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Telex: 337675 TELPES G



Instant finance available subject to status. Written details on request.



1381 Valves and Receivers



Cover The history of valves and the receivers that they were used in over the last half-century makes fascinating reading. The three valves on the cover are a Brimar 6CD6, Zaerix 6AS7G and a Mazda 20P1.

COMING SOON

Audio Filter George Dobbs explains in his inimitable way how to make this very useful add-on unit.

Aeronautical Radio — 3 Godfrey Manning concludes his very interesting series by explaining instrument landing systems and other navigational aids.

EDITOR: Dick Ganderton C.Eng., MIERE, GBV/FH

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A WORD IN EDGEWAYS

Sir

I am writing to congratulate you on SWM. It really is aimed at the Short Wave Listener.

I have been s.w.l.ing for 35 years and remember cycling from Burton with an old Cossor or Bush Radio on the back carrier. I've never been interested in the ham side at all and have gone to commercial radio stations, etc. I cannot tell you the number of sets I've had, and I'm now at the top of the range with an R600 and Lowe Teletype reader/decoder.

I am pleased you are now going to look at the aircraft radio side and I hope it is h.f. I was a private pilot but had a very serious illness and now I listen a lot. I don't condemn the amateurs but it is all about strength, interference, harmonics, QTH, etc. and it bores me to tears, so I listen mainly to h.f. aircraft band broadcasts, writing to control

centres, etc. I've had letters in the form of QSLs from the following airlines: TWA, QUANTAS, Singapore, Cathay Pacific, Air India, Lufthansa, Swissair and British Caledonian, all picked up on 6556 and 5656kHz over South Korea and Thailand.

I have had letters from air traffic control centres and struck up good friendships, and I listen each night on 6556 or 5658 u.s.b. to Bali, Indonesia, Polynesia, Port Moresby, Korea, Rangoon, Bombay, Calcutta.

I get charts, photographs and all sorts of amazing things, people are so surprised to be heard over here. Like the British Caledonian pilot I picked up across Kuming (China) at 33000 feet. Most interesting.

GEOFFREY POWELL
TAMWORTH

Sir

Congratulations, I have been waiting for years for just such a magazine. In fact, ever since "World Radio" ceased to be published.

A brief personal history. I celebrated my seventieth birthday last December, and have been a keen s.w.l. since 1936. In those days I had a twenty-one valve Ferguson Superhet, a one hundred and twenty foot long dipole antenna slung between the house and an eighty foot pole. A copper tube from an old lorry buried in the garden as an earth, with copper plates connected in a star pattern buried around it. Where I lived at that time was on the perimeter of Northampton Racecourse, reputed to be the highest point between there and the Ural Mountains.

Great days. The short waves were so clean and propaganda was a dirty word in most of the world. I used to listen to small orchestras playing in hotels in Bombay and Delhi, the days of the Raj still being with us. I used to monitor some of the early experimental broadcasts of Radio Australia. On one occasion I picked up the Spanish language transmission from the Golden Gate Exposition in San Francisco, which got me a picture and a mention in "World Radio".

My wife and I have made friends world-wide through s.w. radio. In fact, last year we entertained, on their second visit, Keith Glover and his wife—Keith being a Radio

Australia personality on DX programmes over many years until his recent retirement. We also enjoyed brief visits from friends we had come to know from Radio New Zealand, FEBA Seychelles, and even Tristan da Cunha. What a hobby this is, even in these days of crowded bands!

I am not a "technical" man. I listen for the pure excitement and enjoyment of the hobby. Currently I am monitoring Deutsche Welle, and have been for four years or more. Incidentally, for those interested in German programmes in English, I would recommend listening to Deutschlandfunk on 1269kHz. They broadcast some excellent programmes every evening from 1915 to 2000UTC, with a DX programme every Tuesday.

Your magazine was given to me last Sunday by a good "ham" friend, Johnny Johnson, G3JJW, and I placed a regular order with my newsagent on Monday morning. A super magazine. I enjoyed Joan Ham's "The Voice of England" tremendously. I came in ten years later.

My thanks to you for the magazine, and for the excellent contributors. More strength to your elbow. Incidentally, my current listening is done on a ITT Tourport 220 and a Sanyo RP8880, using an external folded dipole antenna.

ALAN SMITH
NORTHAMPTON

Sir

Well done! I have often looked at your old magazine but now I shall buy it every month.

Plenty of news for short wave listeners with lots of other interesting items. "The Voice from England" — enthralling, "Restoring a Nazi Communications Receiver" — very interesting. "Starting Out" — Thanks, I hope to learn something here. "What's New" and "Bandscan" — more of both please. "Seen & Heard" — very informative, not a

column wasted. In fact a great mag from page 1 to 64.

I am primarily a short wave listener with a Russian "Vega" 8-band portable. I came back to the air waves 6 months ago and have DXed regularly since.

QSL cards from Brazil, Japan, Happy Station (I'm only 36 but I remember Eddie Stortz), Spain, Australia, and others grace my wall. My wife and two small boys listen in as well.

