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TR9130	2M Multimode	499.00	(—)
TW4000A	2M/70cm mobile	536.51	(—)
TM201A	2M 25W mobile	309.95	(—)
TM401A	7cms FM 12W	340.68	(—)
TR2500	2M FM Synthesised Handheld	270.47	(—)
TR3500	70cm Handheld	291.85	(—)
TR2600	New 2M FM Synthesised Handheld	295.69	(—)
ST2	Base Stand	60.36	(1.50)
SC4	Soft Case	15.92	(1.00)
SMC25	Speaker Mike	18.66	(1.00)
PB25	Spare Battery Pack	29.10	(1.00)
MS1	Mobile Stand	37.31	(1.00)
R600	Gen. Cov. Receiver	299.52	(—)
R2000	Synthesiser 200KHz-30MHz Receiver	479.47	(—)
HC10	Digital Station World Time Clock	78.99	(1.50)
HS5	Deluxe Headphones	26.88	(1.00)
SP40	Mobile External Speaker	16.46	(1.00)

NEW MODELS

TH21E/41E	2M/70cm Mini-Handhelds	188.56/214.50	
TM211E/411E	2M/70cm FM Mobiles	396.08/452.58	
TS711E/811E	2M/70cm base stations	831.77/964.97	
TR3600	70CM Handheld	298.89	

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TONO (G series)

2M40G	2m, 1-3W in, 20-35W out, preamp	101.81	(2.00)
2M90G	2m, 10-15W in, 70-90W out, preamp	161.20	(2.00)
2M130G	2m, 10 15W in, 110-130W out, preamp	159.00	(2.50)
4M70G	70cms, 3-15W in, 40-60W out, preamp	219.74	(2.00)

MICROWAVE MODULES

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MML432/30L	inc preamp (1/3w i/p)	145.00	(2.00)
MML432/50	inc preamp (10w i/p)	129.95	(2.00)
MML432/100	linear (10w i/p)	299.00	(2.50)

B.N.O.S.

LPM 144-1-100	2m, 1W in, 100W out, preamp	181.00	(2.50)
LPM 144-3-100	2m, 3W in, 100W out, preamp	181.00	(2.50)
LPM 144-10-100	2m, 10W in, 100W out, preamp	157.00	(2.50)
LPM 144-25-160	2m, 25W in, 160W out, preamp	217.00	(2.50)
LPM 144-3-180	2m, 3W in, 180W out, preamp	247.00	(2.50)
LPM 144-10-180	2m, 10W in, 180W out, preamp	247.00	(2.50)
LPM 432 1-50	70cm, 1W in, 50W out, preamp	197.00	(2.50)
LPM 432-3-50	70cm, 3W in, 50W out, preamp	197.00	(2.50)
LPM 432-10-50	70cm, 10W in, 50W out, preamp	167.00	(2.50)

SWR/PWR Meters

HANSEN

FS50VP	50-150MHz 20/200 Interval PEP/SWR	106.70	(1.50)
FS300V	50-150MHz 20/200 PWR/SWR	53.50	(1.50)
FS300H	1.8-60MHz 20/200/10W	53.50	(1.50)
FS210	1.8-150MHz 20/200 Auto SWR	63.50	(1.50)
W720	30-430MHz 20/200W	41.50	(1.50)

WELZ

SP15	1 8-160MHz PWR/SWR	49.00	(1.50)
SP45	130-470MHz PWR/SWR	69.00	(1.50)
SP10X	1.8-150MHz PWR/SWR	34.00	(1.50)
SP200	1.8-160MHz PWR/SWR	89.00	(1.50)
SP250	1.8-60MHz PWR/SWR	65.00	(1.50)
SP300	1.8-500MHz PWR/SWR	129.00	(1.50)
SP350	1.8-500MHz PWR/SWR	79.00	(1.50)
SP400	130-500MHz PWR/SWR	89.00	(1.50)
SP600	1.8-500MHz PWR/SWR	106.00	(1.50)

TOYO

T430	144/432 120 W	44.65	(1.00)
T435	144/432 200 W	49.35	(1.00)

Scanning Receivers

SMC8400	VHF/UHF Scanner	249.00	(2.50)
SX200	VHF/UHF Scanner	299.00	(2.50)
SX400	VHF/UHF Continuous Coverage	598.00	(2.50)
AOR2001	VHF/UHF Continuous Coverage	378.01	(2.50)
FDK RX40	141.00-180.000 MHz	159.00	(2.00)

Icom Products

IC751	HF Transceiver	1299.00	(—)
IC745	HF Transceiver	899.00	(—)
IC735	New HF Transceiver	P.O.A.	(—)
PS15	P.S. Unit	145.00	(4.00)
PS30	Systems p.s.u. 25A	297.85	(—)
SM6	Base microphone for 751/745	40.25	(1.00)
IC290D	2m 25w M/Mode	479.00	(—)
IC290E	Low Multi-Mode Mobile	449.00	(—)
IC271E	2m 25w M/Mode Base Stn.	729.00	(—)
IC271H	100W version of above	899.00	(—)
IC25H	2m 45w FM	359.00	(—)
IC27E	25W FM mobile	379.00	(—)
IC45E	70c 10w FM	345.00	(—)
IC47E	25w 70cm FM mobile	469.00	(—)
ICBU1	B/U Supply for 25/45/290	29.90	(1.00)
ICR70	General Coverage Receiver	629.00	(—)
ICR71	General Coverage Receiver	729.00	(—)
IC02E	2m H/Held	269.00	(—)
IC2E	2m H/Held	289.00	(—)
ML1	2m 10w Linear	79.35	(2.00)
IC4E	70cm H/Held	259.00	(—)
IC04E	70cm handheld	279.00	(—)
BC35	Base Charger	62.10	(—)
HM9	Speaker mic	18.55	(1.00)
IC3	Carry Case	5.50	(1.00)
ICBP3	Std Battery Pack	37.50	(1.00)
BP5	High Power Battery Pack	52.80	(1.00)
CP1	Car Charging Lead	5.50	(1.00)
DC1	12v Adaptor	13.75	(1.00)

Mutek Products

SLNA 50	50MHz Switched preamp	44.90	(1.50)
SLNA 144s	144MHz Low noise switched preamp	39.90	(1.50)
SLNA 145sb	Preamp intended for 290	27.40	(1.50)
GLNA 432e	70cm Mast head preamp	149.90	(2.50)
RPCB 144ub	Front end FT221/225	74.90	(1.50)
RPCB 271ub	Front end IC251/211	79.90	(1.50)
BBA 500u	20-500MHz Preamp	32.90	(1.50)
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	(1.50)
TVHF 230c	2M-FM Transverter	334.90	(5.00)
LBPF 144v	Bandpass Filter	19.95	(1.50)
LBPF 432u	Bandpass Filter	19.95	(1.50)
TVVF 50c	6M Converter	189.89	(2.50)
GLNA 433e	70cm Pre-amp	79.90	(2.50)

Datong Products

PC1	Gen. Cov. Conv.	137.40	(1.50)
VLF	Very low frequency conv.	29.90	(1.50)
FL2	Multi-mode audio filter	89.70	(1.50)
FL3	Audio filter for receivers	129.00	(1.50)
ASP/B	r.f. speech clipper for Trio	82.80	(1.50)
ASP/A	r.f. speech clipper for Yaesu	82.80	(1.50)
ASP	As above with 8 pin conn	89.70	(1.50)
D75	Manual RF speech clipper	56.35	(1.50)
D70	Morse Tutor	56.35	(1.50)
MK	Keyboard morse sender	137.40	(1.50)
RFA	RF switched pre-amp	33.90	(1.50)
AD270-MPU	Active dipole with mains p.s.u.	51.75	(1.50)
AD370-MPU	Active dipole with mains p.s.u.	69.00	(1.50)
MPU	Mains power unit	6.90	(1.50)
DC144/28	2m converter	39.67	(1.50)
PTS1	Tone squelch unit	46.00	(1.50)
ANF	Automatic notch filter	67.85	(1.50)
SRB2	Auto Woodpecker blanker	86.25	(1.50)

CW/RTTY Equipment

Tono 9000E	Reader/Sender	P.O.A.	(—)
Tono 550	Reader	329.00	(2.50)

MICROWAVE MODULES

MM2001	RTTY to TV converter	189.00	(2.00)
MM4001	RTTY terminal	269.00	(2.00)
MM4001KB	RTTY term with keyboard	299.00	(2.00)

BENCHER

BY1	Squeeze Key, Black base	53.95	(1.50)
BY2	Squeeze Key, Chrome base	69.95	(1.50)

HI-MOUND MORSE KEYS

HK702	Up down keyer marble base	30.95	(1.50)
HK703	Up down keyer	29.35	(1.50)
HK704	Up down keyer	19.95	(1.50)
HK705	Up down keyer	15.49	(1.50)
HK706	Up down keyer	16.96	(1.50)
HK708	Up down keyer	14.95	(1.50)
HK802	Up down solid brass	86.30	(2.00)
HK806	Up down keyer	39.95	(1.50)
MK704	Twin paddle keyer	13.50	(1.50)
MK705	Twin paddle keyer marble base	25.65	(1.50)

KENPRO

KP100	Squeeze CMOS 230/13.8v	82.50	(2.50)
KP200	Memory 4096 Multi Channel	169.50	(2.50)

Yaesu

FT1	HF Transceiver	P.O.A.	(—)
FT980	HF Transceiver	1650.00	(—)
SP980	Speaker	79.95	(2.00)
FT77	Mobile HF Transceiver	479.00	(—)
FP700	PSU	170.00	(5.00)
FC700	Tuner	119.00	(2.00)
FT77s	10w. version	449.00	(—)
FMU77	FM Board for FT77	28.35	(1.00)
FT757	HF Transceiver	829.00	(—)
FC757	Auto A.T.U.	290.00	(2.00)
FP757HD	Heavy Duty PSU	200.00	(2.00)
FP757GX	Switched Mode PSU	180.00	(2.00)
FL2050	Linear Amplifier	115.00	(2.00)
FT290	2m M/Mode Port/Transceiver	349.00	(—)
FT290	With Mutek front end fitted	379.00	(—)
FL2010	Linear Amplifier	69.00	(1.00)
MMB11	Mobile Bracket	31.45	(1.00)
NC11	Charger	11.50	(1.00)
CSC1	Carrying Case	5.00	(1.00)
YHA15	2m Helical	7.65	(1.00)
YHA44D	70cm 1/2wave	10.19	(1.00)
YM49	Speaker Mike	20.30	(1.00)
FT230	2m 25w FM	269.00	(—)
MMB15	Mobile Bracket	14.55	(1.00)
FT203R	NEW 2m H/Held/C/W FNB3	225.00	(—)
FT209R	NEW 2m H/Held/C/W FNB3	269.00	(—)
FT208	2m H/Held	209.00	(—)
FT708	70cm H/Held	189.00	(—)
MMB10	Mobile Bracket	8.80	(0.75)
NC8C	Charger	9.60	(0.75)
NC8	Base/station Charger	64.80	(2.00)
PA3	Car Adaptor/Charger	18.00	(1.00)
FNB2	Spare Battery Pack	24.90	(1.00)
YM24A	Speaker Mike	23.75	(1.00)
FT726R	2m Base Station	869.00	(—)
430/726	70cm Module for above	295.00	(2.50)
FRT7700X	A.T.U.	49.85	(1.50)
MH1B8	Hand 600 8pin mic	17.65	(1.00)
MD1B8	Desk 600 8pin mic	74.75	(1.00)
MF1A3B	Boom mobile mic	19.95	(1.00)
YH77	Lightweight phones	15.70	(1.00)
YH55	Padded phones	16.10	(1.00)
YH1	L/weight Mobile H/set Boom mic	15.70	(1.00)
SB1	PTT Switch Box 208/708	18.00	(1.00)
SB2	PTT Switch Box 290/790	17.25	(1.00)
SB10	PTT Switch Box 270/2700	17.25	(—)
QTR24D	World Time Clock	34.50	(1.00)
FF501DX	Low Pass Filter	31.45	(1.00)

NEW MODELS

FRG9800	HF Receiver	559.00	(—)
FHV9800	Convertor 118-175 for above	90.00	(—)
FT703	70cm H/Held	P.O.A.	(—)
FT709	70cm H/Held	P.O.A.	(—)
FT270R	2m 25W F.M.	349.00	(—)
FT270RH	2m 45W F.M.	399.00	(—)
FT2700R	2m/70cm/25W/25W	559.00	(—)

Power Supplies

DRAE			BNOS		
4 amp	40.50	(2.00)	6 amp	58.00	(2.50)
6 amp	63.00	(2.50)	12 amp	99.00	(3.00)
12 amp	86.50	(3.00)	25 amp	148.00	(4.00)
24 amp	125.00	(4.00)	40 amp	296.00	(4.00)

Aerial Rotators

9502B	3 core Lighter Duty	69.50	(2.00)
AR40	5 core Medium Duty	115.00	(2.00)
KR400	Med/H Duty	109.95	(2.50)
KR500	6 core Elevation	139.95	(2.50)
KR400RC	6 core Medium Duty	132.50	(2.50)
CD45	8 core Heavy Duty	189.95	(2.50)
KR600RC	8 core Heavy Duty	189.50	(2.50)
HAM1V	8 core Heavier Duty	299.00	(4.00)
T2X	8 core Very Heavy Duty	365.00	(4.00)

Switches

Sigma	2 way SO239	14.49	(1.00)
Sigma	2 way 'n' Skts	19.95	(1.00)
Welz	2 way SO239	22.95	(1.00)
Welz	2 way 'n' Skts	41.90	(1.00)
Drae	3 way SO239	15.40	(1.00)
Drae	3 way 'n' Skts	19.90	(1.00)

Miscellaneous

DRAE	Wavemeter	27.50	(1.00)
T30	30W Dummy load	8.05	(1.00)
T100	100W Dummy load	35.20	(1.00)
T200	200W Dummy load	42.55	(1.50)
CT300	300W Dummy load	69.00	(2.00)
DRAE	2m Pre-set A.T.U.	14.50	(1.50)
ALTAI	KDM6 Dip Meter	68.60	(1.50)
TAU	SPC3000 HF Tuner	349.95	(5.00)

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Practical Wireless

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NEXT MONTH

JULY '85 ISSUE

S-METERS: FACT OR FICTION?

How accurate are the S-meters on some recent popular h.f. rigs and receivers? We look at test figures from our lab.

LOW-COST CRYSTAL TESTER

Use this pocket-sized unit to check out those junk-stall crystals on the spot, and make other checks back in the shack.

ON SALE 7 JUNE

PW COMMENT

WHILE NOT WISHING to be accused of scaremongering, it does seem that amateur radio is under increasing threat on both financial and interference fronts.

Recent increases in the cost of Morse Tests and planning applications for antenna masts, and the upward trend on equipment price-tags resulting from exchange-rate movements, are well known. The amateur licence fee could be up for drastic revision in a couple of years too, if "spectrum pricing" is extended to amateur radio. The idea is that users pay a licence fee based not on the administrative cost of processing the application, but on the demand for spectrum space—in other words the law of supply and demand will operate. This was originally intended to apply to business users, but the DTI recently announced that a study of the idea now under way will include amateur radio and CB

On the interference front, a report in the February 25 issue of *New Technology* quotes a management consultancy study into the progress of the UK cable-TV industry as implying that only the acceptance of lower technical standards for the distribution system can give the chance of survival. Putting the cables above ground, and abandoning the idea of "new technology" (i.e. fibre optic systems) could bring the return on capital up to a level that would interest the City. This, it said, would mean trouble with amenity and conservation lobbies. No mention of the effect on amateur radio users!

G3GSR

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 set the standard for amateur radio after-sales service. The shops are open Tuesday to Friday from 9.00 to 5.30 pm, Saturday from 9.00 to 5.00 pm and close for lunch each day from 12.30 till 1.30pm.

In Glasgow the LOWE ELECTRONICS' shop (the telephone number is 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 (the telephone number is 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 (the telephone number is 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, signposted Chesterton. After passing a children's playground on your left turn left again (between the shops) into Green End Road. Very quickly, and without you noticing it, Green End Road becomes High Street. Easy and free street parking is available outside the shop.

For South Wales, the LOWE ELECTRONICS' shop is located in Cardiff. Managed by Richard GW4NAD, who hails from Penarth, the shop (the telephone number is 0222 464154) is 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 red 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.

LOWE ELECTRONICS' London shop is located at 223/225 Field End Road, Eastcote, Middlesex (the telephone number is 01-429 3256). The new shop, managed by Andy G4DHQ is easily found, being part of Eastcote tube station buildings and as such being on the Metropolitan and Piccadilly lines (approximately 30 minutes from Baker Street main junction). For the motorist, we are only about 10 minutes' driving time from the M40, A40, North Circular Road (at Hanger Lane) and the new M25 junction at Denham. 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.

Although not a shop there is on the South Coast a source of good advice and equipment – John G3JYG. His address is 16 Harvard Road, Ringmer, Lewes, Sussex. (telephone 0273 812071). An evening or weekend telephone call will put you in touch with John.

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.

not even a mouse, could hide behind a TRIO TH21E.....

I am not for one moment suggesting that current hand-helds should be photographed with an elephant but I have heard many amateurs refer to their existing hand-helds as "bricks". That the TH21E could not be called. In fact I am tempted to say it is the rig that not even a mouse could hide behind. Over the past fourteen years I have watched amateur radio equipment develop from cumbersome to perfection. I remember John, G3PCY, showing me the first TR2400 and our mutual amazement at how TRIO could put so much radio in such a small package. Later developments produced the TR2500 and its 70 centimetre version, the TR3500 and left me in no doubt that TRIO would soon produce a compact inside pocket transceiver. At the same time it became apparent that a simpler rig with performance would have great appeal. That transceiver is the TH21E and being typically TRIO is right first time. Size is not the most important feature, it's just the way the transceiver feels when picked up, impossible to put down. I am not going to give its dimensions, I will just say that it is hand sized, the true inside pocket transeiver. As an owner and with the rig always on your person the hobby of amateur radio expands to an all day event. **Never miss a contact, never miss a friend.**

A similar transceiver is available for 70 centimetres, the TH41E. Having the same features including reverse repeater the TH41E is just the rig that newcomers to the hobby have been looking for. Around the country are many 70 centimetre repeaters and what has been needed for some time has been a low cost FM rig that everyone could afford. The TH41E from TRIO is that transceiver and many amateurs are discovering the 70 centimetre band with one.

First of all the Pocketfone, now the TH41E.

1 watt output in high power position, 150 mW in low position.

Full coverage of the 2 metre amateur band from 144 to 146 MHz. (TH41E covers from 430 to 440 MHz.)

Frequency selection by simple thumbwheel switches.

Full repeater facilities including reverse repeater.

The rig comes complete with nicad pack and charger.

TH21E..... £188.46 inc VAT
TH41E..... £214.15 inc VAT

LOWE ELECTRONICS
Chesterfield Road, Matlock, Derbyshire, DE4 5LE.
Telephone 0629.2817, 2430, 4057, 4995. Telex 377482.
(Delivery of stock items normally by return of post)

the TRIO two metre base station, the TS711E.

Several weeks have passed since I took delivery of my own TRIO TS711E. The Japanese home market model has returned whence it came and I am using the version designed specifically for the UK market. The rig is perfection epitomised. For todays two metre operator any base station with less facilities and performance then the TS711E would be far from acceptable. The TS711E's receiver performance in sensitivity and in its ability to reject unwanted adjacent signals is outstanding. I'm not talking about test equipment figures though undoubtedly these will soon be published. My own on air operating with the rig has enabled me to hear what I previously couldn't.

The transceiver covers the 2 metre band from 144 to 146 MHz in FM, USB, LSB and CW modes. When switched to the auto position the rig correctly selects mode according to frequency, a great advantage to the blind operator. Simple up/down frequency shift is provided both on the transceiver front panel and microphone.

IF shift is available, an essential when considering todays crowded 2 metre band. For more penetrating transmitted audio when working DX speech processing can also be switched in.

The TS711E has two separate VFO's and forty channels of memory. Each memory remembers frequency, operating mode, simplex or repeater shift and whether or not a tone burst is to be included. Frequencies stored in memory can be readily transferred to either VFO A or B. The VFO can be either free running as for SSB or CW operation or electrically switched to a "click" stop where it changes frequency in 12.5 or 5 kHz steps. The two VFO's can quickly be put on the same frequency, an aid when checking the position of a strong adjacent signal with one VFO whilst remaining on your operating frequency with the other.

Frequency scan on VFO can be either between or outside user set limits. On memory the transceiver can either scan the entire memory contents or be instructed to look at those frequencies of a particular mode. The TS711E has a timed hold on an occupied channel.
Both priority channel and the immediate recall of your local net frequency are possible with the TS711E.

For those with failing sight or a blind operator the TS711E is a dream come true, not only is the operating mode identified by the appropriate CW letter sent in tone (F for FM, U for upper side band etc.), other rigs just bleep but, when fitted with the VS1 optional board, a digitally encoded girls voice will announce both frequency and where applicable, whether the rig is switched to repeater shift.

TS711E 2 metres £831.77 carr £7.00
TS811E 70 cmtes £964.97 carr £7.00

TS430S

The TS430S combines the facilities of a solid state HF transceiver with those of a general coverage receiver. It's the ideal rig for the radio amateur who not only wants to communicate with his fellows but also enjoys listening to the world. As an amateur band transceiver the rig covers top band to ten metres, as a short wave receiver coverage is from 150KHz to 30MHz. Operating on AM, FM, USB, LSB and CW the TS430S is extremely compact and, as such, is the perfect transceiver for mobile, portable or base station operation.
TS430S HF transceiver with general coverage receiver .....£769.50 inc VAT.

TW4000A

Taking into account the amount of activity on the 2 metre FM channels it is not surprising that many people have turned their attention to the wide open spaces of 70 centimetres. With the TW4000A, TRIO have produced a dual band FM transceiver that gives its owner the best of both worlds. Facilities include 10 memories, two VFO's, priority channel, full repeater operation, band scan and memory scan. In memory scan mode the rig can be instructed to look for either 2 metre or 70 centimetre signals. The transceiver produces 25 watt RF output on both bands and comes complete with mobile mount and microphone. For greater safety whilst mobile the optional VS1 board will announce frequency, memory channel and whether or not the rig is set on repeater shift.
TW4000A dual band FM mobile.....£536.51 inc VAT.

R600

For those who are banned from the house and have to operate from the shed at the bottom of the garden, why not consider an R600 to monitor the bands from the comfort of the fireside. No wife would forbid such an attractive looking receiver in the lounge, after all it could also be used to listen to *Women's Hour*. The R600 is a basic receiver covering from 150KHz to 30MHz and having switched upper and lower sidebands, wide and narrow am and cw. It has a 20dB attenuator and a noise blanker fitted as standard. Operation is simple, select the mode of operation, turn the MHz dial to the correct band and, by using the VFO knob, tune to the desired frequency. The clear digital readout makes station selection simple. The TRIO R600, your passport to comfortable listening.
R600 general coverage receiver ..... £299.52 inc VAT.

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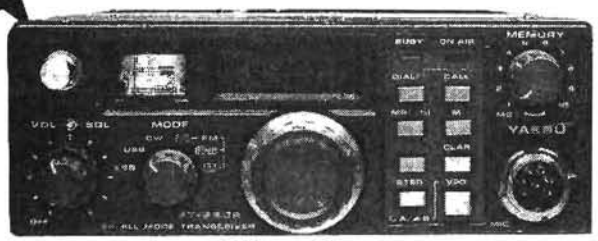

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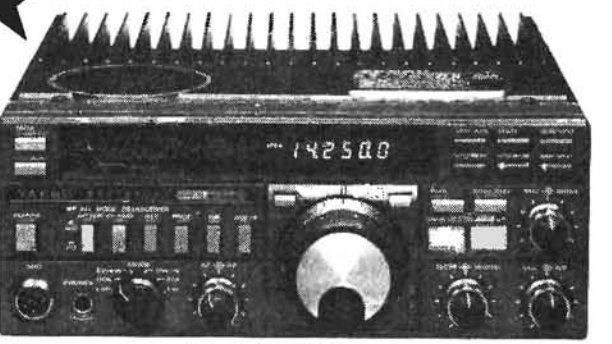

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Other features include a 10 channel memory able to store operating frequencies, Simplex or Duplex. A memory lock-out function allows the memory scan to skip programmed channels when not required. The IC-3200E has a built-in duplexer and can operate on one antenna for both VHF and UHF. Options include: IC-PS45 DC, power supply, HS-15 mobile mic, SM6 and SM8 desk mics, SP 10 external speaker and UT-23 speech synthesizer. A great future is predicted for the IC-3200E.

IC-290D/290E

290i .he state of the art 2 meter mobile. it has 5 memories and VFO's to store your favourite repeaters and a priority channel to check your most important frequency automatically. Programmable offsets are included for odd repeater splits, tuning is 5KHz or 1KHz.

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At last, permits are now available in the U.K. for the 50MHz (FM) band. If you wish to use this less crowded amateur frequency the IC-505 SSB CW portable transceiver has already gained an excellent reputation world wide.

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Other accessories available include the EX-248 FM unit, BC-15 charger unit and the LC 10 carrying case.

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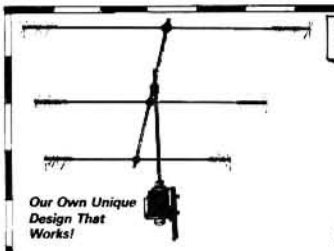

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Don't be put off by the low price, this receiver works well and is capable of world-wide reception. Modes SSB and CW. A case and two tuning capacitors are the only major parts to add to finish your receiver. We have suitable tuning capacitors for all but the 160M version, at £1.50 each while stocks last.
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EC91	8.00	GZ34	3.00	QQV03-10	23.50	6AW8A	3.75	6SG7M	2.50
ECC33	4.50	GZ37	4.75	QQV03-20A		6B7	3.25	6U8A	2.25
ECC35	4.50	KT61	5.00		48.38	6B8	3.25	6V6GT	2.25
ECC81	1.75	KT66	15.00	QQV06-40A		6BA6	1.50	6X4	2.00
ECC82	1 75	KT77	12.00		75.00	6BA7	5.00	6X5GT	1.75
ECC83	1.75	KT88	20.00	QV03-12	6.80	6BE6	1.50	12AX7	1.75
ECC85	1.75	N78	15.00	R18	3.00	6BH6	2.50	12BA6	2.50
ECC88	3.50	OA2	3.25	R19	9.24	6BJ6	2.25	12BE6	2.50
ECC91	8.93	OB2	4 35	SP41	6.00	6BN6	2 00	12BY7A	3.00
ECF80	1.50	OC3	2.50	SP61	4.00	6BQ7A	3.50	12HG7	4.50
ECH35	3.00	OD3	2.50	U19	13.75	6BR7	6.00	30FL1/2	1.38
ECH42	3.50	PC86	2.50	U25	2.50	6BR8A	3.50	30P4	2.50
ECH81	3.00	PC88	2.50	U26	2.50	6BS7	6.00	30P19	2.50
ECL80	1.50	PC92	1.75	U37	12.00	6BW6	6.00	30PL13	1.80
ECL82	1.50	PC97	1.75	UABC80	1.25	6BW7	1.50	30PL14	1.80
ECL83	3.00	PC900	1 75	UBF89	1.50	6BZ6	2.75	572B	40.00
ECL86	1.75	PCF80	2.00	UCH42	2.50	6C4	1.25	805	45.00
EF37A	5.00	PCF82	1.50	UCH81	2.50	6C6	3.50	807	3.75
EF39	2.75	PCF86	2.50	UCL82	1.75	6CB6A	2.50	811A	18.33
EF41	3.50	PCF801	2.50	UCL83	2.75	6CD6GA	5.00	812A	29.50
EF42	4.50	PCF802	2.50	UF89	2.00	6CL6	3.75	813	65.00
EF50	2.50	PCF805	1.70	UL41	5.00	6CH6	13.00	866A	20.03
EF54	5.00	PCF808	1.70	UL84	1 75	6CW4	8.00	872A	20.00
EF55	3.50	PCH200	3.00	UY41	2.25	6D6	3.50	931A	18.50
EF80	1.75	PCL82	2.00	UY85	2.25	6DQ5	6.00	2050	7.00
EF86	3.50	PCL83	3.00	VR105/30	2.50	6EA8	3.00	5763	4.50
EF91	2.95	PCL84	2.00	VR150/30	2.50	6EH5	1.85	5814A	4.00
EF92	6.37	PCL85	2.50	Z759	25.00	6F6	3.00	5842	12.00
EF183	2.00	PCL86	2.50	Z803U	25.00	6Gk6	2.75	6080	14.00
EF184	2.00	PCL805	2.50	2D21	3.25	6H6	3.00	6146A	8.25
EH90	1.75	PD500	6 00	3B28	40.00	6HS6	3.77	6146B	12.00
EL32	2.50	PFL200	2.50	4CX250B	45.00	6J5	4.50	6883B	8.25
EL33	4.00	PL36	2.50	5R4GY	3.50	6J6	8.93	6973	4.00
EL34	4.00	PL81	1.75	5U4G	3.00	6J7	4.75	7360	10.00
EL36	2.50	PL82	1.50	5V4G	2.50	6JB6A	5.00	7586	15.00
ELL80	19.00	PL83	2.50	5Y3GT	2.50	6JS6C	6.00	7587	23.00
EL81	5.25	PL84	2.00	5Z3	4.00	6K4N	2.50		
EL84	2.25	PL504	2.50	5Z4GT	2.50	6K6GT	2.75		
EL86	2.75	PL508	2.50	6Q3OL2	1.75	6K7	3.00		
EL91	9.69			6AB7	3.00	6K8	3 00		
EL95	2.00			6AH6	5.00	6KD6	7.00		
EL360	8.50								

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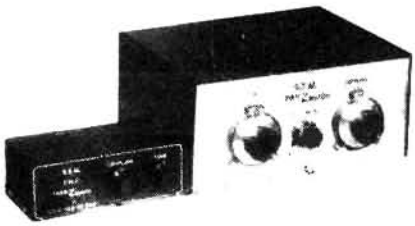

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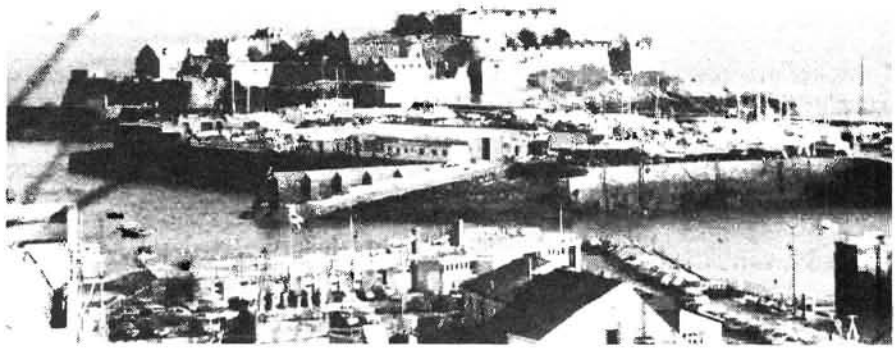
40th Anniversary of the Liberation of the Channel Islands

Radio amateurs in Guernsey will celebrate the 40th Anniversary of the Liberation of the Channel Islands from German occupying forces, by operating a special event station, GB2LIB, from the 9–11 May 1985.

During the course of World War II, the Channel Islands of Guernsey, Jersey, Alderney, Sark and Herm were the only part of Great Britain to be occupied by enemy forces. On Sunday 30 June 1940, German troops landed in Guernsey to begin what turned out to be a five year occupation. The first few years were little different for Islanders than for people in other parts of occupied Europe, but as the war drew to its close, critical shortages of food, medical supplies and other essential provisions meant enormous hardships for the Islanders.

For this reason, the Liberation of the Islands by allied forces on the 9 May 1945 is such a major day of celebration. On the days mentioned, and in addition to, considerable public celebrations, the special event radio station will be installed in the ancient fortification of Castle Cornet (see photograph) and operated on both the v.h.f. and h.f. bands by a team of local amateurs.



Whilst the callsign GB2LIB has been issued, application has been granted for a special out-of-sequence callsign, GV0LIB. All contacts will be responded to with a special QSL card and information, plus a souvenir pack.

Further information from: *The Publicity Officer, Peter Rouse GU1DKD, 5/7 Park Street, St. Peter Port, Guernsey, C.I. Tel: (0481) 23451/25893.*

New Amateur Radio Shop

Lee Electronics Ltd. of 400 Edgware Road, London W2, have opened a new branch and called it North London Communications Ltd.

The new branch stocks the full range of amateur radio products and services, like the parent company, and likewise cellular radio, BT radiophones, land mobile and marine communications equipment is also stocked.

An on-the-spot installation service can be arranged and there is also free car parking for 100 cars at: *North London Communications Ltd., 211 The Broadway, West Hendon, London NW9 7DE. Tel: 01-202 2778.*

Rallies and Events

The Swindon and District Amateur Radio Club will be holding the Swindon Radio and Electronics Rally '85, on Sunday 12 May, at Oakfield School, Marlowe Avenue, Swindon, starting at 10.00am. Admission will be 50p, with free car parking on-site, and talk-in will be available on S22 and SU18, along with refreshments, childrens' film shows and other family entertainments.

Further details from: *Ken G8SFM, telephone (066 689) 307.*

Maidstone Amateur Radio Society will be holding their Bi-annual Mobile Rally on Sunday 26 May, from 11.00am, at the YMCA Sportscentre, Melrose Close, Cripple Street, Maidstone, Kent.

Enquiries should be sent to: *Alan Judge G6FZD, QTHR, telephone (0622) 50709.*

The East Suffolk Wireless Revival 1985 has once again been organised by the Ipswich Radio Club, who celebrate their Golden Jubilee this year, and the Martlesham Radio Society.

To be held on Sunday 26 May, at the usual venue, the Civil Service Sportsground, Straight Road, Bucklesham, Ipswich, Suffolk, this popular annual mobile rally will feature all the usual attractions, such as trade stalls, fleamarket, antenna testing range, vintage radio display, plus childrens' play area and model aircraft flying display, to keep the whole family entertained.

For further information, contact: *Jack Tootill G4IFF, 76 Fircroft Road, Ipswich IP12 1HS. Tel: (0473) 44047.*

Whatever Happened to Centigrade?

Most people have probably dismissed the recent move from centigrade to Celsius in the weather reports as just another case of change for change sake—those bureaucrats in Brussels, etc., etc. In fact, just for once, there's a good reason for the change—to avoid confusion with another meaning for the same word.

