electronics & RC G6HH G1HHH It's West Hill Community Centre, Croft Road, Hastings, third Wednesday for main meetings with the club room situated at Ashdown Farm Community Centre, Downey Close, off Harrow Lane, and just before the DOE, gathering on Fridays at 8. September's main meeting on the 19th will deal with repeaters and power supplies. A junk sale is on the cards for the October meeting. Dave Shirley G4NVQ is the sec and can be found on Hastings 420608.

Haverhill & District ARS Friday evenings but you'll have to contact sec Rob Proctor G4PZW on (0787) 281359 or 10 Hunts Hill, Glemsford, Sudbury, Suffolk, for precise details! However, I can tell you that the meeting in September is on h.f. band operating procedures.

Hornsea ARC G4EKT G6EKT Wednesdays at 7.30, The Mill, Mill House, Atwick Road, Hornsea, North Humberside, with lectures starting at 8, and there is participation in Raynet activities. Sec Norman Bedford G4NJP is on (0262) 73635. Big event on Sunday October 21 is a Radio, Computer and Electronics Exhibition organised by the club at the Floral Hall, Hornsea, starting at noon, with something promised for everyone including a junk sale and bring-and-buy sale.

Horsham ARC First Thursdays at 8pm, Guide HQ, Denne Road, Horsham, with a grand autumn junk sale on September 6. More from PRO Pete Head G4LKW on Horsham 64580.

Inverness ARC GM4TPF GM1DZU Thursday evenings at 7.30, Cameron Youth Club, Planefield Rd. Inverness, with a talk by GM3WOJ on September 6, subject not revealed. There is interest in the local RAYNET group. Your man is sec David Jones GM4SXD, on Farr (08083) 240.

Lincoln SW Club G5FZ G6COL Sunday September 23 is Lincoln Hamfest '84 time at the Lincolnshire Showground which is four miles north of the city on the A15 Scunthorpe road. The "do" is organised by the club and will have many attractions for everyone including a fairground, model aircraft display, bring-and-buy stalls and ample refreshments of all kinds. Otherwise the run-of-the-mill meetings are held at the City Engineers Club, Central Depot, Waterside South, Lincoln, with a chat on "Moxon Slopes" v.h.f. antennas by G3FDW on September 12. In general second and fourth Wednesdays at 8 and on other Weds it's c.w. classes and RAE course time. Contact Pam Rose G4STO at the above QTH for further info.

Manchester University ARS G3VUM G8FUM Special event station GB2MU will be run by the Students' Union from September 30 to October 5 with operation on as many bands as possible depending upon the manpower available. A separate exhibition devoted

to AR is planned plus a video show of AR activities. The society has its own shack in the Union working on most bands and modes with associated antennas on the roof. Informal meetings every Wednesday afternoon during term time with the shack open most lunchtimes, and to be found on the first floor of the Union building next to the main Debating Hall, with visitors always welcome. More from Khee Chan G5MUR, 20 Agnes Court, Wilmslow Road, Fallowfield, Manchester M14 6AJ.

Midland ARS As far as I know it still meets at 294a Broad Street, Birmingham, but there was talk of a move. Third Tuesday of the month with Mondays as construction evenings and the payoff is on September 19 when it's home-brew judging time. Make a note of the AGM on October 20 and don't say you weren't told! Contact is Tom Brady G8GAZ, 57 Green Lane, Great Barr, B'ham, or ring him on 021-357 1924.

Mid-Warwickshire ARS Second and fourth Tuesdays of the month, 61 Emscote Road, Warwick, with the secrets of metal detecting revealed on September 11 plus a great big junk sale on the 25th. Watch out for G3III on Air Navigation on October 9. Starting time is generally 8pm. Carol Finnes G4TIL is the sec, on Southam 4765.

Nene Valley RC G4NWZ G6GWZ Meets at the Dolben Arms, Finedon, near Wellingborough, Northants, Wednesdays with September topics including G3DOT on RSGB matters on the 12th and lecture by the County Emergency Planning Officer on the 26th, not forgetting the club's special event station at the Hinwick Hall Craft Fair on Sunday/Monday 23rd/24th. Contact Lionel Parker G4PLJ, 128 Northampton Road, Wellingborough, for latest info.

Newquay & District ARS G4ADV "Alternate" Wednesdays at the Drill Hall, Crantock Street, Newquay, at 7.30 which makes it September 12 for an end-of-season gathering followed by the first of a series of talks on the 26th, this time G3XC on test gear. Sec Andy Angove G6ZWI lives at 22 Bramble Close, Newquay, and is also N'quay 4285.

ARC of Nottingham G3EKW G6GW G8IUT Every Thursday at 7.30 the Sherwood Community Centre, Mansfield Road, Nottingham. A "Forum" on I know not what on September 6, a talk for beginners to AR on the 13th, a 144MHz band foxhunt on the 20th and a junk sale on the 27th, with another forum on October 4. More on club activity from Jim Towle G4PJZ, Hon Sec, 63 Digby Avenue, Mapperley, N'ham or N'ham 624764.

Oldham ARC has moved home and now meets in the Bunker, Derker Street, Oldham, on Monday evenings at 8.30 with visitors and potential members most welcome. Fiona Butterworth can give you much more info on the club's activities on 061-652 8862.

Robin Hood ARS Every Friday evening at 8pm, the White Hart Inn, Ollerton, Notts, with anyone interested in AR very welcome. Agenda info from Pete Buckmaster G6VGN, POB 1, New Ollerton, Newark, Notts.

Salop ARS G3SRT The Albert, Smithfield Road, Shrewsbury, every Thursday at 8. September 13 has the fourth and final d.f. foxhunt, with the RSGB film *Secret Listeners* on the 27th. Note now the AGM on October 11. Hon sec is Diana Parslow G4XBI, 1 Willington Close, Little Harlescott Lane, Shrewsbury.

South-East Derbyshire ARS Tuesdays during term time at SE D'shire College, Ilkeston Road, Heanor, at 7.30 with talks and discussions and usual club events which sec W. F. Peck G4VNB, 2 Sandfield Avenue, Ravenshead, Nottingham, will be glad to tell you about.

South Manchester RC G3FVA G3UHF G8SMR Friday evenings at the Sale Moor Community Centre, Sale, at 8pm with September highlight a junk sale on the 21st. More programme info from Dave Holland G3WFT, 32 Woodville Drive, Sale, Cheshire, or buzz 061-973 1837.

Stanford-Le-Hope & District ARC It's every Monday night at 8, St Joseph's Parish Rooms, Scratton Road, Stanford-Le-Hope, Essex. A fairly new club seeking new members. Jim Thompson G4OVG is sec and can be chatted to on S-L-Hope 642312.

Stockton & District RS Every Wednesday at 7.30, Billingham Community Centre, with Morse code classes from G4PVN and an RAE course under way run by G4DXP and G6DJO. A club c.w. contest is already in full swing and there is a 144MHz band award based on potal codes, available to all. John Walker G6NRY on (0642) 582578 with more info on club events, is secretary.

Stowmarket & District ARS New venue is the Maltings Entertainment Complex, opposite the railway station, first Mondays. First event I can inform you on is a talk on the work of the RNLI on October 1 and on Nov 5 its 2·4GHz (13cm) and 1·3 (23cm) time with how to get started on these bands, by G3ZQU. Club sec for more info is J. Lowe G8SCB, "Bulan", 35 Barking Road, Needham Market, Suffolk.

Street & District ARS First Tuesday at the Strode College where G3GC will talk on the how and why of antenna radiation patterns on September 4. November 6 has G6HTI holding forth on long-distance TV reception. Club sec is Colin Webber G4SCD available on (0458) 45145.

Todmorden & District ARS Queens Hotel, Todmorden, with the RSGB's *Secret Listeners* video show on October 1, that makes it the first Monday of the month. Fuller details of the club's activities from Janet Gamble G6MDB, 283 Halifax Road, Todmorden, Lancs.

Torbay ARS G3NJA G8NJA Every Friday night for informal meetings, at Bath Lane at the rear of 94 Belgrave Road, Torquay, with talks and the like on the last Saturday of the month, with G3OZ expected to give a chat on TV matters on September 29. No sec at the moment but Tony Rider, 7 Kingston Close, Kingskerswell, S. Devon, is holding the fort in the meantime.

Watford RC First and third Wednesdays, the Tudor Arms, Bushey Hill Lane, N. Watford, at 8pm. Event details from sec Gordon Clarke G8XXV, on 01-950 3611.