CLIFFORD ALLEN
NEWBURY

FIRST WORD

Well, here we are again. Time flies doesn't it? By and large the reaction to the "new look" SWM has been very favourable. However, several readers have told me that they consider that the printing is "very grey" or "too faint" and hence difficult to read, particularly when combined with the shiny paper.

We are looking into this and hope to be able to do something about it without spoiling the overall appearance of the magazine, or pushing the production costs up so high that there is no chance that it will be viable. I think that you will agree that the May issue was better regarding the printing of the photographs.

Your letters make interesting reading and I can assure you that they are read



thoroughly and the ideas and criticisms carefully considered. Please keep them coming, and who knows, you could even find that your letter is published. For each letter published in the magazine we give the writer a £5 voucher to spend on any of our goods or services.

In this issue you will find a new feature which I hope will become regular. This is "First Aid", a column open to readers after difficult to find information on receivers or equipment that they own and are trying to get going again. Or perhaps you have a piece of gear which needs some elusive component long out of production. Hopefully, amongst our readers there will be someone who can help.

DICK GANDERTON

WHAT'S NEW

Telescopic Masts

If you are one of those enthusiasts who delight in clambering over wild and inhospitable mountains in search of the elusive DX then these ultra-lightweight telescopic masts will interest you.

Antenna Technologies have developed a range of telescopic masts made from advanced carbon – glass composite materials such as are used in aerospace applications. Up to 12m in height when extended these masts are much lighter than metal versions and can easily be carried by one person.

The design has evolved from a need for a mast light enough to be rapidly deployed by any unskilled person. The 12m mast weighs less than 8.5kg and retracts to 1.5m whilst the 8 and 6m versions are even lighter. The composite materials used also offer other benefits such as corrosion resistance and a long, maintenance-free life.

The masts are raised by extending the tubular sections manually and locking them into position with the quick-release collars. No pneumatic seals or other complex equipment are used, and any number of the section can be left unextended as required. When extended the sections cannot rotate within each other. Vehicle mounting brackets are available and a canvas carrying case complete with stays and stakes is supplied as standard.

Antenna Technologies
Horace Road
Kingston upon Thames
Surrey
KT1 2SN
Tel: 01-546 7808



405 Line Society

The aim of this Society is to help members preserve and restore all items of 405 line television history.

Following the closure of the world's first high definition television service, at the end of 1984, it became apparent that many enthusiasts had preserved a considerable quantity of 405 line equipment, dating from 1936 onwards.

As this equipment is now obsolete and unuseable, a number of enthusiasts decided not only to preserve this equipment for the future, but to keep it in working order.

Annual subscription is £2 plus four s.a.e.s. for the quarterly newsletter which, amongst other things, will carry free advertisements for members wishing to buy, sell or exchange 405 line equipment.

H. H. Journeaux
7 Blair Avenue
Poole
BH14 ODA

Dorset Dish

Dorset people now have their own company specialising in providing the world's entertainment, news and arts by live satellite television.

Using existing televisions, a receiver (smaller than most video recorders) and a 1.2m dish, pictures can be received for up to 24 hours a day from the USA, France, Germany, Italy and the UK.

Dorset Dish (Satellite TV) Ltd aims to put Dorset on the map as far as this new industry is concerned, it already has plans to market its products to a wide audience and has negotiated dealerships with some of the major players in the market. TV pictures from around the world are shown daily in the showroom.

Dorset Dish (Satellite TV) Ltd
4 Station Road
Parkstone
Poole
Tel: 0202 749495

Engineering Information

A new antenna system has been installed at the BBC's Campbeltown transmitter. This means that listeners on the Kintyre Peninsular and Strathclyde Region should now be able to get better v.h.f. f.m. stereo reception.

The transmitter, located 1.5km south-west of Campbeltown, hasn't changed its frequencies. So listeners can still find:

- Radio 1/2 on 88.4MHz
- Radio 3 on 90.6MHz
- Radio Scotland on 92.9MHz

A new television relay transmitting station should now bring better reception to those in the Black Bridge and Kingsland areas of Holyhead. It has been built at the Kingsland Road Fire Station.

The channels that are being used are:

- Channel 21 BBC1 Wales
- Channel 24 ITV-HTV Wales
- Channel 27 BBC2
- Channel 31 Sianel 4 Cymru.

To receive these signals you will need an outside vertical Group A antenna.

Scanner

This item is included to make the scanner enthusiast drool.

The Fieldtech Heathrow T-1200SR scanning receiver is a microprocessor controlled, digitally synthesised, scanning receiver featuring direct and remote electronic signal analysis.

The press release states that it integrates the signal analysis functions of several instruments into a single compact and portable unit capable of monitoring communications signals within the range 100kHz to 999.999MHz in 100Hz steps.

No further information was given so if you are interested contact

Fieldtech Heathrow Ltd
Huntavia House
420 Bath Road
Longford
Middlesex
UB7 0LL
Tel: 01-897 6446



WHAT'S NEW

Media Network

The schedule for Media Network programmes from Radio Netherlands look interesting for the next few weeks.