The word "centigrade" (meaning one hundredth part of a "grade") is used in some European countries, especially France, as a unit of angular measure. A "grade" is one hundredth of a right-angle, so it's a bit smaller than a degree. In Europe, you can buy protractors in which each right-angle is divided into 100 parts instead of the usual 90.

To complicate matters even further, in Germany and Finland, they've devised two new units of angular measure, a "new minute" which is one hundredth of a "grade" (the same as a centigrade), and a "new second" which is one ten thousandth of a "grade".

All in all, it seems a good idea for temperature to escape into the simplicity of degrees Celsius. Though there was always Fahrenheit, of course!

Ohm-less?

The US magazine *Worldradio* reports that the official One Ohm Standard kept at the International Bureau of Standards in Paris was recently measured and showed 0·99999999851 ohms. Better check your ohmmeters!

Insurance

Readers who are interested in applying to the *PW Radio Users Insurance Scheme* are advised to use the coupon published on page 18 of a previous issue.

Broadcast SSTV

We are often called upon for assistance at *PW* so the prospect of providing a Slow Scan TV demonstration for the local Poole Amateur Radio Society did not seem unusual. However, it turned out that a live interview to promote amateur radio had been organised in conjunction with Two Counties Radio (2CR) and they wanted to broadcast the SSTV material via their m.f. and v.h.f. transmitters. As it happened we had previously arranged to obtain a review sample of the Drae SSTV receiver (Products, February 1985, page 17) together with its demonstration tape—this arrived with 24 hrs to spare and the cassette was hastily despatched to the 2CR studio for duplication onto reel-to-reel format ready for the broadcast. Generous publicity was given before the programme with the listening public being promised TV pictures by radio, which seems to have puzzled more than a few local people, judging by comments made after the event! However, the moment arrived and a 24 second burst of mono SSTV was duly passed and fully decoded at the *PW* offices—another Broadcast milestone? We must confess that the signal strength was quite reasonable, as you might expect when being within 3 km line of sight to a 300W v.h.f. Band II transmitter! It appears that we were not the only successful recipients that day as several reports from both m.f. and v.h.f. sources were received including the dot matrix printout supplied by none other than Grant Dixon G8CGK, one of the foremost exponents of this mode. No, 2CR had not propagated as far as Grant's Herefordshire QTH, but had survived being taped "off air" by his son in Bournemouth, passed via the post and decoded on a Triton computer. The resulting Epson MX-80 F/T3 print-out shown here is the result. Grant has had the system running for some time and has concluded that a 4 × 4 matrix representation of individual pixels is the best method. Expanded patterns are shown above the print-out with an example of the Gray scale at the foot. Any other contenders for best DX?

Raynet

If you have ever thought that it would be nice if others could benefit from your hobby, then perhaps the RAYNET organisation has something to offer. There are groups all over the country and in the London area probably the most active is the South West London RAYNET Group. With a current membership of about thirty, the group covers an area comprising the six London Boroughs of Merton, Lambeth, Wandsworth, Richmond, Kingston and Sutton, but are always willing to assist other groups in neighbouring areas. Each of these Boroughs' Town Halls has emergency control rooms equipped with 144MHz and 430MHz band antennas for RAYNET use, and all of the group's members have mobile or portable rigs for 144, not all have 430.

The Royal Borough of Kingston upon Thames recently granted the group a sum of money to assist with their operations and this has enabled them to purchase a caravan which they have completely modified to provide a mobile control station which can support antenna masts. Such is the demand for the groups' services that by February they had already filled their maximum quota (imposed by the licence) of twelve non-emergency events for 1985 and were having to turn down further requests for assistance. Forthcoming operations include the talk-in stations for the VHF Convention and the BARTG Rally, both to be held at Sandown Park; providing St Johns Ambulance with communications around the routes of marathon runs in Sutton, Hillingdon, Richmond and Kingston; and providing the Red Cross with communications throughout an overnight Scout competition hike across the North Surrey Downs.

In order to meet these commitments while still maintaining their high standards, the group is anxious to increase its numbers. So, if this type of activity sounds interesting to you, and you are the sort of person who is willing to give up a little time to help others whilst enjoying your hobby, why not contact the Controller of the South West London RAYNET Group for more information. He is *Martin Black G4HJY, 28 Cricketers Close, Chessington, Surrey, KT9 1NL.*

If you are interested but live outside south-west London, contact the *Membership Services Department of the RSGB, Lambda House, Cranbourne Road, Potters Bar, Herts, EN6 3JW,* for information about RAYNET in your area.

Second User Service

Sellers and buyers of second user radio equipment will probably already be aware of the "List-a-Rig" sales system run by G3RCQ Electronics, and will be interested to learn of a new service called "G3RCQ Auctions".

To utilise "List-a-Rig", prospective buyers send an s.a.e. to G3RCQ Electronics to receive the free list. For those who wish to have a for sale/wanted entry on the list a small charge is made.

The new auction service requires the seller to nominate a "reserve" price for the equipment to be sold (say £100), and then sends 10% of the price (£10) to G3RCQ, the details will then be entered on a monthly auction list, which is published in national and international radio magazines, such as *Practical Wireless*. Additionally, the seller is automatically entitled to a free entry in "List-a-Rig".

Bids will then be sent to the seller, with some hopefully above the reserve price, and the deal struck. Should any item not be sold after two auction entries, then the 10% fee will be returned.

For further info and a current list, send an s.a.e. to: *Used Equipment Centre, G3RCQ Electronics, 65 Cecil Avenue, Hornchurch, Essex RM11 2NA. Tel: (040 24) 55733.*

News

Weather Satellites

Some fifty interested radio amateurs attended a meeting of the Remote Imaging Group at the RSGB National VHF Convention at Sandown Park on March 23. It was decided that a committee should be formed to put the group on a more formal basis, and that a bi-monthly newsletter would be distributed to group members, the initial subscription being £2.00 per annum.

Although the interest at present is centred on the reception of weather maps from the European, American and Russian satellites, it was envisaged that this would expand to cover pictures from navigational satellites and from space probes.

Until the committee organisation is established, enquiries (with s.a.e. please) and membership applications should go to: *Henry Neale G3REH, Thornlea, Fishers Gate, Sutton St. James, Spalding, Lincs PE12 0EZ.*

Ambassador RFI

The RSGB has reported that the cause of 144MHz band r.f.i. from Ambassador telephones had been traced to spurious oscillation in l.e.d. driver circuitry being radiated from the line cord. The fault, which is confined to business "key system" installations, can be simply cured by adding decoupling. BT are correcting all installations reported to be causing interference, and the necessary modification will be incorporated in all new production.

Amateurs suspecting that a telephone of this type is causing r.f.i. should contact their local Telecom office, quoting "Ambassador ESS RFI Problem". It is stressed that the domestic type Ambassador is not responsible for the problem.

Class "B" Morse

Up to the middle of March, between five and six thousand applications had been received at RSGB headquarters from Class B Licensees wishing to use Morse on the air under the arrangements outlined on page 45 of our February issue.

Morse Test

Readers anticipating taking the Morse Test will be interested to know that arrangements have been made for the test to be taken at Swindon Rally on Sunday 12 May.

For details, contact immediately: *K. A. Saunders G8SFM, "Tamarisk", Tetbury Lane, Leighterton, Glos. GL8 8UP. Tel: (066 689) 307.*

New Distributor for G.E.

Greenwood Electronics, manufacturers of the Oryx range of soldering equipment and electronic production tools, has appointed Engineering and Electronic Supplies Ltd., of Neath, West Glamorgan, to distribute the entire range of Oryx products.

As part of a planned programme of expansion for Greenwood's selective distributor network, this appointment brings the number of Oryx distributors in the UK to six, and further appointments are currently under consideration.

Further information from: *Greenwood Electronics, Portman Road, Reading, Berks. RG3 1NE. Tel: (0734) 595844.*

Recent British Standards

Sound and television broadcast receivers and associated equipment: electromagnetic compatibility BS 905:1985.

This Standard is in two parts. Part 1 deals with spurious signals generated by sound and TV receivers, and by TV games (but not tape recorders, record players, TV cameras or computers). Part 2 deals with how well sound and TV receivers, including associated equipment such as audio amplifiers, audio tape recorders and video machines and record players (but not computers), reject interference in the frequency range 26 to 30MHz. Also how well TV receivers reject direct internal pick-up of the TV signal they are tuned to. This effect can cause ghosting in strong signal areas.

In each case, the Standard deals with the limits of spurious signals or immunity, and with the methods of measurement.

Copies of BS905, Parts 1 and 2 may be obtained from: *The Sales Department, British Standards Institution, Linford Wood, Milton Keynes MK14 6LE*, price £16.20 each.

Special Event Stations

Clwyd County Raynet Group have organised a special event station, GB2MHC (Mulberry Harbour, Conwy), to commemorate the building of Mulberry Harbour caissons at Conwy.

Amateurs throughout the world are invited to contact the station, which will be operational from 1000 to 2200hrs, on all bands.

All QSOs will be acknowledged with a special QSL card and reports from s.w.l.s are cordially invited.

Further details from: *Hon. Sec., J. B. Thorogood GW4UWI, 75 Victoria Park, Colwyn Bay, Clwyd LL29 7YY.*

Bromsgrove & District Amateur Radio Club will be operating a special event station, GV4OVE on May 8 as part of the Victory in Europe celebrations. They should be using all bands and all modes, with three stations operating simultaneously. Contacts will receive QSL cards via the bureau. One of the stations will be operating from a wartime prefab building at the Avoncroft Museum of Buildings at Bromsgrove. In addition to the GV4 station club members will try and run GV2VE on other days during that week. For further details contact John Harvey G4IVJ, QTHR.

The Wirral and District Amateur Radio Club will be providing a special event amateur radio station at the International Waterways Festival, to be held over the Spring Bank Holiday between 25 and 27 May, at the Boat Museum, Ellesmere Port.

The club has been granted the special callsign GB2IWF, and will operate on the h.f., v.h.f. and u.h.f. bands, over the three days, with the possibility of some evening and night working taking place.

Further details from: *The Secretary, Gerry Scott G8TRY, 19 Penkett Road, Wallasey, Wirral, Merseyside L45 7QF. Tel: 051-630 1393 (home), 051-227 1018 (work).*

Battery Charger Controller

by J. P. Bell G4LSA
and E. J. Barker

Interest in high current power supply units (p.s.u.s) seems to be continuing as more transistorised "linear" power amplifiers come onto the air—100W now being quite a common output. Unfortunately, p.a. stages demand 12V to 13V d.c. at anything up to 25A peak during s.s.b. operation. This leads to heavy transformers, large heatsinks, complicated stabilisers and over voltage protection, etc. The whole lot resembling the valve p.s.u. of not so long ago.

Because of this, many people operate linears and associated equipment from lead acid vehicle batteries, either charging these as required or by leaving the charger connected continuously. With lapses of memory, etc., the charger is often forgotten and the battery ends up overcharged and messy or undercharged and almost flat. All rather annoying when this happens at the same time as an Aurora on 144MHz!

The control unit to be described can be added to any charger, solving most of these problems as it can be left on continuously. This provides an approximately 85 per cent charged battery with little gassing as would be found on a vehicle. The other main advantage is the unit is cheap and simple to construct.

Before describing the unit it may be useful to look at modern batteries and their job when used on vehicles. Low maintenance types can be topped up with distilled water like their predecessors. However, with the plates containing less antimony the amount of water needed is reduced as the cells gas less. Research and development has produced the "sealed for life" battery which cannot be topped up. In these the plates have a very low level of antimony or may contain calcium instead. Sealed for life batteries hardly gas at all although a small vent is provided to prevent pressure build-up, if the battery is overcharged.

As virtually all current production vehicles have alternator charging systems, with higher outputs than the older dynamo, the main job of the battery is now to provide a surge of current to operate the starter motor—the alternator easily copes with most electrical loads when the engine is running. With this in mind it followed that modern batteries are not designed for deep discharging. On a vehicle, the battery will spend most of its life on charge or standing idle waiting to give the next surge of current to the starter motor.

With their reduced maintenance requirements, batteries are much cleaner and generate less fumes **provided** they are not overcharged or deeply discharged. Single-sideband operation is a good example of use where the average current is considerably less than the peak current, also the duty cycle between "overs" helps the battery recover and the charger to cope—100W rag-chewers with speech processors excluded!

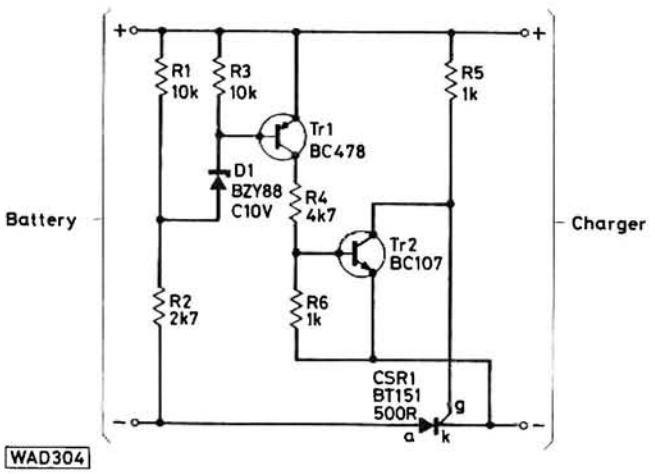


Fig. 1: The complete circuit diagram of the battery charger controller. See text and Fig. 3 for adjustable voltage option

Circuit Operation

The complete circuit diagram of the battery charger controller is shown in Fig. 1. When the battery is first connected its voltage is approximately 12V. Zener diode D1 does not conduct and Tr1 and Tr2 are off. The silicon controlled rectifier CSR1 is fed with gate current via R5 and is switched on, allowing the unsmoothed d.c. to flow from the charger to the battery. As the charge continues the battery voltage rises and when it reaches approx. 13·5V the Zener diode conducts, turning on both Tr1 and Tr2. In this condition the gate of CSR1 is clamped to its cathode by Tr2, effectively switching it off and stopping the charge. As the battery voltage decays, D1 stops conducting and Tr1 and Tr2 are turned off, restoring gate current to CSR1 and re-starting the charge process. The result of all this is the charger and battery are rapidly connected and disconnected by CSR1 and the battery voltage will not rise above 13·5V with the ammeter on the charger "flickering" around zero.

Construction

Construction is very straightforward, especially if the p.c.b. layout shown in Fig. 2 is used. The complete unit may be mounted inside a diecast aluminium box which also acts as a heatsink for CSR1. (Note, with the device specified an insulating washer is not needed, the anode of CSR1 being bonded, via the mounting tab, to the box. However, for correct circuit operation it is important that the d.c. output terminals of the battery charger are independent of mains earth.) Alternatively, the p.c.b. may be housed inside the charger, using the case as the heatsink for CSR1, assuming the case is metallic of course!

The operating voltage of the unit may be changed by altering the value of R2. Alternatively, a small pre-set potentiometer and resistor may be fitted (2·2kΩ and 1kΩ in series, Fig. 3) making adjustment easy. This was used on some prototypes but was discarded because of the temptation to twiddle.

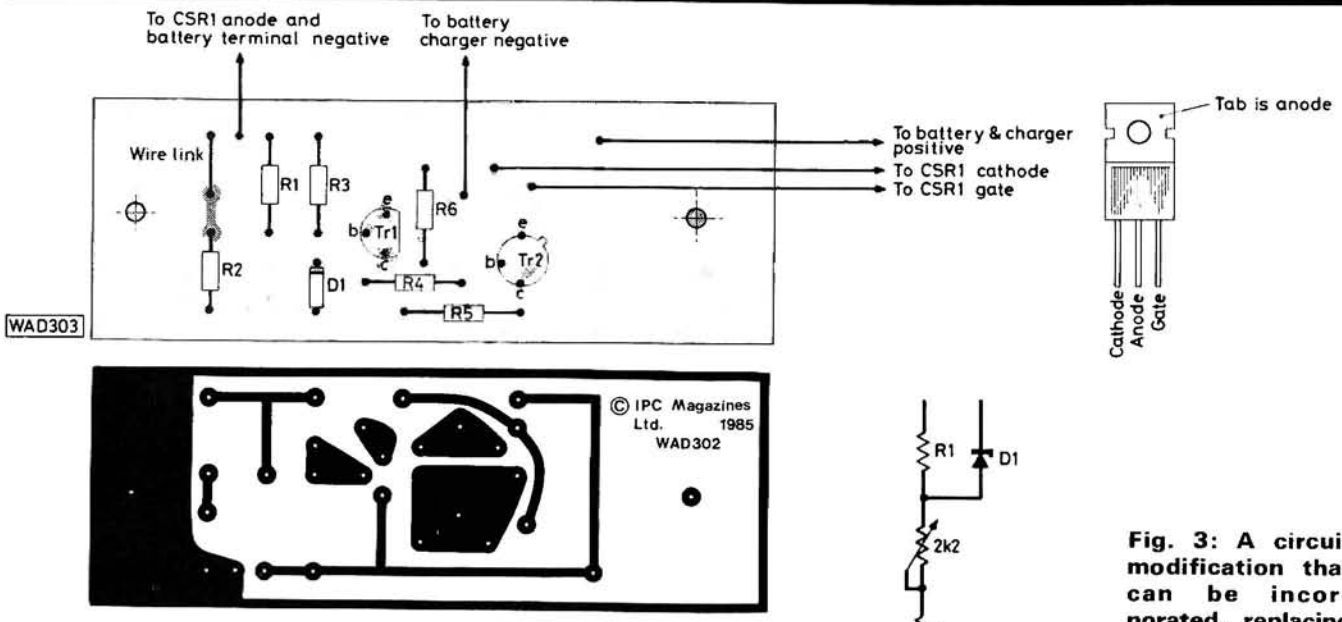


Fig. 2: Full size component overlay and p.c.b. track pattern. If an alternative device is used for CSR1 ensure the mounting tab/stud is at anode potential

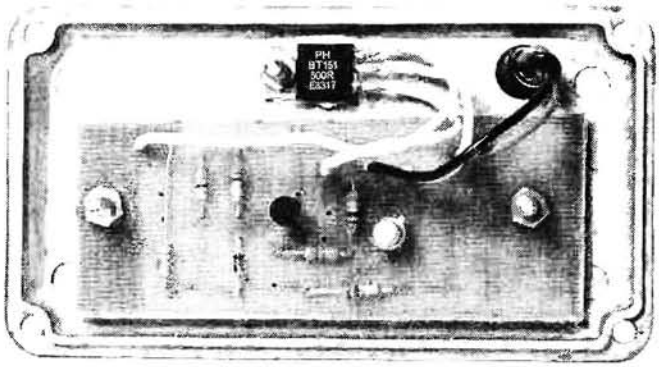
Fig. 3: A circuit modification that can be incorporated, replacing R2 to give adjustable voltage cut-off

The semiconductors used are not critical, almost any *pnp* silicon transistor can be used for Tr1 and most *npn* transistors will work for Tr2. The device type specified for CSR1 may be changed, although a BT151 or equivalent is convenient as it may be mounted without an insulating washer.

Testing

Before mounting the p.c.b., check the wiring and components for errors, before connecting the charger. Connect the charger to a battery and switch on (with the customary feelings and prayers!). The ammeter should show a charge—the rate depending on the state of the battery, a heavily discharged battery demanding more charge. As the battery is charged its voltage rises. Connect a voltmeter across the battery and when the voltage reaches approximately 13·5V the unit should be working—charge will be reduced with the charger ammeter hovering around zero. This state will continue until the battery voltage is reduced by current demand, i.e. a linear amplifier on transmit.

continued on page 53 ▶▶▶



The author's prototype battery charger controller. The negative lead to the battery is bolted to the outside of the lid/heatsink

★ components

Resistors

¼W 5% carbon film

1kΩ	2	R5,6
2·7kΩ	1	R2
4·7kΩ	1	R4
10kΩ	2	R1,3

Semiconductors

Diodes

BT151-500R	1	CSR1
BZY88C10V	1	D1

Transistors

BC107	1	Tr2
BC478	1	Tr1

Miscellaneous

Diecast aluminium box, 114 × 64 × 30mm (see text), p.c.b., heatsink compound.

BUYING GUIDE

All the components used in this project are readily available from regular suppliers.

Approximate Cost £6

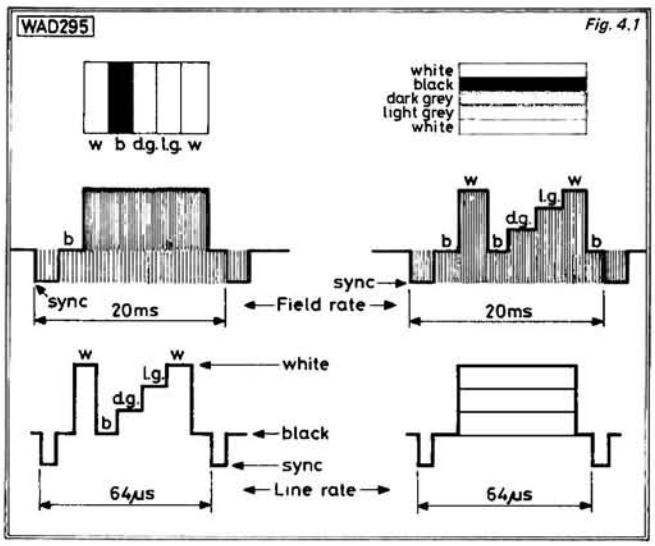
Construction Rating BEGINNER

PRACTICAL ATV TECHNIQUES

Part 4 by Allan Latham G8CMQ

Many readers will be familiar with the TV waveform and its associated frequency spectrum. For those who may not have yet acquainted themselves with the mysteries of TV, here is a simple explanation of some of the more common terms and an example of a TV waveform.

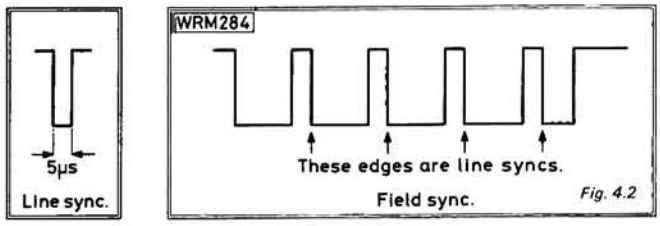
You will probably be aware that the picture is made up of horizontal lines. As the electron beam in the tube sweeps left to right across the face of the TV tube in about 57μs its intensity is changed and this leads to a single line of picture information being displayed. The retrace from right to left is very brief and is blanked so that no picture information is displayed (i.e. the electron beam is switched off). The total line duration is 64μs. The frequency is 15 625Hz and is known as the **line** rate.



During the course of this 64μs period the electron beam has moved down the tube face a little and the next line is drawn below the preceding one. At the bottom of the screen the electron beam is quickly returned to the top of the screen. This retrace is also blanked so that no picture information is displayed. The time taken for one sweep down the screen is 20ms and 312½ lines are covered in this time. The frequency of this vertical scan is 50Hz and is called the **field** rate. Each alternate field of the picture is displaced vertically from its predecessor so that the lines in one field fall in the gaps between the lines in the other. This is done to reduce flicker and is called **interlacing.** The scan sequence repeats itself at 40ms intervals and this is called the **frame** rate or picture rate, i.e. 25Hz.

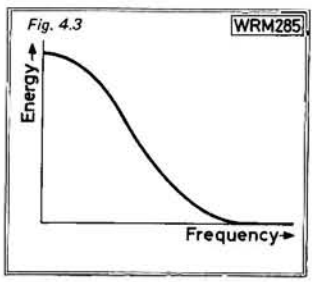
For the moment we will confine ourselves to a static black and white picture, e.g. a grey-scale step test pattern. We will leave colour and movement until later.

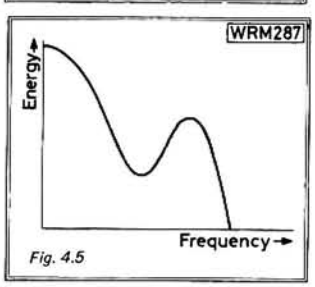
The diagrams in Fig. 4.1 illustrate what you would see on an oscilloscope at field rate and line rate. In fact to be accurate you should really use frame rate but the difference doesn't matter for our purposes. The important points to note are that the vision signal itself varies the amplitude of the waveform between black and white level

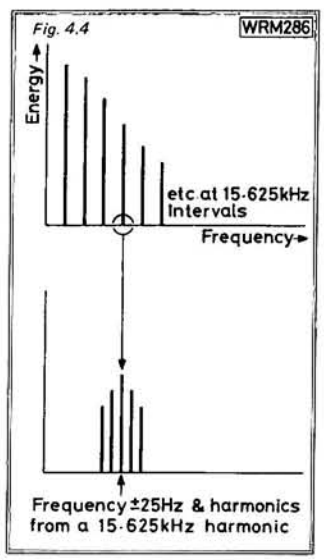


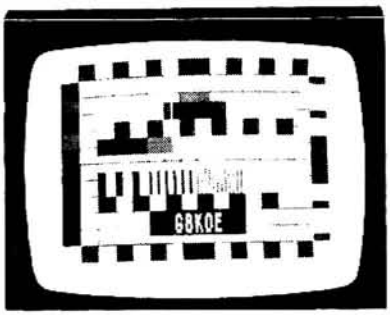
depending on picture content. Before the end of each line the signal is forced to black level for a few μs then the signal goes to a level lower than the black level. This is the line synchronisation pulse. Immediately after the sync pulse (which lasts for about 5μs) are a further few μs of black level before the picture information starts again. A similar situation applies for the field-rate signal, except that the durations are correspondingly longer. The fact that the field sync is much longer than the line sync allows the TV set's timebases to separate the two. In detail the field sync also contains edges at line sync rate in order that the line timebase stays in lock during the field sync.

You will notice that the waveform shown in Fig. 4.2 contains steep edges: the picture itself could also contain fine detail. A rapidly changing waveform contains high frequency components and in the case of a TV signal these can go up to 5·5MHz. This is a limit imposed by the broadcasters to save bandwidth. Computer generated graphics can contain components up to approximately 20MHz and the difference between 5MHz and 20MHz can easily be seen on a high definition tube. Similarly few domestic v.c.r.s reach 3MHz and this (together with the worse signal to noise ratio) is clearly visible on domestic TV tubes. The spectrum of a TV signal is not simply "white" noise from d.c. to 5·5MHz. First of all the amplitude of high frequency components is much less than low frequency components, Fig. 4.3.









Just three of the 45 features available on the GB3VR repeater groups program for 48K Spectrum, which include a real time clock, crosshatch and Universal locator calculator. Full details from Mr. R. Stephens G8XEU, Toftwood, Mill Lane, High Salvington, Worthing, W. Sussex. Tel: 0903 67228

Secondly, because (for a static picture) the waveform repeats every 40ms it contains most of its energy at 25Hz and harmonics. In fact because differences between lines are very small there is a strong tendency for most energy to be contained near 15·625kHz and its harmonics, Fig. 4.4.

Colour is added to the monochrome signal as a suppressed carrier signal at 4·43MHz, carrying two independent signals in quadrature. In order to recover these signals a burst of reference carrier is sent just after each line sync. The result in the frequency spectrum is to add a large amount of energy at 4·43MHz ± 500kHz, Fig. 4.5. Movement in the picture tends to "spread" the 25Hz peaks near each line-frequency harmonic.

The effect of distortion can be considered in relation to the waveforms and spectrum shown. If the amplitude non-linearity is severe the syncs will be "crushed", i.e. much smaller in relation to the video, and the signal will be difficult to lock. Similarly whites can be crushed and the visual effect is no difference between light greys and white; the whites appear to flare out and contain no detail. It is of course possible to have the two distortions in the same signal, Fig. 4.6. This distortion affects the colour information as well. The PAL system used in the UK copes well with distortions of the signal and non-linearity errors often go unnoticed by most viewers.

Distortion of the frequency response characteristic in the receiver, or transmitter, can also cause problems. As the bandwidth is reduced the high-definition details in the picture are softened—this is often not possible to see on camera pictures because of limits set by the camera optics and the camera tube, but it shows up well on computer graphics. The noise content of the picture also falls as bandwidth is reduced and this may be considered a visual improvement by many viewers. When the bandwidth has been reduced sufficiently the colour information cannot be detected and a black and white picture results. Finally as the bandwidth gets down to about 1MHz the picture becomes smeared and picture detail is lost. The vertical definition of the picture remains constant because of the fixed number of lines per picture; the reduction in sharpness takes place only in the horizontal direction not the vertical.

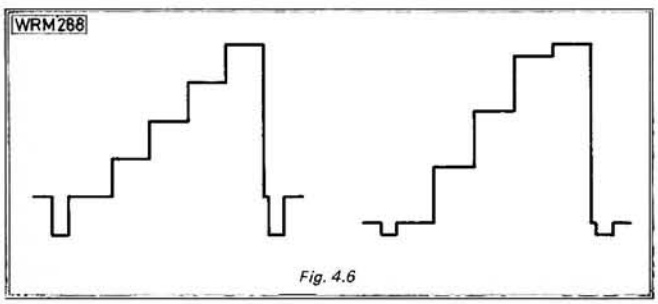
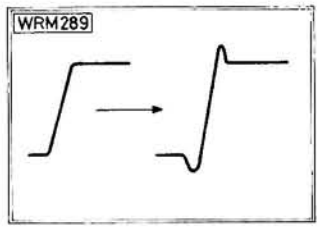


Fig. 4.6

Fig. 4.7 ▶



Notches and peaks in the video frequency response can have strange effects, e.g. loss of colour on a seemingly perfect full bandwidth signal—due to a notch at 4·43MHz. One common distortion deliberately introduced is high-frequency boost in a signal which has been bandwidth limited, e.g. the 3MHz bandwidth signal in a v.c.r. The effect of a boost at the h.f. end is to increase the visual sharpness of edges; however if it is overdone the edges "ring" and noise increases too, Fig. 4.7.

Generating RF

The time has come to consider how we are going to generate r.f. on 1·3GHz. In some ways this is easier with TV than with audio. The frequency stability constraints are a lot less. For reliable s.s.b. work you want to be able to set your frequency to within a few hundred Hz, an absolute frequency tolerance in the order of 1 in 10^8 at 1·3GHz. For ATV work an error of a few MHz is not too serious, considering we work with bandwidths of up to 20MHz. Of course if you are putting your signal into a fixed-tuned receiver, e.g. a repeater, you will want to be more accurate.

Linearity is a problem for s.s.b.—you must use a linear amplifier to increase the power output of the transverter. For any f.m. mode, f.m. TV included, there are no linearity problems and the r.f. amplifiers can be designed for maximum r.f. output power. Finally the big difference between ATV and the narrow-band modes is the power level needed. Because ATV operates in bandwidths about 1000 times wider than audio modes you need approximately 1000 times the power for the same carrier to noise ratio at the receiver, other factors being equal. Milliwatt ATV is fun for very short range, very good line of sight paths and for setting up equipment, but to work distances over obstructed paths you need to aim for several watts.

This then is the basic requirement: 5 to 10W r.f. modulated with f.m. TV with a stability of a few hundred kHz.

Direct or Triple

There are two distinct routes to take to obtain this sort of power on the 1·3GHz band. First, start direct at 1·3GHz; modulate a free-running oscillator at the final

frequency and amplify the r.f. to the required level. Second, start with 430MHz and triple; modulate a 430MHz free-running oscillator—amplify the r.f. at 430MHz to about three times the final level required (e.g. 15W if you want 5W) and feed it through a varactor tripler.

As the direct method seems so simple and straightforward you may be forgiven for asking why anyone would contemplate the tripling method. In fact, because of the high price of microwave power transistors, until very recently the tripling method was the only one financially viable for most amateurs.

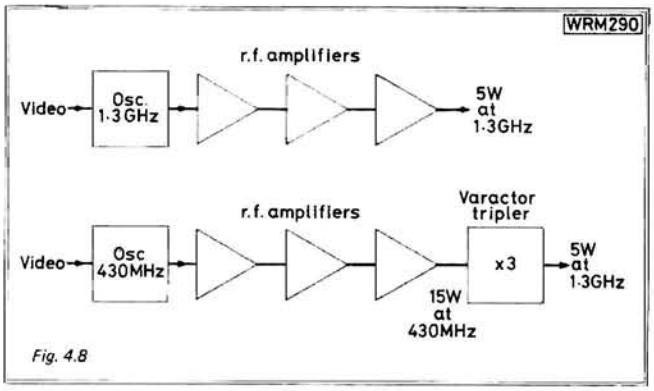


Fig. 4.8

Tripling

As the tripling method has history on its side let's look at it first. The amplifier chain works at about 430MHz—this is the main advantage of the system. Technology on these frequencies is well established and up to 50W transistors are not very expensive—a number of manufacturers produce kits. Construction at 430MHz requires care and attention (1·3 GHz needs a bit more) but the fact that many amateurs have made 430MHz band equipment and it works well is proof that this part of the system is no real problem. For those who don't want to build, 430MHz amps are commercially available.

The start of the chain is a free-running oscillator capable of being frequency modulated by a TV signal. There is a wide choice—kits are available and there is a BATC design which also works well. At least one amateur I know has modified a 430MHz ATV transmitter by replacing the crystal with a free-running *LC* circuit. Whatever oscillator is used the tuned circuit will contain a varicap diode, across which the video is applied. The varicap diode is always reverse biased and in this condition its capacitance varies with the voltage across it—this in turn causes the oscillator to change frequency in sympathy with the applied signal, i.e. f.m. The video will need some pre-processing and sound will need adding—more on this later.

Finally we come to the Achilles heel of this method of generating 1·3GHz—the tripler. I personally have built several different designs and have had through my hands other examples. I can honestly say that no two behaved the same way! Efficiency varies from 10 to 60 per cent. The best one I ever made used a diode which refused to work at all in a slightly different design. I have set out my observations on triplers in a separate part of this article for the benefit of those who may have one in the junk box and may wish to improve it. I have now vowed *never* to touch another tripler.

Besides this problem of lack of reproducibility in triplers, there is another serious problem—spurious outputs. It is quite possible to put 15W of 430MHz into a tripler and get 5W out at 1290MHz, but you are also likely to get 500mW at 430MHz and 860MHz as well. With careful alignment and good design these outputs can be minimised. (You all have access to microwave spectrum analysers don't you?). In reality the only cure is to follow the tripler with a filter offering about 50dB attenuation at 860MHz and 430MHz. An interdigital filter—home-made or bought is essential. You can then tune for maximum output on an r.f. power meter (If the 860/430MHz energy is at 50 to 70dB below the wanted level at 1·3GHz this isn't too important).