Welland Valley ARS G4WVR This brand-new group meets at the Welland Park College on Mondays at 7.15pm, with the first Monday intended to be the main meeting of each month. Alan Faint G4TZY is the chairman while Dave Lunn G3LSL on Market Harborough 880746 can handle club enquiries.

Wessex ARC Via my spies on *PW* I find that this club only came into being last June and is anxious to increase its membership. Meetings at the Cricketers in Wimborne, Dorset, at 8pm, with next meetings on September 4 and 18 but wouldn't rely upon it always being first and third Tuesdays. So contact Wendy Stacy on (0202) 822125 for latest news on the club's activities.

West Kent ARS Recent AGM has meant some new names on the committee and a new programme of forthcoming events can be expected shortly. In the meantime contact Jane Green G4UPI on Tunbridge Wells 28275 for current details.

Westmorland RS Re-formed last year and now meets at the Strickland Arms, Sizergh, near Kendal, Cumbria, at 8pm, on the second Tuesday of the month. The sec, to tell you of future happenings, is Frank Burrow G8BME on Sedgwick 60803.

Wimbledon & District RS Second and last Fridays of the month at St John's Ambulance HQ, 124 Kingston Road, Wimbledon, London SW19. Visitors and potential members are always assured of a good welcome. It's surplus equipment sale time again, on September 14, followed by a talk on kite flying by expert G8VCL on the 28th, and fill in the AGM in your diary for October 12. Always willing to help is sec Geoff Mellett G4MVS, 26 Paget Avenue, Sutton, Surrey, also on 01-644 8249.

Wirral ARS G3NWR First and third Wednesdays at 7.45 for a start at 8pm, the Guide Hut, Westbourne Road, West Kirby. Interesting debate on September 5 poses the proposition "CW—a dying art?" For my money the answer has got to be "No"! The result should be interesting. Take your problems along to the club on the 19th when all will be revealed. Your contact is Cedric Cawthorne G4KPY on 051-625 7311.

Wirral & District ARC G4MGR G8WDC Second and fourth Wednesdays at the Irby Cricket Club, Mill Hill Road, Irby, the clubhouse being just off the main Irby-Greasy Road. Club 144MHz band net is on 144·325MHz so not surprisingly the excellent club journal is entitled *"Airwave 325"*. Sunday September 9 is the fifth and final d.f. hunt of the season, and highlight is the equipment demo by Lowe Electronics on the 12th. Finally, inter-club quiz night with the Chester group, at Irby. Sec with all the info is Gerry Scott G8TRY, on 051-630 1393.

Dave Jones GW3SSY is hon secretary of the Abergavenny & Nevill Hall amateur radio club. The equipment comprises Heathkit HW8 and HW101, a Yaesu FT-480 for 144MHz and an FRG-7700 receiver for the h.f. bands

Wisbech Radio & Electronics Club G4PQL G8NED Meets at the Five Bells, Parsons Drove, Wisbech, "every other Thursday" but afraid I don't know which Thursdays that is in September. But it's at 7.30 when you do find out from Ken Stockley G4UQN on Wisbech 61029.

Worcester & District ARC September meetings I know of are on Monday 17th with an informal gathering at the Old Pheasant Inn, New Street, Worcester, with the AGM at the same spot on the 24th at 8pm. Some meetings are also held at the Odd-Fellows Club in the same street but the where's and when's from sec Alastair Lindsay G4NRD on Evesham 41508.

Yeovil ARC G3CMH G8YEO Thursdays at 7.30, the Recreation Centre, Chiltern Grove, Yeovil, with G3GC asking "are RST reports meaningful?" on September 6, and G3MYM showing how to wind your own coils on the 13th. Relax with a natter night on the 27th. Details of club matters from Eric Godfrey G3GC on (0935) 75533.

Chesham & District ARS ran special event station GB2SCC on Chesham Moor on the occasion of the Schools of Chesham Carnival. Visitor Ron G3NCL from the Chiltern RC is on the key while Shirley G4HES does the logging

Photo courtesy of G4UXA

There seems to be a trend developing for groups of clubs and societies to form local federations with a view to closer co-operation in matters of meeting dates, treasure hunts, competitions, field day events, quizzes and the like. According to Dave Davis G6YQD sec of the 308 ARC such a federation has already been formed in the Southend, Braintree and Colchester area of Essex and he is contacting his local clubs with the same aim, probably to be called the West London Federation of Radio Societies. I did suggest a while ago that clubs with the same meeting date might come on the air with the club station on a common frequency, probably on the 3·5MHz band and exchange news and ideas rather than just call at random.

MEDIUM WAVE BROADCAST BAND DX

by Charles Molloy G8BUS

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

Regular readers will know that it is the ionosphere, layers of rarified gas above the earth's surface, that is responsible for the DX we hear on the medium waves. After dark, signals travel upwards into the ionosphere and are bounced back a long way from the transmitter, well outside the normal service area. Why after dark? During the day the sun's radiation creates the lowest layer, the D layer at approximately 100km above the earth. This D layer absorbs medium wave signals so we have to wait until it is dark and the D layer disappears, before we can start DXing.

The higher, reflecting layers are also created by the sun and their ability to propagate DX depends on the amount of radiation received. When the sun is active then the higher short wave bands are favoured and reception on 26MHz comes into its own but m.w. DXing is poor. When the sun is quiet, the lower frequencies including the medium waves improve while reception at the h.f. end of the s.w. spectrum declines. There is a silver lining to every cloud!

The amount of radiation from the sun follows a cycle, from max to min and back again, of approx 11 years duration. The number of sunspots visible follows the same cycle. Many spots means an active sun, few spots a quiet one. At the moment we are in the run up to a sunspot minimum and the period m.w. DXers have been waiting for has arrived. Reception should soon be at its peak so if you want to try medium wave DXing, this is the time to start.

North America on the Medium Waves

Back in the early days of wireless, reception of North American m.w. stations in the UK was not considered unusual. Radio magazines of the day contained glowing reports from readers who not only picked up transatlantic DX but were even able to listen to the programmes. I have a copy of *Amateur Wireless* dated 1 November 1924 which devoted a full page to *A Great Night with WGY—The American Season Begins.* The letters WGY make up the callsign of a station in Schenectady in the State of New York. WGY is still on the air, currently on 810kHz with a power of 50kW but alas it is now a rarity. Why so?

Today's medium wave band is crowded with high powered stations and nowhere is the situation worse than in Europe. Fortunately some of them go off for the night. Also there must be a path of darkness right across the Atlantic and not just at our location before reception is possible so we start looking for DX around bed-time, when the band is relatively quiet and propagation is favourable.

At this time of year broadcasting in Newfoundland, which is the nearest part of Canada and no farther away than Egypt, ought to be audible by 2300UTC. Listen on 930kHz for St John's. This commercially operated station has the call letters CJYQ and uses the slogan "Q Radio" frequently. Like all broadcasters in North America it has a callsign, just like an amateur station.

How do we find 930kHz. Tune to the Belgian on 927kHz earlier in the evening and leave the dial set to 927kHz. When you switch on at 2300 the Belgian will have signed off for the night. You may then hear the letters SW in Morse (. . . — —), which is an aeronautical beacon in Eastern Europe operating exactly on 930kHz. Slow fading is normal for DX on the medium waves so stay on 930kHz for a few minutes if nothing is heard. The signal may peak up.

Once CJYQ is picked up and identified then try for CBNA St Anthony on 600kHz, CKYQ Grand Bank on 610, CKCM Grand Falls 620, CBGY Bonavista on 750. On a good night all may be heard; on a poor one, none. Propagation across the North Atlantic is changeable so do not be discouraged if success eludes you at first attempt. Once you do pick up North America you'll wonder how you missed them before. Next time we will look for DX from the United States.

Tape Recording for the DXer

It is not until you use a recorder as an aid to DXing on the medium waves that you realise how valuable it is. No longer is there a problem collecting material for a reception report—just playback the recording several times and pick out the items you want. If there are two stations on the same channel, each fading up and down then the recorder, unlike the human ear and brain, will accept both of them and you, at your leisure can select each in turn and often identify both. It is interesting to keep a library of your best catches to supplement or even substitute for a collection of QSLs and veries.