June 4: News Update. Arthur Cushen has the usual round-up of listening tips from the Pacific, and they examine the receiver front. They also look at a recent publication looking at 70 years of tubes and valves.

June 1: HF Research. It's not true that ionospheric research is all wrapped up. In fact a lot of amateurs continue to make observations that the professionals could never afford. They preview an event in September which any listener with a radio and clock can follow and take part in a scientific experiment.

June 18: News Update. A look at current events, including news from the Amsterdam office of the WRTH.

June 25: EMC and Me. EMC, electro-magnetic compatibility, is the new term for interference. Put a short wave receiver next to a TV, and the radio just picks up the line oscillator in the TV, giving a very annoying buzz. TVs, on the other hand, seem very prone to interference from nearby experiments by ham radio operators. What rights do the listeners have for interference-free reception? Where does the Treaty of Rome come in? They talk with those who are making new rules about interference.

Sticker Competition

Fed up with newspaper competitions that ask you to write a 15 word essay as to why their product is so wonderful? Relax. Enter the Radio Netherlands mobile sticker contest.

Rules are simple. Write off for a free 40th anniversary Radio Netherlands sticker. Then position its self-adhesive back to something that moves... virtually anything legal will do. To prove to the disbelieving souls in Hilversum you must send them a photo of yourself and the sticker still stuck to the moving object for the prize draw on October 31.

The quality of the photo doesn't matter — colour, black and white, brown and white, anything that resembles a photo. Prizes for the most original entries.

Stickers on the Move
Radio Netherlands
PO Box 222
Hilversum
The Netherlands

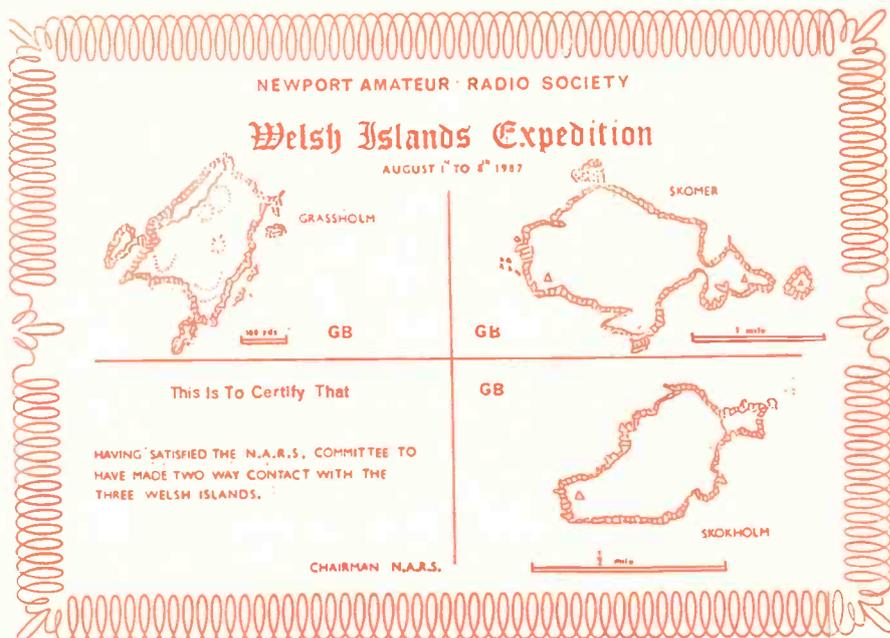
Software

Are you looking for something useful for your BBC-B micro-computer to do?

How about using it to generate and display various maps of either the world or the UK and Europe?

Technical Software have sent details of their new Europe and UK map and locator program, written for the BBC-B.

The program displays separate maps of the UK and Europe and, as with their World Map program, locations can be entered as latitude and longitude, locator (Maidenhead or QTH), National Grid Reference or any of over 430 Europe-wide place names. The place names are concentrated on the UK with the aim of placing most users less than 30km from one of them. The World Map program has almost 250 place



Welsh Islands Expedition

The Newport ARS are at it again. After the successful trip to Lundy in September 85, a group of 15 members will attempt to activate, for the first time, three islands off the Dyfed coast on 1.8 to 28MHz as well as 144 and 430MHz.

Call	Island	WAB
GB4WIE	Skokholm	SM70
GB2WIE	Skomer	SM70/71
GB0WIE	Grassholm	SM50/60

The Universal locator is IO71, which is the old XL Square for all those still using that system.

New Interval Signal

Radio Netherlands has a double celebration this year. It's 40 years since Radio Netherlands foundation was formed, and 60 years since shortwave broadcasts began from the Netherlands. On April 15 they will be changing the interval signal used on air to a new digital version of the current melody, recorded at the carrillon in Breda. Letters sent in the month of April will get a special Radio Netherlands 40th anniversary postal franking mark.

Prize winners in the anniversary story contest will be eligible for special "first-day covers" hand cancelled and postmarked 15 April 1987. These will become collectors items in a few years time.

names. Input is fully automatic in that you do not have to specify which form of data you are using — the computer works it out for itself.