Triplers can also produce outputs on frequencies not harmonically related to the input—this is thankfully uncommon and in any case the interdigital filter will "cure" it. If you have deduced that I don't like this method you have guessed right. It had a lot to commend it in the past, i.e. it was the **only** practical way to do it, but it should now be considered obsolete.

Direct

Starting out at the final frequency certainly has simplicity on its side. A year ago the economics of doing it this way were not too favourable. Now things have changed, the Japanese semiconductor manufacturers have entered the market with devices intended for f.m. p.m.r. use at about 1GHz (ie. cellular radio).

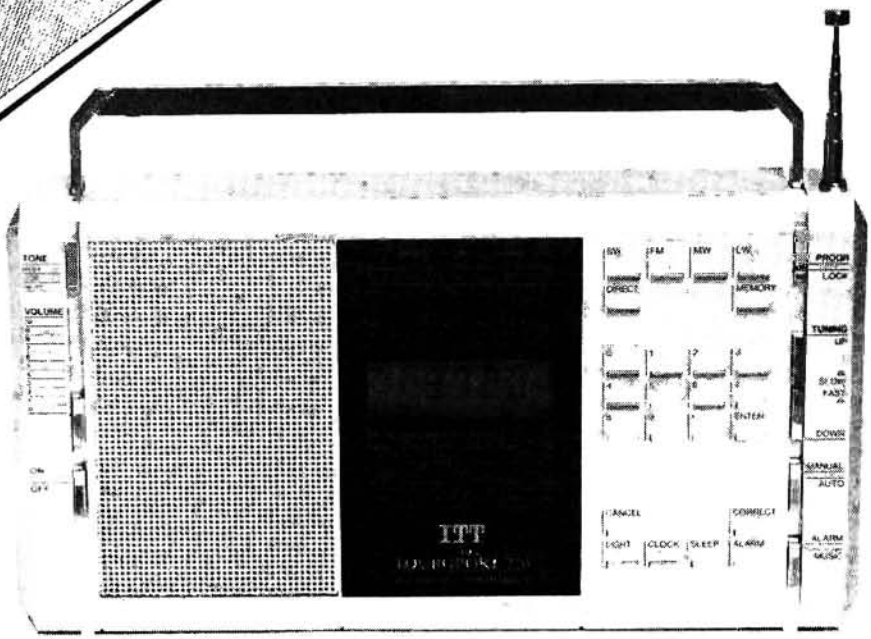
The availability of commercial grade devices at sensible prices has made all the difference. When I was deciding how to approach the design of an f.m. TV transmitter for Solent Scientific the basic policy decision was made to go for the direct method as the only way to produce kits that could be built and aligned by a careful amateur, with simple test gear. So how does the direct method work?

The first stage, just as in the other method, is a free-running oscillator. Because of the frequency involved, stripline techniques are used for some of the circuit elements. A varicap diode is again used to allow the video signal to frequency modulate the oscillator. If there is any problem at all with home alignment of the transmitter it is here. Not many cheap frequency meters go up to 1·3GHz. In practice a calibrated receiver is sufficiently accurate for ATV purposes.

The 1·3GHz f.m. TV signal is then amplified by a further three transistor stages up to 1W. A further two transistor amplifiers can take this up to 10W. That's all there is to it. Just a few trimmers to peak and the standing current to set in the power transistor and it's all done! That really is all there is to this simple straightforward approach. Care is needed in construction of course, but all the critical bits are etched on the p.c.b. thus removing most of the risk of failure.

PW REVIEW

ITT Touroport 220 Broadcast Receiver



The Touroport 220 is a synthesised battery/mains portable receiver for the traveller or broadcast bands enthusiast. It covers the long, medium and short-wave broadcast bands and v.h.f. Band II, as listed in the table.

Limiting short-wave coverage to the broadcast bands is unusual in a synthesiser-controlled m.f./h.f. receiver. As the set doesn't incorporate a b.f.o. for c.w. or s.s.b. reception, it could be argued that anything outside the broadcast bands would be of little interest anyway. The snag is, of course, that changes in frequency allocations during the life of the receiver could bring stations up on bands that are not covered. As an example, there are already a number of stations operating in the band 13·6–13·8MHz, not due to transfer its allocation from the Fixed Services to Broadcasting until 1989, and not included on this receiver.

Also, some stations operate out of band. Although the coverage of most bands on the Touroport 220 extends beyond the official allocation, this is not the case everywhere. For example, the BBC World Service on 9·410MHz, and nearly 40 other stations using frequencies between 9·0 and 9·5MHz are left very much out in the cold.

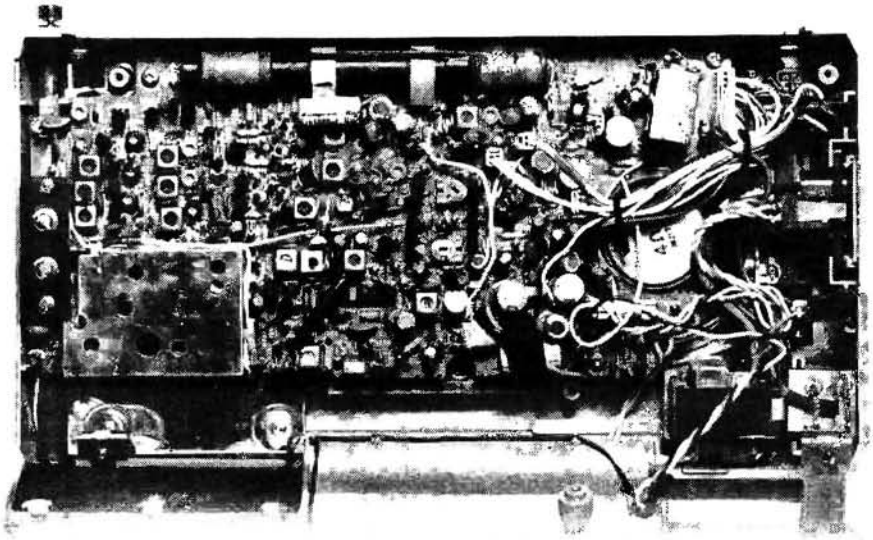
There are rumblings from some European countries of proposed legislation to outlaw possession by the "man in the street" of general-coverage h.f. receivers. Should such laws every reach the statute books, this type of receiver will no doubt become the norm. Until then, my own feeling is that it's an unnecessary limitation.

Features

Waveband selection and frequency entry is by means of a press-button keyboard, with manual and automatic station search by means of UP/DOWN buttons as an option. The frequency tuned is given on a liquid crystal display. Entry and search is in frequency steps whose size varies according to the band. On long waves the steps are 1kHz; on medium waves 9kHz (corresponding to Region 1 channel spacing); on short waves 5kHz (again corresponding to normal channel spacing), and on Band II f.m. 50kHz. Manual search can be at a slow or fast stepping rate, depending on whether the UP/DOWN buttons are partly or fully depressed. In the automatic search mode, the search stops when a sufficiently strong station is received. Two l.e.d.s indicate whether the receiver is searching or in tune. A 10-station memory remembers the band and fre-

Frequency Coverage

AM			
153	—	281kHz	(l.w.)
522	—	1611kHz	(m.w.)
2·300	—	2·935MHz	(120m)
2·940	—	3·575MHz	(90m)
3·580	—	4·215MHz	(75m)
4·540	—	5·175MHz	(60m)
5·820	—	6·455MHz	(49m)
7·100	—	7·735MHz	(41m)
9·500	—	10·135MHz	(31m)
11·585	—	12·215MHz	(25m)
15·100	—	15·735MHz	(19m)
17·500	—	18·135MHz	(16m)
21·340	—	21·975MHz	(13m)
25·500	—	26·135MHz	(11m)
FM			
87·5	—	108MHz	(Band II)



quency of your favourite stations. A 3-position tone switch completes the "radio" controls.

The l.c.d. frequency readout doubles as the display for a 24-hour digital clock, an alarm clock which wakes you by either music or a "bleeper", and a 60-minute sleep timer.

The Touroport 220 will run from 220/240V (or 110/127V) 50/60Hz a.c. mains, from an external 6V d.c. supply, or from internal batteries. Four IEC R14 (HP11) type batteries are required for the radio itself, and two IEC R6 (HP7) type batteries for the clock and memory functions. With a standing (no signal) current consumption of around 100mA measured in our tests, the radio batteries obviously aren't going to have too long a life, and I would recommend mains operation wherever possible.

On long and medium waves, a ferrite rod antenna is used. On short waves and v.h.f. a 700mm telescopic whip comes into play, but there are terminals for connection of an external s.w. antenna and earth. In my tests, I found the whip was quite good enough for s.w. reception unless you were after very weak signals—the lower bands in daylight, or the higher bands at night. Sensitivity measured in our lab was 3–4μV e.m.f. for 20dB signal-to-noise ratio across the s.w. bands, quite a respectable figure. Selectivity appeared adequate, even in today's crowded band conditions.

The 3-position tone control gives useful frequency tailoring, and in our lab tests, produced the following –6dB bandwidths: NEWS 140Hz–1·7kHz; LOW 40Hz–1·7kHz; HIGH 40Hz–1·7kHz. The restricted audio bandwidth NEWS position produced really punchy speech. Audio output checked out at 0·8W into 4Ω with 10 per cent total harmonic distortion, with a maximum level of 1·1W at 20 per cent t.h.d., adequate for listening in reasonably quiet surroundings. A 3·5mm jack is provided for private listening on headphones, which can be from 4–600Ω impedance.

The Touroport 220 measures approximately 282 × 152 × 55mm, and has a convenient carrying handle which doubles as a tilting rest when the receiver is laid down. It has a stylish crystal silver metallic finish and costs £139.00, including VAT, from ITT Consumer Products (UK) Limited, retail stockists.

Geoff Arnold

Swap Spot

Have Casiotone 701 Electronic Organ. Normal or auto chord, sound effects, bar code/manual memory, l.e.d. chord indicators. New costing £379. Would exchange for best 60 channel programmable scanner or transceiver offered. Leif, 30 Honeysuckle Close, Chatham, Kent, ME5 0RU. *W819*

Have Pentax spotmatic camera f1.8, in mint condition. Would exchange for good oscilloscope d.c. to 15Mhz or higher, complete with service manual. E. Schofield, 26 Birkenshaw Lane Birkenshaw, Bradford, West Yorkshire, BD11 2HA. *W809*

Have service sheets and manuals in my collection—vintage wireless, amateur radio, television, test, etc. Would exchange for service sheets and manuals, any age, make or model, s.a.e with your "wants" and offers. M. Small, 8 Cherry Tree Road, Chinnor, Oxfordshire, OX944QY. *W921*

Have FLDX500 transmitter, FRDX500 receiver fitted with f.m. Would exchange for QRP s.s.b./c.w h.f. transceiver. Also have Tandy TRS80 extended colour 16K. Would exchange for 28MHz f.m. rig or w.h.y. GM4ELV, QTHR. *W923*

Have Yaesu FTV-901R transverter frame complete with 144MHz module, option to fit 430MHz and 50MHz modules, original box, manual and connecting leads etc. Would exchange for Yaesu FT-290R or other multimode 144MHz transceiver. GW6TYJ, QTHR or Tel: Swansea 844680. *W925*

Have new boxed Microwave Modules MM2001 RTTY to TV converter. Would exchange for good condition Spectrum 48K computer and accessories. Tel: Northwich 45584. *W937*

Have 12′ glass fibre canoe complete with paddle, nylon fitted spray cover, buoyancy aid and safety helmet. All in good condition. Would exchange for FL3 or MML144/100-LS or MM2001. G6SBR, 13 Herbert Street, Padiham, Lancs. *W942*

Have teleprinter with built-in paper tape, Friden Flexowriter 1F, includes spares. Would exchange for anything aeronautical; avionics, aircraft part, flying equipment or manuals etc., or any h.f. gear. Godfrey G4GLM, 63 The Drive, Edgware, Middlesex, HA8 8PS. Tel: 01-958 5113. *W948*

Have TRS80 64K twin disk computer with Seikosha DMP quality printer complete with paper, 130+ disks, disk storage, many books, programs, word proc., file, reports, edit/ass, scripsit, manuals and mains filter system (plus lots more). Would exchange for v.h f./u.h.f. base station, w h.y. Tel: 0473 85526. *W951*

Have quantity vintage wireless valves, most new. Also have quantity television valves, most new. Would exchange for high voltage bipolar transistors; polarity, size, age immaterial. Must be in good condition. High h_{fe} power types preferred. S.J. Payne. 5 Delius Close, Alway Estate, Newport, Gwent NP9 9SL. *X090*

Have Sommerkamp FT7B h.f. rig and FDK multi 750E 144MHz rig. Would exchange for FT-77 or similar and 144MHz transverter. Tel: Southport 74792. *X115*

Have DX200 receiver covering amateur bands from 0·15-30MHz. Also have Heathkit oscilloscope, both in perfect condition and good working order. Would exchange for 144MHz mobile transceiver, working if possible but faulty equipment considered. Andres. Tel: 0274 674397 (Bradford). *X127*

Have Realistic PRO47 ten channel v.h.f./u.h f. scanning receiver and seven amateur crystals. Mains or 12V d.c., ranges: v.h.f. 30-50MHz, 144-174MHz. u.h.f. 450-512MHz. Would exchange for good airband scanner or receiver. T Heard. 12 Stewart Garth, Cottingham, N. Humberside HU16 5YQ. Tel: 0482 846320 after 6pm. *X151*

Have Eddystone 680X receiver, in working order. Would exchange for Heathkit (SB300 or SB301 receover. Tel: 0793 826325 after 7pm (Swindon). *X158*

Have Fletcher Arrow sportsboat with cover, trailer and 40hp Johnson outboard (value £700+). Would exchange for amateur equipment. Cash adjustment either way. Jennings. Tel: 0242 34916 (Cheltenham). *X178*

144MHz QRP Contest 1985

by Neill Taylor G4HLX

The third *PW* QRP contest will be held along very similar lines to the popular events in 1983 an 1984. As before, the contest is open to all, the 3 watt limit on transmitter output power enabling anyone with a small s.s.b./c.w./f.m. transceiver to compete effectively, either from home, or, for those who prefer to take to the hills and enjoy the benefits of an elevated site, as a portable station.

As last year, a summary results table and details of the leading stations will be published in *Practical Wireless,* and entrants should send a large s.a.e. with their entry if they would like to receive a full detailed results list.

There are a few minor changes in the rules this year; please read them carefully. The most important change is the adoption of the new Universal Locator (Maidenhead) system to specify the location in place of the old QTH Locator (QRA) used in previous years. If you have not yet determined your Locator, it should take you less than five minutes with the simple procedure given on page 30. Even if you think you do know the locator for your station (or the portable location you intend to use), it may be as well to spend a few minutes checking that you have got it correct.

Newcomers to v.h.f. contest operation might like to refer back to the VHF Contest Special published in *PW,* May 1983, for some introductory advice. A few of the important Do's and Don'ts are given here, not only for newcomers, but as a reminder to all entrants.

Do use standard phonetics for callsigns and pronounce them in a clear, ungarbled manner, and never omit the suffix (e.g. /P) if there is one.

Do ensure that your log is an accurate record of what is sent and received — again take special care over the /P suffix (this is where most points have been lost in previous years).

Do make a neat copy of the log for submission as an entry, on A4 paper (the normal way up, not sideways). The sample here shows how the columns should be arranged.

Don't rely on other stations to avoid duplicate contacts, but take care yourself by using a check log during the contest.

Do check your transmitter output power as required by the rules. If you are using equipment which is normally capable of running more than 3 watts output, this must be reduced by suitable means. The simplest way is often by the application of a (variable) negative voltage to the transmitter a.l.c. line, available via the accessory socket. A simple and accurate method of measuring the output power is shown in Fig. 1. Connect this to the 50Ω output of the transmitter and adjust the a.l.c. voltage so that the voltmeter does not exceed 16·7V on a good whistle into the microphone.

Do observe the band plan.

Don't start transmitting on a frequency without first checking that it is not already in use by another station. Be aware that you may be sharing a frequency with others without realising it, due to unfortunate beam headings, and be prepared to QSY if a conflict arises.

Don't use the normal calling frequencies, 144·300MHz and 145·500MHz, and during the morning stay clear of the frequencies used by GB2RS news broadcasts, 144·250MHz and 145·525MHz. Avoid any other frequency that is obviously in use for non-contest purposes.

Don't radiate a broad or poor-quality signal as caused, for example, by the overdriving of a stage in the transmitter or by excessive speech compression.

Don't expect normal performance from your receiver in the presence of many very strong signals (despite being QRP), particularly if you are using a high-gain pre-amplifier. Before concluding that another station is radiating a poor signal check that the problem is not an effect such as overload, intermodulation or reciprocal mixing in your receiver (try at least 30dB of attenuation at the input, and remove any pre-amplification).

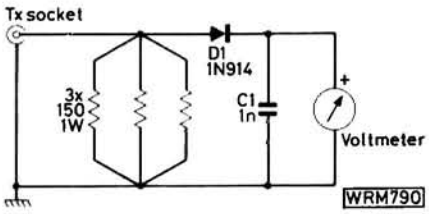


Fig. 1: Suitable circuit for low power measurement in a 50Ω system. The resistors should not be wirewound. All leads (except those to voltmeter) should be as short as possible (10mm maximum). The meter will read ($\sqrt{100P}$)–0·6 volts for a power of P watts (16·7V at 3 watts)

Do obtain permission to use a portable site from the owner of the land.

Don't choose a site that another group might be planning to use; take steps well before the contest to avoid a clash. It is wise to have an alternative site available in case a problem of this nature is encountered when you arrive to set up station.

Do observe the Country Code when portable.

Do have an enjoyable day!

Neill Taylor G4HLX

PRACTICAL WIRELESS 144MHz QRP CONTEST

Date	Callsign	Locator	Sheet N° of

Time GMT	Callsign	Report & serial N°		Locator
		Sent	Received	

RULES

1. General
The contest is open to all licensed radio amateurs, fixed stations or portable, using s.s.b., c.w. or f.m. in the 144MHz (2m) band. Entries may be from individuals or from groups, clubs, etc. The duration will be from 0900 to 1700GMT on 16 June 1985.

All stations must operate within the terms of the licence. Special event callsigns may not be used.

2. Contacts
Contacts will consist of the exchange of the following minimum information:
(i) callsigns of both stations
(ii) signal report, standard RS(T) system
(iii) serial number: a 3-digit number incremented by one for each contact, starting at 001 for the first
(iv) locator (i.e. full 6-character Universal Locator).
Information must be sent to, and received from, each station individually, and contact may not be established with more than one station at a time.

Entrants outside the British Isles may claim points for contacts with stations within the British Isles only (i.e. stations with prefix G, GB, GD, GI, GJ, GM, GU, GW or EI).

If a non-competing station is worked and is unable to send his full Universal Locator, his old-style QTH Locator (QRA) or his location may be logged instead. However, for a locator square to count as a multiplier (see Rule 4), the full 6-character locator must have been received in at least one contact with a station in the square.

Contacts via repeaters or satellites are not permitted.

3. Power
The output power of the transmitter final stage shall not exceed 3 watts p.e.p. If the equipment in use is usually capable of higher power, the power shall be reduced and measured by satisfactory methods.

4. Scoring
Each contact will score one point. The total number of points gained in the eight hour period will then be multiplied by the number of different locator squares in which contacts were made (a "square" here is the area defined by the first four characters of a Universal Locator).

Example: 52 stations worked in IO81, IO90, IO91 and JO01 squares; final score = 5 × 52 = 260.

Only one contact with a given station will count as a scoring contact, even if it has changed its location, e.g. gone /M or /P. If a duplicate contact is inadvertently made, it must be clearly marked as such in the log.

5. Logs
The log submitted as an entry must be clearly written on **one side only** of A4-sized (210 × 297mm) paper ruled into columns showing:
(i) time GMT
(ii) callsign of station worked
(iii) report and serial number sent
(iv) report and serial number received
(v) locator received (or location)
Underline or highlight the first contact in each of the locator squares worked.
At the top of each sheet, write:
(a) callsign of your station
(b) your location as sent
(c) sheet number and total number of sheets (e.g. "sheet No. 3 of 5")

6. Entries
Accompanying each entry must be a separate sheet of A4-sized paper bearing the following information:
(a) name of entrants (or of club, etc., in a group entry) as it is to appear in the results table
(b) callsign used during contest (including any suffix)
(c) name and address for correspondence
(d) location of station during contest
(e) locator **as sent**
(f) whether single- or multi-operator (where a single-operator means an individual who received no assistance from any person in operating the station, which is either his permanent home station or a portable station established solely by him/her); if multi-operator, include a list of operators' names and callsigns
(g) total number of contacts and locator squares worked
(h) list of the locator squares worked
(i) a full description of the equipment used including TX p.e.p. output power
(j) if the transmitter is capable of more than 3W p.e.p. output, a description of the methods used (i) to reduce and (ii) to measure the output power
(k) antenna used and approximate station height a.s.l. Failure to supply the previous information may lead to disqualification.

The following declaration must then be written and **signed by the entrant** (by one responsible person in the case of a group entry): "I confirm that the station was operated within the rules and spirit of the event, and that the above information is correct".

This declaration concludes the entry, which should be sent, with the log sheets, to: *Practical Wireless* Contest, c/o Dr. N. P. Taylor G4HLX, 87 Hunters Field, Stanford-in-the-Vale, Faringdon, Oxon SN7 8ND.

A large s.a.e. should be enclosed if a full set of contest results is required.

Entries must be postmarked no later than 1 July 1985.

Any other general comments about the station, the contest and conditions during it are welcome, but should be written on a separate sheet of paper. Photographs of the station are also invited (but please note that these cannot be returned); if these are not available by the time the entry is submitted they may be forwarded later, to arrive by 2 August 1985.

7. Adjudication
Points will be deducted for errors in information sent or received as shown by the logs. Unmarked duplicate contacts will carry a heavy points penalty. A breach of these rules may lead to disqualification. In the case of any dispute, the decision of the adjudicators will be final.

PW QRP CONTEST
16 JUNE 1985
0900–1700GMT

A SIMPLE METHOD OF FINDING YOUR UNIVERSAL LOCATOR

One of the virtues of the new Universal Locator system (sometimes known as "Maidenhead" or "G4ANB" system) is its simplicity. Whereas a number of computer programs have been published to determine a locator from a latitude and longitude, this can easily be done without a computer. Using the following simple procedure and the tables given here, the only "hardware" you will need is a pencil, provided your arithmetic skills stretch to multiplying by 2 and, in some cases, adding 60 to a number.

The procedure is valid for any location within the British Isles: specifically, any location with a latitude between 49°N and 60°N and longitude between 11°W and 2°E.

You must, of course, first know your latitude and longitude in degrees and minutes. These are readily found from an Ordnance Survey or similar map, but beware that lines of latitude and longitude are not parallel to grid lines, so a long straight edge that can reach from one side of the map to the other, lined up on the scales on either side, can be useful.

Now work through the following steps in sequence. Write the results, as directed, in the appropriate boxes below, which are identified in the text by the small letters in the top left corners.

1. Enter the degrees and minutes of

latitude in boxes (a) and (b), rounding down the minutes figure to the next 0·5′ (i.e. the digit after the decimal point in box (b) should be either a 0 or a 5).

Example: 52° 19·8′ is entered as (a) 52, (b) 19·5.

2. Enter the degrees and minutes of longitude in boxes (c) and (d), this time rounding down the minutes figure to the next whole number, and enter East or West in box (e).

Example: 2° 35·7′ West is entered as (c) 2, (d) 35, (e) W.

3. If you've written East in box (e), write "J" in box (f), "0" (zero) in box (h), and skip to step 5.

4. If you've written West in box (e), write "I" in box (f). Taking the number you've written in box (c), consult Table 1 to find a digit to write in box (h).

5. If you've written "49" in box (a), write "N" in box (g), otherwise write a letter "O" in box (g).

6. Take the second of the two digits in box (a) and copy it into box (j).

7. Take the number you've written in box (b), double it, and write the result in box (m).

8. Take the number in box (d) and write it in box (n), first adding 60 to it if box (c) contains an odd number. Note: zero is regarded as an even number.

9. Using the number you've written in box (n), look up a letter in Table 2, from column 1 if box (e) contains East, or column 2 if box (e) contains West. Write this letter in box (k).

10. Use the number in box (m) to look up a letter from column 1 of Table 2 and write this in box (l).

Boxes (f) to (l) now contain your Universal Locator.

(m) or (n)	column 1	column 2
0– 4	A	X
5– 9	B	W
10– 14	C	V
15– 19	D	U
20– 24	E	T
25– 29	F	S
30– 34	G	R
35– 39	H	Q
40– 44	I	P
45– 49	J	O
50– 54	K	N
55– 59	L	M
60– 64	M	L
65– 69	N	K
70– 74	O	J
75– 79	P	I
80– 84	Q	H
85– 89	R	G
90– 94	S	F
95– 99	T	E
100–104	U	D
105–109	V	C
110–114	W	B
115–119	X	A

Table 1 ▶

box (c)	box (h)
0	9
1	9
2	8
3	8
4	7
5	7
6	6
7	6
8	5
9	5
10	4

◀ Table 2

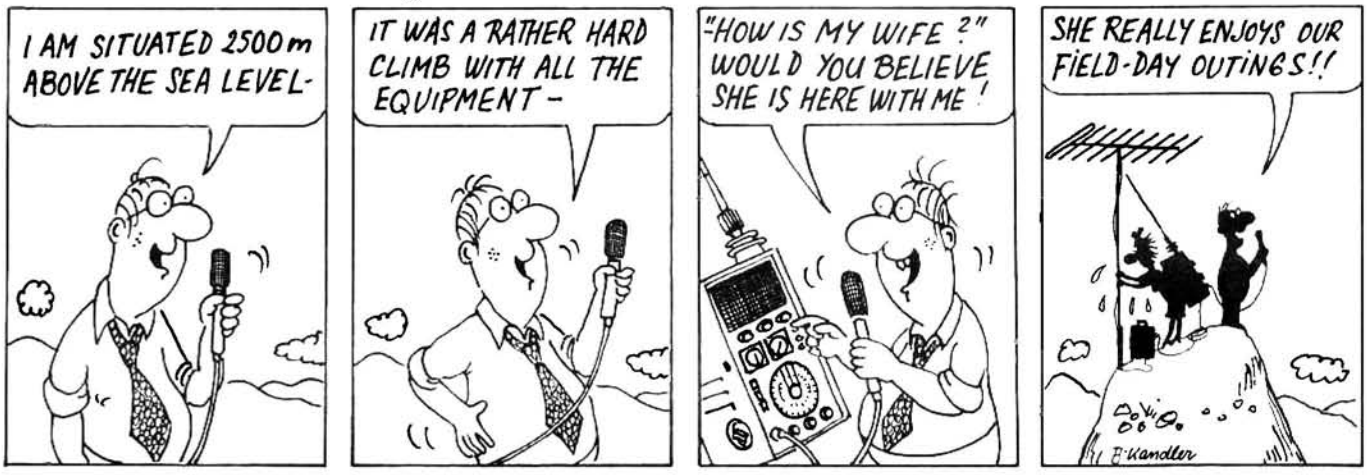
Latitude (a) ° (b) ′ N
degrees minutes

Longitude (c) ° (d) ′ (e)
degrees minutes E/W

Locator (f) (g) (h) (j) (k) (l)

(m) (n)

Benny



Swap Spot

Have Cinerex Siper 8mm STD 8mm projector, Halina Super 8mm cine camera, both in good condition. Would exchange for v.h.f./u.h.f. portable, hand held transceiver or 100W linear with receive pre-amplifier. G1GXS. Tel: 01-672 1833. *W959*

Have Hohner International EK61 electric piano and solid state Kay practice amplifier, both as new and little used, cost £300. Would exchange for 144MHz band transceiver, 430MHz transceiver or communications receiver of comparable value. Write, Mr. John Maguire, 5 Gweedore Park, Suffolk Road, Belfast 11. Tel: 0232 617589. *W960*

Have Sharp RG9500 (top of the range) radio cassette with 50W amplifier and speakers. Would exchange for a 144MHz or 430MHz hand held transceiver. John. Tel: 0553 828897 anytime (King's Lynn). *W964*

Have Yaesu FT-290R, unmodified, as new condition, NiCads and charger, soft case with manufacturers packing and manual. Would exchange for FRG-7700 or FRG-7 and MM or Europa 144MHz band transverter. GM4PGV. Tel: 0294 72950. *W973*

Have Baille "Parisienne" 120-base Musette accordion (as new). Would exchange for a Yaesu FRG-7000 or similar receiver. 10 Turner House, Erasmus Street, London SW1P 4DZ. Tel: 01-821 8255. *W994*

Radio Wave

Part 5 by F. C. Judd G2BCX

The Antenna Special series Part 7 in the August 1983 issue of *PW* dealt with the effect of ground on the vertical angles of radiation from both horizontal and vertical h.f.-band antennas at low physical height and which applies particularly to antennas for the 1·8, 3·5 and 7MHz amateur bands. Few radio amateurs are able to erect horizontal antennas for these bands at heights much in excess of 10 to 12 metres which is approximately a quarter-wavelength at 7MHz, one-eighth of a wavelength at 3·5MHz, and one-sixteenth of a wavelength at 1·8MHz.

With low antenna height two major effects are produced. First, there is little or no radiation at low vertical angles, i.e. at angles near to ground. Secondly, if the antenna is very low there well be an overall loss of radiation due to close mutual coupling between antenna and ground. However, at 7MHz and with the antenna at a height of a quarter-wavelength, or approximately 10 metres. the ground acts as a "plane reflector" resulting in increased radiation with maximum at 90 degrees, i.e. vertical from ground, although there will be little at low angles, if any at all. In fact to obtain radiation at lower angles from any horizontal antenna, it must be at least half a wavelength above ground at the frequency of operation. This would mean heights of about 22·9 metres for 7MHz, 45·9 metres for 3·5 MHz and 91·8 metres for 1·8MHz, but in each case the angles of maximum radiation would not be much lower than 30–35 degrees.

Angles of Radiation

Those radio amateurs confined to using antennas for 1·8. 3·5 and 7MHz at low heights (in the region of 10 to 12 metres above the ground) are generally pleased rather than disappointed with the results they achieve. The reason for the good results depends largely on the relationship between the vertical angles of radiation from the antenna, the prevailing ionospheric conditions and the frequency of operation. To illustrate this we can take a horizontal half-wave antenna for the 7MHz band at a physical height as before (approximately 10 metres) and for which the radiation patterns, both broadside and end-on to the antenna, will be similar to those shown in Fig. 5.1(a) and (b). Without the presence of ground, or in an otherwise "free-space" environment, the horizontal radiation pattern would be the usual cosine or figure-of-eight shape with maximum radiation in all directions about the axis of the antenna as in Fig. 5.1(b). However, as the ground is a quarter-wavelength beneath the antenna it acts as a fairly efficient "plane reflector" so the antenna behaves as a driven element with a reflector, rather like a two-element beam except that maximum radiation is in an upward direction i.e. vertical at 90 degrees. If the ground conductivity is reasonably good the "gain" in the vertical direction will be in the region of 3dB over an otherwise "free-space" half-wave antenna. This condition is based on a ground reflection factor of 2 with the angle of maximum radiation derived from

$$\theta = \arcsin(A/4h)$$

where θ is the wave angle
h the antenna height in wavelengths
and A has a value of 1

For example,

$$\arcsin \frac{1}{4 \times 0{\cdot}25} \text{ gives } 90 \text{ degrees}^{(1)}.$$

The amplitude of radiation at different vertical angles can also be related to angles of incidence with the appropriate ionosphere layer and reflection from the layer from which an approximation of propagation distances can be obtained as in Fig. 5.2. For instance, at vertical incidence (90 degrees) radiation reflected from the F layer at a virtual height of 350km will be returned to earth at the point of origin. At all other angles and for the same layer

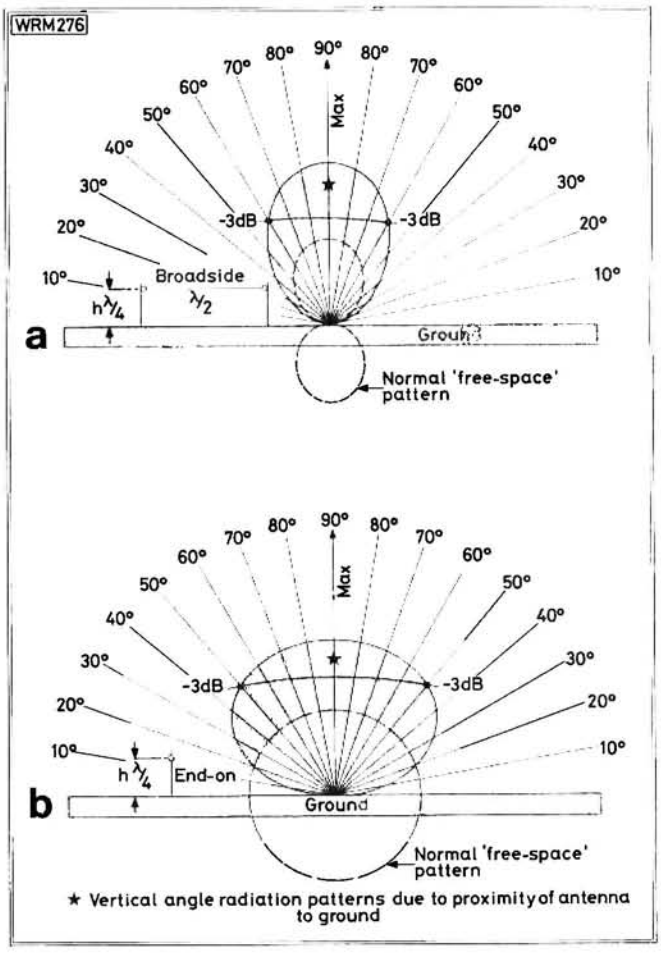


Fig. 5.1

Propagation

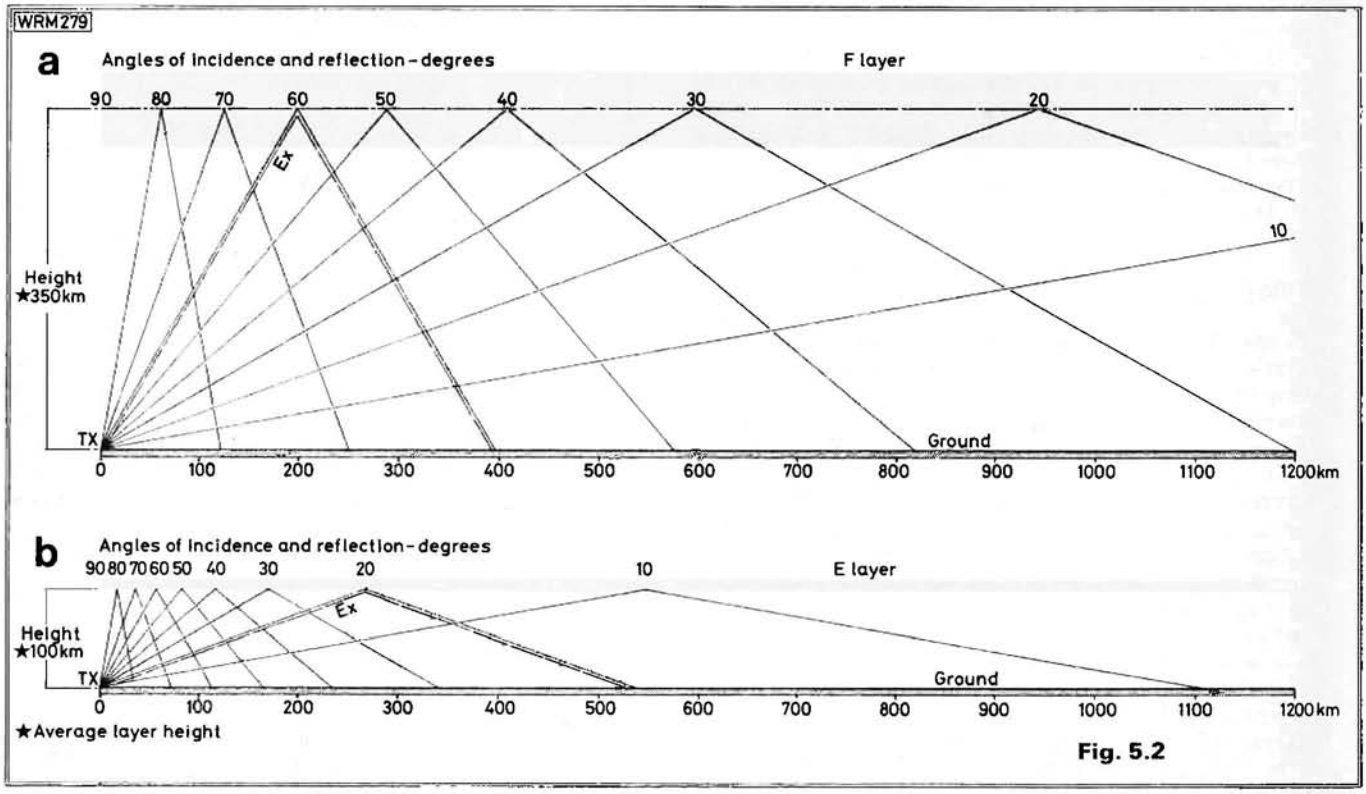


Fig. 5.2

height, the reflected wave will be returned to earth at finite distances. Taking the condition for Fig. 5.1(a), broadside to the antenna, the angle between 90 degrees and 60 degrees (angle cutting the −3dB point) is 90 − 60 = 30 degrees. The wave from this angle, as per the example "Ex" (the broken line) Fig. 5.2(a) is reflected to reach earth at a distance equal to 2(tan 30 × 350) or 404km which is the "first hop" distance. For the "end-on" condition as in Fig. 5.2(b), the angle between 90 degrees and the 50 degrees cutting the −3dB pint is 40 degrees. Distance on reaching earth after reflection from the layer will be 2(tan 40 × 350) or a "first hop" distance of 587km. Either of the above distances are doubled for the second hop distance but note the foregoing applies only if the critical frequency is above 7MHz and that there is no sporadic-E reflection.