My first tape recorder was a Collaro Studio Deck which took 7in reels of tape. The recording had to be controlled manually, carefully watching the magic eye. Now I have a CR375 2-track mono cassette which has automatic level control, a counter and remote ON/OFF, though the recorder is small enough to go on the table beside the receiver, logbook and notepad. One advantage of a cassette is that you can protect recordings of rare DX from accidental erasure by removing the erase lock tabs at the rear.

If you are a headphone DXer and you should be if you are listening late at night, then it is very easy to hook on the recorder using a "Y" adaptor in the phone socket. Plug the phones into one outlet

and a lead going to the AUX input of the recorder into the other. On the DX160 which has a 6·3mm (¼in) phone socket I use a Tandy "Y" adaptor type 274-309. With the Hitachi d.f. portable which has a 3·5mm socket a Tandy 274-310 is appropriate.

You can record direct from the loudspeaker by using an external mic from the recorder and placing it in front of the set's loudspeaker. The optimum distance is found by trial and error. Although this method is frowned on I have found it adequate when DXing, as the signal is a long way removed from hi-fi. The disadvantage is that any background noise in the shack, such as a clock ticking, is also recorded.

It isn't difficult to fit a tape outlet to a receiver. All you have to do is to locate the volume control (audio gain) and tap on an isolating capacitor and screened lead. Figs. 1 and 2 show how to do it. Since the signal fed to a tape recorder depends on the setting of the volume control it may at times, especially when listening to a weak station, be too weak for the AUX input. If this happens feed it to the MIC input. Alternatively, tap the isolating capacitor onto the tag marked 3 in Fig. 2. The signal fed to the recorder will now be independent of the setting of the volume control but it will now have to be applied to the AUX input.

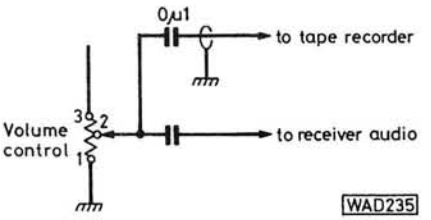


Fig. 1.

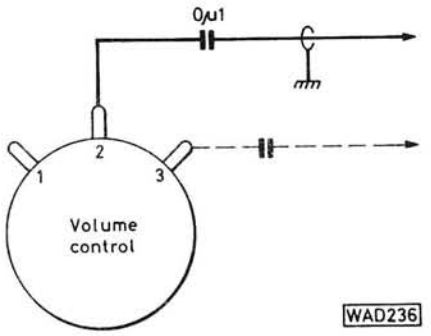


Fig. 2

DXing Local Radio

A trap dipole intended for the seven bands from 6MHz to 26MHz was picked up secondhand for £10 by reader **William Lee** who lives at Bosffordd in the Isle of Anglesey. When used without a balun on the medium waves it performed very well. Using a Trio 9R59DS receiver during the period 0700 to midday last July our reader picked up BBC Radios Cornwall on 630kHz, Leeds 774, Devon 855, Sheffield 1035, Derby 1116, Brighton 1485, Bristol 1548, Cumbria 756, Furness 837. IBA outlets heard were Devonair Radio on 666kHz, Two Counties Radio in Bournemouth 828, Plymouth Sound 1152, Radio Tay in Dundee 1161, Mercia Sound Coventry 1359, Radio Wyvern Worcester 1530.

Daytime DXing does require a good antenna as we are trying to pick up the ground wave and William's excellent log shows what can be done. After dark continental sky-wave QRM takes over and much of the DX will be swamped.

There is an alternative way of DXing local radio that does not require an outdoor antenna. During the changeover from day to night propagation, which extends for about an hour on either side of sunset, almost anything can be heard. Distant stations peak up while those much nearer can fade. This is the time to take advantage of the directional effect of the internal antenna of your portable or table receiver. If the stations lie in different directions then it should be possible to suppress, i.e. null out, each in turn by pointing the receiver at it.

SHORT WAVE BROADCAST BANDS

by Charles Molloy G8BUS

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

"I am no longer confused" writes **Dennis Starr** of Bletchley who is referring to the mix up between the Voice of Hope on 6·215MHz and the Voice of Peace on 6·240, reported in the July issue. After trying an add-on digital frequency meter (d.f.m.) with his Grundig Satellit 1100 Dennis has now gone all the way and bought a receiver with digital readout. "I would recommend everyone else to do the same even if it does mean going a little bit hungry." The new set is a Satellit 3400 which "is, I think, my ultimate DX set . . . it will take an external antenna on the medium waves . . . it will work on a battery pack which is much quieter than mains operation." Our reader's response to digital readout is similar to my own. When tuning round the bands my add-on d.f.m. indicates exactly where I am or at any rate to the nearest kHz. All the guesswork has gone and a new dimension has been added to short wave listening.

Digital Readout

Last December in this column I discussed the principles involved in connecting an external digital readout unit to a receiver and I described the set up at my QTH. Here I use a d.f.m. which has an offset of 455kHz and an l.e.d. (light emitting diode) display, with three sets, a BRT400, DX160 and DX150A. A number of readers who were having problems were prompted to write to me while in the meantime I have acquired a Timestep DFC42 counter which was supplied in kit form. This has a l.c.d. (liquid crystal display) and I have had the opportunity to compare it with the Honest Frequency Meter with l.e.d. display.

Radio frequency interference (r.f.i.) coming from the l.e.d. display and associated circuitry was a major source of trouble to some, especially if power was drawn from the receiver to run the d.f.m. A separate mains-derived 12 volt supply for the d.f.m. cured the problem with the BRT400 and DX160 but in the caravan, where the DX150A and d.f.m. are run from the same car battery, the noise was so bad on the medium waves that the d.f.m. had to be switched off before one could listen even to a local station. On the short waves r.f.i. was patchy, being absent on some parts of the spectrum but creating a weak but annoying mush on others.

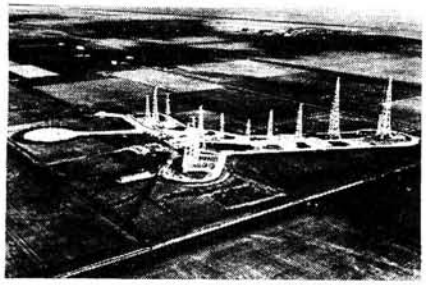
The Timestep unit with l.c. display cured the problem completely, even with the unit in a plastics box placed on top of the receiver and run from its stabilised power supply. The power consumption on the short and medium waves is so low that the display can be left on all the time the set is in use. A d.f.m. with liquid crystal display seems to be the one to use. The only drawback I could find was that the display is difficult to read in poor light but that is a small price to pay for the absence of r.f.i.

Whether to fit an external d.f.m. to an existing receiver is a matter of economics and individual choice but to anyone contemplating the purchase of a new set I cannot improve on the advice from our reader—get one with digital readout even if it means going a little bit hungry.

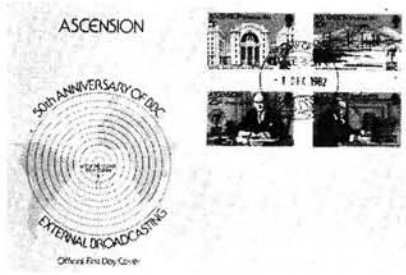
Goodbye to Old Friends

The end of an era came last June with the retirement of Helen and Clayton Howard, hosts of the *DX Party Line* programme. Aimed at DXers, it has been on the air for 22 years and comes from the missionary station HCJB, the Voice of the Andes, located at Quito in Ecuador. HCJB comes in well in the UK, the result of using high powered transmitters, directional antennas and a favourable location high in the Andes in South America.

It came as a surprise when Clayton announced that the next programme would be his last and as luck would have it I was unable to listen on the final night. *DX Party Line* will continue under its new guide John Beck. Although slanted towards DXing in the United States much of what is broadcast is of general interest. Listen on Monday and Saturday on 21·4775MHz or 17·790 or 15·295 at 2130UTC. There is also *ANDEX*, a short



Flevoland Transmitting Centre



First Day Cover sent in by Dave Williams

Farewell Card from HCJB

wave club founded by Clayton and sponsored by the station. Send two IRCs to Andex, Box 691, Quito, Ecuador for membership details. A full schedule of programmes and frequencies can be had from the same address.

Radio Netherlands

A programme information release from Holland takes a look at special events coming up on Radio Netherlands' English Section. The *Report Programme* aired Monday/Wednesday/Friday contains several interesting items. *Now what seems to be the trouble* examines diseases that threaten us all. *Pop Roundup* covers news from the Dutch pop music scene while of particular interest is *Operation Market Garden* which took place in the Netherlands during World War II and was the subject of the film *A Bridge Too Far*. The 40th anniversary of this event will be marked in the Netherlands between September 17 and 25. *Report* will be looking at the operation, its successes and failures, on Monday September 17.