The base and distant stations are plotted on the maps with the great circle path between them. The distance, beam and return headings, v.h.f. contest score (on the 50km ring system) and, for h.f. DX over 16000km, the long path distance and bearings.

A real-time clock and local time of the place names is shown on the map. The World Map also displays daylight and darkness zones, continuously updated as the program runs, and re-calculated and re-displayed after midnight for the new day.

Other refinements include a choice of colours to make the display suitable for colour or mono monitors, automatic correction for the Equation of Time (the difference between local

An award will be available on their return for either working them on all three islands or for working 3 different operators irrespective of callsign. Send in the details of the callsigns and serial numbers. The cost of the award will be £1 or 4IRCs to help with the cost of about £2000 for the whole party and to help with the costs of the next one.

Sked can be arranged via GW6ZUQ or via NARS.

Newport ARS
PO Box 33
Newport
Gwent

ISWL 87

Following the collapse of the International Shortwave League (ISWL) in June 1986, due to financial problems. The League has now been re-formed under the title ISWL 87 with a new HQ. Their journal *Monitor*, edited by Edward Baker, will once again be available to members for full details contact:

ISWL HQ
10 Clyde Crescent
Wharton
Winsford
Cheshire
CW7 3LA

mean time and solar time) when displaying the daylight/darkness zones and automatic insertion of IO or JO when inputting Maidenhead locators for the UK.

Technical Software reckon that these are the ultimate in this type of program and they are available on cassette (£10) or 40 and 80 track disk (£12). If you already have the World Map program you can take advantage of Technical softwares usual 50% upgrade discount.

Technical Software
Fron
Upper Llandwrog
Caernarfon
Gwynedd
LL54 7RF
Tel: 0286 881886

WHAT'S NEW

EA6 loggings

Several English radio amateurs and short wave listeners either live permanently or have second holiday homes on the island of Mallorca. They are also members of the Radio Club Cultural Mallorca.

The photograph was taken in front of Palma Cathedral at the Club's special event station (callsign EA6WQ) to mark the anniversary of the patron saint — San Sebastian.

Left to right are Gabriel EA6VQ, Antonia EA6WQ, Austin EA6XG, Alan G4WUL, Jan EA6WV, Lon EA6XS, Mike EA6SX and Vic G4UPG. photo by G3KPO

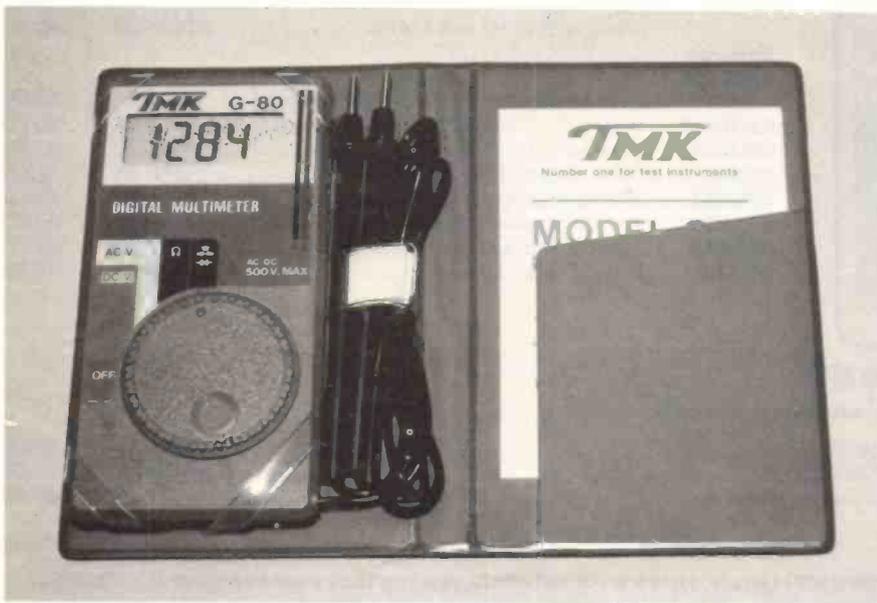


MW DX Listing

A new booklet is available for the DXer. It contains listings of all m.w. DX heard in the UK/Eire, from Africa, Middle East, Asia, South America, Central America and N. America.

The 36 pages of listings show what has been heard over the years of m.w. DXing. Price £4.

Edward Baker
17 Sheepwash Avenue
Guide Post
Northumberland
NE62 5NW



Broadcast Info

A new relay has been built at Grange Road, Halesowen to the south-east of the town centre. It should improve reception for those around the area. The channels being used are:

Channel 54	Channel 4
Channel 58	BBC1
Channel 61	Central
Channel 64	BBC2

For best results, viewers should use vertical Group C/D antennas.

The new BBC v.h.f. f.m. stereo radio transmitting station at Limavady is now in service. It broadcasts Radio Ulster on 85.4MHz, Radio 1/2 on 89.6MHz, Radio 3 on 91.8MHz. A new Radio 4 service will also be available in the spring on 94MHz.