Ionospheric Omni-directional Propagation

From the radiation patterns as in Fig. 5.1(a) and (b), it is possible to visualise a solid, or three dimensional lobe of radiation with an elliptical cross section. At the −3dB points the cross section area will be in the region of 3800 square degrees but as the radiation travels upward this area expands more and more. On reaching the F layer at a median height of 350km, the radiation will be "illuminating" an elliptical area of the layer approaching 200 000 square kilometres as shown by (X) in Fig. 5.3. Since reflection occurs from all angles within and around that area, propagation of the reflected wave is elliptically omni-directional.

The "first hop" elliptical area (Y) has a major axis of about 1150km and a minor axis of 850km thus covering a total (X and Y) as in Fig. 5.3, of nearly 750 000 square kilometres. The areas X and Y are to scale with the map and the concentric distance rings. Although the areas given for this example are reasonable approximations they apply only to transmissions on 7MHz from a half-wave antenna a quarter-wavelength in height, an average F layer height of 350km and that the ionosphere critical frequency is above 7MHz.

Low Height Antennas at 3·5MHz

The example in this case is a half-wave antenna resonant for 3·5MHz at a height of approximately one-eighth of a wavelength above ground (in the region of 10 metres). During daylight hours ionospheric reflection will be from the E layer at a median height of 100km. Radiation from the antenna will be at maximum in the vertical direction at

90 degrees from ground and the patterns virtually circular, as in Fig. 5.4, for either the broadside or end-on condition. The cross-sectional area of the lobe at −3dB will be approximately 6360 square degrees.

The angle between 90 degrees and the −3dB point will of course be 45 degrees so the first hop distance will be 200km, the second hop 400km and the third 800km and so on. By way of contrast, if the angle of incidence from the −3dB point was as low as 20 degrees as per the example "Ex" in Fig. 5.2(b), then the first hop distance would be 549km but to achieve this the antenna would have to be well over half a wavelength in height, i.e. higher than 49·5 metres.

Returning to the low height condition and the circular cross-section of the radiation pattern at −3dB as in Fig. 5.4, the ground coverage on reflection from the E layer will be in the region of 125 600 square kilometres for the first hop maximum distance, over 500 000 square kilometres for the second hop distance and around 200 000 000 square kilometres for the third hop distance. As these areas are circular, propagation from the E layer would be truly omni-directional.

Ionospheric Conditions—3·5 and 7MHz

Some idea as to whether the right critical frequency prevails for 3·5 or 7MHz can generally be confirmed if strong signals (S9 or over) can be received from other stations very short distances away e.g., 30 to 50km. If so this is a good indication that the received signals have taken an almost straight up and down path from the place of transmission via the appropriate ionospheric layer.

When a band seems void of stations except for those arriving from fairly long distances, perhaps more than 400 to 500km, then it is likely that the critical frequency is below the frequency of operation.

At times a particular band may appear to go suddenly dead, even though conditions have otherwise been quite good. The periods of deadness which may last for almost any length of time are often due to strong ionisation of the D layer which has the effect of completely absorbing waves both upward and downward. This usually only happens during the daytime as ionisation of the D layer disappears at night.

Ionospheric Chordal Mode Propagation

This mode of propagation has not been mentioned before but is generally accepted as a means of achieving DX operation around that portion of the earth away from the sun where darkness exists over more or less the whole path of transmission. During the darkness period the ionospheric F layer virtual height increases and a wave meeting the layer at an oblique angle may not be returned to earth in the usual way but instead may be reflected from point to point, chordally, along the layer itself as illustrated in Fig. 5.5. The wave is finally returned to earth at a point where daylight prevails once more and the F layer is at its lower normal height. Because a wave propagated by chordal hop mode is not reflected to earth at all along the major part of its travel, it suffers very little attenuation. For example, reception of very strong signals (S9+) from places as far distant as Australia or New Zealand etc., and via the long path when this is in darkness, may well be due to chordal hop propagation[2].

(1) *Antennas*. J. D. Kraus. Sec 11–7, 12–4. McGraw-Hill Book Co. Inc.
(2) *HF Antennas for all Locations*. L. A. Moxon. RSGB.

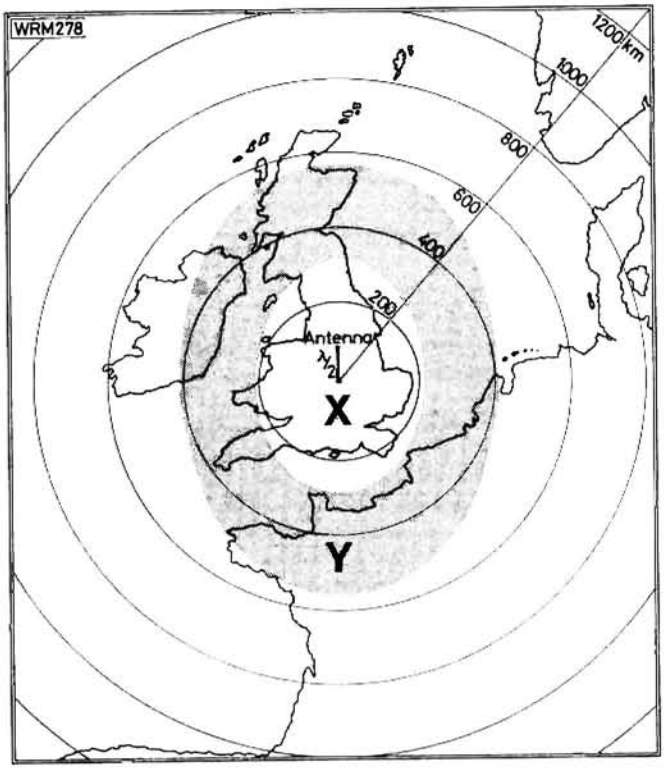
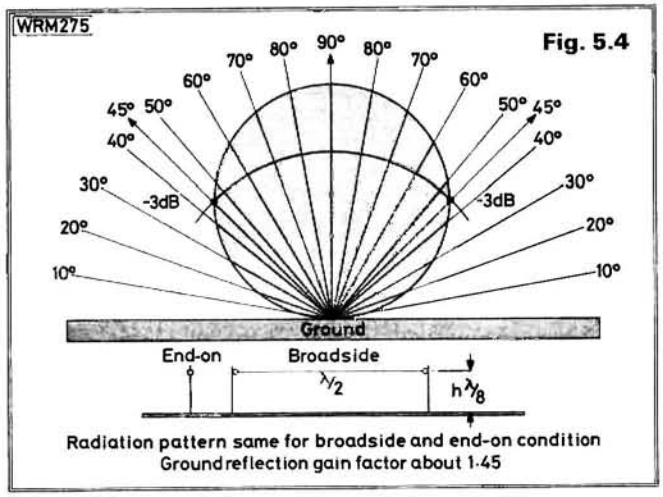
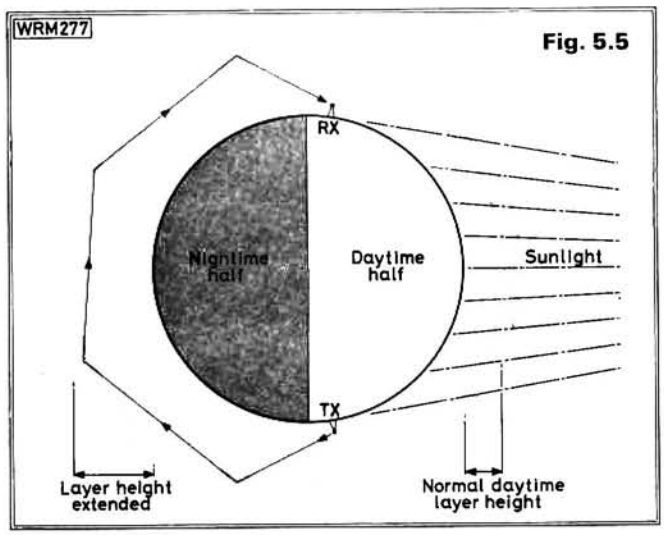


Fig. 5.3





THE PRACTICAL WIRELESS

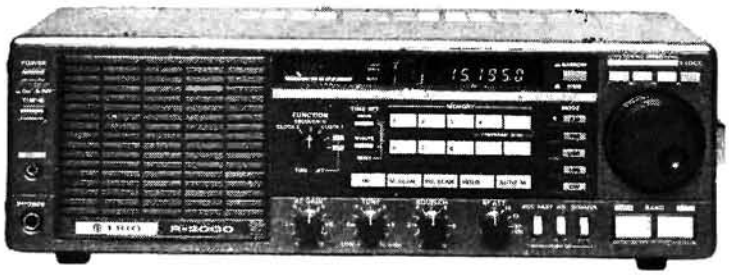
Reader Questionnaire

During 1984, 73 Magazine *in the United States carried out a survey of their readers' views on amateur radio by means of a 50 item questionnaire. This same questionnaire, with some alterations to take account of national differences in amateur radio regulations and practice, was repeated later in the year in the Japanese magazine* CQ Ham Radio, *which afterwards compared the results obtained in the two countries.*

We thought it would be interesting to carry out a similar exercise for the UK, using the common questions from the surveys in the USA and Japan, the two major strongholds of amateur radio, and adding some of our own to make up the 50.

In our questionnaire, Items 1–37 are the common questions, with one or two very minor modifications. Items 38–43 are questions on topics of general interest, while 44–50 are designed to give us information which we can use to develop PW *further along the lines you, the readers, would like. We plan to publish a run-down on the answers to questions 1–43 in a future issue of* PW, *along with the results from the USA and Japan where relevant.*

Some of the questions assume that you hold an amateur transmitting licence. If you do not, then please ignore those questions and answer the rest; we want to hear from listeners, too.



YOU COULD WIN THIS RECEIVER!

DETAILS ON LAST PAGE OF PULL-OUT

START HERE

BACKGROUND

1. Do you hold a current UK amateur transmitting licence? (5)

- ☐ 1 Yes
- ☐ 2 No

If "YES" please continue with the following questions, if "NO" skip to Q4.

2. Which class of licence do you have? (6)

- ☐ 1 Class A
- ☐ 2 Class B

3. How long have you had a licence? (7)

- ☐ 1 1 year or less
- ☐ 2 1–5 years
- ☐ 3 6–10 years
- ☐ 4 11–20 years
- ☐ 5 21 years or more

4. How old are you?

- ☐ 6 15 and under
- ☐ 7 16–21
- ☐ 8 22–39
- ☐ 9 40–59
- ☐ 0 60 and over

5. About how many hours a week do you devote to amateur radio? *(round up to nearest hour)* (8)

- ☐ 1 Up to 1 hour
- ☐ 2 2–5 hours
- ☐ 3 6–10 hours
- ☐ 4 11–20 hours
- ☐ 5 21 hours or more

6. Which h.f. amateur band(s) do you use most often? (9)

- ☐ 1 1·8MHz
- ☐ 2 3·5MHz
- ☐ 3 7MHz
- ☐ 4 10MHz
- ☐ 5 14MHz
- ☐ 6 21MHz
- ☐ 7 28MHz
- ☐ 8 Do not operate h.f.

7. Which v.h.f./u.h.f. amateur band(s) do you use most? (10)

- ☐ 1 50/70MHz
- ☐ 2 144MHz
- ☐ 3 430MHz
- ☐ 4 1200MHz or higher
- ☐ 5 Do not operate v.h.f./u.h.f.

8. Which mode(s) do you use most? (11)

- ☐ 1 a.m./s.s.b.
- ☐ 2 c.w.
- ☐ 3 f.m.
- ☐ 4 RTTY
- ☐ 5 SSTV
- ☐ 6 TV

9. How much money have you spent on amateur radio within the past year? (Include QSL expenses, magazines, club or society dues, and other incidental expenses.) (12)

- ☐ 1 £0–£50
- ☐ 2 £51–£250
- ☐ 3 £251–£500
- ☐ 4 £501–£1000
- ☐ 5 £1001–£2500
- ☐ 6 £2501 +

SOCIAL CHARACTERISTICS

10. Has amateur radio influenced your choice of career?

(13)

- Greatly ☐ 1
- Somewhat ☐ 2
- Not at all ☐ 3

11. How old were you when you first became interested in the radio hobby?

(14)

- 15 years or younger ☐ 1
- 16–21 years ☐ 2
- 22–39 years ☐ 3
- 40–59 years ☐ 4
- 60 and over ☐ 5

12. Do you think that the DTI should increase the speed on amateur c.w. examinations?

(15)

- Yes ☐ 1
- No ☐ 2

13. Do you own a home computer?

(16)

- Yes ☐ 1
- No ☐ 2

If "YES" please state which model

..... (17)

14. Do you think radio amateurs, compared to computer hobbyists, are:

(18)

- More technically inclined in their hobby ☐ 1
- Less technically inclined in their hobby ☐ 2
- Both are about equally skilled in their hobby ☐ 3

15. Do you think that home computing is siphoning people (including youngsters) away from amateur radio?

(19)

- Yes ☐ 1
- No ☐ 2

16. Should the City and Guilds of London Institute (CGLI) Radio Amateurs Examination System remain as it is?

(20)

- Yes ☐ 1
- No ☐ 2

17. Should UK amateur licences retain a minimum age requirement?

- Yes ☐ 3
- No ☐ 4

18. Do you think that radio amateurs should be subject to periodic retesting?

- Yes ☐ 5
- No ☐ 6

OPERATING HABITS

19. If amateurs were restricted to data communication only (no phone or c.w. operation) in all amateur bands, would you still continue with amateur radio as a hobby?

(21)

- Yes ☐ 1
- No ☐ 2

20. Have you ever used a personal computer in conjunction with your amateur radio activities?

(22)

- Yes ☐ 1
- No ☐ 2

21. Is it time to completely deregulate amateur radio by having the DTI turn over all responsibility for amateur operation to the amateur community?

(23)

- Yes ☐ 1
- No ☐ 2

22. What do you think about exchanging QSL cards?

(24)

- Like it a lot ☐ 1
- Like it ☐ 2
- Neither like nor dislike ☐ 3
- Don't like it ☐ 4
- Dislike it a lot ☐ 5

23. Do you think that c.w. sub-bands should be:

(25)

- Abolished ☐ 1
- Reduced in size ☐ 2
- Left as now ☐ 3
- Increased in size ☐ 4

24. Do you think that DX nets have a place in amateur radio?

(26)

- Yes ☐ 1
- No ☐ 2

25. Do you think that nets in general have a place in amateur radio?

(27)

- Yes ☐ 1
- No ☐ 2

26. If, while tuning across a band, you heard a net called "Jammers International" in progress would you:

(28)

- Jam it ☐ 1
- Ignore it ☐ 2
- Complain to the DTI or some other organisation ☐ 3
- Listen to it ☐ 4
- Join it ☐ 5

ONLY CLASS "A" LICENCE HOLDERS ANSWER Q27. HOLDERS OF OTHER LICENCES PLEASE SKIP TO Q28.

27. If required, could you solidly copy c.w. at the speed which you were licensed?

(29)

- Yes ☐ 1
- No ☐ 2

28. If required, could you now pass the CGLI Radio Amateurs Examination?

(30)

- Yes ☐ 1
- No ☐ 2
- Don't know ☐ 3

29. Do you think the Radio Society of Great Britain affects amateur radio in a positive manner?

(31)

- Yes ☐ 1
- No ☐ 2

30. Do you ever speak to foreign, non-English-speaking amateurs in their own language?

(32)

- Often ☐ 1
- Sometimes ☐ 2
- I attempt it ☐ 3
- Rarely ☐ 4
- Never ☐ 5

31. Do you solder together your own coaxial connectors?

(33)

- Yes ☐ 1
- No ☐ 2

32. Is your antenna system mounted on your:

(34)

- House ☐ 1
- Tower/mast ☐ 2
- I only operate mobile/portable ☐ 3

33. Have you ever designed or made your own antenna?

(35)

- Designed and made ☐ 1
- Made from a published design ☐ 2
- Never ☐ 3

34. What do you think of contesting?

(36)

- Like it a lot ☐ 1
- Like it ☐ 2
- Neither like nor dislike it ☐ 3
- Don't like it ☐ 4
- Dislike it a lot ☐ 5

35. What do you think of DXing?

(37)

- Like it a lot ☐ 1
- Like it ☐ 2
- Neither like nor dislike it ☐ 3
- Don't like it ☐ 4
- Dislike it a lot ☐ 5

36. What do you think of repeaters?

(38)

- A very good idea ☐ 1
- A good idea ☐ 2
- Acceptable ☐ 3
- Not a good idea ☐ 4
- Totally against them ☐ 5

37. If you heard an emergency net in progress, would you:

(39)

- Join in immediately and offer to help ☐ 1
- Listen, in case your help was needed ☐ 2
- Ignore it ☐ 3

38. Do you use CB radio?

- Used it in the past ☐ 4
- Use it now ☐ 5
- Never used it ☐ 6

39. Do you think that there should be some form of novice licence in the UK?

- Yes, for c.w. only ☐ 7
- Yes, for phone only ☐ 8
- Yes, for phone and c.w. ☐ 9
- No ☐ 0

40. Do you construct your own radio equipment or accessories (excluding antennas)?

(40)

- Yes ☐ 1
- No ☐ 2

If "YES", How?

- From your own designs ☐ 3
- From designs published in books or magazines ☐ 4

41. How would you describe your expertise in radio/electronics?

(41)

- Beginner ☐ 1
- Average ☐ 2
- Advanced ☐ 3

42. How many radio rallies/exhibitions do you visit each year?

- None ☐ 4
- 1 ☐ 5
- 2 or 3 ☐ 6
- 4 or more ☐ 7

43. Which of these radio clubs/societies, if any, do you belong to?

(42)

- AMSAT ☐ 1
- BARTG ☐ 2
- BATC ☐ 3
- DXAGB ☐ 4
- G-QRP ☐ 5
- RAYNET ☐ 6
- RSGB ☐ 7
- Local radio society ☐ 8
- None of these ☐ 9

44. Do you have any hobbies other than radio? If so, what?

.....

.....

.....

GENERAL INFORMATION

45. Please state how often, if at all, you read each of these magazines: *(please tick one box in each row)*

	All/Most issues ***	Occasionally **	Rarely *	Never	
Amateur Radio	☐ 1	☐ 2	☐ 3	☐ 4	(43)
Elektor	☐ 1	☐ 2	☐ 3	☐ 4	(44)
Ham Radio Today	☐ 1	☐ 2	☐ 3	☐ 4	(45)
Radio and Electronics World	☐ 1	☐ 2	☐ 3	☐ 4	(46)
Short Wave Magazine	☐ 1	☐ 2	☐ 3	☐ 4	(47)
Practical Wireless	☐ 1	☐ 2	☐ 3	☐ 4	(48)
Ham Radio (USA)	☐ 1	☐ 2	☐ 3	☐ 4	(49)
73 Magazine (USA)	☐ 1	☐ 2	☐ 3	☐ 4	(50)
CQ Amateur Radio (USA)	☐ 1	☐ 2	☐ 3	☐ 4	(51)
Practical Electronics	☐ 1	☐ 2	☐ 3	☐ 4	(52)
Everyday Electronics and Computer Projects	☐ 1	☐ 2	☐ 3	☐ 4	(53)
Electronics & Wireless World	☐ 5	☐ 6	☐ 7	☐ 8	

*** *3 or 4 out of 4 Issues* ** *2 out of 4 Issues* * *1 or less out of 4 Issues*

46. Thinking now about *Practical Wireless*, which "added-value" features do you prefer?

(54)

Extra editorial pages	☐ 1
Datacards or charts	☐ 2
Free gifts (e.g. Pocket magnifier with April 1985 issue)	☐ 3

47. How interested are you in reading about the following facets of radio in *Practical Wireless*? *(please tick one box in each row)*

	Very Interested	Quite Interested	Not at all Interested	
Licensed amateur radio	☐ 1	☐ 2	☐ 3	(55)
Broadcast listening on:				
Long/medium waves	☐ 1	☐ 2	☐ 3	(56)
Short waves	☐ 1	☐ 2	☐ 3	(57)
VHF	☐ 1	☐ 2	☐ 3	(58)
TV-DXing	☐ 1	☐ 2	☐ 3	(59)
Satellite TV	☐ 1	☐ 2	☐ 3	(60)
Antennas	☐ 1	☐ 2	☐ 3	(61)
Radio control of models	☐ 1	☐ 2	☐ 3	(62)
Test equipment	☐ 1	☐ 2	☐ 3	(63)
Professional uses	☐ 1	☐ 2	☐ 3	(64)
Computer applications	☐ 1	☐ 2	☐ 3	(65)

48. Please state how interested you are in reading each of the following sorts of features in *Practical Wireless*? *(please tick one box in each row)*

	Very Interested	Quite Interested	Not at all Interested	
News	☐ 1	☐ 2	☐ 3	(66)
Products	☐ 1	☐ 2	☐ 3	(67)
Equipment reviews	☐ 1	☐ 2	☐ 3	(68)
Modifications	☐ 1	☐ 2	☐ 3	(69)
Construction (major)	☐ 1	☐ 2	☐ 3	(70)
Construction (minor)	☐ 1	☐ 2	☐ 3	(71)
On the Air	☐ 1	☐ 2	☐ 3	(72)
Operating	☐ 1	☐ 2	☐ 3	(73)
Theory	☐ 1	☐ 2	☐ 3	(74)
Club News	☐ 1	☐ 2	☐ 3	(75)
Advertisements	☐ 1	☐ 2	☐ 3	(76)
History/Nostalgia	☐ 1	☐ 2	☐ 3	(77)

49. Have you bought any of the following as a direct result of seeing an advertisement in *Practical Wireless*?

(78)

Major equipment (transmitter, receiver etc.)	☐ 1
Accessories	☐ 2
Antennas	☐ 3
Components	☐ 4
None of these	☐ 5

50. And which national daily newspaper(s), if any, do you read most often?

(79)

Daily Express	☐ 1
Daily Mail	☐ 2
Daily Mirror	☐ 3
Daily Telegraph	☐ 4
Financial Times	☐ 5
The Guardian	☐ 6
The Star	☐ 7
The Sun	☐ 8
The Times	☐ 9

We would welcome any other comment you would like to make about *Practical Wireless*.

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Thank you for taking the trouble to fill in this questionnaire. To show our appreciation, we are giving away a very attractive prize to the winner of a simple competition, open to anyone returning a completed questionnaire.

Please write in the space provided how many completed questionnaires you think we will receive back by 24th May 1985. The correct answer and the nearest estimate will be announced in our October issue and the winner will receive a prize of a Trio R-2000 h.f. communications receiver plus VC10 v.h.f. converter adding coverage of the range 118–174MHz. The Editor's decision is final.

My estimate is:

Name and address:

.....

.....

.....

.....

Please return your completed questionnaire to us in an envelope addressed:

Practical Wireless
FREEPOST
Room 2701
King's Reach Tower
Stamford Street
LONDON SE1 6BP

You do not need to put a stamp on the envelope. Please don't enclose anything else with the questionnaire.

Although we shall be publishing the overall results of the survey, as mentioned at the beginning of the questionnaire, individual replies will, of course, be kept entirely confidential.

Mods

No.32
Roger Hall
G4TNT (Sam)

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

All of this month's mods were given to me by David Monkhouse when I last visited him at Lowe Electronics in Matlock, so they are all for Trio equipment.

TR-9000

This mod allows the TR-9000 to be tuned whilst transmitting on s.s.b./c.w. First find the control unit (X53.1160.61) and then locate the 11-pin connector, J5. Find the third pin from the right (when viewed from the front panel) and cut the white/purple wire that is attached to it. Now connect the cathode of an 1N4148 type diode to the piece of wire that is still connected to the third pin. Solder the anode to the FT connection on the mode switch p.c.b. (See Fig. 1.)

The modification is now complete. It works by removing the 9 volt transmit supply from pin 5 of the microprocessor when on s.s.b./c.w. The diode is necessary to restore this 9 volt supply on f.m. transmit so as to activate the repeater shift instruction to the microprocessor.

TR-9130

This mod lets the HIGH/LOW output power switch work on s.s.b./c.w. as well as on f.m. First remove the bottom cover (5 screws). Then locate R188 which is on the front left-hand side, just behind connector J33. The printing on the board is a little confusing and this resistor looks as though it has been labelled D48. When you have found R188, cut one of its legs and then replace the bottom cover. The HIGH/LOW power switch will now work on s.s.b./c.w.

To adjust the low power output on both f.m. and s.s.b./c.w. remove the top cover and locate VR3. This is to the rear of the set and slightly to the right of centre. Adjust this pot until the required output power is obtained and then replace the top cover.

TS-780

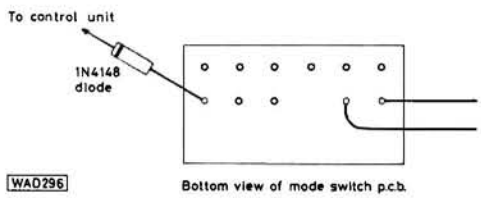
This mod also allows the HIGH/LOW switch to work on s.s.b./c.w. Start by removing both the top and bottom covers. Care should be taken not to damage the speaker and back-up battery wires when doing this. Now remove the four screws that retain the front panel, hinge this panel forward and drop it to its fullest extent. Remove the two screws that hold in the S-meter lamp bracket and lift the S-meter clear. Now find the board that is mounted on the rear of the switch-bank and locate the 10kΩ resistor that is just above the NOISE BLANKER switch on this board. Open-circuit it by cutting one of its legs. Re-assemble the S-meter, replace the covers and the mod is complete—the HIGH/LOW output power switch will now work on s.s.b./c.w.

TS-930S

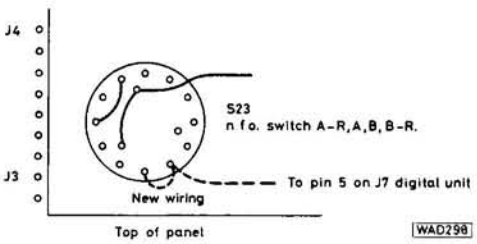
This mod increases the number of memory channels from 8 to 16. Start by removing the cover and finding the digital unit (X54.1670). This is located underneath the p.l.l. board and is laid out as in Fig. 2. Linking pin 5 of the connector J7 to earth will access the 8 additional memories and this can easily be done by utilising some of the spare contacts on the v.f.o. switch to give 8 memories on v.f.o. A and another 8 on v.f.o. B. The switch, which should have new wiring added as shown, is seen in Fig. 3, with the other end of the new lead run across to the digital unit where it can be soldered to pin 5 of J7.

It is also possible to scan the memories but the scan will only monitor each memory channel without stopping, even when a signal is present. However, if you want to make use of this facility, just link pin 6 on connector J8 to earth and the scan will be initiated. This could be achieved by running leads from the connector to a suitable switch on the front panel.

Connector J8 can also be used to provide another very useful feature. If pin 8 on this connector is linked to earth, the entire main display will move one place to the left and a new digit will appear to the right. Thus the frequency display will be capable of displaying frequencies to 10Hz resolution. It is probably easier to hard-wire this link rather than make this feature switchable. Thanks for passing on these mods, David.



◀ Fig. 1



◀ Fig. 3

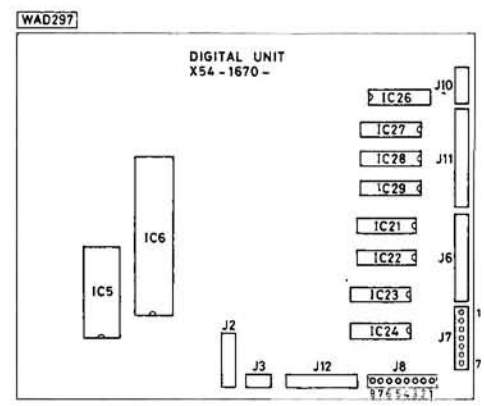


Fig. 2 ▶

by S. Niewiadomski
Part 3

PW 'COLNE'

Direct Conversion Receiver

In this part of the *PW* Colne we look at the last of the p.c.b.s, Board 4, the crystal oscillator and frequency converter.

Crystal Oscillator and Frequency Converter

Transistor 4Tr3 and associated components form an oscillator whose frequency is determined by crystal 4XL1. Its frequency can be trimmed to exactly 9MHz by trimmer capacitor 4C29. The output from the oscillator is taken via the 10·7MHz i.f. transformer, 4T1, which can be tuned to 9MHz by adjusting its core. This type of crystal oscillator tends to produce some second and third harmonic components which are removed here by the lowpass filter formed by 4C24, 4C25, 4C26, 4L7 and 4L8. At the output of this filter, the second harmonic was −55dB, and the third harmonic −60dB, with respect to the fundamental. Reduction of the harmonic input to the frequency converter, 4IC1, helps to reduce the unwanted frequencies at its output, which have to be filtered out to avoid spurious responses.

The other input to 4IC1 comes from the 5–5·5MHz v.f.o. Biasing of 4IC1 is similar to that of 3IC1, but a "balance" preset potentiometer, 4R7, is provided which can be adjusted for minimum 9MHz output (as described later). Again, sums and differences of multiples of the input frequencies are produced at the outputs of 4IC1. The highest amplitude components are 9MHz minus 5–5·5MHz and 9MHz plus 5–5·5MHz.