A photo with the pamphlet shows an aerial view of the new short wave transmitter site at Flevoland, which will gradually take over from the present site at Lopik. The new site on Flevo Polder is six metres below sea level.

The current schedule, valid until September 29, quotes English to Europe on 5·955, 6·045, 11·930 and 15·560 at 0930 and 1330 and on 6·020 at 1830 while the African Service can usually be picked up in the UK on 17·605 and 15·560 at 2030, all times being UTC (GMT).

On the Bands

The following selection of broadcasts in English will be of interest to newcomers to short wave listening. All times are in UTC.

Swiss Radio International has a daily half-hour programme which is on the air several times. Listeners in Europe should try 9·535MHz, 6·165 or 3·895 (75m band) at 1100, 1315, 1520, 1845, 2145. The well known *Swiss Short Wave Merrygoround* run by the two Bobs is on the air on the second and fourth Saturday of the month.

Canada appears twice during the evening for half an hour on weekdays. At 1900 and 2000 on 21·695, 17·875, 15·235 direct from Canada and on 7·285 and 5·995 from the Daventry relay in the UK. Saturday and Sunday brings a one hour programme at 1900, the one on Sunday ending with the popular SWL Digest.

Have you heard Italy on the short waves? Probably not as the single daily transmission lasts only twenty minutes. Listen at 1935 on 7·275, 9·710 or 11·800 for a short news bulletin followed by a ten minute feature. On Tuesday and Thursday it is an Italian language lesson. Finland is on the air daily from 1830 to 1855 on 15·430, 11·755 and 6·120 with interesting programmes from the far north of Europe. *Starting Finnish*, a radio course for students of Finnish at elementary level, can be heard on Tuesdays.

Try Cairo for something different. Its English programme is aired daily from 2115 to 2245 on 9·805 and contains a varied selection of short features and music. Finally, have you tried the BBC World Service? It is on 5·975MHz in the 49 metre band 24 hours a day and comes in well at my QTH during the daytime.

Readers' Letters

"Is this a record?" asks **Stephen Higgins** of Hounslow who sent a reception report to the Voice of Nigeria on 24 July 1982 and received a QSL card on 29 April 1984. Well, they did reply! From Totnes in Devon comes a report from **Anthony Barrett** who uses a Realistic DX302 along with a 20 metre random wire and Muzuko a.t.u. Spanish Foreign Radio produced a very strong signal for him on 15·525MHz at 1800. Radio Korea was picked up on 15·575 at 2000. In Bootle Merseyside **Bob Evans** uses a Realistic DX200 with home-brew a.t.u. and 10 metre random wire. To his surprise the Voice of Kenya came in well on 15·420 from 1600 to 1700. To reader Dave Williams, thanks for the first day cover. If you send me your address I will return it.

VHF BANDS *by Ron Ham BRS15744*

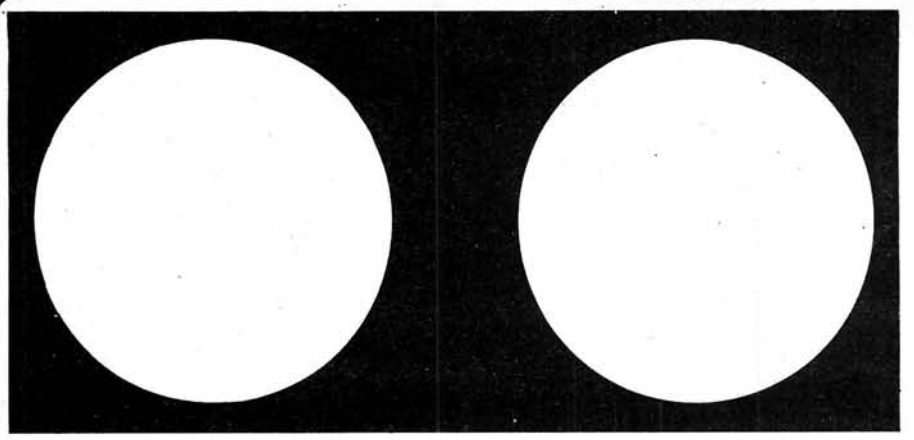
Reports to: Ron Ham BRS15744, Faraday, Greyfriars, Storrington, West Sussex RH20 4HE.

New rules for the 50MHz band in VK, European beacons and v.h.f. broadcast stations via sporadic-E, record membership for BARTG, a packet radio net and vintage wireless enthusiasts visit a museum, are among the main subjects to discuss from your letters this time.

Solar

"In June, so far, the only report of visible auroral activity has come from Robert Robotham, Ontario, who recorded homogeneous arcs and multiple rays between 0310 and 0430GMT on June 15 and 16," writes **Ron Livesey,** auroral coordinator for the British Astronomical Association. Ron tells me that there were minor magnetic storms on May 17 and 21 to 24 and that provisional data suggests stormy conditions on June 3, 10, 15, 16 and 18. This is very interesting because both **Cmdr. Henry Hatfield,** Sevenoaks and I recorded a major noise storm and two lesser ones on June 18, 19 and 23 respectively. Optically, **Patrick Moore,** Selsey, observed the sunspots on June 18 and 20, Figs. 1 and 2, which were no doubt responsible for the solar radio noise that Henry and I recorded at 136 and 143MHz respectively. Henry, using his spectrohelioscope, observed two sunspot groups, with about 10 spots on June 20 and three groups with between 6 and 10 spots on the 26th and July 6. The latter two were "very quiet" remarked Henry. Like Patrick, **Ted Waring,** Bristol, projects the sun's image through his telescope on to a white card. He counted 20 individual spots on June 15, 14 on the 25th, 14 on July 4 and 11 on the 10th.

A variety of forms, including blanks for sunspot drawing, are available from the London Solar Committee who publish a circular, *Solar News*, which is full of gen covering most aspects of solar observation. All details available by sending an s.a.e. to Bill Wooler, Stella Maris, Fyrsway, Fairlight, Hastings, East Sussex, TN35 4BG.



Figs. 1 and 2

The 50MHz (6m) band

"I have, for the month of June, about seven pages of 50MHz signals in my log book," writes **Dave Coggins,** Knutsford. He logged GB3SIX daily from the 10th to the 30th, via tropo and the Gibraltar beacon ZB2VHF on the 9th and the 30th by Sporadic-E. Among the stations in Dave's log are G2AOK, G3COJ, G3LTF, G3NOX, G3PWK, G3TCU, G3UGF, G3ZIG, G4BAO, G4CUT, G4IJE, G5KW, G6XM, GM3WCS, GM3ZBE, GM4FZH and GW4IIL/A, all received by c.w. or s.s.b using an FRG-7700 communications receiver, FRV-7700 converter and a wide-spaced 2-element Yagi.

"VK6 can use 50–54MHz a.m., c.w. and f.m. now, but with the segment 50·15 to 52MHz limited to s.s.b. and 100W output. Other VK states can use 50 to 50·15MHz from 1 January 1985", writes Graham Rogers VK6RO, Bunbury and adds, "the last Equinox, March–April, was about the best season we have had to Japan on 50MHz for the past 4 or 5 years with plenty of sporadic-E, assisted by F2 and TEP. It really was a superb season."

28MHz Beacons

"I think that this must be the scantiest 28MHz beacon log that I have sent in the past twenty or so months," writes **Norman Hyde** G2AIH, Epsom Downs, who adds, "I suppose that at this stage of the sunspot cycle this will be the pattern for the next few years." I hope not Norman, because when 28MHz is open it is a cracking good band and full of interest. "In general, bad conditions during the period of this log sheet (June)", writes **Chris van den Berg,** The Hague, but, like the rest of us, he was pleased to hear the Palma beacon EA6AU again. **Ted Owen,** Maldon, said that he found the 28MHz band almost dead on July 1, 2 and 12. "On July 13 the German beacons were nocturnal only," writes Ted Waring. Dave Coggins heard a new beacon PA0ITI around 28·301MHz on June 17 and reports that although most of the beacon signals he logged during June were via sporadic-E, he heard the Norwegian beacon LA5TEN, on the 18th, with a very long and slow QSB, which is typically tropo. Logs from **Bert Glass,** Chris van den Berg, Dave Coggins, **John Coulter,** Henry Hatfield, Norman Hyde, **Bill Kelly,** Ted Owen and Ted Waring, plus my own, were used to make up the monthly beacons heard chart, Fig. 3.