Orkney Activity Month

Orkney is a relatively rare part of the UK. The Callbook shows 34 licences (14 "A" and 20 "B"), but not all are active. With a view to stimulating some interest and to provide others with a chance to work Orkney, the Orkney Group of Radio Amateurs have decided to consider June as an "Activity Month". During this month, as many as can will make a special effort to be on the various bands.

The suggested frequencies for operation are (all in MHz and \pm):

1.973, 3.735, 7.023, 7.053, 14.033, 14.253, 21.253, 28.8, 29.6, 70.26, 144.033, 144.353.

Modes will be c.w., s.s.b., f.m. and possibly RTTY.

Bill GM3IBU
QTHR

Pocket DMM

Multimeters have been getting smaller and smaller, cheaper and cheaper and more and more useful and it is now possible to buy a pocket-sized digital multimeter (d.m.m.) suitable for the hobbyist at under £25.

TMK's G80 is a 3½ digit l.c.d. instrument which comes with its permanently attached leads, in a plastics case not much larger than a credit card. Apart from you deciding on the basic type of measurement — resistance, d.c. or a.c. volts, continuity or diode check — the meter thinks for itself, selecting the best range for the levels being tested.

The measurements are: a.c. and d.c. volts (1mV to 450V with better than 10M Ω input impedance), resistance (1 to 20M Ω), audio-visual continuity and diode checks.

The display also indicates over-range polarity, units of measurement and low battery warning.

The G80 costs £24.95 complete with test leads, case, instructions and batteries.

Harris Electronics (London) Ltd
138 Grays Inn Road
London
WC1X 8AX
Tel: 01-837 7937

Lowe's Radio Evening

On Wednesday, June 17, meeting at 7.30 for a prompt 8pm start, Lowe Electronics have booked the functions room of the Charlton Arms Hotel, Church Street, Wellington, Telford for a radio evening. Two talks are planned, John Wilson G3PCY (technical director of Lowe Electronics) will speak on "Reminiscences of a Radio Amateur" and John Thorpe on "The Design and Development of the HF125 Short Wave Receiver".

A cup of coffee and a biscuit will be available free of charge to the first 50 people to arrive. The bar at the back of the room will be open before, between and after the lectures. The latest gear from Kenwood plus the HF125 receiver will also be on view.

In order to navigate the Wellington town centre one-way system a knowledgeable talk-in station has been arranged which will operate in the 144MHz band (S22) from 7pm.

SHORT WAVE RECEIVERS



		Price	Carriage
HF125	General coverage receiver made in Britain by Lowe Electronics, 30 kHz to 30 MHz	£375.00	£7.00
Options			
K125	Optional frequency entry keypad	£59.50	
D125	FM and synchronous AM detector	£59.50	
P125	Portable pack, includes internal nicads, charging system and active whip antenna	£69.50	

R2000	KENWOOD general coverage receiver 150 kHz to 30 MHz	£637.26	£7.00
Options			
VC10	VHF converter, adds 118 to 174 MHz	£170.76	£2.50
YG488C	500 Hz CW filter	£116.62	£1.00

R5000	KENWOOD general coverage receiver, 100 kHz to 30 MHz	£895.00	£7.00
Options			
VC20	VHF converter, adds 108 to 174 MHz	£176.32	£1.00
YK88C	500 Hz CW filter	£48.59	£1.00
YK88CN	270 Hz CW filter	£57.62	£1.00
YK88SN	1.8 kHz SSB filter	£49.29	£1.00
YK88A1	6 kHz AM filter	£50.68	£1.00
SP430	Matching speaker	£43.04	£2.50
VS1	Voice module	£34.02	£1.00

NRD625	JAPAN RADIO COMPANY general coverage receiver, 90 kHz to 34 MHz	£1195.00	£7.00
Options			
CMK168	Optional VHF/UHF Converter, adds 34-60, 114-174, 423-456 MHz	£391.35	£7.00
CMH530	Internally fitted RTTY demodulator	£102.19	£1.50
CMH532	Internally fitted RS232 interface	£91.75	£1.50
CC232	Cable for CMH532 interface	£60.25	£2.00
CFL231	300 Hz crystal filter	£126.37	£1.00
CFL232	500 Hz crystal filter	£126.37	£1.00
CFL233	1.0 kHz crystal filter	£126.37	£1.00
NVA88	Matching loud speaker	£62.86	£2.50

DATA DECODING EQUIPMENT

(read RTTY, CW or AMTOR using a UHF television or monitor)

CD600	Decoder for CW/RTTY/TOR/AMTOR	£215.14	£7.00
CD680	Decoder for CW/RTTY/ASCII/TOR/AMTOR	£264.97	£7.00
CD670	As CD660 but with built-in dot matrix two line display	£327.77	£7.00

VHF/UHF CONVERTERS

(use your short wave receiver to listen to VHF/UHF signals, check with us before you buy that your receiver is suitable).