A filter to select the difference frequency (4–3·5MHz) is connected to one output of 4IC1 (pin 6). This filter is designed to pass 3–4·5MHz so that

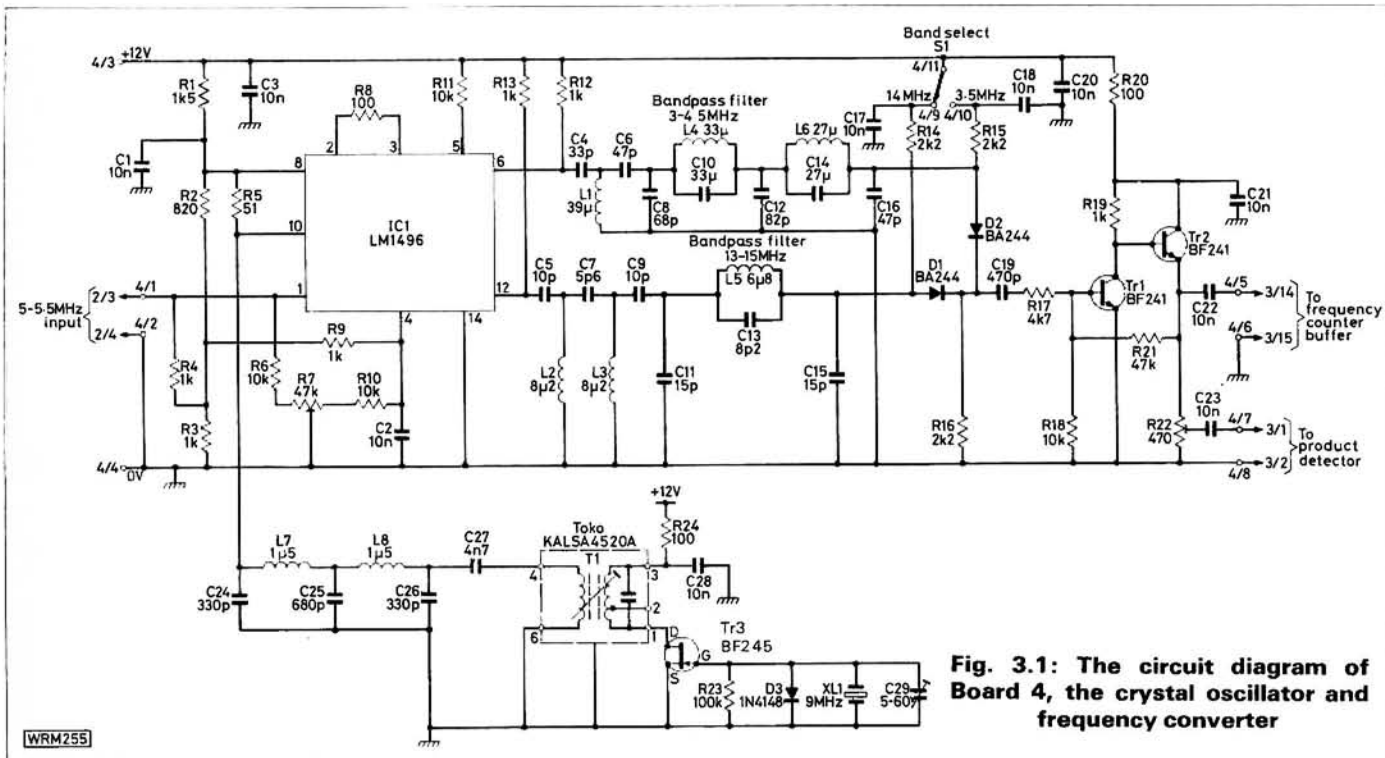


Fig. 3.1: The circuit diagram of Board 4, the crystal oscillator and frequency converter

★ components

Board 4 Crystal Oscillator and Frequency Converter

Resistors
¼W 5% Carbon film

51Ω	1	R5
100Ω	3	R8,20,24
820Ω	1	R2
1kΩ	6	R3,4,9,12,13,19
1·5kΩ	1	R1
2·2kΩ	3	R14–16
4·7kΩ	1	R17
10kΩ	4	R6,10,11,18
47kΩ	1	R21
100kΩ	1	R23

Miniature horizontal preset

470Ω	1	R22
47kΩ	1	R7

Capacitors
Disc ceramic

10nF	10	C1–3,17,18, 20–23,28

Sub-miniature plate ceramic

5·6pF	1	C7
8·2pF	1	C13
10pF	2	C5,9
15pF	3	C10,11,15
33pF	2	C4,14
47pF	2	C6,16
68pF	1	C8
82pF	1	C12
330pF	2	C24,26
470pF	1	C19
680pF	1	C25
4·7nF	1	C27

Polypropylene Trimmer

5–60pF	1	C29

Inductors

KALSA4520A	1	T1

Semiconductors
Diodes

BA244	1	D1,2
1N4148	1	D3

Transistors

BF241	2	Tr1,2
BF245	1	Tr3

Integrated Circuits

LM1496	1	IC1

Miscellaneous
9MHz HC18U Crystal; s.p.c.o. switch, Veropins, p.c.b., 6BA nuts and bolts.

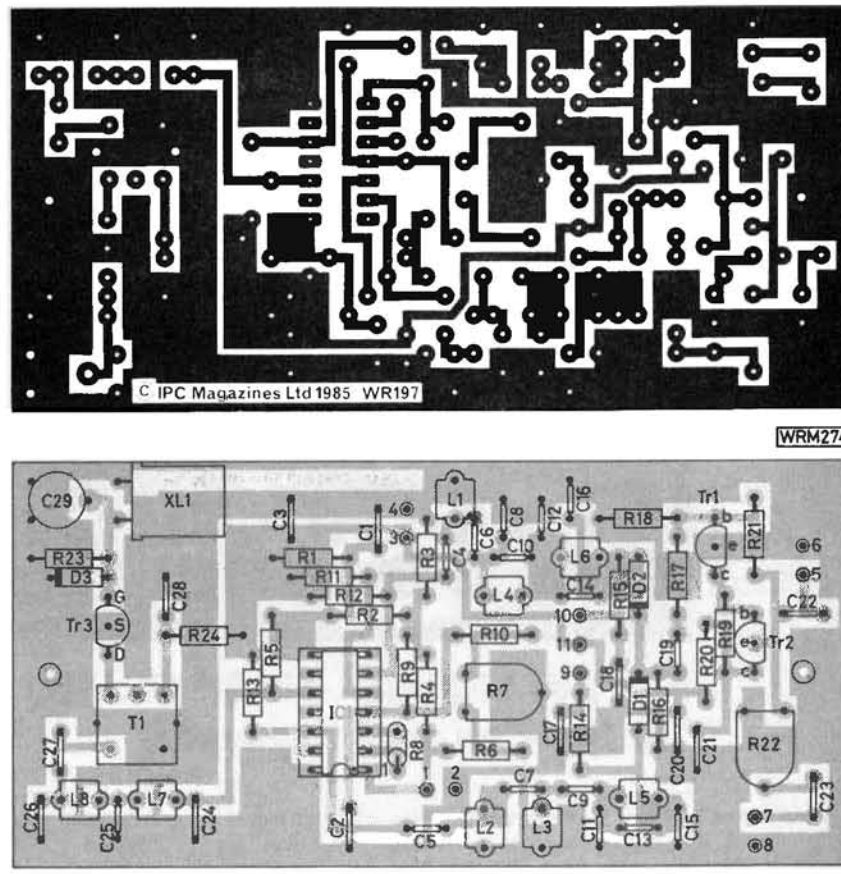


Fig. 3.2: The component layout and p.c.b. track pattern, shown full size, for Board 4

no adjustments are necessary despite the tolerances of the components used. Another filter is connected to the other output of 4IC1 (pin 12) which selects the sum frequency (14–14·5MHz). This filter will pass frequencies of 13–15MHz. This method of driving filters means that no switching is required on the inputs to the filters. Unwanted frequencies at the output of each filter are more than 40dB less than the wanted frequency.

Whichever filter output is required is selected by 4S1 which switches d.c. to diode 4D1 via 4R14 or 4D2 via 4R15. The correct termination impedance for the selected filter is provided by 4R16 and either 4R14 or 4R15. This d.c. switching scheme means that no r.f. has to be taken to and from the bandswitch, which is always a potential source of problems.

Transistors 4Tr1 and 4Tr2 form a buffer amplifier to raise the level of the filter outputs to that suitable to drive the product detector, 3IC1. The output level is adjustable by varying 4R22 and another output is also provided to drive the frequency counter buffer if this is fitted.

Construction (Boards 3/4)

With the exception of the controls 3R23, 4S1 and the POWER l.e.d. 3D1, all components are p.c.b. mounted. The p.c.b. track patterns and component placements for each board are shown in Figs. 2.3 and 3.2. The use of p.c.b.s makes construction simple and straightforward, but the circuits were prototyped and developed on Veroboard and copper-clad boards. Though these other methods are not very easy to use, especially when mounting dual-in-line i.c.s and transformers, they are a viable alternative to the p.c.b.s.

All the i.c.s on the prototype were mounted in sockets without any instability problems arising. Fault-finding is much easier if an i.c. can be substituted without unsoldering.

There is not much headroom available above the 9MHz oscillator and frequency converter board and so take care to keep all components as low as possible. There is sufficient height for a socket for 4IC1, however. It is because of the height restriction that 10nF, rather than 0·1µF, decoupling capacitors have been used on this board.

MORE IN PART 4

Part 2 by Stephen J. Birkill* G8AKQ
The Satellites and Programmes

In Part 1 we started to look at satellite TV and what options are available. In this part we will look at satellite transponder frequencies and "footprint" coverage, and examine the type of electronics required for satellite reception.

A QDBS Installation

A block schematic diagram of a satellite television receiving terminal of the type now being installed for Quasi-DBS use in the UK is shown in Fig. 2.1. The antenna is a paraboloid reflector of between 1·2 and 1·8 metres aperture, front or offset fed, with the low-noise amplifier and first converter combined as a low noise block downconverter (l.n.b.), housed in a weatherproof enclosure with waveguide input and coaxial output and mounted directly on the antenna's feed horn. Block conversion implies a fixed-frequency local oscillator, and a wide-band (tuneable) first i.f. The European industry-standard block i.f. is 950 to 1700MHz, corresponding to 10·95 to 11·70GHz at r.f. Local oscillator frequency is 10·00GHz, stabilised by a dielectric resonator oscillator (d.r.o.). Typical l.n.b. noise figure is 2·5dB, and conversion gain is in the region of 50dB.

Low-loss 50 ohm cable carries the first i.f. block into the home, while returning 15 volt d.c. power to the l.n.b. The indoor tuner-demodulator unit is placed on or adjacent to the TV set, and provides satellite channel selection and demodulation to video and audio, usually followed by remodulation as a standard u.h.f. a.m. (Ch. 36) PAL TV signal.

The second conversion is frequency-synthesised for stability, to a final intermediate frequency which may lie anywhere in the v.h.f./u.h.f. range. Every designer has his own preference, and favourite frequencies include 850, 612 and 410MHz and, much to the consternation of v.h.f. radio amateurs, 134 and 70MHz. A bandpass filter defines the receiver's selectivity and noise bandwidth, and is followed by the f.m. demodulator, usually a phase locked loop, which sets the threshold performance.

The demodulated baseband signal is de-emphasised (to restore a flat video response), filtered (to remove sound subcarriers and h.f. noise) and clamped (to remove the low-frequency triangular **energy dispersal** waveform), before being amplified to standard one-volt video level. The audio demodulator separates out the sound subcarrier(s) in the 5·5 to 8·5MHz range, tunes, filters, demodulates and de-emphasises in much the same manner as a TV receiver's intercarrier sound circuits, and delivers a standard audio signal. Video and audio outputs are available from the satellite receiver, but a unit designed for QDBS will also supply a u.h.f. remodulated output for use with a normal TV set.

The block conversion system lends itself readily to multiple receiver installations with independent channel selection, either within the home or to include neighbouring homes, a number of tuner demodulators being fed from the one l.n.b. While the larger SMATV installations will require CATV-type distribution, with separate receivers and modulators for each channel carried, smaller systems of just a few dwellings can clearly operate more economically by distribution of the full first i.f. block, each home having its own set-top tuner demodulator.

Footprints and Frequencies

The southern sky as seen from London is shown in Fig. 2.2, the geostationary arc stretching from the eastern to western horizon. Only satellites with C-band or K-band TV capacity are shown. As well as operational satellites, I have included systems with firm launches planned during the next three years. It should be borne in mind that some transponders direct their beams to other parts of the earth's surface—not all will be receivable in the UK, at least not with antennas of realisable dimensions. The Clarke orbit belt will have much the same appearance throughout the British Isles, with a decline in elevation angle being apparent at higher latitudes.

*Mr Birkill is Technical Director, Satellite TV Antenna Systems Ltd.

Examples of footprints of the 11GHz systems listed in Part 1 are shown in Figs. 2.3 and 2.4. These contour maps represent the current typical (not guaranteed) values of saturated transponder e.i.r.p. in dBW, for each satellite and beam. Most services operate at saturation, to give maximum radiated power, but remember the INTELSAT V F4 West Spot channels are "half-transponder", with e.i.r.p.s some 4dB below the footprint value.

ECS, INTELSAT and DBS are dual-polarisation frequency re-use systems: the two orthogonal senses of polarisation carry independent transmissions. Accurate alignment of antenna feeds allows 30dB or more of discrimination against the unwanted signal from the same satellite. Further protection against interference is given by offsetting the cross-polarised channel frequencies within the wide-band transponders (ECS, INTELSAT) or by offsetting the transponder frequencies themselves (DBS).

Noise

All the transmissions of interest employ frequency modulation of the r.f. carrier by the video signal. At microwave frequencies receiver noise is the enemy, and f.m. has the advantage that the receiver can operate at carrier to noise ratios (c/n) as low as 9 to 14dB, while still recovering pictures with weighted signal to noise ratios (s/n) of 45dB or more after demodulation. Amplitude modulated transmissions would demand very much higher satellite power for the same performance. Below the receiver's f.m. threshold (7 to 11dB for most receivers) the "f.m. advantage" is lost: the demodulated signal degrades rapidly, and is quite unuseable at a c/n value of 3dB.

It is possible to predict the power levels in a satellite downlink far more accurately than with terrestrial transmissions, and we can specify link performance to a fraction of a dB. Indeed, the odd one or two dB change in signal level on a satellite circuit can make the difference between success and failure. The aim is to achieve a c/n just above threshold: any more is a waste of resources and gives only a marginal improvement in performance; any less and the results are not worth having. Operation close to f.m. threshold gives a very characteristic effect to the TV picture. As c/n is reduced, isolated spikes of impulse noise appear as random spots or streaks throughout the picture, although the overall h.f. video noise level may be low. These high level impulses, or "sparklies" as they are known in the USA, are white in dark areas of the picture and black in light areas. They will also be more concentrated in regions of saturated colour. Further reduction of c/n below threshold intensifies the effect, until the picture is obliterated.

Link Budget

In order to determine the receiving terminal requirements for each satellite service, we must calculate a "power budget". We can start with the e.i.r.p. value given by the footprint map—this has already been derived from a knowledge of the transponder's r.f. output power and the

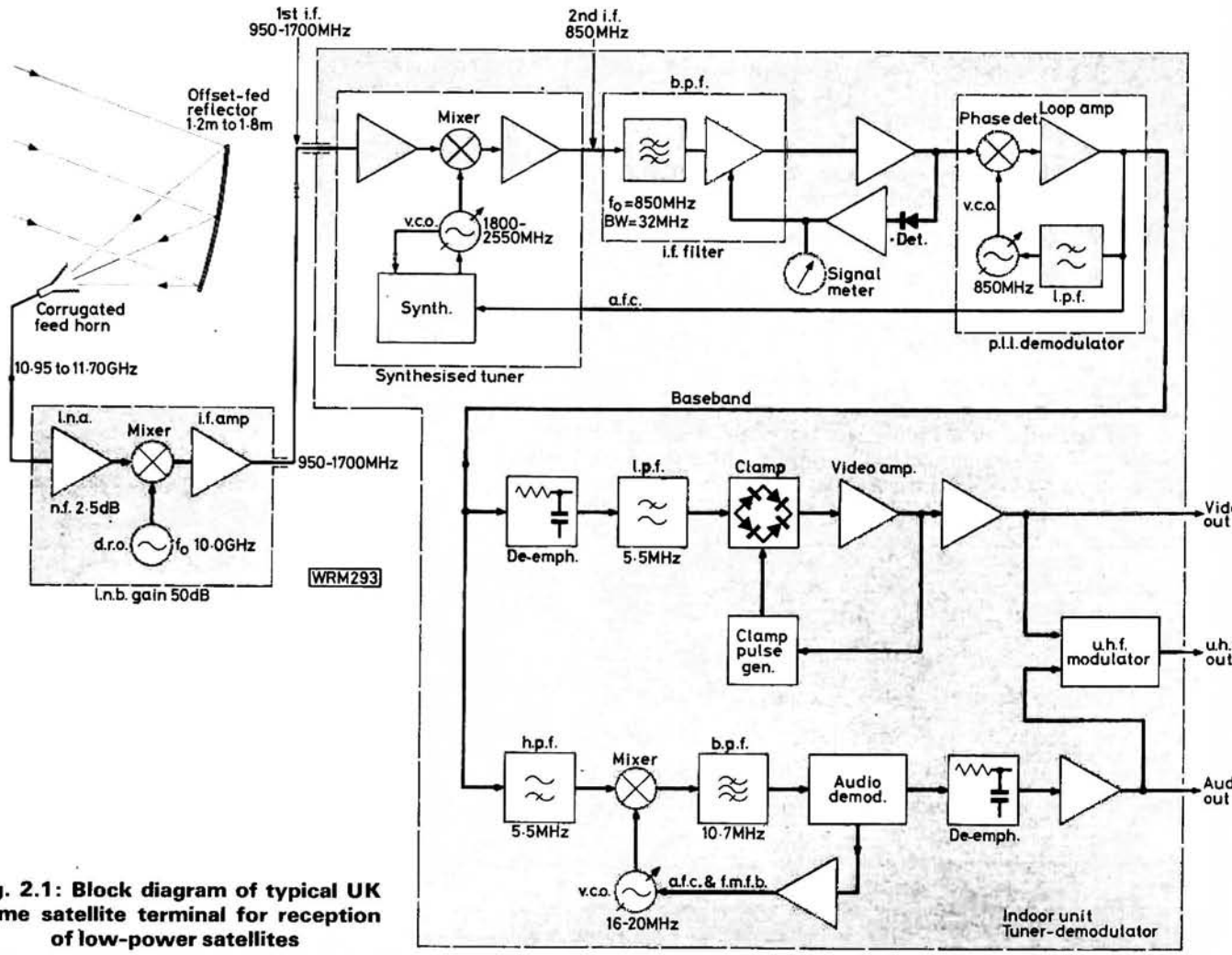


Fig. 2.1: Block diagram of typical UK home satellite terminal for reception of low-power satellites

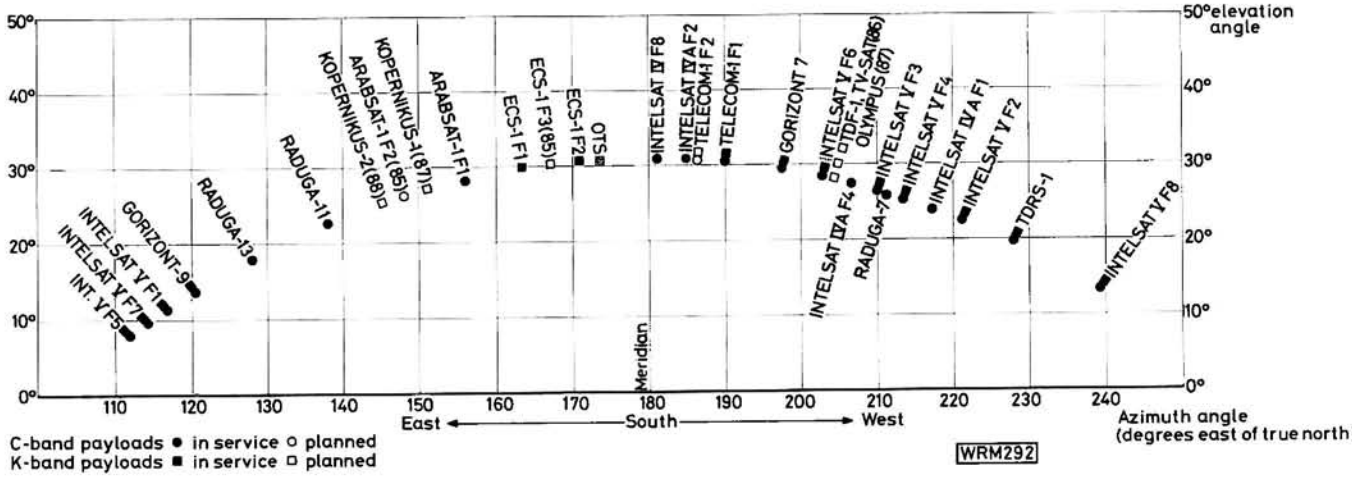


Fig. 2.2: The geostationary orbit as viewed from London

satellite antenna's net gain, taking into account waveguide and switching losses on board the satellite. Let us assume we wish to receive one of the ECS F1 Spot West services, and that our location lies on the 47dBW contour. We shall work in decibels, so gain factors will be added rather than multiplied.

Path Loss

The major loss factor is the free space "spreading" attenuation over the distance from satellite to receiving terminal, proportional to the squares of frequency and of distance according to the inverse-square law. For a path length of 38 700km from ECS to the UK, at a frequency of (say) 11·5GHz, this works out at 205·4dB. Atmospheric attenuation under clear sky conditions adds a maximum of 0·5dB to the path loss figure at moderate elevation angles. Heavy rainfall can increase the figure by several dB for short periods, but statistics show 11GHz rainfall attenuation in excess of 3dB to be quite a rare occurence in temperate climates—most of the time signal levels remain substantially constant.

Antenna Gain

From here on, our terminal has to make the most of the available signal. Antenna gain (always referenced to the hypothetical isotropic radiator, not the familiar dipole) makes the largest contributions. At this frequency, a 3 metre dish of 61 per cent efficiency (a typical value) yields a gain of 49·0dBi. Gain is proportional to area, or to the square of diameter, so halving the diameter will reduce the gain by 6dB (four times power ratio), all other factors being equal. A 1·5 metre antenna will have a 43dBi gain, and a 750mm dish achieving the same efficiency will show a gain of 37dBi.

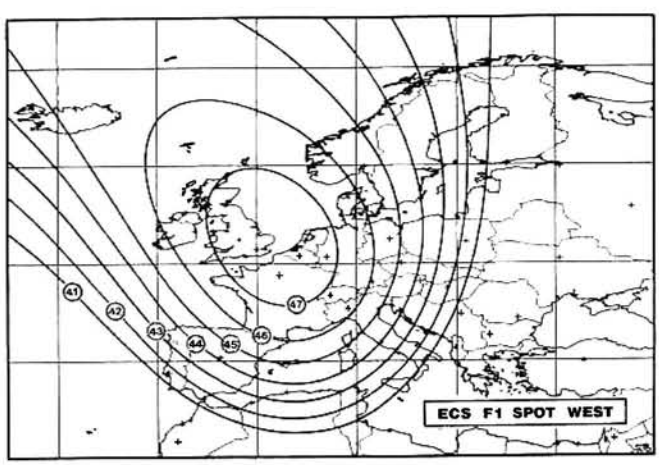
Carrier Power

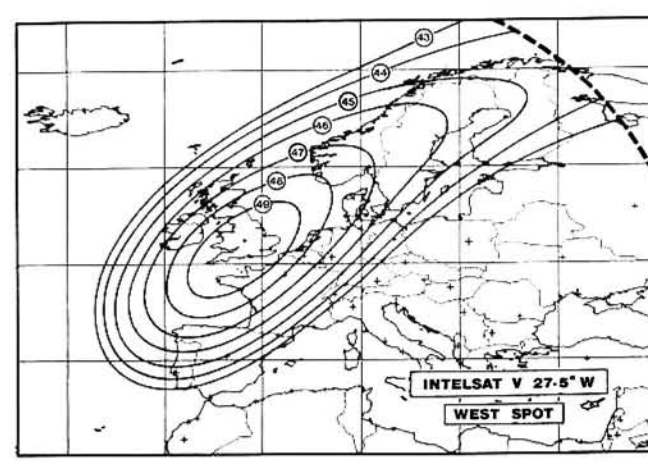
After the antenna comes the receiver's electronics, the input mixer or low-noise amplifier (l.n.a.), or in commercial K-Band systems usually a combined l.n.b. Knowledge of the receiving antenna gain enables us to calculate the signal power present at the antenna output/l.n.b. input port, to which the system's noise performance is referred. For the sake of the exercise we shall assume clear sky conditions and ignore miscellaneous loss factors such as waveguide and mismatch loss, polarisation misalignment, pointing error, etc.

If e.i.r.p. = 47dBW
total path loss L = 205·4 + 0·5dB
1·5m antenna gain G = 43dBi then,
l.n.b. input power = e.i.r.p. − L + G
= 47 − (205·4 + 0·5) + 43
= −115·9dBW,
equivalent to 2·57 **picowatts**

System Noise Temperature

Against this we must set the sum of all noise contributions, referred to the l.n.b. input. It is convenient to express noise power as its equivalent noise temperature, measured in kelvin (K).





Noise figure is defined as:

$$10 \log_{10} \left(1 + \frac{T_R}{290}\right)$$

where T_R is the receiver's equivalent noise temperature. So a 3dB noise figure represents a noise temperature of 290K. Commercial l.n.b.s typically have conversion gains in the 50dB region, in order to overcome i.f. cable losses and indoor unit noise figure contributions. In a well-engineered system these amount to no more than 1 or 2K referred to l.n.b. input, and overall receiver noise temperature is substantially the same as l.n.b. noise temperature.

However, the system noise temperature T_S is made up not only of receiver noise temperature T_R, but also the antenna noise temperature T_A. At h.f., antenna noise temperatures are measured in thousands of degrees, but a high gain microwave antenna looking skywards (away from the sun) will intercept very little external noise. Apart from the cosmic microwave background, plus a small thermal contribution from the atmosphere and from waveguide loss in the feed components, antenna noise is entirely the result of terrestrial thermal noise entering the antenna. This is caused by sidelobes to the main beam, or spill-over from the feed system, seeing "hot" (20°C is 293K) ground, buildings or trees, particularly at low elevation angles. At 11GHz, for the antenna sizes considered here, and at elevation angles above 20 degrees, we should expect to see clear sky antenna noise temperatures of between 25 and 50K.

Our 1·5 metre antenna looking at ECS (about 30° elevation from southern England) might exhibit a T_A of 35K. Assume we have a 3dB l.n.b. noise figure (290K), so system noise temperature $T_S = 290 + 35, = 325K$. To convert this to noise power we must know the noise bandwidth of our receiver.

IF Bandwidth

We can apply the familiar Carson Rule (Bandwidth = $2f_d + 2f_m$) to the f.m. signal. A typical value of peak video deviation is 12·5MHz, measured at the pre-emphasis crossover frequency. In the PAL and SECAM systems, maximum modulating (video) frequency is about 5·5MHz. So the required bandwidth would seem to be (2 × 12·5) + (2 × 5·5), or 36MHz. Adding a sound subcarrier above the video baseband, at perhaps 6·6MHz, would increase this to 38·2MHz. But Carson is a little pessimistic when applied to f.m. TV, and in practice 36MHz is more than sufficient bandwidth for the full deviation signal, including sound subcarrier. Certain of the European transmissions adopt a lower deviation, 10MHz peak (equal to 20MHz peak to peak, or "per volt"), and specify a channel bandwidth of 30MHz. The WARC–1977 DBS plan defined a channel only 27MHz wide.

It is important that our receiver's i.f. filter should be no wider than necessary to pass the desired signal without distortion. Too much bandwidth just lets through more noise, and impairs the all-important carrier to noise ratio presented to the demodulator. Let us assume we have selected a compromise filter bandwidth of 32MHz. The noise bandwidth of a filter is not the same as its 3dB bandwidth, being dependent upon the filter's design and shape factor, but the difference is small and we shall ignore it here.

Noise power is given by

$P = kTB$

where k = Boltzmann's constant (equal to −228·6dB/K/Hz

T = noise temperature in K

B = the bandwidth in hertz.

Glossary

c/n	carrier-to-noise ratio
dBW	decibels relative to one watt
d.r.o.	dielectric resonator oscillator
e.i.r.p.	equivalent isotropically radiated power
G/T	gain to noise temperature ratio
l.n.a.	low noise amplifier
l.n.b.	low noise block downconverter
MAC	Multiplexed Analogue Component
PAL	Phase Alternation Line
QDBS	Quasi Direct Broadcasting by Satellite
SECAM	Sequential with memory (or Sequential Colour & Matrixing)
SMATV	Satellite Master Antenna Television
s/n	signal-to noise ratio
TVRO	Television Receive Only

So, in dB, for a system noise temperature of 325K (25·1dBK) and a bandwidth of 32MHz (75·1dBHz), noise power equals −228·66 + 25·1 + 75·1, equals −128·4dBW (0·14pW).

Carrier Noise Ratio

We now have the "noise" part of carrier to noise ratio. The calculated carrier power at the same point in the system was −115·9dBW, so

c/n (dB) = carrier power (dBW) − noise power (dBW)

= − 115·9 − (−128·4)

= + 12·5dB

We can live with this, and in fact this value of c/n will result in a picture quality perfectly adequate for home viewing. Signal to noise ratio will be below studio standards, but far beyond what many viewers seem to ask of their terrestrial TV antennas. The high quality achievable with small dishes and low power satellites is a source of wonder to those unfamiliar with satellite TV.

G/T Figure of Merit

If I seem to have manipulated a great many variables to arrive at this result, consider that for a given satellite and transponder, the e.i.r.p. and path loss are fixed, determining the field strength (power flux density) on the ground. We are left with antenna gain, system noise temperature and receiver i.f. bandwidth to play with, and of those the latter is more or less set by the transmission parameters. The remaining two terms, gain and noise temperature, may be conveniently combined into a single figure of merit known as G/T, the gain to noise temperature ratio, as a measure of the system's r.f. sensitivity. The terminal analysed here has antenna gain of 43dBi and a system noise temperature of 325K. Expressed in dB, the latter is

10 log 325, or 25·1dBK

and G/T is given by:

G/T (dBK) = Gain (dBi) − system noise temp (dBK)

43·0 − 25·1

17·9dB/K

The G/T figure allows a direct comparison of effective system sensitivity, between different combinations of antenna and l.n.b. Identical G/T (and hence performance) could be obtained from a 3 metre antenna (49dB gain) and a system noise temperature of 1288K (7·3dB l.n.b. noise figure), or from a 1 metre antenna (39·5dB gain) and a 1·3dB noise figure l.n.b. (144·5K system noise). Current l.n.b.s have noise figures of between 2·0 and 3·0dB, and this sets the practical range of antenna sizes.

To be continued

Top of the Range Trio

Trio have a world-wide reputation for producing top-flight h.f. base station receivers—the introduction of the latest in this series, the TS-940S, will be seen to offer improvements in both performance and facilities of even this well established range.

From the outset Trio have acknowledged the demand for a transceiver whose receive performance, in terms of dynamic range and selectivity, will produce optimum results within the ever compacting h.f. amateur and broadcast bands. Apart from direct key access to all current h.f. amateur bands the TS-940S provides continuous RX coverage over the range 150kHz to 30MHz with a quoted dynamic range, at 14MHz (50kHz spacing, 500Hz c.w. bandwidth) of typically 102dB. Slope tuning of the i.f. passband on both u.s.b. and l.s.b. together with c.w. variable bandwidth tuning, i.f. notch filter (40dB) and active c.w. audio filtering are incorporated. A selection of i.f. filter bandwidth options are available—the normal version is provided with 2·7kHz i.f. filtering for s.s.b. (at 8·83MHz and 455kHz) and 6kHz for a.m. (455kHz).

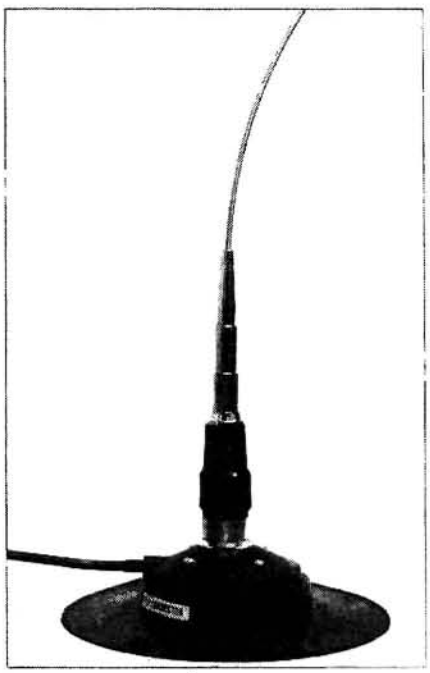
To complement this performance the transmitted signal passes to the antenna via a 28V 'solid state final—full or semi break-in is available and as standard the TS-940S can be operated in s.s.b./c.w./a.m./f.m. and f.s.k. modes.

Frequency selection can be accomplished by either of the twin v.f.o.s, 40 memory channels or direct keyboard command. Once entered the v.f.o. can be used to tune away from the selected frequency in 10Hz steps or if the control knob rotation exceeds two to three revs per second, both the rate and step size increase automatically. Frequency readout is via a large fluorescent digital display with combined analogue subscale—a separate green back-lit dot matrix l.c.d. shows graphically v.b.t. and i.f. slope tuning positions and can be used to review memory or alternative v.f.o. frequencies, monitor the state of the (optional) internal tuning unit or display time and pre-programmed on/off switching times. For those with diminished eyesight, all mode changes are audibly verified by c.w. ident with frequency details available on demand from the optional digital YL speech synthesiser.

For further details and its matching accessories contact: *Lowe Electronics, Chesterfield Road, Matlock, Derbyshire DE4 SLE. Tel: (0629) 2817/2430.*

Super Mag-mount

Most mobile operators will either have heard of, or experienced a wandering magnetic mounted antenna when speeds around 30 miles per hour are exceeded.



Waters and Stanton Electronics claim that a mag-mount that they have discovered, is more than three times stronger than conventional types and portrays positively limpet like qualities of adhesion.

The special design means that for normal car mounting surfaces, and up to the legal speed limit, the antenna will stay put. Tests have indicated that there is every likelihood of the antenna base breaking before the magnetic base parts company with the car metal work.

The magnetic mount comes complete with SO239 connector, 50Ω cable terminated with a PL259 plug, for connection to the transceiver.

Made in Japan and priced at around £15.00, the unit should be found in most good amateur radio shops, or alternatively is available for £16.75, which includes carriage, direct from: *Waters and Stanton Electronics, 18–20 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835 or 204965.*

Ten FM Conversion

New from Spectrum Communications is their SC29 synthesiser conversion board which can be fitted to most legal UK f.m. CB rigs to give coverage of 29·31 to 29·70MHz in forty 10kHz steps.

The board, which measures 76 × 38 × 13mm, is designed for rigs where the synthesiser v.c.o. runs at around 17MHz on receive and 13·9MHz on transmit. This includes the LC7136 and LC7137 series and TC9119P p.l.l. i.c.s., which form the vast majority of synthesisers. Fitting, which involves connecting up one screened and four unscreened wires, takes around 30 minutes, including aligning the synthesiser for lock. Retuning for full sensitivity and output power on 29MHz takes somewhat longer.

The board is supplied built and aligned for £15.00 including VAT and p&p, with fitting instructions and retuning information. Or Spectrum will fit the board and return your rig fully tuned in 10 to 14 days for an inclusive price of £27.50. Conversion of rigs containing the MC145106 such as the JWR, DNT, LCL and ICOM is done by the crystal method and including retuning and postage is again £27.50.