28MHz Satellites

In Winchester, John Coulter received signals from stations in England, East and West Germany, Iceland, Poland, Scotland, Sweden, the USA and the USSR working through the Russian satellites during the month prior to July 12. "On June 18, RS3A announced a satellite communications contest on the 23rd from 1700 to 1930 Moscow time," writes Chris van den Berg, who told me that this message came via the RS5 robot transmitter as did the "Welcome" message for contest participants. At 1540 on June 22, John received "VVV . . . Priwet, Uoastnikam Sorewnowanij na priz Vurnala Radio 73AR", or greetings to participants in contest for Vurnala radio prize. Around 1522 on July 12, John heard F9EA tell F9IO, through one of the RS satellites, that RS6 was not working.

Bill Kelly logged European and Russian stations working through the Russian satellites at 1825 on June 15, 1545 on the 17th and orbital data from various Radio Sputniks at 1825 on the 15th, 0450 on the 16th, 1545 on the 17th, 1848 on the 21st and 0530 on the 24th. "The RS1 or 2, the never dying old soldier, regularly shows up on 29·402MHz, for instance, on July 6 from 1200 to 1214 it was still giving the group 5015 several times followed by 55, without transponder traffic," says Chris. He raises the following question: "During the passing of RS7 on July 9, the robot continuously transmitted the group DZDD OE 9. There was no separation so it was impossible to see where the group begins every sequence, for instance, OE9DZDD is possible." Any ideas readers? I copied orbital data on 29·331MHz at 0055 on July 6, but not being a c.w. expert like Bill, Chris and John, I used the c.w. section of my Tono Theta 550 communications terminal to read the signals, which proves, that with one of the Morse code readers now on the market such signals are no longer a barrier to radio enthusiasts who are not familiar with the art of c.w. operating.

Sporadic-E

During a sporadic-E disturbance at 1920 on June 17, I counted 27 very strong signals from East European broadcast stations between 66 and 73MHz, and 8 at 1710 on the 22nd. New readers often ask about these signals and want to know why they are mainly reported during the mid-summer months. Well, obviously these transmitters are on the air in their own countries every day and cannot be heard, thousands of kilometres away, in the UK. But, when the E layer of the earth's ionosphere is disturbed, it is not unusual for signals between 30 and 100MHz to travel more than 3500km while the abnormal conditions prevail. Around 20 such stations were counted during the late afternoon of the 25th, the early mornings of the 26th and 27th and up to 39 and 45 respectively around 1830 on the 29th and 30th. "June 17 was interesting", writes **Harold Brodribb,** St Leonards on Sea, who heard the sporadic-E ebb and flow during the day. At 1010 he logged 8 broadcast stations between 66 and 73MHz, up to 41 at 1135 and some of those were interfering with each other, down again to 6 at 1440 and a final count of 17 at 1830 before the event ended. Harold counted 31 at 1100 on the 18th and among the 11 he heard at 1900 on the 29th, were some Russians and one "was very loud" said Harold.

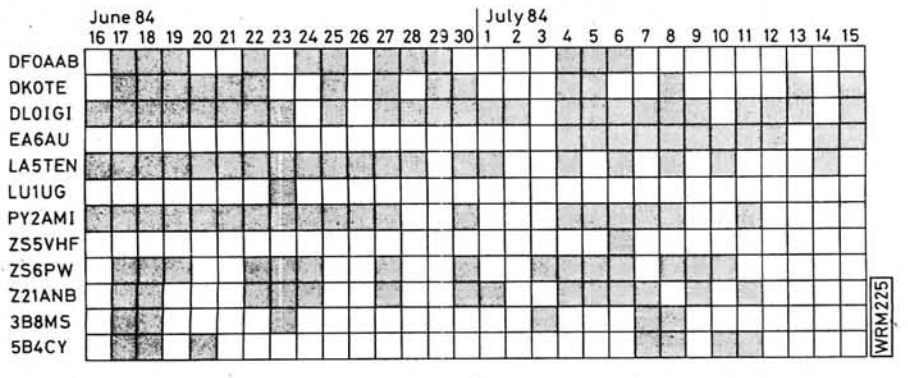


Fig. 3

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TRANSISTOR BARGAINS

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WHO IS TIMOTHY EDWARDS? He's 32, licenced for 14 years, was a senior design engineer at Pye Telecomm and now works full-time for Timestep. He's also responsible at Timestep for designing the synthesizers and down convertors for British Telecom used on the current ECS satellite system. He also specified and uses our new Spectrum analiser and signal generators costing over £40,000. Now you can see why our amateur modules always work properly and have full meaningful specifications..

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Access

"On June 7 we were setting up the station ready for the *PW* QRP contest and at 0830GMT we heard 9H1BT calling with a 59 signal," writes **D. N. Cousins** G4WBB, Rotherham. He took his turn along with G4RVR/P and G4RVS/P to work the Maltese station. "We were using an FT-290R with 2½ watts to a 12-element ZL beam," said a delighted G4WBB having made his first ever QSO via sporadic-E.

Tropospheric

The atmospheric pressure, measured at my QTH with a Short and Mason barograph, began this period on June 16, high, at 30·2in (1022mb), just where v.h.f. operators like to see it. After a peak around 30·4 (1029) on the 18th and 19th the pressure settled between 30 and 30·1 (1015–1019) from midnight on the 20th to 1800 on July 2, when it rose to average around 30·4 from 2000 on the 3rd to 1600 on the 5th. Over the following three days it slowly fell to 29·9 (1012) and my barograph then drew a straight line at this level until the 15th, when this month's report ended.

During one of the tropo openings, within the period, at 0825 on July 8, I received strong signals from PE1GBP in QSO with G6LGW, Canvey Island and PE0IMU working G8UVM, Amersham, via the Antwerp 144MHz repeater ON0AR on R8. Many repeaters were accessible on most channels around that time and by what I could hear, the vhf operators were making the most of it.

Those of you who look for the many beacons now active on the 144MHz band, may like to know that the ex-RAF mechanical keyer used at the RSGB's first beacon, GB3VHF at Wrotham in the early 1960s, is now on display in the radio building at the Chalk Pits Museum, Amberley, Sussex.

This year's VHF NFD contest was held over the weekend July 7/8 and as usual band conditions during the event were reasonably normal. During the 24 hour setting-up period members of the Flight Refuelling ARS, located 218m a.s.l. on the Purbeck Hills in Dorset (YK30e), observed a large scale temperature inversion along the English Channel, accompanied by considerable v.h.f. and u.h.f. tropospheric ducting. Unfortunately this excellent system had completely disappeared by the start of the contest and did not re-appear until some 3 hours after the event had finished! Nonetheless the club managed to improve on the results of last year with all four of its stations operating on 70, 144, 430 and 1296MHz.

On 70MHz the callsign G3PFM/P managed to contact 81 stations during the 8 hour c.w. only period and 122 stations in the corresponding telephony only section. The recently constructed single stage 4CX250B amplifier and 12-element NBS Yagi seemed to be quite effective with best DX being GM4PHG/P at 595km.

On 144MHz G4RFR/P worked 617 stations in 65 QTH locator squares, including 8 contacts into Spain. Best DX on this band was EA1BLA at 920km. Several UK stations worked EA8 on the Canary Islands during the contest on both 144 and 430MHz, probably creating new tropo DX records in the process.

G4VQP/P had a lively time working 322 stations in 43 squares and a best DX in the form of EB1MS/P in XC square, some 898km. This contact was made using 4 × 24-element quad loop Yagis, a "shack" mounted MuTek bipolar preamp (the GaAs f.e.t. unfortunately having become an early casualty) and another recently constructed item, a twin 4CX-150 K2RIW full legal linear.

Up on 1296MHz G4WHO/P managed to double the 1983 score, mainly due to the new antenna system which comprised 8 × 49-element quad loop Yagis. The 30W single 2C39 cavity p.a. and barefoot Microwave Modules transverter resulted in the station making 76 contacts throughout the UK and Europe, the best DX being F6CIS in ZD square at 818km. This station was either extremely QRO or more probably being assisted by early morning tropo ducting as reports of 5/9+ were exchanged with the Frenchman's signal only dropping to 5/2 off the back of the 400-element antenna array.