MMC5028S	6 metre converter, uses 10 metre IF	£37.95	£1.25
MMC14428	2 metre converter, uses 10 metre IF	£37.95	£1.25
MMC14428HP	as MMC14428 but higher specification	£47.84	£1.25
MMC43228S	70 centimetre converter, uses 10 metre IF	£44.85	£1.25

HEADPHONES

HS7	KENWOOD miniature head phones	£16.66	£1.00
HS6	KENWOOD lightweight headphones	£25.68	£2.00
HS5	KENWOOD de luxe headphones	£39.57	£2.00

WORLD CLOCK

CWTC	CASIO world time clock	£15.95	£1.00
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AERIALS AND ACCESSORIES FOR SHORT WAVE LISTENING

HF5	80-10 metres vertical aerial	£83.39	£7.00
HF5R	Radial kit when HF5 mounted on chimney etc	£54.81	£7.00
TRAPKIT	Trap dipole kit, inc. 7MHz traps	£22.51	£2.50
KX3	MIZUHO aerial tuning unit	£67.28	£2.50
AL1	Lightning and static protector	£34.71	£1.00
CS201	2-way 50 ohm coax switch 0-500 MHz fitted with SO239 sockets	£21.90	£2.50
CS201G	As CS201 but with N-type sockets	£35.01	£2.50
CS401	4-way version of CS201	£69.09	£2.50
CS4	4-way coax switch BNC connectors	£30.39	£2.50
CX3A	3-way coax switch 0-30 MHz only	£7.35	£1.50

COMPONENTS FOR BUILDING SHORT WAVE AERIALS

		Price	Carriage
CUWIRE	25 metres of 14 SWG copper wire	£8.50	£1.50
CPC	Centre piece insulator for dipole aerial	£4.96	£0.75
UR43	50 ohm coaxial cable	£0.30	
UR67	50 ohm coaxial cable	£0.85	
PL259	Coax plug for UR67	£0.66	£0.50
REDUCER	Reducing sleeve for PL259 for use with UR43	£0.15	£0.50
TWIN 300	300 ohm twin feeder	£0.20	
TWIN 75	75 ohm twin feeder	£0.20	
EIS	Small ceramic egg insulator	£0.61	£0.50
EIL	Large ceramic egg insulator	£0.79	£0.50

VHF/UHF MONITORING RECEIVER



AR2002	Scanning receiver from AOR covering 25-550 MHz and 800-1300 MHz	£487.30	£7.00
Options			
RCPack	RS232 Interface for computer control	£255.63	£2.00
RCAD	RC Pack adapter for use with AR2001	£25.45	£1.50
MB2001	Mobile mount	£11.34	£1.00

FREE

Send 50p to cover the postage and we will send you, by return of post, your FREE copy of "THE LISTENER'S GUIDE", a commonsense look at radio listening on the LF, MF and HF bands. Its unique style will, I am sure, result in a "good read" but underneath the humour lies a wealth of experience and expertise. You will also receive detailed leaflets on our range of receivers and a copy of our current price list.

AERIALS, CABLE AND CONNECTORS FOR VHF/UHF RECEIVERS

REVCONE	Discone aerial, 30-500 MHz	£31.50	£7.00
D130	Diamond wide coverage aerial, 25-1300 MHz	£79.34	£7.00
UR43	50 ohm coaxial cable	£0.30	
UR67	50 ohm coaxial cable	£0.85	
BNCPLUG	50 ohm connector for UR43 cable	£1.50	£0.50
PL259	Standard coax plug for UR67	£0.66	£0.50
REDUCER	Reducing sleeve for PL259 for use with UR43	£0.15	£0.50

AIRBAND RECEIVERS



R537S	Airband receiver, tunable 118-136 MHz plus 2 crystal controlled channels crystals extra	£69.51	£2.00
Options			
RB537	Rubber helical aerial	£4.60	£0.50
R528	Scanning airband receiver, 6 channels crystal controlled, crystals extra	£125.36	£2.00
Options for both R537S and R528.			
PS9	Mains adaptor	£8.50	£2.00
R537L	Soft case	£3.68	£0.50
RX22	Rechargeable nicad battery	£6.98	£1.00
CH122	Charger for RX22 Nicad	£8.50	£2.00
CRYSTAL	Plug-in crystal (state frequency required)	£4.60	£0.50
R532	Synthesised airband receiver, 100 memory channels, covers 110-139.995 MHz	£224.05	£7.00
Options			
PS12	Mains adapter	£8.50	£2.00
BP532	Rechargeable nicad battery pack	£32.68	£2.00
CH532	AC Charger for BP532 battery pack	£8.50	£2.00
LC532	Soft case	£9.86	£1.00
BNC6	Telescopic whip for portable use	£7.46	£0.50
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HG3FA	5/8 REVCO mobile whip	£7.50	£7.00	BNCPLUG	50 ohm connector for UR43 cable	£1.50	£0.50
SCC	Base for HG3FA	£6.50	£1.00	PL259	Standard coax plug for UR67	£0.66	£0.50
SCCB	As SCC but with quick release	£7.80	£1.00	REDUCER	Reducing sleeve for PL259 for use with UR43	£0.15	£0.50
2065	5/8 ground plane adjustable 118-180 MHz	£31.50	£7.00				