Further details from: *Spectrum Communications, Unit B6, Marabout Industrial Estate, Dorchester DT1 1YA. Tel: (0305) 62250.*

Handheld Scanner

Scanning receivers continue to be a very popular item with both the radio amateur and general listener, often involving mains powered or 12V d.c. "base station" type installations. Whilst such equipment, when used with a suitable wide bandwidth external antenna, is capable of excellent performance there are often times that require the receiver to be taken to the point of activity.

The Regency HX2000 is a true handheld programmable 20 channel a.m./f.m. monitor receiver operating from its own 4·8V NiCad pack.

Performance of the compact (77 × 175 × 39mm) unit is the equal of most house-bound scanners—typical sensitivities, quoted at 12dB SINAD, are 0·5μV over the v.h.f. ranges 60–90MHz/137–148MHz and 0·7μV over the ranges 148–175MHz, 406–450MHz, 450–470MHz and 470–496MHz. The range 18–136MHz is quoted as 1μV at a signal-to-noise ratio of 10dB. Selectivity for both a.m. and f.m. is 6dB at ±7·5kHz; scanning of pre-entered memory channels takes place at the rate of 15 channels per second, or approximately seven seconds to cover each MHz when on search scan. Scan stop delays are selectable at either 0·6 or 2 seconds with a priority channel also at 2 seconds. On the v.h.f. ranges search frequency increments are available at 5, 10 and 12·5kHz with fixed u.h.f. increments at 12·5kHz.

Frequency entry and control is by front deck keypad with frequency readout and function status via side illuminated (switchable) l.c.d. display. Audio output is 120mW at under 10 per cent distortion.

The HX2000 is available at £269.00 inc. VAT, NiCads, charger, antenna, case and user manual from: *Garex Electronics, 7 Norvic Road, Marsworth, Tring, Herts. HP23 4LS. Tel: (0296) 668684.*

Icom 85 Models

Thanet Electronics have supplied advanced details of several new items of Icom amateur band equipment to be launched in the UK during 1985.

The IC-3200 is an extremely compact (140 × 50 × 207mm) dual-band 144/430MHz f.m. mobile transceiver, capable of providing 25W of r.f. on either band. Channel separation of the UK model is selectable at 25/12·5kHz with standard 1750Hz toneburst. Unlike its dual-band competitors the IC-3200 is supplied with an internal duplexer which provides more than 40dB of isolation between bands and allows the use of a single dual-band antenna. Whilst being very compact the transceiver has the full complement of functions available, including twin v.f.o.s, 10 memory channels (which include mode, frequency and offset information) and comprehensive scanning options. For base-station operation a d.c. power supply, desk microphone and external speaker are available together with the UT-23 speech synthesiser.

To cater for the h.f.-minded the IC-735 h.f. transceiver is the latest model in this well established series, superseding the IC-730. Once again compact size, 241 × 94 × 272mm, together with comprehensive facilities should ensure this transceiver is well received (must give up these puns!). Full transceive coverage of all amateur bands is provided together with general-coverage reception to 30MHz. Principal modes are s.s.b., c.w. (with full or semi break-in and selectable filter bandwidths), a.m. and f.m. An electronic auto-keyer, passband tuning and variable notch filtering are all included. To make its presence felt the IC-735 is capable of 200W p.e.p. output (40W a.m.) and has switchable audio processing.

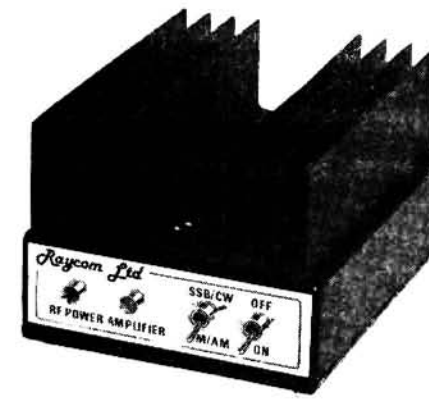
For further details of both these transceivers and other Icom products soon to be introduced, contact: *Thanet Electronics, Dept PW, 143 Reculver Road, Herne Bay, Kent. Tel: (02273) 63859/63850.*

Expanding Raycom Range

R Withers Communications have provided details of several new items recently added to the Raycom range. Owners of the Yaesu FT-757GX h.f. transceiver will be interested in a Mod Board now available which will improve the v.f.o. tuning and eliminate v.c.o. "glitch". Additionally the main dial tuning speed can be increased from 5kHz to 50kHz per revolution (selectable on the 500kHz step switch). Our Editor, Geoff Arnold G3GSR, has been able to evaluate the uprated FT-757GX and finds the modification well worth while in terms of operating convenience. The board is supplied fully built and tested for £29.50, requiring eight connections to the mainboard microprocessor. Alternatively the unit can be installed by RWC for £39.50 plus carriage.

Hand portable owners should find the Raycom v.h.f./u.h.f. series 25 range of r.f. power amplifiers the ideal means to uprate their system output capability. Designed primarily for the 1–3W v.h.f. or u.h.f. portable, such as the Yaesu FT290R/790R, these self-contained units are based on a range of wideband hybrid power modules made by Mitsubishi and Toshiba and found in the vast majority of current 15 to 35W mobile and base station transceivers. The range includes both Class C (f.m./c.w.) and linear (all mode) options which are pre-set on request by Raycom to allow r.f. drive levels in the range 30mW to 5W; power requirements are 10–16V d.c.

A large vertically finned heatsink allows the amplifiers to be rated at 50 per cent duty cycle—this specification should not be ignored as high duty cycle mode users have already found to their cost, after finding large temperature excursions can lead to a non-resettable "thermal switch" condition. If you do find yourself in this situation RWC can also supply and fit replacements to the majority of Japanese transceivers using these otherwise highly reliable output devices. For further details of the comprehensive range of power amplifiers, which incorporate auto TX/RX changeover relay switching and switchable hang time, or any other items in the Raycom range, contact: *R Withers Communications Ltd., 584 Hagley Road West, Oldbury, Worley B68 0BS. Telephone: 021-421 8201.*



No Mess Thermal Joints

Remember the last time you built a high current p.s.u. and lovingly plastered the faces of the 2N3055 series regulator devices with heatsink compound? It's a messy job at the best of times—a potential contamination nightmare for the i.c. and miniature component manufacturer—a little zinc oxide filled silicone compound can go a long way!

Charcroft Electronics of Haverhill Suffolk have just introduced a thermal joint compound called Crayotherm which combines high thermal conductivity and electrical resistance but comes in sheet, roll or ready formed gasket. When the equipment is switched on the Crayotherm, which is coated onto each side of a high thermal conductivity Kapton R insulator film, changes state from solid to liquid, thus wetting the thermal joint. At switch off the Crayotherm layers revert to the solid state—unlike previous dry elastomeric ("rubbery") insulators this new material can be cycled indefinitely without hardening and subsequent breakdown.

At the moment Charcroft Electronics, the UK distributors, are mainly supplying equipment manufacturers but would welcome the opportunity to establish links with retail distributors. For further details contact them at: *Charcroft House, Sturmer, Haverhill, Suffolk CB9 7XR. Telephone: (0440) 705700.*

Deluxe CW

With many thousands of UK amateur Class B licence holders now in possession of a letter of licence variation, allowing the use of on-air c.w. for tuition purposes, the next 12 months will see a large and hopefully permanent increase in the use of this most basic mode of communication. For the experiment to be a success the standard of the c.w. sent must be of a high order and no doubt with this particular use in mind Dewsbury Electronics have recently introduced their own designed and produced product, the Star-Masterkey.

Featuring full iambic keying, together with the facility for semi-automatic keying, the Star-Masterkey has dash/dot memories, speed ranges from 1–55w.p.m. and selectable positive or negative keying to suit transistorised or valved transceivers. The unit has a built-in sidetone oscillator with its own loudspeaker, together with headphone socket for practice purposes. Power can be provided by internal 9V battery or 6–15 volt d.c. external p.s.u.

The keyer is enclosed in a purpose-designed, vinyl-clad steel enclosure and is fully guaranteed for 5 years. Your Star-Masterkey is available now at £52.95 inc. postage from: *Dewsbury Electronics, 176 Lower High Street, Stourbridge, West Midlands. Tel: (0384) 390063.*

PRACTICAL WIRELESS INTRODUCE 3 MORE SPECIALIST REPRINTS

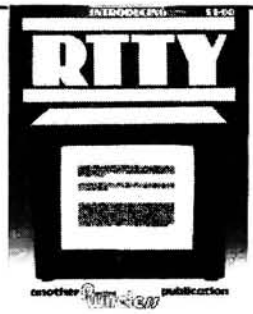
Articles on learning and using Morse code, with designs for iambic, triambic and memory keyers.

The PW "Severn", the "Dart" and the "Teme" all appear in this collection of articles about low-power transmission.

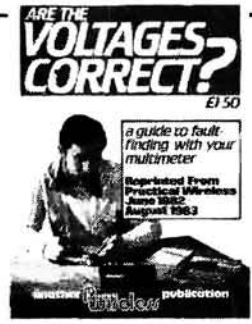
Popular designs from PW, with outputs up to 30 amps d.c. at 12 volts, plus articles on batteries, heatsinks, etc.

NOT FORGETTING OUR 5 FAVOURITE EXISTING TITLES . . .

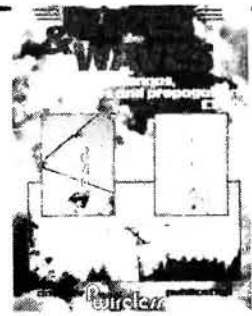
A collection of articles on propagation and antennas, mostly v.h.f. and u.h.f.



A simple and inexpensive way into radio communication with the printed word.



Fault-finding with a multimeter in solid-state or valved equipment.



The theory and practice of antennas, from long waves to microwaves, plus test gear and accessories.

Covering the technical syllabus for the RAE, plus tips for the newly qualified amateur.

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CLUB NEWS

Compiled by Eric Dowdeswell G4AR
Reports to: Eric Dowdeswell,
57 The Kingsway, Ewell Village,
Epsom, Surrey KT17 1NA
PLEASE MARK "CLUB NEWS"

It is good to see more and more club secretaries including their telephone numbers when submitting info for this feature. It makes for a quicker link between a club and a prospective member who might not otherwise bother if it involved letter writing. It also takes up less of the precious space allocated to the club news feature, enabling more clubs to be mentioned every month.

Abergavenny & Nevill Hall ARC: J. B. Davies GW4XQH on telephone (0873) 4655. New secretary here due to unfortunate illness of GW3SSY, to whom we send our wishes for a speedy recovery. The club meets every Thursday at the Pen-y-Fal Hospital, in the room above Male Ward 2, at 7.30pm.

Acton, Brentford & Chiswick ARC G3IIU: W. G. Dyer G3GEH, 188 Gunnersbury Avenue, Acton, London W3. Next meeting is Tuesday May 21, at 7.30pm, when G4GD will describe a modified all-band a.t.u.

Bangor & District ARS: Stewart Mackay GI4OCK on (0247) 454049. Two important notes, the meeting spot is now the Royal Hotel, Bangor, on the first Friday of the month and the annual dinner dance at the Quarterdeck restaurant, Crosby Street, Bangor, on Friday May 10.

Barry College of FE RS GW4BRS GW3VKL: P. Beckett GW4YCU, 9 St Fagans Road, Fairwater, Cardiff. Meets every Thursday evening at 7.30pm, in the annex at Weycoch Cross, Barry.

Biggin Hill ARC G4RQT G6TBH: Ian Mitchell G4NSD on (09598) 376. Third Tuesdays of the month at St Marks Church Hall, Biggin Hill, Kent, starting at 8.30pm. The subject for May 21 will be getting going in the early days of amateur radio.

Borders ARS: Mrs. S. P. Jones G1IUK on (0289) 305465. First and third Fridays at 8pm in the Tweed View Hotel, Berwick-on-Tweed. The lecture on May 12 will be on cubical quad antennas. The functions of the Royal Observer Corp will be the subject of June 7.

South Bristol G4WAW: Len Baker G4RZY on (0272) 834282. Every Wednesday at the Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol, at 7.30pm. A 14MHz band activity evening will be run by G4TXW on May 8, with a "QSL Rally" by G1HFJ on the 15th. There will be a 430MHz band night on the 22nd, ending the month with a bring-and-buy night on the 29th. The Bristol 70cm repeater group will give a presentation on June 5.

Bromsgrove ARS G4TUI: John Rowlands G4OJS on 021-445 3207. The British Legion Club at 8pm on the second and fourth Tuesdays, in Birmingham Road, Bromsgrove, Worcs.

Cambridge & District ARC G2XV: David Leary G8JKV, The Farmhouse, Blackers Hill Farm, Lowndes Drove, Needingworth, Cambs. Every Friday at 8pm, the Visual Aids Room, Coleridge Community College, Radegund Road, Cambridge, with G3DME holding forth on h.f. beacons on May 10, with a video presentation of members' shacks on the 17th. It's rig check-out time on the 24th.

Cheltenham ARA: Tim Kirby G4VXE on (0242) 36723 is the new secretary of the club which meets on first and third Fridays of the month at the Stanton Room, Charlton Kings Library, Cheltenham. G4CNY talks on May 17 on his experiences operating from VP9AD in the 1984 WW SSB contest. Moonbounce operation is the subject for G4ASR on June 7.

South Cheshire ARS: Nick Gutten G6IGW on Crewe 60062. It's 8pm on second and fourth Mondays at the Victoria Club, Gatefield Street, Crewe. A net operates on S14 on Sunday evenings at 8pm. The club will be running special event station GB4SVF at the Shavington Village Festival in May.

Cheshunt & District ARC G4ECT G6CRC: Roger Frisby G4OAA on (0992) 464795. Wednesdays at 8pm, Church Room, Church Lane, Wormley. On May 15 G6AXO will deal with radio paging systems, with G3WFM talking on a contest operations "primer" on the 29th.

Chester & District RS G3GIZ G8GIZ: Alan Warne G4EZO on Chester 40055. Every Tuesday at 7.15pm with code classes to start with, at the Chester RUF Club, Hare Lane, Vicars Cross, Chester. Video show on May 14 includes "Secret Listeners" and "WOORE, next amateur in space". A talk on the 21st deals with the Northern ARA, ending the month on the 28th with G2JT discoursing on coaxial cables.

Chichester & District ARC: C. Bryan G4EHG on Chichester 789587. The Fernleigh Centre, 40 North Street, Chichester, at 7.30pm, first Tuesday and third Thursday of the month. On May 7 there will be a presentation by club members of 1·3GHz band ATV and make a special note of Louis Varney G5RV addressing the club on June 4.

Colchester Radio Amateurs: F. R. Howe G3FIJ on (0206) 851189. The Colchester Institute, Sheepen Road, Colchester, at 7.30pm. On May 16 G4PAY has a quick look at the USA.

North Cornwall RC: John West G6ICW on Bude 4976. First Wednesdays of the month at 7.30pm, the RAOB Club, Camelford, Cornwall. A d.f. hunt will be featured on June 5.

Cornish RAC G4CRC: N. Pascoe G4USB on Falmouth 40367. Main club meets in the Church Hall, Treleigh, on the old Redruth by-pass, at 7.30pm, with the computer section gathering at the same spot but on second Mondays. On June 6 the club will be addressed by G8VST on the subject of getting started on satellites. For the computer section the talk on May 13 will be on Boolean algebra.

Coulsdon ATS G4FUR: Alan Bartle G6HC on 01-684 0610. A lecture by G6MFM on basic test equipment will be given on May 13. The venue is the St Swithins Church Hall, Grovelands Road, Purley, Surrey, at 8pm on second Monday and last Thursday, which includes Morse tuition.

Coventry ARS: Robin Tew G4JDO on Coventry 73999. Fridays at 8pm, Baden Powell House, 121 St Nicholas Street, Radford, Coventry, May 10 is a night on-the-air, a talk on microwaves on the 17th, 24th also on-the-air, with a v.h.f. d.f. contest on the 31st. Morse tuition and practice available.

Crawley ARC: Dave Hill G4IQM, 14 The Garrones, Worth, Crawley, W. Sussex. Second and fourth Wednesdays at Trinity Church Hall, Ifield, at 8pm. Annual club dinner on Friday May 10, at Goffs Park Hotel, Crawley. A junk sale is organised for May 22.

Droitwich ARC: Gordon Taylor G4HFP on (02993) 3818. Second and fourth Mondays at the Scout HQ, Union Lane, Droitwich, next to the railway station, at 8pm. "Waves and resonance" is the subject of G3LBS on May 13 with the same lad talking on the uses of the oscilloscope on July 8.

Dunstable Downs RC G8DDC G4DDC: Phil Morris G6EES on Dunstable 607623. Gathers at Chews House, High Street South, Dunstable, at 8pm. On May 10 there will be d.f. hunts on both the 1·8 and 144MHz bands, with G8LOK talking on Satellites on the 24th. Provisional at the moment is a trip to the Mullard Observatory on June 7.

Ealing & District RS G3UUP G8UUP: Anton Berg G4CSR on 01-997 1416. Every Tuesday at 7.30pm, Northfields Community Centre, 71a Northcroft Road, London W13. On May 14 G4ROM will describe radio operating in Scandinavia.

Edgware & District RS G3ASR: John Cobley G4RMD on Hatfield 64342. Second and fourth Thursdays at 8pm, 145 Orange Hill Road, Burnt Oak, Edgware, Middx., with club net on 1·875MHz on Mondays at 10pm. Contest c.w. practice takes place on May 9 with a constructors' contest on the 23rd. A "straight key" evening will be held on May 30 on the 3·5MHz band.

Exeter ARS: Roger Tipper G4KXR on (0392) 68065. Annual used equipment sale on Monday May 13 at the Community Centre, St Davids Hill, Exeter, at 7.30pm. That's an invitation to have a good clear out!

Ex-G Radio Club: D. Rayner W3CTR, 416 Burkhart Street, Johnstown, PA 15906. A radio club for Radio Amateurs born in the UK and domiciled abroad. Contact W3CTR for further details.

Exmouth ARC G4HOB: Des Thompson, Four Winds, 131 St Johns Road, Exmouth, Devon. Meetings on May 8 and 22, both Wednesdays, at the 6th Exmouth Scout Hut, Marpol Hill, Exmouth, at 7.30pm.

Flight Refuelling ARS: D. Wilkes G8ZLH, 63b Runneymeade Avenue, Bearcross, Bournemouth. May 5 brings an Italy Travel Log by John Sykes G6CML, G6NA talks on using repeaters in the 1950 on the 12th, G4WHO deals with another of his popular series "Nicks Rambles" on the 19th. A lecture to look out for is Satellite Telemetry since Sputnik by G3MQD on the 26th. June 2 brings an RSGB video. Club meets Sundays at 7.30pm at FR Sports & Social Club, Merley Park Road, Wimborne.

Fylde ARS: F. Whitehead G4CSA on Lytham St Annes 737680. First and third Tuesdays at the Kite Club, Blackpool Airport, at 7.45pm. On May 7 G3XSH, RSGB's regional rep, will give a chat on the RSGB, with a junk sale on the 21st. John Gibson, chairman of the Blackpool and Fylde Gliding Club, will deal with gliding as a sport on June 4.

Glossop & District ARG: G. Sims G4GNQ, 85 Surrey Street, Glossop. Last Thursday of the month at 8pm, the Nags Head, Charleston Road, Glossop.

Grafton RS: John Kaine G4RPH, 74 Camden Mews, London NW1, is the chairman who says the club meets second and fourth Fridays at 8pm, the Five Bells, East End Road, East Finchley, London. RAE and code classes and tuition plus computers as well as usual AR facilities.

Grimsby ARS: George Smith G4EBK on Grimsby 887720. Gathers on the second and fourth Thursday of the month at the Cromwell Social Club at 8pm. On May 9 and 23 there are d.f. hunts, while a visiting speaker will deal with antennas on the 30th. June 6 is computer time.

Havering & District RC G8HRC G4HRC: D. St J. Gray G1HTQ on Hornchurch 41532. Venue is Fairkytes, Billet Road, Hornchurch, Essex, on Wednesdays. On May 15 G4YHD speaks on "The Master Travels" and on the 29th G4MYO organises a d f. hunt.

Home Counties TV Group: Paul Hancock G8UAV, The Flat, 5a The Broadway, Southall, Middx. Fourth Wednesday of the month at the Beaconsfield Arms, West End Road, Southall.

Horsham ARC: Pete Head G4LKW on Horsham 64580. This may be in time to tell you that Ray Flavell G3LTP will talk on h.f. propagation on May 3. It's the first Thursday at 8pm, Guide HQ, Denne Road, Horsham, W. Sussex.

Hull & District RS: C. North G4PEP on (0482) 77249. Every Friday at 8pm, the West Park Recreation Centre, Walton Street, Hull, plus RAE classes on Tuesday evenings. May 3 brings a repair night and on May 10 there will be a talk on operating AR while on holiday, while on the 17th there is a visit to the local police establishment. A d.f. hunt takes pride of place on the 24th and the month ends on the 31st with a construction contest. First item in June is a bring-and-buy on the 7th.

Inverness ARC: Brian Adam GM1GFX on (0463) 242463. Club rooms at the Cameron Youth Centre, Planefield Road, Inverness, 7.30pm every Thursday.

Ipswich RC G4IRC: Jack Tootill G4IFF on (0473) 44047. Don't overlook the East Suffolk Wireless Revival event at the Civil Service Sports Ground, Straight Road, Bucklesham, Ipswich, on Sunday May 26 with traders' stands, fleamarket, car boot sale, antenna testing range and much for the rest of the family. Otherwise meetings in the clubroom of the Rose & Crown, 77 Norwich Road, Ipswich, second and last Wednesdays at 8pm.

East Lancashire ARC G3NTJ G1ELC: Stuart Westall G6LXU on (0254) 887385. At the Conservative Club, Cliffe Street, Rishton, with formal gatherings on the first Tuesday and informal on the last Tuesday. On other Tuesdays there is a club net on 145·4MHz at 7.30pm. The meeting on June 4 will describe Japanese "Morse" code.

Leighton Linslade RC G4LLR G6LRC: Ian Jardine G1ACQ on (0525) 376741. Meetings in Room A64, Vandyke Community College, Vandyke Road, Leighton Buzzard, Beds, on first and third Mondays at 7.30pm. No meeting on May 6 due to Bank Holiday but on the 20th G6IXH will talk on antennas for 934MHz.

Lincoln SW Club G5FZ G6COL: Pam Rose G4STO c/o City Engineers Club, Central Depot, Waterside South, Lincoln, which is the club's venue every Wednesday at 8.15pm. Bear in mind the club's Lincoln Hamfest '85 on Sunday September 8 with details later. Main feature for May is the AGM on May 22. RAE and c.w. classes every other week.

Loughborough AR & Electronics Club: Jim Smith G4DZL c/o Top Floor, Brush Social Club, 18 Fennel Street, L'boro, where the club meets Fridays at 8.30pm, plus a constructors' group on Tuesdays at 7.30pm. May 10 is an RTTY evening with a social darts and ale spot on the 17th. The club's second d.f. hunt on the 1·8MHz band is on the 24th.

Maidstone ARS G3YSC G3TRF G8TRF: Alan Judge G6FZD on (0622) 50709. Every Friday at the YMCA Sportscentre, Melrose Close, Cripple Street, Maidstone, Kent. Highlight for May is a rally on the 26th, a Sunday, with bar and usual entertainments starting at 11am.

Maltby ARS: Ian Abel G3ZHI on Rotherham 814911. Fridays at 7pm, Church Building, Church Lane, Maltby. On May 10 SSTV in colour is the subject of a lecture, with a visit by Lowe Electronics on the 17th.

South Manchester RC: D. Holland G3WFT on 061-973 1837. Fridays and Mondays at 8pm, the Sale Moor Community Centre, Norris Road, Sale, Cheshire. Microwaves will be dealt with by G3PFR on May 10 and the club AGM is on the 24th. G0AOU and G6EAO will jointly lecture on 10GHz from the homebrew point of view, on the 31st.

Maxwelltown ARC GM0AEE: C. D. S. Rogers GM4NNC, 5 Elder Avenue, Lincluden, Dumfries. Meets on a Wednesday at 8pm, the Tam O'Shanter Inn, Dumfries.

Medway ARTS G5MW G8MWA: Tony Faram on (0634) 578647. New secretary here, hopefully to be licensed soon. It's Fridays in St Lukes Church Hall, King William Road, Gillingham, Kent.

Midland ARS: Norman Gutteridge G8BHE on 021-422 9787. Meets every day of the week at 294a Broad Street, Birmingham. Coming up on Sunday May 12 is the Drayton Manor Mobile Rally, open at 11am with trade stands, children's entertainments, zoo, refreshments and so on. Regular meeting on Tuesday May 21 is G3BA talking on antennas for small gardens.

ARC of Nottingham G3EKW G6CW G8IUT: Jim Towle G4PJZ on (0602) 624764. On May 9 and 30 there will be d.f. hunts on the 144 and 430MHz bands respectively. The 14th is a station activity evening. So, every Thursday at 7.30pm, the Sherwood Community Centre, Mansfield Road, Nottingham.

Oldham ARC: John Midgley G3SAO on 061-652 6529. Monday meetings at 8.30pm, the Wheatsheaf Hotel, Derker Street, Oldham.

Oswestry & District ARC: Brian Goldsmith GW6YIY on (0691) 831023. A welcome at the Bell Hotel, opposite the Parish Church, Oswestry at 8pm first Tuesday of the month.

Greater Peterborough ARC: Frank Brisley G4NRJ on (0733) 231848. Fourth Thursdays at 7.30pm, the

Southfields Junior School, Stanground, P'boro. May 23 will be devoted to preparations for the VHF Field Day.

Plymouth ARC: R. B. Weston, POB 46, Plymouth. Activity is centred in May on the annual mobile rally on Sunday 26 at the Devonport Secondary School, Park Avenue, Devonport, with a wide variety of attractions plus talk-in on S22 and RB2 by G3PRC.

Reading & District ARC: Chris Young G4CCC, 18 Wincroft Road, Caversham, Reading, Berks. Next meetings on May 7, 21 and 28 I think, the White Horse, Peppard Road, Emmer Green, Reading. Check with Chris for dates.

Rhyl & District ARC GW4ARC GW1ARC: Melfyn Allington GW1AKT on Nantglyn 469. The Mona Hotel, Market Street, Rhyl, first and third Mondays at 7.30pm. On May 6 GW8XLL will demonstrate ATV and note that on June 3 there will be a visit to the Comms Room of the NW Police HQ, Colwyn Bay. Keep June 17 clear as the Rev George Dobbs G3RJV will attend to talk on matters QRP.

Rossendale Valley RC: Lee Standley G1EIU on Rossendale 214411, is the new secretary of this club which gathers at 8pm at the Bishop Blaize Hotel, on the A56 in Rawtenstall, Lancs, every Thursday evening.

Salop ARS G3SRT: John Orrells G6DQY, Perry Willows, Yeaton, Baschurch, Shrewsbury. Meetings every Thursday at 8pm, the Olde Bucks Head, Frankwell, Shrewsbury. On May 9 there will be a junk sale, and a d.f. hunt on the 23rd.

Sefton ARC G4RAQ: Jim Hanratty G6PVQ on 051-523 3971. May 15 and 29 at the Liverpool Prison Officers' Club, Hornby Place, Walton, L'pool. RTTY and computer demos coming up soon, plus constructional projects and quiz games.

Southdown ARS G3WQK G1KAR: R. Wilson G1BAB on (0323) 890234. First Mondays of the month at the Chaseley Home, Southcliff, Eastbourne at 7.30pm, and at the clubroom of the Wealden District Council Offices, Vicarage Fields, Hailsham on Tuesdays and Fridays where RAE and code courses are held. On May 5 the lecture will be on telex over AMTOR and RTTY, and on June 3 it will be about kits for amateurs.

Southgate ARC: R. F. Snary G4OBE, 12 Borden Avenue, Enfield, Middx. Second Thursdays at 7.30pm, St Thomas' Church Hall, Prince Georges Avenue, Oakwood, London N14. Wind loading and tower safety will form the subject on May 9, the talk being given by G3UDO.

Spen Valley ARS G3SVC: Tim Clough G4PHR on Mirfield 499397. Thursdays at 8, the Old Bank WMC, Mirfield, W. Yorks. G4JJ will handle amateur satellites on May 9 and G4SUI will talk on a.t.u.s on the 23rd. Dig out your old gear for the junk sale on June 6.

Stafford & District ARS: A. C. Bairstow G4RSW on Stafford 46306. The Coach & Horses Hotel at Weston on the A51 any Tuesday at 8pm. Talks or demos most weeks.

North Staffs ARC G4BEM: David Morgan G6MLI on (0782) 332657. At the Harold Clowes Community Centre, Dawlish Drive, Bentilee, Stoke-on-Trent, every Monday at 8pm. Demos in the pipeline on RTTY, ATV and OSCAR 10.

Stamford & District ARS: M. B. Rochester G6ZCY on (0572) 55334. Meets at the Anchor pub in Stamford second and fourth Wednesdays, where there will be a social evening on May 8. On other Wednesday evenings there is a club net on S9 at 9pm.

Stanley ARC: Ron Piper G6XCO on (0207) 235930. It's the Kings Head Hotel, Stanley, Co Durham, every Tuesday at 7pm. RAE and constructional classes.

Stratford-upon-Avon & District RC: David Boocock G8OVC on S-u-A 750584. Gathers at the Control Tower, Bearley Radio Station, near Stratford, second and fourth Mondays at 7.30pm. His experiences in a Japanese war camp are described by G3BA on May 13.

Street & District ARS: Colin Webber G4SCU, 3 Orchard Road, Street, Somerset. Foregathers at the Strode College on the first Tuesday of the month at 7pm. It's a Q & A session on May 7 coupled with a construction competition. Note especially a talk on the work of the RAIBC by Frances Woolley G3LWY, on June 4.

Mid-Sussex ARS G3ZMS: C. R. Cook G1FRF on (07918) 2937, is the new secretary of this club which meets during school term times at Marle Place, Burgess Hill, Sussex, with a full programme of events, every Thursday evening.

Sutton & Cheam RS: Alan Keech G4BOX, 26 St Albans Road, Cheam, Surrey. It's the third Friday of the month at 7.30pm, Downs Lawn Tennis Club, Holland Avenue, Cheam. Main attraction in May is the AGM on the 17th. Note now the return quiz match with the Coulsdon club on June 21. Club nets on Tuesday at 10.30am 3·7MHz s.s.b., Thursdays 8pm 144·390MHz s.s.b. and Sundays 10.30am on 144·500MHz f.m.

Swindon & District ARC: Dave Ineson G4ZAZ on Swindon 37489. The club will be busy getting ready for the Swindon Rally on Sunday May 12. Otherwise it meets every Thursday at 7.30pm, Oakfield School, Swindon.

Thornton Cleveleys ARS: Jack Duddington G4BFH on (0253) 853554. No meeting on May 6 but on the 13th G4EZM will talk on the alignment of receivers and transmitters, with an NFD discussion on the 20th. Normally meets Mondays at 7.45pm, 1st Norbreck Scout HQ, Carr Road, Bispham, Blackpool.

Tiverton (SW) RC: G. W. Draper G4ZNV on (03634) 235. Good radio facilities and pleasant social surroundings are available at the Half Moon Inn, Fore Street, Tiverton, Devon, every Tuesday at 7.30pm.

Todmorden & District ARS: J. Gamble on Todmorden 2494. Formally on first Monday and informally on third Monday at the Queen Hotel, Todmorden, at 8pm. An h.f. demo station G4WYT will be active on May 6.

Torbay ARS G3NJA G8NJA: Brian Wall G1EUA, 48 Pennyacre Road, Teignmouth, South Devon. Last Saturday and every Friday of the month at the EEC Social Club, Ringslade Road, Highweek, Newton Abbot. Diary note for Sunday August 25 for the Mobile Rally to be held in the STC Social Club, Old Brixham Road, Paignton.

Trowbridge & District ARC: Gerry Callaghan G4SPE on (02214) 4532. Venue is the Southwick Village Hall, near Trowbridge, Wilts, at 8pm on the fourth Thursday of the month. Changes to sec's phone number and meeting day.

Vale of White Horse ARS: Ian White G3SEK on Abingdon 31559. First and third Tuesdays in the upstairs meeting room of the Waterwitch, Cockroft Road, Didcot, Oxon, at 7.30pm.

Verulam ARC: Hilary Claytonsmith G4JKS on St Albans 59318. Meets at the RAF Association HQ, New Kent Road, off Marlborough Road, St Albans, on the second and fourth Tuesdays. Subject for May 28 is G3EUR on Clandestine Wireless (SOE).

Wakefield & District RS G3WRS: W. Parkin G8PBE on Wakefield 378727. Venue is the Community Centre, Prospect Road, Ossett, near Wakefield, at 8pm. On May 14 G4KLN will deal with c.w. operation and there is a Bring-and-Buy Sale on the 28th.

North Wakefield RC G4NOK G6WRS: Mike Leonard G4YJR on (0532) 852875. Thursdays at the Carr Gate WMC. Lawns Lane, Wakefield, at 7.30pm. There will be a lecture/visit by the Royal Observer Corp on May 16.

Walsall ARC G4HLL: Linda Prince G6HZI on (0922) 32607. The Forest Comprehensive School, Hawbush Road, Bloxwich, Walsall, every Wednesday at 8pm. Club net on S15 Fridays at 8.30pm and at 8pm on 28·025MHz c.w. and 9pm around 3·7MHz s.s.b.

Mid-Warwickshire ARS: Carol Finnis G4TIL on Southam 4765. Second and fourth Tuesdays at 61 Emscote Road, Warwick at 8pm. Get ready for the d.f. hunt on Tuesday June 11.

Welwyn Hatfield ARC: Dave Fairbank G0AII on Welwyn Garden 26138. First and third Mondays of the month at Knightsfield Scout HQ, Welwyn Garden City, plus Morse code classes on Thursdays. Club net is on S15 at 8pm on other Mondays.

West Bromwich Central RC: John Bates G6ZLW on 021-553 0531. Every Sunday evening at the Hop & Barleycorn, Dartmouth Street, West Bromwich, with RAE and code tuition.

Westmorland RS: G. Chapman G1IIE on (0539) 28491. AGM time again at 8pm on Tuesday May 14 at the Strickland Arms, Sizergh, near Kendal, Cumbria.