The full blown contest groups were also out in force for NFD, although the "East Coast Phenomenon" seemed to be only in evidence on the two higher frequency bands. However, this being said the Sheppey Combined Group apparently worked over 800 stations on 144MHz and an incredible 600 plus on 430MHz together with in excess of 200 QSOs on 1296MHz.

Band II

After hearing a lot of activity on 27MHz at 1415 on June 17, **Damien Read,** Newport, switched on his Amstrad 8090 and found Band II packed with stations, some from such countries as Italy, Spain and Yugoslavia. This was due to an extensive sporadic-E. During the event, **Andrew Guy,** also from Newport, reported hearing stations from Germany and Greece as well as those that you heard Damien. I bet the telephone lines were active between Andrew and Damien on that day. Andrew uses a Crown SMC 6300 receiver and reports hearing similar signals during an opening on the 30th and asks if anyone can identify the station around 99·6MHz that kept playing Bonnie Tyler music while the event was in progress. At 1325, **Simon Hamer,** New Radnor, heard the tune *Tiptoe Through The Tulips* followed by the Zagreb ID for their news at 1330 from JRT, Yugoslavia. "During the good openings which we had in the first 2 weeks or so of June, I logged many stations on my Philips ART20 including France, Germany and Spain," writes Dave Coggins who remarked, "I listened to music in stereo from France and Italy and was amazed at their strengths." Typical of sporadic-E Dave.

On July 7, Simon Hamer took a receiver on a railway excursion from Llandrindod Wells to Paignton and between 1030 and 1727 he heard CBC Cardiff, Gwent BC, BBC Radio Gwent, Devonair Radio, BBC Radio Devon and 2CR Bournemouth. Talking of Radio Gwent, Damien received a descriptive engineering information leaflet from the BBC showing the service areas for Radio Gwent on 95·1MHz, Blaenavon and 103MHz Christchurch. The antenna polarisation for these transmitters is vertical and mixed respectively.

"Conditions on Band II so far this month (July) have been the best for years," writes **Leo Nolan,** Athlone, Eire. While using his car radio on July 1, Leo heard French, Italian and Spanish stations and on the 4th, he connected a 6-element Yagi to his Hitachi TRK8000 and logged BBC Radios Cumbria, Cymru, Lancashire, Northern Ireland and Scotland and Red Rose and Manx Radio. Just shows what a good antenna and a lift will do Leo, you sure had a good haul.

RTTY

"Because of the upsurge of interest in Packet Radio, a net has been formed to help stimulate further interest in the mode," writes **Trevor Tugwell** G6TJT, Stevenage, who tells me that the net is held every Monday at 2000 on 144·675MHz f.m. and covers the counties of Bedfordshire, Hertfordshire and north London. "At present all participants are using the BBC model B microcomputer and have been achieving excellent results with 300 baud Packet transmissions at distances up to 80km," says Trevor and adds, "we welcome call-ins from other BBC users or indeed anyone with an interest in Packet regardless of which micro they have".

Pete Lincoln, Aldershot, concentrated his RTTY listening to evenings during the month prior to July 14 and copied several stations in the USA and CE3CEW on most nights. "I have received CE3CEW very strongly ever since I started RTTY in 1981," writes Peter, who also logged PYs in local QSOs, EL7W working into the USSR and TG9VT in QSO with GI. During the daytime, Peter noted that the European stations were dominated by Italians. RTTY seems to be very popular with the Italian amateurs Peter, Norman Jennings from Rye commented on this a few months ago.

Between June 16 and July 15, I logged RTTY stations from 31 call areas, CN, CT, DK, DL, EA, F, G, HA, HV, HB9, I, IT9, LX, OE, OH, OK, OZ, SM, TI, UT, UZ, VE, Ws 3, 4, 8, 9 and 0, XE, YV, Y39 and ZK on the 14MHz band, around 14·090MHz and a single PY on the 21MHz band, around 21·090MHz. Among the specials I copied were OH6CN who signed off his QSO with a large "73" made up of 7-character-high zeroes at 1010 on July 4, and ZK1CG from Cook Island, a first for me, at 0810 on the 3rd.

"The big news this time is that our membership level has smashed all previous records," writes **Stuart Dodson** G3PPD, Chairman of BARTG in the impressive summer issue of their journal *Datacom*. He continues, "In the last few years, the level has oscillated around the 1000 mark, with a total of 1170 at the end of December 1983. Then, in the Spring of this year, we decided to make an all-out effort to publicise the activities of the group and to tell the world that although we are called the "Teleprinter" group, we do in fact cater for computer enthusiasts as well. And, sticking our necks out, we announced our aim to increase the membership to 2000 by the end of 1984. Well, the effect has been simply incredible! Our membership secretary, John Beedie G6MOK and his wife Pat G6MOJ, have been literally snowed under with applications to join. So much so that the membership has now (May 31st), risen to an all-time high of 1808, representing an increase of 638 members, or 54 per cent, in just five months!" Many congratulations to all concerned Stuart, we look forward to hearing more of your progress.

The group's news bulletins are transmitted in RTTY on the first and third Sundays of each month and news items and reception reports are welcomed by Ken Young G3ZCG, 12 The Grange, Cubbington, Leamington Spa, Warks CV32 7LE. These bulletins can be heard at 1200, 1330 and 1900 on 3·590MHz and 0730, 1530 and 1900 on 14·090MHz beamed from Scotland to VK/ZL, the Far East and the USA respectively. Full details and for the times and beam headings for the transmissions on 144·600MHz are available from Ken, but don't forget the s.a.e. lads and lasses.

Tailpiece

During the weekend of July 7th and 8th, the Chichester and District Amateur Radio Club put on their usual display of amateur radio, sound and vision, in the Priory Church as their contribution to the annual Chichester Gala. In previous years, the club station using the callsign GB2CHI has made contacts around the world from the church as shown by the collection of QSL cards including one from a Russian s.w.l. they received in 1981. The exhibition station included demonstrations of AMTOR, RTTY and FSTV.

Members of the British Vintage Wireless Society entertained about forty overseas visitors, mainly from the American Antique Wireless Association at the Chalk Pits Museum on June 18. Among the American guests were

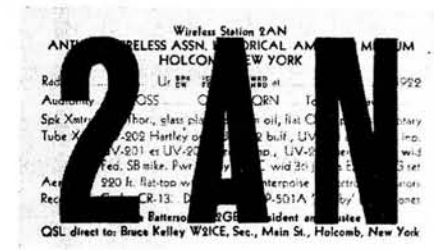


Fig. 4

KA3MUO, K0SVJ, K3ZJW, W2BJI, W2GK, W2GOE, W2KE, W4GYE, W4JT and W4JY who held the call 7JY in 1928 and was delighted to find reference to this in an early American callbook in the museum's library. Several of the stateside old timers remembered working G2YL, G6YL and G2NM, and were fascinated by the museum's tribute to these amateurs in the form of a vintage shack. This was made very clear by Bruce Kelly W2ICE, President, Editor and Curator for the AWA who gave the museum one of their QSL cards, Fig. 4. Bruce was licensed in 1929 and *still* works some DX, but now devotes most of his time to amateur radio history and the AWA museum. G6ACA, G6GLN and PA0NGR were among the BVWS members who helped give the Americans a memorable time.

TELEVISION *by Ron Ham BRS15744*

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

Adverts from Hungary, bull fights, a documentary on Gibraltar, horse racing and a talent competition from Spain, cartoons from Russia, football from Italy, Portugal, Spain and the USSR and news and weather from Czechoslovakia, Italy, Poland and Russia (Figs. 1 and 2) are among the items of television entertainment seen by readers during the sporadic-E disturbances in June and early July.

Sporadic-E

"Ever since I was 12, when I first started reading *PW*, I have been fascinated by the DXTV reports", writes **Chris Howles,** Lichfield, who has now left school and is a Technician Apprentice with a television rental company. Chris is now a DXer himself with a Plustron TVR5D, a 4-element array for Band I, and a pair of Triax grid antennas for u.h.f.

"I am interested in getting in contact with other TVDXers, especially in my area", says Chris, so there you are readers, drop him a line at 26 Rocklands Crescent, Lichfield, Staffs WS13 6DH.

His report of countries received in Band I, via sporadic-E, for June is included along with those of **Tim Anderson,** Bexhill-on-Sea, **Mike Bennett,** Slough, **Harold Brodribb,** St Leonards-on-Sea, **Keith Chaplin,** Leicester, **Simon Hamer,** New Radnor, **Owen Jones,** Blurton and **Tony Palfreyman,** Sheffield, in Fig. 14.