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GRASSROOTS

Lorna Mower

Why should I need to join an amateur radio club? That's a question that often is asked by s.w.l.s, and the answer is a very simple one. Where else can you find such a wealth of knowledge, enthusiasm, advice and second hand equipment! This month the postbag seems even bigger

The **Derby and District ARS** have a junk sale planned for June 3. Other interesting features are The Work of the IBA by Janet Wootten — their Regional Executive on June 10 and a barbeque on June 24. The club meets at 7.30 at 119 Green Lane, Derby but Jack Anthony G3KQF on Derby 772361 can give you more details.

A video about the Solar Cycle 21 is on the cards for members and visitors to the **Winchester ARC** on June 19. The club meets every third Friday at Durrigate House, Eastgate Street, Winchester. Dick Murray on Winchester 880605 has all the details.

If you contact Keith on Rotherham 814135, secretary of the **Maltby ARS**, quickly, you may just be in time for their barbeque on May 29. Other forthcoming activities are TV Trouble Shooting by G1CAQ on June 12 and the Maltby Festival Special Event Station briefing on the 26th.

Anyone interested in amateur radio as listener or operator is very welcome to join us says Mike Mundy G0GNV, from the **Mid-Sussex ARS**. They have a talk on packet communications by G3YSX planned for June 11, the 18th brings the clubs 21st anniversary at the Windmills, Clayton with June 25 being a talk on lineat amplifiers by John Matthews G3WZT. If you want more details contact Mike on Burgess Hill 41407.

Anyone going to the **Southgate ARC** meeting on June 11 is in for a treat — the History of Morse Code by Tony Smith G4FAI. They meet at 7.45pm in Holy Trinity Church Hall (Upper), Green Lanes, Winchmore Hill, London N21. Their publicity officer, D. C. Elson G4YLL, on Waltham Cross 30051 has all the details for you.

There's been a change of secretary at the **Eden Valley RS** recently. You should now contact Martin Rigby G4FUI on Penrith 66728. The club has Angus Mackenzie G3OSS as their guest speaker on June 22. They normally meet at 7.30 in the Ullswater Centre, Penrith or the Cram Hotel, Eamont Bridge.

Radio Control of Models by Roger Jenkins G8HDP is the subject awaiting the **Crystal Palace and District RC** on June 20. The club meets in the All Saints Parish Rooms, Beulah Hill, SE19. Contact Geoff Stone G3FZL at 11 Liphook Crescent, Forest Hill, London SE23 3BN for the latest news.

The **Vange ARS** are holding their eighth annual rally on September 20, so plenty of notice. The club meets

every Thursday, 8pm at the Barstable Community Centre, Long Riding, Basildon. New members are always welcome, they say, irrespective if they have or have not an amateur licence. Doris Thompson on Basildon 552606 can give you more details.

A 144MHz d.f. hunt that starts and finishes at the Gardener's Arms, Charlton is on for those at the **Vale of Evesham RAC**. June 18 brings a Ragchew Evening and July 2 is a demo on 10/24GHz equipment by Dave G0DJA. For details of which meeting place for which meeting, contact Martin G6TRS on Worcester 27793.

The **Bromsgrove and District ARC** have a new club secretary, and that is G. Lloyd G3RBL. You can contact him on 021-445 4672. Meetings are held each 2nd Friday at Avoncroft Art Centre.

Another change of details, but this time it's the **Chesham and District ARS**. Liz Cabban G0ETU is now the secretary and can be contacted on 09278 3911. The club meets every Wednesday at 7.45pm in the Stable Loft, The Bury Farm, Pednor Road.

Coulsdon ATS have an interesting program lined up, June 8 is Field Days Organisation, Operation and Locator Code by Alan Bartle G6HC and the 19th is a Quiz against The Sutton and Cheam RS at their HQ. Alan, the club secretary, can fill you in on all the details, ring him on 01-684 0610.

The Spring issue of *Probe* makes very interesting reading, it's full of all kinds of information. The **Midland ARS** have Fox Hunting tips by Chris G8FTU and Tony G4DEJ which will be followed with a fox hunt — all on June 16. Tom Brady G8GAZ on 021-357 1924 can tell you when and where the club meet.

Another club with a Radio Control Demonstration is the **Welwyn/Hatfield ARC**, the date is June 1. The club meets on the 1st Mondays at Lemsford Village Hall, Brocket Road, Lemsford and 3rd Mondays at the 9th Welwyn Garden Scout HQ, Knightsfield. Kevin Dunwell G4WLG on 0707 335162 can tell you more.