Wigtownshire ARC GM4RIV: Gerry Maxwell on (0776) 2876. Every Thursday at 7.30pm, the Stranraer Community Centre with RAE, Morse code and practical tuition.

Willenhall & District ARS: John Perkins G4LWI on (0734) 782036. The Saracen's Head, Bloxwich Road South, Willenhall, W. Mids, every Wednesday at 8pm.

Wimbledon & District ARS G3WIM G8WIM: George Cripps G3DWW on 01-540 2180. Second and last Fridays of the month at 8pm, generally at the St Johns Ambulance HQ, 124 Kingston Road, Wimbledon, London SW19. On May 10

G4ILP will run a homebrew exhibition evening and on the 31st there will be an illustrated talk on the Voice of the Andes HCJB. Advance notice of a junk sale on June 14.

Wirrall ARS G3NWR: Cedric Cawthorne G4KPY on 051-625 7311. First and third Wednesdays at 7.45pm, the Parish Hall, Heswall, with probability of a talk-in on 144·725MHz. Members homebrew equipment will be on display on May 15 and note now the talk on AMTOR by G6VS on June 5.

Wirral & District ARC G4MGR G8WDC: Gerry Scott G8TRY on 051-630 1393. The Irby Cricket Club, Irby, Wirral, at 8pm, second and fourth Wednesdays. On-the-air night on May 8 and a d.f. hunt on Sunday 12th. On the 29th there will be a practice d.f. hunt at the Heswall lay-by at 8pm.

Wisbech & District AR & Electronic Club: P. W. Frampton G6NNK, Fencroft, Summerfield Close, Wisbech, Cambs. Advance notice of the club organising a special event station for the Wisbech Annual Rose Fair Parade on Saturday July 6. A camera on one of the floats will transmit live pictures to fixed stations around the route.

Wolverhampton ARS: Keith Jenkinson BRS 84269 on (0902) 24870. Meetings every Tuesday at 8pm, the W'hampton Electricity Sports and Social Club, St Marks Road, Chapel Ash, W'hampton. On May 5 G6UDX will talk on frequency synthesisers and on Sunday May 12 there will be a 144MHz band d.f hunt. There will be no meeting on the 28th.

Worcester & District ARC: Derek Batchelor G4RBD on (0905) 641733. Formal meetings at the Odd Fellows Club, New Street, Worcester and informally at the Old Pheasant in the same street. First and third Mondays at 8pm, with June 3 a formal with a "Test your rig" against the specification evening.

Cover Date	Deadline	For events from early
August	May 15	July
September	June 15	August
October	July15	September

Worksop ARS: Carole Gee G4ZUN on (0909) 486614. New venue, and secretary I think, for this club which meets every Thursday at 7.30pm, the Unicorn Hotel Bridge Street, Worksop. Lectures alternate with RAE and Morse code tuition. On May 16 G8AQN will chat on microwaves and it's homebrew by G4RUD on the 30th.

Yeovil ARC G3CMH G8YEO: Eric Godfrey G3GC on (0935) 75533. Thursdays at 7.30pm, the Recreation Centre, Chilton Grove, Yeovil. G3MYM talks on oscillators on May 9 and on demodulators on the 23rd. There will be a video on electromagnetic waves on the 16th and another video on the Space Shuttle to be shown on June 6.

Battery Charger Controller

◀◀◀ *continued from page 21*

If the unit does not work, check the operation of D1 and Tr1/2 by disconnecting the battery and charger. Clip a jumper lead between the cathode of CSR1 (or Tr2 emitter) and negative and a voltmeter between Tr2 collector and negative. Next, connect a variable voltage p.s.u., set to approximately 12V d.c., to the positive and negative terminals of the p.c.b. The voltmeter should read approximately 12V, proving Tr1/2 are both off—if not, check the transistors are the correct way round (a favourite mistake), and that the resistors are in the correct place, etc. Slowly wind up the p.s.u. to 14 volts. As D1 conducts Tr1 should switch on with the voltmeter reading falling to zero. Wind the p.s.u. voltage up and down a few times to confirm this. If the circuit fails this test, check the transistor connections and components, etc., as before. This is also a useful way to check the p.c.b. operation before fitting into the box, but do not forget to remove the jumper lead afterwards. Most other problems are caused by incorrect connections to the charger and CSR1. A number of these units have been constructed, solving many standby battery problems with different size lead acid batteries.

If a fully discharged battery is connected the unit may not charge it. A switch connected across CSR1 (anode to cathode) solves this problem nicely and may also be useful if a battery needs to be charged to a gassing state. One final point, the amount of charge lost due to voltage drop across CSR1 is small and does not appear to make any significant difference to the length of time taken to recharge a battery. ●

wap ot

Have Jaybeam 144MHz antennas 5-el Yagi and 6-el quad. Also have BC453B receiver (190-550kHz). Would exchange for 2in diameter glassfibre tube, 2·4GHz band (13cm) components or w.h.y? Martin G8IEM. QTHR. Tel: 0705 466825 (Hayling Island). *W995*

Have set of castings, columns and bearing for Westbury bench vert. mill, a little machining done. Also some other bits and pieces suitable for modal engineer. Would exchange for ATV or radio equipment RX/TX. Tel: Woodstock 812278. *X063*

Have Fortop TVT435 TV transmitter plus extra XTL 437. Also have Microwave Modules receiver converter. Good TV station. Would exchange for 144MHz multi-mode like FT-290R or similar in good condition. Please write: David GI4XIR. 918 Ashmount Gardens, Hillhall Estate, Lisburn BT27 5SB. *X065*

ON THE AIR

AMATEUR BANDS

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

by Eric Dowdeswell G4AR

A special event station GB0RER will be operational on 3·5, 7, 14 and 144MHz (80, 40, 20 and 2m) during Saturday/Sunday May 4/5 to commemorate 25 years of preservation of the Ravenglass and Eskdale Railway in W. Cumbria. There will be visiting locomotives, a model railway and film shows. A special QSL card will be available for contacts or s.w.l. reports. More on this from G. Hunter GM3ULP, 12 Airbles Drive, Motherwell, Strathclyde, or (0698) 53394.

Another special event station is GB2CV located at the Cheltenham Race Course, Prestbury Park, Glos, from Saturday July 27 until July 31. The occasion is the 6th Citröen World Meeting and the station will be run jointly by the Gloucester ARS, Cheltenham ARA and Smiths Industries RS with operation on all the h.f. bands plus 144 and 430MHz. RTTY, SSTV and ATV operation is a possibility. As usual special QSL cards will be provided, by Citröen, for contacts and reports. Further info from Roger G8UJG on (0242 76) 2175.

To celebrate its Golden Jubilee the Ipswich RC is presenting an award certificate signed by the president of the club and the mayor of Ipswich for contacts made during 1985. There is also a similar award for s.w.l.s. More details from Alan Owen G4HMF, 102 Constable Road, Ipswich. Contacts with Ipswich club stations and their special event stations during the year will count.

The Swansea ARS GW4CC holds a rally on Sunday May 5 in the Patti Pavilion next to the St Helens County Cricket Ground on the A4067, on the Swansea to Mumbles coast road. Trade stands, bring-and-buy, bookstalls, and c.w. test facilities plus full catering and bar and family attractions. More from Roger Williams GW4HSH on (0792) 404422.

Gathering of members and families of the Maltby ARC at their Christmas junk sale which raised almost £50 for the club's funds

DX Bands

Stephen Campbell GM4OSS of Stewarton, Ayrshire, has built the "Teme" transceiver described in the November 1984 and following issues of *PW*. With an input of around 3W he has worked HB9O, DK7NN, OK1AMR, YU2PJ, HA8KVB, YO7AVX, and many others, sometimes getting 599 reports on 14MHz c.w. The antenna is a G5RV at about 7m high at its highest point and bends at each end! Stephen uses a Z-match tuning unit but he intends replacing this with a home-brew antenna tuning unit. Good idea OM as I always reckon that the Z-match is a bit lossy although it does a good job of impedance matching if one has power output to spare.

I hadn't heard from **Paul Martin** of Dartford, Kent, for some while but in a recent letter it seems he has not been wasting his time as he is now the proud owner of the call G1JOU. Congrats OM! A photo of the shack is promised. He has the FT-101Z for listening on the h.f. bands and he uses it to drive a Microwave Modules transverter for operation on the 144MHz band. He has been able to work around the UK plus ON and DL, using a 5-element ZL Special although this has now been superseded by a MET 7-element Yagi. He is also using the Sinclair ZX Spectrum to copy RTTY.

The ARRL Awards Committee has now recognised the UK sovereign base area in Cyprus as a separate country so sort out your ZC4 QSL cards from the 5B4 ones and you may have a new one to add to your DX list. ZC4 cards from this area dated 16 August 1960 and later should be treated as a new country if operating from the base area.

Note the QRP Club late Spring s.s.b. activity contest on the weekend of Saturday/Sunday May 4/5. Times and frequencies are 0900/1100Z (GMT) and 1400/1700Z on 14·285/21·285/28·885MHz, 1100/1300Z, 1700/1900Z and 2100/2300Z on 3·690/7·090MHz, and 1900/2100Z on 14·285MHz.

The 7MHz band has had most attention from **Matthew Probert** of Basingstoke this month. He uses an FRG-7 and a collection of odd lengths of wire at the top of a metal pole about 9m high, fed at the top of the pole with coaxial cable. As I have pointed out to him in a letter I'd be happier with this antenna if he made the random lengths of wire into lengths which were resonant in one or more of the amateur bands. Matthew has also got an old HRO receiver on which he has replaced a lot of the by-pass capacitors and finds that the selectivity is much improved "and is a God-send when compared to my FRG-7". As a lover of these old valved receivers I can only say I'm not surprised! Anyway, on the 7MHz band Matthew logged HC5EA, CO2OM, 5W1EJ, HK0ATU, WB0MIN/V4 (V4 is the new prefix for St Kitts, which used to be VP2K), ZV9ZZ and 9Y4BA, all around 0800Z. Only catch of note on 1·8MHz band was UA2FF also on s.s.b.

First log from **Norman Henbrey** BRS28198 of Rye, E. Sussex, who has an FR-DX400 and FRG-7700 plus Mizuho a.t.u. with a 40m-long wire and TA31JR beam. His bag on 1·8MHz included HH7PV, J87UEE, KV4FZ, PJ7A and VP9IJ. Some nice rare ones there! Best catches around 3·8MHz were CE0ERY, FM5WD (used to be FM8) and PJ2HB. Solitary one worthy of note on 7MHz was CE4FXY, while on 21MHz it was A22ME (QSL AK1E) and VP9KA QSL via W1BPM. The QSL address for PJ2HB just mentioned is POB3052 Netherland Antilles.

Phil Dykes G4XYX down in Poole, Dorset, has been unwell so not much to report in the field of QRP this month. With 3W of c.w. he has managed to work a few Europeans on 7MHz but BC QRM has been a problem. On 28MHz he caught SK4BX and EA8TE with solid QSOs, this with 10W of s.s.b. and a dipole. Phil comments on J28EB working on 28·290MHz in the beacon band with the inevitable pile-up of Europeans on the same frequency, who presumably didn't worry about the beacon service!

From Gloucester comes a log from **Bill Williams** who uses an FRG-7700 with matching FRT-7700 antenna tuning unit, fed from a 20m-long wire. Starting with 7MHz he logged JY9YR and YC2BOG, on to 14MHz and IK8CWB/IC8 on Capri for the island chasers, JY9VQ, S4MWA and VK2RH, VQ9CK and ZS1AAQ appeared on 21MHz.

The set-up in New Malden, Surrey, for **Robert Parsey** comprises an FRG-7700 with home-brew a.t.u. and 60m-long wire at 5m high. This long antenna did a good job on Top Band with SV8CS and T77V (QSL POB 101, San Marino) not to mention around 3·8MHz with D44BS, EL2AK, FM5WD, HH7PV, JY9CL, KK9A/PJ7, TG9VT, TR8JLP, ZS3GB, 3A2HB, 3C1BC (QSLs to K4PHE), 5N8AFE and 6Y5NR. Sounds more like a good log for 14MHz rather than 3·5MHz! I know Robert also has a very good earth system which no doubt contributes to his success on the l.f. bands.

Pretty rare these days, c.w. logs are always most welcome, so the one from **Dick Stanbridge** BRS31879, his first for the column, was appreciated. In Leiston, Suffolk, Dick runs a Trio R-2000 and AT-1000 a.t.u. plus a Datong active antenna at 6m up. On 1·8MHz s.s.b. it was EA8AFS, with RA6AEG and UT5BN on c.w. Around 3·8MHz on s.s.b. the log showed J88AQ, JP3XAF, and K8CV/VP2E. Up to 7MHz and C31LCB on s.s.b. and 5Z4MX on c.w. Brief encounter on the seldom-mentioned 10MHz band was VK2PA on 10·101MHz c.w. Dick was delighted with NL7AX in Fairbanks, Alaska, on 14MHz s.s.b. plus a rare one in VK8HA on c.w. On 21MHz it was just EL7L on s.s.b. and Z21FN on c.w.

Dave Richardson residing in Oadby, near Leicester, comments on LZ1KDP who has a rotary (?) beam for the 3·5MHz band with longest element over 40m long and a boom some 70m long! The LZ seems to have been chasing another LZ who is the op on board a ship down off the Falklands from whom he had not heard for some time. Dave has a 70m-long wire feeding an FRG-7 receiver and between 3·775 and 3·8MHz heard, on s.s.b., C31LD, FG/KK9A/FS with cards to KK9A, HH2MC, HIOB (QSL HI8IH), J37AH (QSL W2GHK), J88AQ (QSL W2MIG), KP4EZ, TI5EWL, YV5CVE, 5V8WS, 7X2LS and KG4W. Only one of interest on 21MHz was 3C1YL.

Logs of the better DX heard on the bands are most welcome and should reach me by the 15th of the month. A reminder that a specimen log sheet is available from me in return for an s.a.e. A dozen of your best catches each month will do fine. See copy deadlines at the end of Club News. Photographs of station set-ups and similar items of interest are also wanted.

MW BROADCAST BAND DX

by Charles Molloy G8BUS

"After 50 years of very amateur DXing on m.w. and s.w. bands I thought I would tidy up some papers," says a letter from a reader in Macclesfield who unfortunately forgot to sign his name. He photocopied some extracts from the pre-war *World Radio*, sister journal of the *Radio Times* which covered broadcasting from abroad but ceased publication in 1939 at the outbreak of the last war.

An article by Mander Barnett called *America on the Medium Waves* from the issue of 11 February 1938 reviewed transatlantic reception during the previous winter and then, under the heading Sensitivity before Selectivity, reported "Between the hours of midnight and early morning the really enthusiastic long-distance listener achieved the best results and generally the most important (feature) as far as the receiver is concerned is sensitivity, a very high degree of selectivity being unnecessary as probably none of the signals will be particularly loud and the locals will be off the air".

That was in 1938. Today the heading could well be Selectivity before Sensitivity. Modern receivers are probably more sensitive anyway but locals certainly do not go off the air at night and the band is full of high-power stations all the time, though it does ease off a bit after 2300. More important than a good receiver is knowing when to listen. There are occasions when QRM is light, so we have to have a look at medium wave propagation to find out when they occur.

Transatlantic DX in Summer

During the day propagation is by the ground wave which does not travel very far. After dark we receive the sky wave which will only propagate between two locations if the path between them is in darkness. In summer, at our location at the western extremity of Europe, this happens for an hour or so between sunset on the east coast of North America and our sunrise in the UK. So provided the path is open, we should be able to pick up m.w. stations situated along the eastern seaboard of Canada and the United States, for an hour before dawn, even on the longest day (shortest night).

Now look to the east. One hour before sunrise in the UK should find the whole of central and eastern Europe and the Middle East in daylight, so no QRM from those areas. From my location in NW England even western Europeans fade out as dawn approaches, while signals still come in from the west and continue to do so for perhaps 20 minutes after daybreak. For a short period we are back to 1938—little or no QRM! The farther west you are the greater the effect, anyone DXing on the west coast of Ireland should do very well.

What can we expect to hear? Last year, from a small boat moored on Lake Windermere I picked up CJYQ St John's on 930, CBNA St Anthony on 600, CKYQ Grand Bank 610, CBN St John's 640, CKVO Clarenville 710, CBGY Bonavista 750, all in Newfoundland, WMRE Boston 1510, WCAU Philadelphia 1210 and WQXR New York City 1560. I would probably have done better at home with my one metre-square loop antenna.

The receiver was a Realistic DX150A run from a car battery. The antenna, three metres of wire run round the cabin and a Cambridge Kits antenna tuner to match antenna to receiver. I like this particular a.t.u. as it is effective with a short antenna at low frequencies. I hope to be at it again this summer on a different boat with a 7 metre metal mast, which ought to make a good vertical antenna.

A Car Radio for DXing

"I was wondering whether a car radio is good enough for DXing on m.w. with a loop. If this can be used, how would I connect a loop to it and how would I make a loop antenna?" asks **Thomas Murray** of Clydebank in Scotland. The receiver our reader uses has its own internal antenna for m.w. and consequently cannot be used with the DXers loop.

Yes, a car radio should make an excellent receiver for medium wave DXing and you may even be able to get hold of a secondhand one with digital readout. Such a set has to work under adverse conditions of electrical noise and reception in areas of poor reception using a small antenna, so one would expect better performance than from a portable receiver.

The car radio in its metal case will be well screened and as it doesn't have an internal antenna there should be no problems using a loop with it. Just plug the loop into the set in place of the car antenna. Constructional details and other information about the DXers loop antenna will be found in my article in the *PW* publication *Out of Thin Air*.

Panasonic RF3100

"As the owner of an RF3100 I was interested to read the note on page 73 of the August *PW* regarding the use of an a.t.u. attached to the rod antenna, to improve reception. I was surprised to read that he (Ron Wyres) got any reception at all and can only surmise that the a.t.u. was acting as an attenuator on the end of a long wire," writes **Ted Kimber** who lives in Taunton.

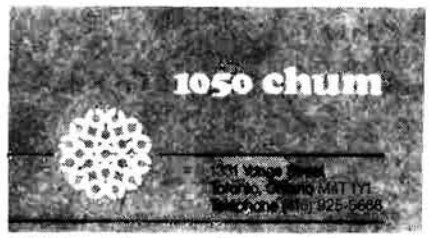
Our reader goes on to say that, "The RF3100 has three antenna inputs and an earth terminal at the rear. The right-hand and centre inputs are for a low impedance source, either the output of an a.t.u. or a dipole. The left-hand and centre inputs are for a v.h.f. dipole. The switch on the back panel also has to be in the appropriate position, left or right. I am sure Ron Wyre will get better results if he attaches the output of his a.t.u. to the centre and right-hand terminals. I bought a Cambridge Kits a.t.u. kit and made up the unit which is in a screened aluminium case. This gives excellent results." Many thanks for the tip Ted, and I agree with your assessment of the Cam-

bridge Kits a.t.u. Mine really peaks up the daytime local radio DX.

Daytime DXing

Ground-wave DXing during the hours of daylight may be new to some readers. DXers who are interested in local radio will know that there can be excellent DX from low-power locals in the UK during the day, the main obstacles being weak signals and electrical noise. My personal preference for this type of DXing is a random wire antenna rather than a loop. I have constructed a small "Shack" at the end of the garage farthest from the house. The antenna is about 10 metres long and runs from the garage to a mast at the bottom of the garden. The antenna is joined to a Cambridge Kits a.t.u. and then to a Realistic DX150A communications receiver, these two items also being my "mobile" rig. The receiver is run from a car battery or the mains as required and there is a good earth consisting of a Tandy earth rod, driven into the ground right outside the shack. It does on occasion make a difference to run the set from the car battery as the mains can be a prolific carrier of noise.

Reader **Martin Scholes** of Telford in Shropshire is a fellow daytime DXer who sent me a list of 98 medium wave stations picked up during the daytime using a Sony 2001 receiver and a 40 metre-long wire antenna. Yes, 40 metres! This would make a disastrous combination after dark with overloading, spurios, etc., guaranteed. During the day when the band is quiet you may get away with it.

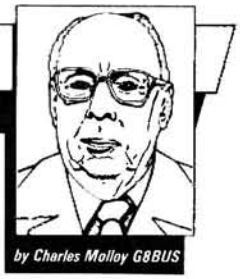


CHUM (Toronto, ON) on 1050kHz

From this part of the country it is not normal to hear continental radio during the day but the highlights from Martin's catches show what can be done. Switzerland was heard on 531kHz and 765kHz, DDR (East Germany) on 783, 882, 1044, France on 792 Limoges, Toulouse on 945, Bordeaux on 1206, Stavanger in Norway on 1314. On the local radio front, Radio 4 in Newcastle on Tyne was heard on 603kHz and at Lisnagarvey in Ulster on 720kHz, Radio York on 774 with QRM from Sottens, Radio Leicester 837kHz, Beacon Radio 990, Radio Cambridge 1026, Radio Derby 1116, Birmingham/Manchester/unidentified on 1152, Viking Radio Hull 1161, Radio Orwell 1251, Manx Radio 1368, Essex Radio 1431, Pennine Radio (under Wyvern) on 1530. Martin concludes with "I have in general been quite pleased with the 2001 although I do feel that battery consumption could have been better—I would rather have a variable r.f. gain control than one of these silly DX/LOCAL switches the 2001 has!"

The last word is from **Graham Powel** (Pontypridd) who reports "two new and interesting loggings both heard with positive identification using my Grundig Satellit 1400SL with internal antenna." These were WHN in New York City at 0100 on 1050kHz and CBGY in Bonavista Bay in Newfoundland, part of the CBC English network, at 0124 on 750kHz. These loggings were in March; listen a couple of hours later to hear them at this time of the year.

SW BROADCAST BANDS



by Charles Molloy G8BUS

"I was interested to read your comments about the Sony ICF-7600D as a portable communications receiver", writes **T. Stuart McCabe** from Skeabost in the Isle of Skye. He goes on to say "When I bought mine I rigged a single wire between the chimney stacks (about 5 metres) and led it into my lounge—it was some two weeks later I bent to disconnect the outside antenna, it had not been connected!" Our reader then set about comparing reception with and without the outdoor antenna and he concluded "now I can sit in my cottage with one metre walls and enjoy the set (on its own) without a really noticeable drop in performance."

Antennas and Portables

The modern portable really is a very sensitive receiver and there is no need to provide an additional antenna for normal short wave listening. Why then is there a socket for an additional antenna on some of these sets? Well, if you want to operate inside a motor vehicle or a caravan, where it would be screened, then an additional whip (car antenna), fitted on the roof of the caravan, should overcome the problem. Similarly, if you live in a steel-framed building you might improve reception by operating the receiver close to a window and fitting an additional whip on the outside window ledge.

The main problem the s.w.l. will face is electrical noise. Modern living means that we live in a haze of electrical noise. The TV is the worst offender followed by light dimmers, motors, etc. The mains wiring acts as a very good radiator or noise-transmitting antenna. What can we do then? A short outdoor antenna may improve reception. Try using the TV antenna, connecting to the "inner" at the coaxial plug and earthing the outer screen if you can.

If you are a DXer and use a communications receiver like the FRG-7700 then of course you will need an external antenna for normal reception. This type of receiver must have an additional antenna to operate satisfactorily and there is little point buying this type of set if you are unable to provide one.

My Shack

For the benefit of the uninitiated, it has long been the practice for radio enthusiasts to describe their "listening post" as a shack. It may be the spare room, a shed in the garden, a den in the roof space or a corner of the living room but it is theirs and is devoted to the hobby. Reader **Thomas Blamey** of Tonyrefail, Mid. Glamorgan, reports "My radio shack in the garden has been out of order because the electricity supply has not been working—I have had to set up indoors without an earth connection and with only a 5 metre indoor antenna which was supplied with the R600 (communications receiver)." Thomas says he was amazed with the good results. "I

Thomas Blamey, Tonyrefail, Mid. Glamorgan, in his shack

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Access

picked up Radio Japan on 21·695MHz at 1532, Radio Afghanistan on 7·590 at 1900, Radio RSA on 11·900 at 2100. I would not have thought you could pick up broadcast stations like these with such a puny indoor antenna."

DXers do not normally have the chance to meet, to inspect each other's gear and to swap ideas. If you have a photo of yourself and your gear then it might be of interest to others who may pick up some ideas from it. Many thanks Tom for your letter and photograph.

Mystery Station

"With reference to the mention of the Voice of America transmitting sites in *PW* March 1985, you might be interested to know that in 1955 I heard on my domestic receiver some continuous light music—eventually a VOA announcer. I had not heard of station KK2XEZ so I sent off a report—I was suprised to receive a QSL card with the correct frequency given, together with a location of Dallas, Texas. I had never seen this location before, if you know anything maybe you could let me know." writes **Dave Fairhurst** who lives at Enfield.

At first sight it seemed that our reader had been listening to a feeder station, used to get the programme to the transmitting station, though the frequency of 17·840 inside the 16m broadcast band seemed to rule against it. Digging into the "archives" produced a copy of *Guide to Broadcasting Stations 1956–57* which showed 17·840 as VOA (Voice of America) in Munich, West Germany. Dallas was not listed as a VOA site.

Does anyone know anything about KK2XEZ? Perhaps it was a feeder after all, but these are invariably commercial links operating outside the broadcast bands. The current trend is to replace feeders with satellite links but there are still quite a few feeders left, usually operating in s.s.b. mode.

On the Bands

"I am over 80 years of age." writes reader **A. H. C. Trickey** of Bristol who has been an s.w.l. since he obtained a Vega 206 portable last June. A selection from a comprehensive and useful log shows what can be done with this receiver, using its whip antenna. On 75 metres Swiss Radio was picked up on 3·985MHz at 1545; on 60m Senegal on 4·890 at 0001; the 49m band produced Radio Australia on 6·035 at 2030, Vatican Radio on 6·252 at 1445; on 41m Israel was heard on 7·410 at 0015; 31m turned up Radio Australia on 9·580 at 1515, India on 9·660 at 1530, Bagdad 9·610 at 2135, Turkey on 9·610 at 2315, Afghanistan on 9·665 at 2030, Pakistan 9·865 at 1545. From the 25m band Beijing on 11·600 at 1330, Kuwait 11·675 at 2030, Habana, Cuba, 11·850 at 2115, Radio RSA 11·900 at 2100; the 19m band Brazil 15·280 at 1800, Quito, Ecuador, 15·295 at 1950, Canada 15·325, Buenos Aires 15·345 at 1945; 16m Pakistan 17·660 at 1115, India 17·855; 13m Dubai 21·655 at 1045 and 21·695 at 1030. Shows what can be done with simple and inexpensive gear.

Reader **Paul Price** (Merthyr Tydfil) reports hearing Radio Damascus on 17·510 at 1200 and again on 11·865 at 2000, Radio Japan (Gabon relay) on 21·695 at 1500, the VOA in s.s.b. on 5·750 at 0100 (feeder), HCJB the Voice of the Andes on 17·790 and 15·295 at 1900, WFYR Family Radio USA on 15·215 and 15·365 at 1800, Voice of the Islamic Republic of Iran on 9·022 at 1930, Radio Sofia 9·700 at midnight.

"In the last few days between 3·650 and 3·850 I have listened to the following" reports T. Stuart McCabe, who enclosed a long list of groups of 5 letters and figures mixed, which were read out over the air. These numbers stations have been on the air for years in English and German. No-one knows what they are except that they are not broadcasting stations.

European DX Council

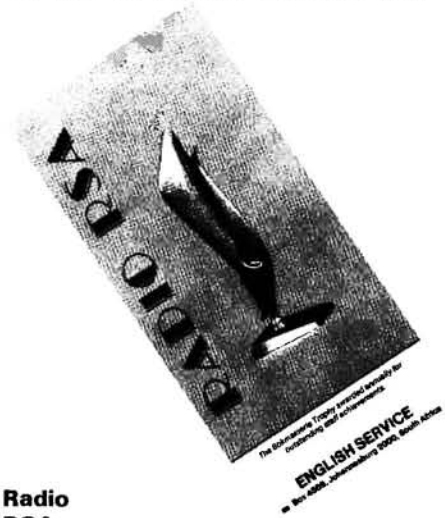
Secretary General Michael Murray has sent me a copy of the 1985 *EDXC Publications List,* which will be of interest to readers. The club-list, which is compiled annually each Spring, contains comprehensive information about all EDXC full and observer clubs together with details about publications, specialisation and membership criteria. Should be useful to anyone contemplating joining a DX club. The list costs 50p for the UK and 2 IRCs to Europe, 3 IRCs elsewhere.

The *QSL Survey* second edition examines the role of QSLs in the 1980s, looking at how they are regarded by international broadcasters. "Find out how reports are used by broadcasters and engineers and what is required by reporters." Price as for club list.

Receiver Files: The EDXC has compiled a number of data files about several popular receivers. Each file consists of a manufacturer's brochure and a summary of user comments from around the world. Files are currently available for the Drake SPR4, Realistic DX160. Trio R1000, and the Yaesu FRG-7 and FRG-7000, and cost 75p each or 3 IRCs worldwide.

Reporting Guide. The second totally revised edition, with reception reporting information and samples in English, French, German and other important DX languages. A DX vocabulary is included with essential details of what should be incorporated in reception reports. "An ideal companion to the *QSL Survey* at £1 (UK) or 4 IRCs (Europe) and £1.50 or 6 IRCs worldwide."

The EDXC, for the benefit of the newcomer, is an umbrella organisation for DX clubs in Europe. It organises the annual EDXC conference, which is in Madrid in May 1985, and it publishes its journal *Euro DX,* ten times a year.



Radio RSA

Radio Netherland

Radio Havana Cuba

VHF BANDS

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

by Ron Ham BRS15744

Throughout the world, radio enthusiasts, whether they are licensed amateurs, broadcast or short-wave listeners or CB addicts, have devised their own way of looking for long-distance stations. Some tune through their favourite band at a set time each day, while others rely on the strength of a particular signal or a beacon. Whatever method is employed, it certainly works, because even in these quiet times when extra patience is required to find the DX, there is a fair bit to write about. Do remember, however small your reports are they are both necessary and welcome to help explain some of the mysteries of radio wave propagation.

Solar

Although the sun is still very quiet, **Cmdr Henry Hatfield**, Sevenoaks, using his spectrohelioscope, located one medium-sized sunspot on February 24, as did **Patrick Moore**, Selsey, who, despite misty conditions, made a drawing of its position on the sun's disc, Fig. 2. "As a single sunspot traversed the disc, a violent transient aurora was detected on the night of February 27/28 by Douglas Scott at Tain, the Meteorological office at the civil airport at Wick and at Cape Wrath lighthouse", writes **Ron Livesey**, Glasgow, auroral co-ordinator of the British Astronomical Association. Douglas told him that the aurora was strong and that rainbow colours appeared at the base of the auroral forms, which, said Ron, "implies that the particle stream was strong and had penetrated deeply into our atmosphere". I recorded several small bursts of solar radio noise between February 24 and 28, and Ron's magnetometer displayed strong activity late on the 27th. Wick reported auroral glows on the nights of 24/25 and 25/26 and **Dr Alastair Simmons** saw and reported on some 19 events between February 6 and 26. "Alastair spent some time during February at the Tromso Auroral Observatory, with night-time temperatures below −30°C and was rewarded with magnificent vision of the full polar aurora", said Ron, who also told me that the Boulder observatory reported a disturbed magnetic field on February 14 and an active field on days 20 and 24.

"How do you know when the sun is active?" asked a friend one day when we were discussing astronomy, "Well, you listen to the background noise of a sensitive v.h.f. receiver", I replied. It sounds easy but honestly readers, if you have a 144MHz band receiving system, that can be tuned to a frequency clear of terrestrial signals, and a rotatable long Yagi antenna, then you can do just that. First, switch your receiver to a.m. and carefully note the background noise level with the antenna facing away from the sun. Then repeat the experiment with your beam pointing toward the rising or the setting sun. If your beam can be elevated then the tests are not limited to these times. When there is a marked increase in the receiver noise, especially if it sounds like the waves on the sea shore, then you know the sun is emitting radio waves, caused by one of the many solar events that are usually associated with sunspots. It is possible that an aurora could follow such solar activity so it is worthwhile turning your antenna due north from time to time over the next 24 hours and tuning around 144MHz for c.w. or s.s.b. signals being reflected from the aurora. Such signals will sound strange; c.w. like a roar instead of a clean tone and s.s.b. like a distant ghostly whipser. If you are really keen and don't mind the expense, then a pen recorder can be added to your system, but remember, be patient because you will not get results every day, especially during this low sunspot period.

28MHz Band

"Despite daily checks on 28MHz, I only logged a couple of ZS6's and that was on February 17", writes **Bill Kelly**, Belfast who adds, "Strange, although the path open seemed to be just to South Africa, the Bulawayo beacon didn't appear". Reference to our beacon chart, Fig. 1, will show that the 17th was a relatively good day on the 28MHz band with further proof from **Dave Coggins,** Knutsford and **Fred Pallant** G3RNM, Storrington, who both heard 5B4BS around the same time in the morning. Fred also heard ZS6ATB at 1350 on the 20th.

"As my main h.f. interest is in the 28MHz band, I am maintaining this, until the DX reappears, by operating on 10m f.m., with a modified CB transceiver, 25W amplifier and half-wave, end-fed vertical antenna", writes **Norman Hyde** G2AIH, Epsom, who, since last December, has heard over 180 stations by this mode and worked about 30, ranging from Brighton to Northampton and as far west as Exeter. He also logged an EA5 on March 5.

Propagation Beacons

My daily checks on the signal from the RSGB beacon at Wrotham, GB3VHF 144·925MHz, between February 15 and March 14, showed it consistent at 539, except for peaks to 559 and 589 at various times on February 16, 24, 25, 26 and 27 and March 7 and 8, which were obviously indicating improved band conditions as the prevailing high pressure systems began to move. **Chris van den Berg,** The Hague, received the Wrotham signals on 8 days between February 20 and March 10 and logged the Belgian beacon, ON4VHF 144·985MHz, on February 16, 23, 24 and 26 and March 9 and 10.