"Looking back to the first part of the season, May 21 to June 12, it was a lot more dramatic than of late. Openings lasted all day with many signals in strong colour, even on a dipole, but since then, until early July, the openings have been generally much shorter and not so strong," writes Tim Anderson. He adds an interesting point, "Some of the short openings, 3 or 4 minutes, have produced some surprises, TVR Rumania in colour and EPT Greece for the first time." Too true Tim, some good stuff can be seen during these short life bursts, which occur more often in the winter.

I have noticed some limited frequency events, for instance, a test card from Norway, Norge Melhus, with digital clock showing 0931, on Ch. E2 48·25MHz, at 0831 on July 13 and at 0750 on the 14th the only DX signal was from the USSR on Ch. R2 59·25MHz. During this latter event I saw the captions EEST-1 and KOHTUMISENI followed by one of the TSS, Televidenie Sovietskovo Soiuza, colour electronic test cards. Early on June 18 I received strong colour test cards from TV1 Sverige on Chs. E2 and E3 55·25MHz and from Norge Melhus and Hemnes on E2 and E3 respectively, at midday on the 21st. Scandinavian signals seem to appear when all is quiet in the eastern European and USSR directions, so it is worth keeping your beams in that direction when Band I is quiet from the DX point of view.

"One thing that has puzzled me since I started TVDX three years ago is the caption EPP which I have seen several times" says Tim, who saw it last at 2003 on May 30 floating over an Italian RAI picture on Ch. 1A 53·75MHz. Another reader Mike Bennett would like to know more about the caption ERP. Any ideas readers?

"On June 24, **Bert Mills** GW3LJP and I watched football from TSS on Ch. R2 while looking at some cows over a fence" writes **Simon Hamer,** who is a farmer and was trying out his new Hitachi 2300 receiver, out portable, with its own telescopic antenna. Among the programmes Simon received in June were an Audi Car Competition from Germany, a nature film from Italy, a documentary about Gibraltar and an episode of *Knight Rider* from Spain and football, Portugal v Rumania from Portugal and Spain v W. Germany from Spain.

The sporadic-E events we are talking about this time manifested for varying periods on June 17 and except for the 26th, daily until the 30th and then again on July 5, 6, 8, 9, 13 and 14. Among the captions positively identified on these days by readers listed in Fig. 14 are ARD, CST, DR, dt, EPT, HOBOCTON, JRT, MTV TV REKLAM, NRK, ORF FS1, PRAHA, PSKK, PTT-SRG1, RAI, RS-KH, RTP Fig. 4, RTV1 LJUBLJANA, SR, SR1TV BRATISLAVA, TSS, TVE, TVP, TVR BUCCURESTI,


Fig. 1


Fig. 2


Fig. 3

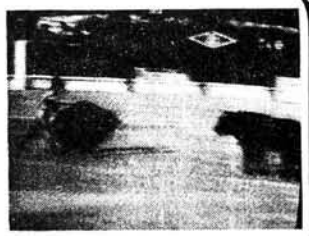


Fig. 4

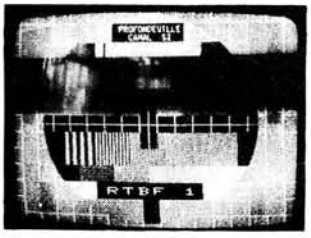


Fig. 5

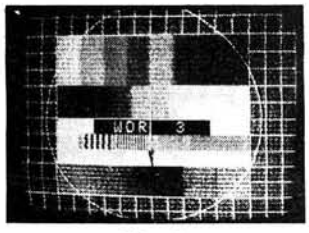


Fig. 6

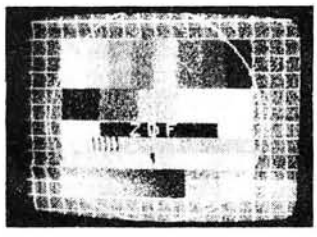


Fig. 7

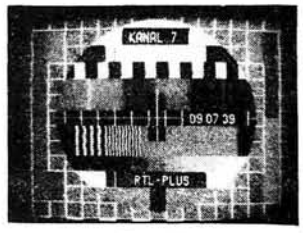


Fig. 8


Fig. 9

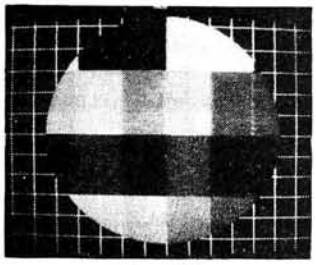


Fig. 10


Fig. 11


Fig. 12

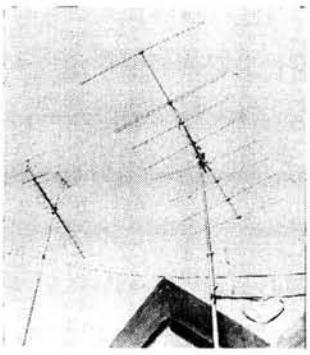
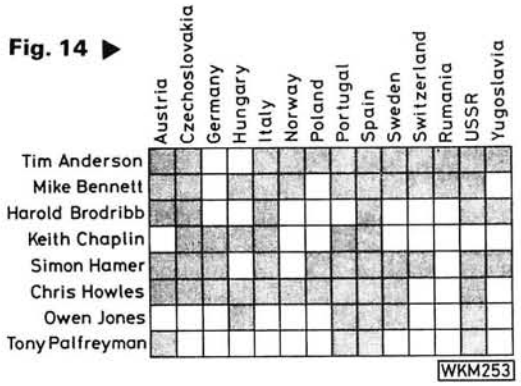


Fig. 13

Fig. 14 ▶



TV1 SVERIGE, UGALA VANALINNA STUDIOS, YLE and ZDF. The regional test cards from Norway Bremanger, Gamlemsveten, Gulen, Hemnes, Melhus and Steigen and captions from Spain Aitana, Gamonterio, Santiago, and TV Espaniola were also seen. On June 30 I saw a YL announcer with the caption SOBOTA to her left and Harold saw a news reader with the words NOVAKY BELA, both on Ch. R1. As usual your letters were comprehensive about the events and the programmes you list are ballet, boxing, bull-fights Fig. 4, English drama, football, horse racing, films about Lady Astor and Jane Eyre, a jazz concert, motor car and motor cycle racing, news, opera and adverts from TV Reklam. To sum up I would say that a most enjoyable time was had by all and newcomers to TVDX will know what to expect when a sporadic-E disturbance plays havoc with the television signals in Band I.

Tropospheric

On June 17 **Mike Evans** received pictures from Radio Bremen on Ch. 22 and NDR from Osnabruck in colour on Ch. 56. For several days prior to the 21st, Mike reports good tropo conditions when he received test cards in colour from Belgium RTBF 1 Profondeville, Fig. 5, on Ch. 52 and Nederlands 1 and 2 on Chs. 32 and 29. For u.h.f. reception Mike uses a scan-tunable National Panasonic receiver and a 91-element Fuba antenna. He also received colour test cards from the German stations WDR 3 and ZDF, Figs. 6 and 7 on June 10. Harold Brodribb saw the caption TDF-CENEX-BCU on Ch. 28 at 0815 on the 16th and more French stations on Chs. 51 and 54 at 1450 on the 25th and Chs. 34, 48, 51 and 54 between 0810 and 1400 on July 11. While **Chris Howles** was at Neil Cattliff's house, using a JVC CX610 and Antiference XG21 antenna, they received pictures from Anglia TV on Ch. 52, watched an English film from Holland on Ch. 34 and a Dutch choir on Ch. 30, all in good colour. From Leicester on July 8, **Keith Chaplin** observed a perfect, noise-free, colour picture from Crystal·Palace and a fair colour picture from TVS Rowridge on u.h.f. and on June 24, **Simon Hamer** enjoyed European football from Radio Telefis Eireann, RTE 2 and a noise-free picture from Winter Hill over 160km away, using his Hitachi 2300 receiver with its own telescopic antenna. From his new QTH in Bexhill-on-Sea, Tim Anderson only needs a slight lift to see three French stations, RTL on Ch. 7, Fig. 8, Canal Plus from Paris, Fig. 9 and the test card from Rouen, Fig. 10.

Early on June 26 and 27, I logged a Belgian test card RTBF 1 on Ch. 8 and BRT TV1 on Ch. E10 at 0932 on July 6. Dutch and Belgian test cards were again seen on Chs. E5 and E10 respectively at 0832 on the 8th. There were several occasions between June 17 and July 14 when weather conditions were right for a tropospheric opening, but sadly, it did not always take place, or at least, not to the degree expected.

SSTV

On June 23, **Richard Thurlow** G3WW, March, had two-way SSTV QSOs with I5HOR and members of the USA 1800GMT SSTV Net, W1JKF, W4OVX, W4CVS and W4TUQ using his new Robot 450C colour converter. Richard swapped 16 second monochrome pictures, via his Volker Wrasse SC-1 converter, with DL5GR, GM4TXX, I0UVP, K2ODC, LZ2OV, YU2NX and YZ2RVI and his signals were also received by SP6BNG who has monitoring equipment only. Earlier in the month, Richard made two-way QSOs with stations in Finland, France, Germany, Italy, Spain and the UK. After exchanging 2 × 24 second single-frame colour pictures, SC-1 to SC-1, with I2CEL during the morning of July 8. Richard was called by DA3ZE and for half an hour, they swapped both 12 second and 72 second colour pictures on 14MHz. Richard replayed one of I2CEL's pictures to DA3ZE who told him that he has had so far, 30 two-way 12 second colour QSOs.

"SSTV has been quiet for me," writes **Peter Lincoln** on July 14, although he did log signals from a few German stations including DJ0GF a regular, several Gs and fellow contributor Richard Thurlow. Earlier in the year Peter received SSTV pictures from F6CLZ calling CQ, Fig. 11 and a PY2, Fig. 12, working into Spain.

Station Reports

"There was an excellent tropo opening on July 1" writes **Major Rana Roy,** India, who watched Rawalpindi TV on Ch. 8 in Band III from 2100 to 2300 and Jaipur TV, on Ch. 5, from 1900 to 2045. Rana has a Crown receiver fed with an 8-element Yagi for Band I and on a separate mast, Fig. 13, he has 18-element and 3-element arrays for Band III. Masthead pre-amplifiers are used and at the set end he has fitted an antenna selector switch.

Swap Spot

Have Satellit 3400, still under guarantee, as new, any examination, digital all bands, quartz clock, etc., a superb RX. Would exchange for like-new FRG-7700 or similar with possible cash adjustment. Lane, 19 Smugglers Way, Birchington, Kent. *V793*

Have Interceptor TC300 f.m. CB plus Casio VL tone mini organ, plus C-Scope TR400 metal detector plus Daiwa SR9 144MHz receiver. All as new. Would exchange for 144MHz TX/RX. Tel: 0532 56742 after 4.30pm (Leeds). *V800*

Have SMC Oscar CB, Persuader mag-mount antenna, power pack and leads, unused. Would exchange for martial arts paraphernalia (uniforms, books, weapons, training equipment) or serious offers. Matt. Tel: 0908 312035 evenings. (Licensed MAC student). *V801*

Have Anas Acuta sea kayak ex-1980 Icelandic expedition, fully equipped hatches, lendal blades, Neoprene spraydeck, flares, bilge pump, painters, etc., in v.g.c., worth £400. Would exchange for FT-101, FT-102 or similar w.h.y. Tel: Smallburgh 877 anytime. *V819*

Have Chinon CE4 f1·7 auto/manual s.l.r. 50mm, 28mm, 100-200mm zoom telephoto, Chinon double flash gun power winder, leather shoulder bag. Would exchange for h.f. TX/RX or separates. Bob Field G4JQJ, 37 Cotswold Avenue, Rayleigh SS6 8AW. Tel: Rayleigh 77998 (evenings). *V868*

Have BBC-B DFS fitted plus Microvitec high res monitor plus tape recorder, all three months old. Would exchange for FT-101ZD or any h.f. transistorised 1·8—28MHz TX/RX. R. Wallace, 44 Kilmein Ave., Patna, Ayrshire. Tel: Patna 531657. *V869*

Have 3m C craft inflatable 5-man boat and engine, very good condition. Would exchange for FT-707 with p.s.u. or similar. V. Waite, 19 Recreation Road, Wargrave RG10 8BG. *V893*

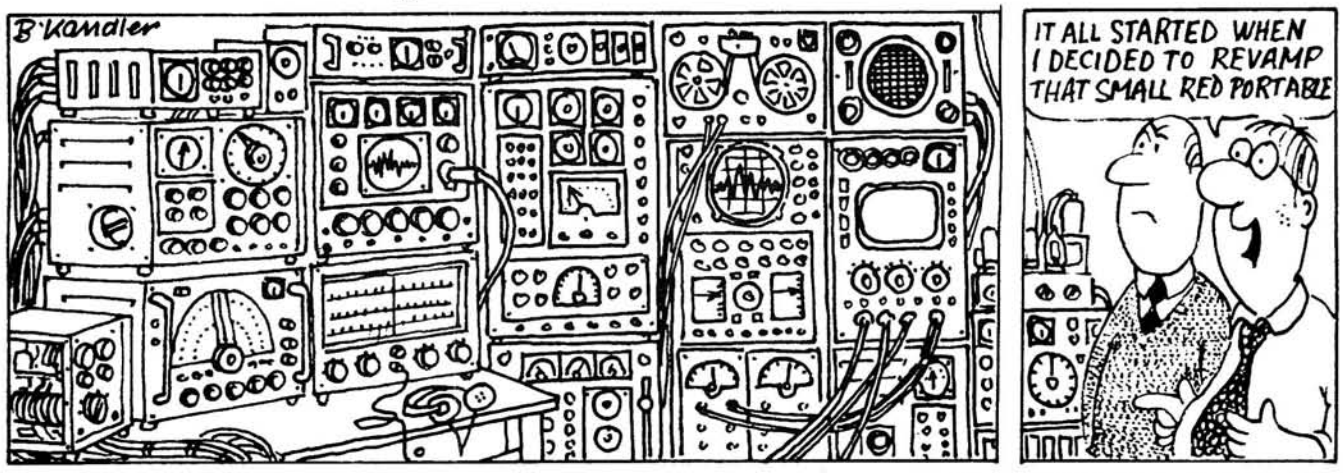
Have Datong AD370 active antenna system plus p.s.u., hardly used. Would exchange for 4 Wolsey Colour King u.h.f. TV antennas in good condition or TVDX equipment. Tel: Ruislip (08956) 32999. *V894*

Have ten complete N1700/1702 v.c.r.s, hundreds old radio valves. Would exchange for any radio equipment, any bands, working or not. Verney, 76 Duffryn Street, Ferndale, Rhondda CF43 4EL. Tel: 0443 733325. *V897*

Have Osram TT21 brand new. Would exchange for TT22. G2HKU. Tel: 0795 873100. *V915*

Have Avo type VCM163 valve characteristic meter, complete with original manuals, mint condition. Would exchange for FT-290R or FL3 Datong filter. Tel: 0983 402273. *V922*

Benny



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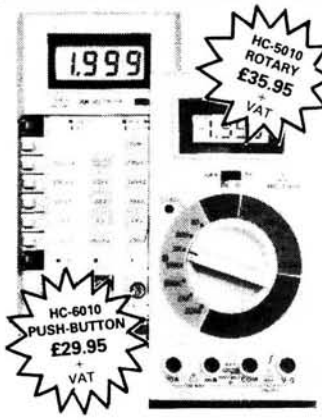

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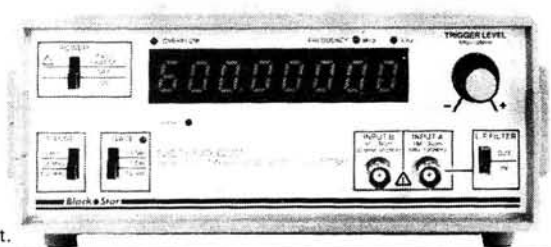

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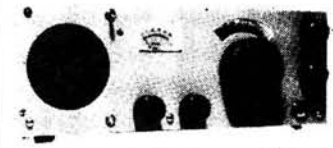

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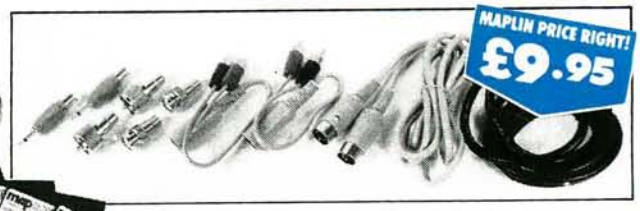

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