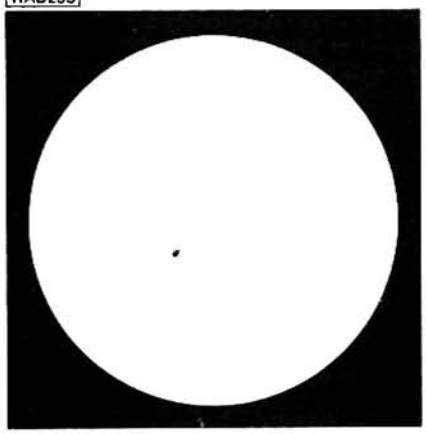
"I think that 28MHz is almost at rock bottom now", writes Dave Coggins, who only logged the Cyprus and South African beacons, 5B4CY and ZS6PW on February 17. "One lonely beacon heard in February", writes Bill Kelly, having logged ZS6PW on the 17th. "Nothing at all heard between February 11 and March 10 inclusive", says Henry Hatfield. "The sudden appearance of ZS1CTB at 1500 on March 10 lightened the gloom" writes **Ted Owen**, Maldon. "Nothing to report this month in the way of 28MHz beacons", says **John Coulter**, Winchester, however he did log signals from the 14MHz band beacons CT3B, OH2B, ZS6DN/B, 4U1UN/B and 4X6TU/B around 14·100MHz, almost daily between February 15 and March 12. "As we approach the trough between sunspot cycles 21 and 22, 28MHz beacon signals are few and far between", writes Norman Hyde, whose log along with those of Chris van den Berg, Dave Coggins, Bill Kelly, Ted Owen and **Geoff Arnold** G3GSR, Wimborne, provided the information for the monthly beacon chart, Fig. 1. Chris also heard the "glut" of beacons on the 17th and then did better than us, he logged Z21ANB on all the days indicated in Fig. 2. My log for the period is also empty despite frequent daily checks.

Tropospheric

Apart from the first few days of March, when the atmospheric pressure, measured at my QTH, was just below 29·9in (1012mb), the indicator on my barograph spent the rest of the period, February 15 to March 14, hovering between 30·0 and 30·6, Fig. 3. Although this was good news for the v.h.f. fraternity, I do think that band conditions should have been a lot better than they were, despite the fact that mild openings did occur for short periods on February 18, 23, 24 and periodically between March 5 and 10. The atmospheric pressure recorded by Ted Owen in Maldon was similar to mine, with extremes of 1006 and 1040mb on March 4 and 9 respectively.

During the afternoon of the 23rd, I heard GW stations working through a repeater, possibly GB3VA, Aylesbury, on R4 and at 0150 on the 24th, I received very strong signals from the Dublin repeater EI1DK R0 and logged EI2FX, EI5EM, EI9FR and GW1EWX while they were using it. Later in the day I heard G6XPY/P, Nr Buxton in QSO through one of the repeaters on R5. During lift conditions, when the range of most v.h.f. repeaters is extended, it is not easy to positively identify which one of them a signal is coming from as was the case at 0200 on March 10 when I heard G8YCK/M in Derby on R0 and GW1MIQ/M on R3. In addition to RTTY, **Fred** and **Jenny Southwell**, Henfield, are active on both 144 and 430MHz with elevatable 9 and 19-element Tonna arrays respectively and a list of equipment which includes an FT–101ZD, FTV–901, FC–902 a.t.u., FV–901 external v.f.o., BNOS linear amplifier and a custom special Trio JR599 for the downlink signals from the OSCAR and

WAD299



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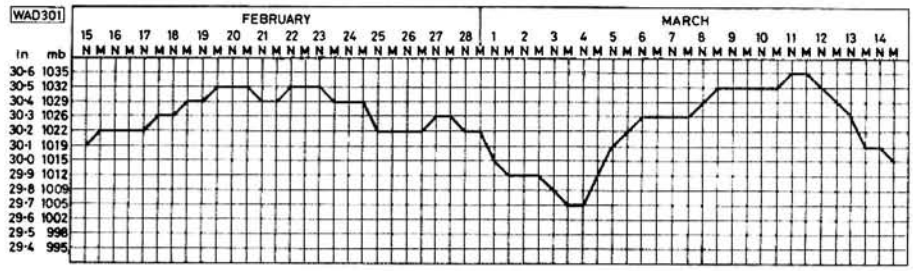

Fig. 1

Fig. 2

WAD300

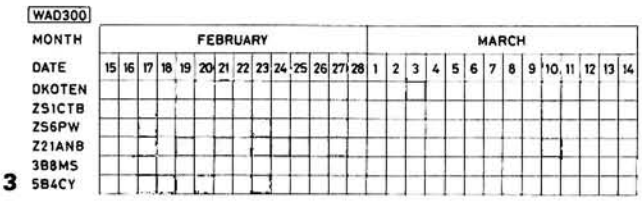

Fig. 3

RS satellites. During the 5 months prior to February, Fred had worked over 30 countries via OSCAR 10 including Australia, Israel and Japan. He uses a ZX Spectrum computer for many of his amateur radio tasks. While making a temporary move in Germany, **Allan Sancto** DD5FM, took his FT–290 along and reports, "I was amazed and very pleased to hear a lot of English chaps on the 144MHz band including a YL DL/G4ZVG"

Band II

"Since obtaining a Grundig Sattelit 1400 receiver, I have heard a lot of new DX", writes **Dave Mayhew**, Yapton, who, during the past few months has increased his score to 10 countries, including Italy, Portugal and Spain, with a good selection of local radio stations in England and Wales. With the atmospheric pressure predominantly high between February 15 and March 14, signal propagation in Band II seemed to be erratic with just a few positive openings. In Wales, on February 24 **Simon Hamer** received signals from BBC Radios Kent, Norfolk and Solent, from ILR Radio Broadlands and from TDF Culture in Brest. On March 8, he listened to a Rugby match from BBC Radio Humberside and air tests from BBC Radio Shropshire. during the evening of the 9th, Simon heard BBC Radio 4 from Les Platons in the Channel Islands, ILR Saxon Radio, and RTE 2 from the Irish Republic.

Harold Brodribb, St. Leonards on Sea, received signals from France Culture, Frequence Nord and Musique on many spots in the band on several days between February 18 and 27 and March 6 and 10. He also logged signals from Belgium, Egem, on February 18 and March 9 and enclosed with his report the weather maps from his daily newspaper, pointing out the comparison between the movements of the high pressure systems and the DX in Band II. At 0205 on February 24 there was a variety of French stations between 94 and 100MHz and by 0900 the band was alive with interstation "warbles" and continental programmes. During the afternoon of March 5, I heard French stations around 100MHz while using the v.h.f. radio section of my Plustron TVR5D and its own telescopic antenna, portable in Ashdown Forest. I found similar conditions again while portable on the Sussex Downs at 1400 on the 8th and I logged French stations and "warbles" from the home QTH at 0045 on the 7th, 1550 on the 9th and around 0200 on days 10 and 11.

Up in Stamford, **Philip Hodgson**, using a Grundig Yacht Boy 300 receiver, with its own telescopic antenna, had a good haul of DX when, on February 23/24 he logged BBC Radios Humberside, Kent, Leicester, London, Norfolk, Sheffield and Sussex, ILR Broadlands, Chiltern, Invicta, LBC, Leicester Sound, Orwell, Saxon and Viking. from Belgium, RTBF and BRT II and from Holland, Hilversum III.

TELEVISION

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

by Ron Ham BRS15744

Television, the world over, is about people in front of a camera, communicating with more people watching a relatively small screen in the comfort of their homes. Briefly, the master planners of the international television services require that station A should serve the viewers in area B and so on, but very often natural disturbances occur within the earth's atmosphere that upset these plans and cause the signal from station A to increase its range tenfold and present itself as an interfering and unwanted signal in other areas besides B. It is then that television DXers around the world observe such events and many of them keep their records, either on videotape or by direct off-screen photography. People appear on television as announcers, entertainers and programme presenters and a few of these can be seen in Figs. 1, 2 and 3 from stations in Germany, Figs. 4 and 5 from unidentified stations and Fig. 6 from the USSR. These pictures come from the archives of **Steve Green,** Malvern, and an unnamed reader, and from my own files. The pictures about people from a Russian station, Figs. 7 and 8, were received by **Major Rana Roy** in India during a sporadic-E disturbance last July.

Band I

Although Band I was relatively quiet between February 13 and March 14, **Simon Hamer,** New Radnor, did receive pictures from Germany ARD Grunten on Ch. E2 48·25MHz on February 14, an old 1956 type test card from Czechoslovakia on Ch. R2 59·25MHz on the 18th, Spanish RTVE 1 and Swedish TV1 Sverige test cards on Ch. E3 55·25MHz on the 19th. Czechoslovakia appeared again with their RS-KH card on Ch. R1 49·75MHz on the 26th, and cards from Sweden and Norway NRK on Ch. E2 on March 3. Sweden appeared again on E2 on the 5th.

Tropospheric

During the evening of January 26, one of our Indian readers, **Krishna Sampath,** Kodaikanal, using a 13-element Yagi and pre-amplifier to feed his Band III receiver, logged pictures from Rangoon on Ch. 7 including Burmese singers, Figs. 9 and 10, a news reader, Fig. 11, and a programme announcement, Fig. 12. "It blanked out our local 1kW transmitter!" said Krishna, who also received pictures from Bangladesh on Chs. 5 and 12 on the 27th. For about half an hour after 2240 on the 28th, following the close-down of a station in Sri Lanka using the same channel, he again received signals from Bangladesh on Ch. 5. "The weather in Kodaikanal, 2250m a.s.l., was sunny days and cold nights, with temperatures averaging from 20 to 9°C" writes Krishna.

On March 10, **George Garden,** climbed to one of Edinburgh's highest points, Arthur's Seat, with a strong bag containing his JVC CX610GB receiver. After reaching this old volcanically formed rock, some 250m a.s.l., he was amply rewarded with plenty of u.h.f. signals to choose from. "The barometer was rising all day and when I returned home it was up to 1046mb", said George who, from the rock, had watched a

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Fig. 1


Fig. 2


Fig. 3


Fig. 4


Fig. 5


Fig. 6


Fig. 7


Fig. 8


Fig. 9


Fig. 10


Fig. 11

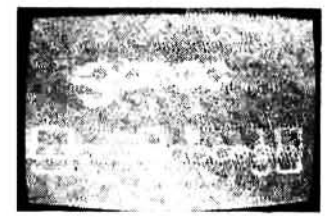


Fig. 12

football match from the Border TV Selkirk transmitter on Ch. 59. Next time George plans to add a v.h.f. broadcast receiver to his pack.

With the atmospheric pressure predominantly high during this reporting period, I kept a close but disappointed watch on Bands III, IV and V and had to be satisfied with negative pictures from France, Canal Plus, around Ch. E5 on February 18 and 24 and March 9 and 10, and test cards from Belgium and Holland in Band III on February 24 and March 8, 9 and 10. Simon Hamer, also received TDF Canal Plus in Wales, during the evening of the 9th.

"I was forewarned, as usual, by the signals from Sandy Heath Ch. 27 getting stronger", writes **Philip Hodgson,** Stamford, who observed the opening on the 23rd and 24th with his Plustron TVRC5D. Early in the event the pictures from Sandy Heath suffered interference from a Dutch station on the same channel and Philip was soon receiving u.h.f. pictures from LWT on Ch. 23 and Tyne Tees on Ch. 29. He also received pictures from Canal Plus, Belgium BRT I and II, and the captions Nederland 2 and Teleac and a programme about bicycles from Holland. In St. Leonards-on-Sea, **Harold Brodribb** received pictures from Canal Plus almost daily from February 14 to 26 and from March 4 to 8. On the 24th, he noted interfence on 12 of the u.h.f. channels between 34 and 65. The following day he received pictures from the London transmitters of IBA Channel 4 and BBC2 on Chs. 30 and 33 respectively and during the 26th he logged the test card, "FR3 es Specialise" with the word Margo on a flashing insert. Harold also identified the French stations Antenne 2, FR3 and TF1 on several u.h.f. channels which he thinks came from transmitters at Abbeville, Boulogne, Le Havre, Neufchatel and Rouen. On March 6 he received these French signals again, but this time with a set-top antenna.

SSTV

"SSTV frequencies have been quite active at weekends through January and February, with propagation bringing signals from Scandinavia in the mornings and mid-Europe and Italy during the afternoons and dropping out around 1630," writes **Lester Curno,** Bude. He continues, "I have found that when QSB allows, I get excellent pictures from a lot of European countries, mainly Finland, Germany and Italy." Lester uses an FRG-7 in conjunction with the Scarab/Spectrum combination for SSTV reception, and has copied very clear pictures from OE5APW, OH6ZS and SM3GOM. To date, Lester has logged stations from 15 countries using SSTV, mostly on 14·230MHz, and comments, "I have seen many pictures, but some of the best are the cartoon characters like Donald Duck and Mickey Mouse with "PSE K", "BYE, BYE", or "HAVE A NICE DAY" scribed alongside".

"Things have been rather quiet, at least at my QTH", writes **Allan Sancto** DD5FM, Bad Aibling, and adds, "I would appreciate a post-card from anyone interested in setting up a one-way sked from the UK, preferably on Sunday mornings on 3·740, 7·040 or 14·230MHz, whichever band happens to be favourite.

Despite what seemed to be an increase in the level of QRM and QSB, I received SSTV pictures around 14·230MHz from DL6AF, the caption, "CQ SSTV" from a station in Lisbon, "TRIO 599 ROBOT" and "QRM" and an image that looked like a target, between 1000 and 1200 on February 16. I copied pictures of people and the caption "QTH PADOVA" from I3XQW at 1100 on the 17th, an unidentified face at 1147 on the 23rd and the captions "QTH", "QSL", "OK", "73", "KK", "CIAO" and "ROBOT" and a partial caption from an ISO around the same time on the 24th. At 0915 on March 9, through strong QRM I saw "AO7" appear on 7MHz and during the afternoon the captions, "VERY 73 PLEASE YOUR QSL", "TEST QRT", "QTH CAPRI" and the callsign IC8POF, was seen fighting for predominance with s.s.b. signals and slowly varying QSB.

SPACE & SATELLITES

Reports to: Pat Gowen G3IOR, 17 Heath Crescent, Hellesdon, Norwich, Norfolk NR6 6XD.

by Pat Gowen G3IOR

Excellent DX contacts continue to be made via OSCAR-10, despite the fact that "tilts" of up to 60° of antenna off-beam pointing to earth when the satellite was near- and post-apogee (because of the need to point the solar panels into the sun to maintain battery charge) have produced a very poor link path over the past four months. New arrivals included YI1BGD in Iran, Bob, WA0NZI/HI8 in the Dominican Republic and the XF4 Revillagigedo DXpedition operated by AMSAT Co-ordinator Dave Liebermann XE1TU. DP0GVN is in Antarctica, Latitude 70°S Longitude 8°W, operated by DL5SL and DJ6TN, and QSLs go to DJ4SO. They will normally be found on a downlink frequency of 145·920MHz. Cyprus, in the form of 5B4LD, should soon be active, this now being a distinct Country from ZC4 for DXCC listings.

Chris van den Berg, NL-9165, was listening on a simple dipole, and despite the weak OSCAR-10 downlink, was copying many European and American stations. He intends to improve his antenna, as he finds s.s.b. rather poorer copy than c.w.

Now we have a much better time to look forward to, as this month the sun-angle dictates that the satellite will have its beam antennas pointing at us around apogee, and signals will be much stronger, with little spin-modulation noticeable. This good condition will stay with us throughout May, and most of June, but after the end of July we shall start to see many problems, with severe eclipses lasting from August 4 to September 1, a consequent reduction of transponder "on" time, bad antenna earth-pointing, and the satellite with its apogee going further into the southern hemisphere, meaning much less availability for stations in our northern hemisphere.

During May and early June, QSO capability will be equal and excellent to locations to our east and west alike, with a slight advantage to southern hemisphere stations. As we go into July, contacts with western stations, such as W's, will be severely disadvantaged, but those situated to our east will provide excellent contacts, especially in the southern hemisphere, so this will be the time to work VK, etc., social hours permitting.

Phase IIIC Plans

Three transponders are now being planned for the new satellite still officially set for launch on ARIANE IV in July 1986, although at least a three month lift-off delay is probable.

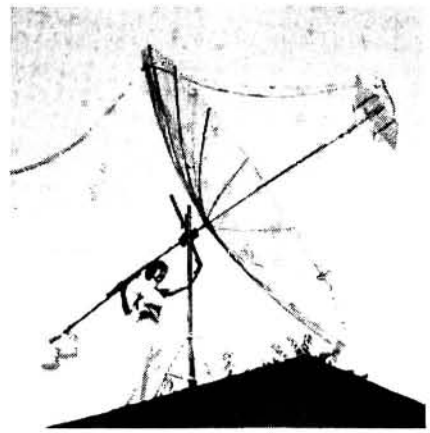
(1) A Mode "B" (435 to 145MHz) transponder with 180kHz bandwidth, fundamentally similar to OSCAR-10.

(2) A new Mode "JL" transponder with uplink from both a Mode "J" type 145 to 435MHz transponder combined with a 1269 to 435MHz. Mode "L" transponder using a 50 watt "HELAPS" amplifier to give a 50kHz passband.

(3) A combined 1269 and 435MHz uplink to give a 2·4GHz, 25kHz-wide, 2 watt downlink for single channel f.m., which will be easily heard with a 1·2m dish antenna and a 1dB n.f. pre-amplifier.

A Mode "L" packet-radio store-and-forward will also be flown, with a 2400 baud rate uplink and a 400 baud rate f.s.k. downlink. This may be made by the UOSAT team at the University of Surrey, as may the proposed AMSAT-VITA PACSAT due for a 1987 launch.

The kick-motor, flown with the satellite to provide a controllable means to take the satellite from the low perigee elliptical equatorial orbit to the higher inclination and perigee required to optimise communications, is now set to be a ground-commandable, spontaneous igniting, liquid fuel mix type similar to that used for the OSCAR-10 propulsion system.



Rooftop dish antenna used for OSCAR-10 used by Gunter Neugebauer VE7CLD

The antennas will be improved, as, even allowing for the "bent" arm of the existing OSCAR-10, they are not of optimum efficiency due to the size limitation of the satellite in terms of wavelengths at 144MHz.

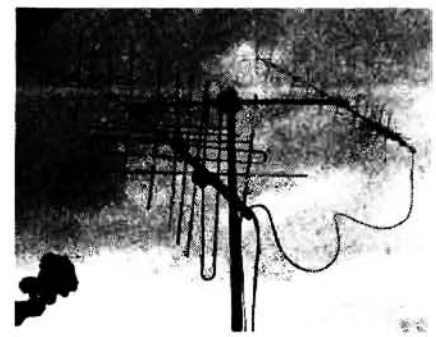
RS Current

As from February 21, the RADIO satellites entered into a new eclipse period, limiting the solar battery-charging power due to sections of each orbit falling into earth's shadow. A limited new schedule during the eclipse periods that recur about every three months will provide transponder operation of RS-5 each Monday and Friday, RS-7 on Tuesdays and Saturdays, and RS-8 Thursdays and Sundays, all times MSK. (UTC minus three hours until USSR Summer Time began on March 31, and then UTC minus four hours.) When the orbits are in continuous sunlight, the satellites will be on daily except for Wednesdays MSK.

Bill Kelly, in Belfast, has been regularly observing all of the transponder and ROBOT operations, the Wednesday orbital data, and has also been trying to decipher some of the telemetry from RS-1. Alas, despite the efforts of the new command in UC2, no meaningful values nor any transponder function have happened, as the voltage supplied seems insufficient to produce proper operation.

Chris van den Berg has also been looking closely at RS-1, and despite a variety of numeric variations from the original "5015" frame transmitted, no meaningful logic is found to be present. Chris is now studying RS-5 as the battery slowly fades in the ageing spacecraft.

On June 30 there will be a large international meeting of v.h.f. and u.h.f. amateurs in Lithuania, with activity from special UP2 stations using R2P callsigns on the satellites, e.m.e., and other related modes. From 0320 until 0820 on this day, there will run a contest activity period on RS-5 and RS-8 (RS-7 will be on codestore message demonstration) for the 3-orbit, 5-hour period. QSOs with the special prefixes, some fifteen in all, will give 5 points, whilst other contacts will give 1 point, with each station to be worked once only during the period of the contest. Logs should be sent to PO Box 88 in Moscow, with a power declaration (100W e.r.p. maximum) and the winners will receive awards and diplomas.



OSCAR-10 antennas at G3IORs QTH (13-el 16dBi G3HUL Yagi on 435MHz, 10XY J-Beam on 145MHz)

Development of the pair of new RADIO (RS) Satellites due for launch at the end of this year is proceeding well, and tests of the system transponders and ROBOTs, by using them as roof-top based repeaters in Moscow and Kaluga, showed that few problems existed other than a few minor technicalities. It is now hoped to obtain separate launches for the two spacecraft into a 2000km orbit, but contingency plans for a joint mission, even a coupled system, are also in vogue.

Frequency planning giving maximum compatibility with the current active spacecraft has evolved the following plan:

RS-9

Beacon Frequency:
29·402MHz.
Transponder Uplink:
145·860–145·900MHz, non-inverting.
Transponder Downlink:
29·360–29·400MHz, linear.
ROBOT Uplink:
145·820MHz c.w.
ROBOT Downlink:
29·320MHz.
Telemetry:
Basically as RS-3 to 8 series, with full parameters yet to be finalised.

RS-10

Mode A Beacons:
29·457 and 29·503MHz
Mode A Transponder Uplink:
145·960–146·000MHz, non-inverting.
Mode A Downlink:
29·460–29·500MHz, linear.
Mode K Transponder Uplink:
21·260–21·300MHz.
Mode K Downlink:
29·460–29·500MHz.
Mode K Beacons:
29·457 and 29·503MHz.
Beacon Power:
250mW or 1W commandable.
Mode K ROBOT Uplink:
21·140MHz.
Mode K ROBOT Downlink:
29·457 or 29·503MHz, commandable.
Telemetry:
Basic system as RS-3 to RS-8 series, with final parameters yet to be proven.

Note: These frequencies are not finalised, and some changes might yet be made immediately prior to launch.

Work is now commencing with the hope of having a new mode on RS-10, as yet undesignated. If time and planning permit, and full compatibility can be established, then RS-10 will also carry a further transponder with an uplink from 21·260–21·300MHz to give a 145·960–146·000MHz downlink, with the beacon associated with this new mode on 145·997MHz. This will bring a desirable link between h.f. and v.h.f. enthusiasts, as well as providing valuable propagational data.

Scientific Satellites

John Branegan GM4IHJ closely follows space exploration, and reports that the ISEE-3 satellite is now well on the way to intercept Comet Giacobini Zinner on September 11 this year, thus being the first probe to get a close look at a comet and measure important particle and radiation levels. (This will help to clarify plans for the GIOTTO rendezvous with Halley's Comet in 1986.) Two years ago ISEE-3 was quietly patrolling the Lagranian earth-sun gravity balance point one million miles sunward of earth. NASA used the unique position by dropping it back toward earth, sending it at high speed around the moon, picking up more speed on this "slingshot" trajectory repetition until after a final ultra-high speed dash, only 120km above the lunar surface, it left earth for ever to meet the comet. John points out that by a fortunate coincidence, severe magnetic storms occurred during the times when ISEE-3 was deep into earth's magnetotail, and hence valuable data leading to a greater understanding of our auroral v.h.f. DX amateur propagation was supplied as an unexpected bonus.

In return for postage and photocopying costs (say £1.00 UK) John offers a copy of two new papers to help enthusiasts' understanding of some of the complex satellite happenings that we do not have the space for in this column. One is devoted to a review of the OSCAR-10 antenna experiments, explaining the relationships between antenna pointing and the sun-angle of the satellite, and between spin-modulation and path variables. The second answers some of the many questions arising due to the relationships of the various satellite orbits and eclipses that cause so many problems. These are written with ease of understanding to the average satellite user in mind, and give a full and adequate explanation of both phenomena. Write to John Branegan GM4IHJ, 8 Whitehills, Saline, Fife, Scotland, with your request and interest.

Finally this month, the times for the GB0AUK (previously GB2RS) news broadcasts on the OSCAR-10 145·962MHz, H2 BC channel: May 12, 0600 UTC. May 19, 0200. May 26, 0830. June 2, 0600. June 16, 0800. June 23, 0130. July 7, 0530. July 14, 0030.

There will be no broadcasts on May 5, June 9, June 30, July 22 or July 28, but it is hoped that other radio societies such as DARC, VERON, etc., will soon use the facility. Also, look on the same frequency at the hour when the satellite is in mutual range with WA2LQQ, who regularly broadcasts valuable satellite and AMSAT information on Saturdays and Sundays.

RTTY

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


by Ron Ham BRS15744

Between January 27 and March 10, **Alan Taylor,** Coventry, copied RTTY stations from six countries around 7·036MHz on 40m, and 14 around 14·090MHz on 20m. Details from his log have been included in our monthly band analysis chart of countries heard, Fig. 1. Alan and I both found a predominance of German stations on 7MHz and, as usual, plenty of Italians on 14MHz.

Ken Easom writes from the RSA and says that he is using an FRG-7 receiver with a Tono Theta 550 terminal and Yaesu YVM-1 video monitor for RTTY. **Dominique Kremp,** Coutances, uses an Icom R70 and an AFR2000 decoder, and says about the latter, "A brand-new one from Polytronic in Switzerland. Splendid!".

Fred and **Jenny Southwell,** Henfield, G6ZRU and G1LIT, use a Spectrum computer with microdrives, G4IDE software and a Scarab terminal unit for their RTTY operations. Jenny made her first QSO the day after getting her licence, on RTTY with Steve Richards G4OAK, via his mailbox.

"Conditions on the bands were not as good as last year when 21MHz provided excellent VE/W contacts," writes **Richard Everitt** G4ZFE, on behalf of the Leicester Polytechnic Amateur Radio Society, G3SDC, about their efforts in the 1985 RTTY World Championships, organised by the American Magazines *73* and *RTTY Journal.* The club station ran 200W to a TET 5-element Tribander antenna using an AMT-1 terminal unit, and on 14MHz made QSOs with 27 of the United States of America, plus such interesting stations as LU3EZA, TG9VT, XO1AST and CG3IMT, both Canadian special prefixes, LU8ESU and PT2BW. During the event they also worked stations in Europe, Scandinavia and the USSR on the 3·5MHz band (80m), Europe and Scandinavia on 7MHz, and from Argentina to Israel and Scandinavia to Spain and the USSR on 14MHz. "21MHz appeared dead during the contest with only one station, HC1BW, being worked at 1600," said Richard.

Among the interesting signals that I copied was KC2TU/TF, using 200W from an IC730 and working for his DXCC while

Country	Prefix	Band (MHz) 3·5	7	14	21	Country	Prefix	Band (MHz) 3·5	7	14	21
Austria	OE			X		Ireland	EI/GI		X		
Balearic Is	EA6			X		Italy	I		X	X	
Belgium	ON			X		Japan	JA			X	
Canada	VE			X		Morocco	CN			X	
Canary Is	EA8			X	X	Norway	LA			X	
Ceuta & Melilla	EA9			X		Portugal	CT1			X	
Czechoslovakia	OK			X		Sardinia	IS0		X	X	
Denmark	OZ	X	X	X		Scotland	GM		X		
England	G	X	X	X		Sicily	IT9			X	
Finland	OH			X		Spain	EA		X	X	
France	F		X	X		Sweden	SM	X		X	
Germany	DJ, DK, DL, DF	X	X	X		Switzerland	HB9		X		
Greece	SV			X		USA	K, W1–9			X	
Holland	PA	X	X			USSR	UA, UB, UT			X	
Hungary	HA			X		Wales	GW	X			
Iceland	TF			X		Yugoslavia	YU			X	

Fig. 1: Monthly band analysis chart of countries heard

in Keflavik, Iceland. Around 1000 on March 13 he worked an OZ on RTTY and told a PA, "We have had winds in excess of 50 knots for 11 days, but thankfully the antennas have survived". I gather that he plans to be in Iceland for about another year and will no doubt make many more RTTY QSOs.

"For a number of years now, RTTY operators both licensed and s.w.l. have been able to pursue the chase for a large number of operating awards which are an indication of the ability to communicate," writes **Ted Double** G8CDW, in the Winter issue of the British Amateur Radio Teleprinter Group's journal *Datacom*. In his article, Ted points out that 'RTTY awards are available for a variety of achievements from amateur radio societies in Germany, Japan, the Netherlands, Scandinavia and the USA as well as BARTG and the Radio Society of Great Britain. Readers interested should send an s.a.e. to Ted at 89 Linden Gardens, Enfield, Middlesex. In addition to his activities on v.h.f. as a licensed amateur, Ted is a diligent RTTY listener on the h.f. bands. He holds the DXCC Award for an s.w.l. from the *RTTY Journal*, marked No. 1, the RSGB DX Listeners' Century Award, with 120 countries confirmed on RTTY, and endorsed "1st RTTY Award issued" and the WSRY award from the Scandinavian RTTY Society, SARTG, with Gold Rosette indicating that this is only the 14th Gold issued and was the first one issued to an s.w.l. anywhere in the world. Many sincere congratulations from us all, Ted, this should really give encouragement to our many readers who are getting started with new RTTY equipment.

Swap Spot

Have Icom multimode 144MHz transceiver in excellent condition, 5-el 144MHz beam, 35m H100 50Ω cable, v.h.f./u.h.f. wavemeter. Would exchange for good quality h.f. transceiver. Matthew Cornwall G4ZZB. Tel: 0895 54965 (Uxbridge). *W996*

Have Yaesu converter FRT-7700C, 140-170, still boxed. Would exchange for FRT-7700E 140-150, 150-160, 118-130. V. Wainwright. Tel: Maidstone 59916. *W997*

Have Yaesu FT-208R 144-148MHz transceiver with charger, NiCads etc. Excellent condition. Would exchange for FRG-7700 or good h.f. receiver. Tel: Medway 714404. *W981*

Have brand new Elmo 8mm movie camera super 108, cased with hand grip, fully automatic. Would exchange for any communications receiver or transceiver. Greg. 6 Hillbarn, Sanderstead, Surrey CR2 0RU. Tel: 01-651 5241. *W985*

Have 16/48K Spectrum programs (radio & games) and radio magazines (Spanish). Would exchange for recent radio magazines or Spectrum programs. Also exchange diagrams of antennas. Francisco EA5EVS, Box 859, 46080 Valencia, Spain. Send IRCs. *X007*

Have small lathe or radio control equipment. Would exchange for general coverage communications receiver. Tel: Diss 741702 (Norfolk) evenings. *X020*

Have ex-Navy Murphy 62B receiver 150-300kHz, 0·5-30MHz, u.s.b./l.s.b./c.w., working. Also have Burndept BE201 transceiver 100-156MHz, complete but needs slight attention. Would exchange for Spectrum computer or wide angle or telephoto lens to fit Canon. Tel: Cradley Heath 634625 (6-6.30pm). *X028*

Have 750 assorted radio valves. Would exchange for h.f. receiver or w.h.y. Write to: D. Proctor, 235 Glebe Green, Winsford, Cheshire CW7 1JT. *X041*

Have Racal 17L, good condition. Would exchange for FRG-7700 plus a.t.u. or R2000. T. Hoyle. 35 Marton Grove, Inglemire Lane, Hull, N. Humberside. Tel: 801771. *X043*

Have Casio 101 polyphonic keyboard, $3\frac{1}{2}$ octaves, full size keys, four memories, vibrato, sustain. As new condition (value £175). Would exchange for MML144100S 144MHz linear or general coverage receiver—not large heavy type. Also have Morse machine, metal case, full size Qwerty keyboard—this item is home brew based on ZX81 program on EPROM type ahead etc. Requires finalising to interface with transceiver, data and circuits available. Would exchange for w.h.y. G3SYD. Tel: Crawley, Sussex 0293 511708. (7-10pm Mon-Thur or during day at weekends). *X044*

Have 144-28MHz transverter (Microwave Modules) as new. Would exchange for KW Atlanta with external v.h.o. G4KIN. Tel: 051-526 4777 evenings (Maghull). *X059*

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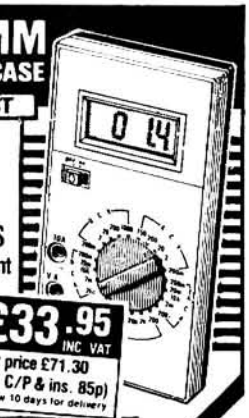

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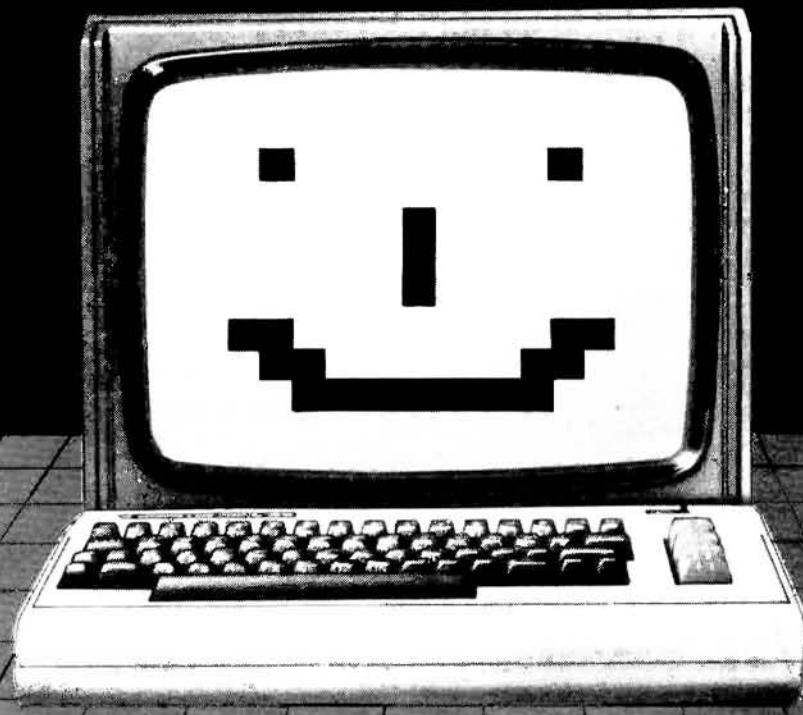

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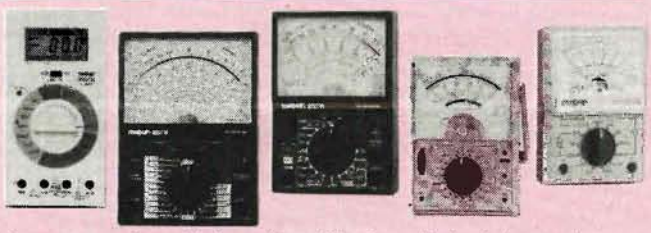

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