The **Itchen Valley ARC** have got the History of p.c.b.s. by Mike G6LMK on June 12 and the Radio Investigation Service, DTI by M. J. Holdsworth and M. Lipscomb on the 26th. Meetings are held at the Scout Hut, Brickfield Lane, Chandlers Ford, Eastleigh on the 2nd and 4th Fridays at 7.30. Maurice Cheeseman G1IPQ on Southampton 736784 is the one to contact for more news.

A Bring and Buy is scheduled for the **Northampton RC** on June 11 and a mobile d.f. on the 25th. They meet at Kingsthorpe Community Centre, Kingsthorpe at 8pm on Thursdays, but Peter Saul on Towcester 51716 can tell you more.

The **Pontefract and District ARS** have the History of Amateur Radio

by Ray Price G3VID on June 11 and a RAYNET Practice on June 18 on their programme. All meetings are held in the Carleton Community Centre, Carleton Road, Pontefract at 8pm. Eddie Grayson G6OJX is their PRO and has all the necessary details.

A Junk Sale, which is bound to be popular, is scheduled by the **Trowbridge and District ARC**. So is a natter night on June 24. I'm not sure when or where the club meets, but I'm sure G0ERI on 0380 83038 will be able to help.

The **Yeovil ARC** have a full programme for the next month. On June 11 it is dBs by G3MYM, the 18th is How to Make Tuned Circuits by G3MTM, the 25th is a natter night and July 2 is The Miller Oscillator by G3MYM (a busy man). The club meets every Thursday at 7.30pm in the Recreation Centre, Chilton Grove, Yeovil. Eric Godfrey G3GC on 0935 75533 has more details.

Hi-Fi Criticism, Musicality or Common Sense? Free for all on RSGB by A. McKenzie G3OSS sounds a very lively evening for the **Edgeware and District RS** on June 11. They usually meet 2nd and 4th Thursdays at 8pm in the Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. Ian Cope, the hon. sec. on Hatfield 65707 has all the latest news.

The **Reading and District ARC** have HF Linear Amplifiers by Peter Chadwick G3RZP lined up for June 23. That meeting will be at the White Horse, starting at 8pm. For any other details contact Steve Coleman G4YFB on Reading 867820.

Saturday June 27 is a business meeting and Expedition to the Gambia by Bob G4YRM for the **Torbay ARS**. They meet on Friday evenings every week and usually one Saturday at the EEC Social Club, Ringslade Road, Highweek, Newton Abbot. John Dart on 0803 51995 has all the details on the club.

Oh dear! An NFD post-mortem is planned for June 10 for the **Stockport RS**, hopefully it won't be too bad a meeting. June 24 heralds Behind the Controls! which sounds intriguing. Meetings start at 8pm in the Blossoms Hotel, at the junction of Bramhill Road on the A6. Mel G4FFW on 061-224 7880 has further details if you need them.

The **Mid-Sussex ARS** meet every Thursday at Marle Place, Leylands Road, Burgess Hill at 7.45pm June 11 will be a talk on Packet Radio and the 18th is the Clubs 21st Anniversary at the Windmills, Clayton. For more details contact Chris G0GMC on Hassocks 2937.

Sutton & Cheam RS have a quiz against CATS on June 19, and a 144MHz Foxhunt on June 21. They meet on the 3rd Fridays at 7.30pm at the Downs Lawn Tennis Club, Holland Avenue, Cheam. Natter nights are held on the 1st Mondays in the Downs Bar. Geoff Plucknett on Epsom 21349 can give you the

latest news.

Modern Test Equipment is the lecture on June 1 at the **Surrey Radio Contact Club**. They meet at TS Terra Nova, Mess Deck (1st Floor), 34 The Waldrons, South Croydon. For more details contact John Simkins G8IYS on 01-657 0454.

Coventry ARS have a surplus equipment sale on June 26 at Baden Powell House, 121 St Nicholas Street, Radford, Coventry. Robin Tew G4JDO can tell you all other details on Coventry 73999.

Another surplus equipment sale, this time at the **Chester and District RS** on June 16. The 23rd brings a barbeque — bring your own steaks etc. The club usually meets at the Chester RUF, Hare Lane, Vicars Cross, Chester at 8pm. Further details on programme and venues from Dave Hicks G6IFA on Chester 336639.

The **Keighley ARS** have a talk by their RSGB Regional Rep, P. R. Sheppard G4EJP, on June 30. Meetings start at 8pm in the Victoria Hotel, Cavendish Street, Keighley. For any further details contact Kathy G1GH on Bradford 496222.

June 2 is Electronic Mail, a talk and demo by G4BLT. For those going to the **Wakefield & District RS**. Other meetings include a d.f. contest on June 9, a 144MHz QRP contest discussion on the 16th and an RNARS and RSARS talk by G4VRY on the 23rd. John Bryan G4VRY on Leeds 820198 can supply all the details you need.

Exmouth ARC have a full programme ahead, QRP Operation by G4EBO on June 3 and Cellular Radio by G8XQQ on June 17 are just two events. Michael Newport G1GZG at 30 Maristow Avenue, Exmouth can give you all other details. The club meet fortnightly at the 6th Exmouth Scout Hut, Marplot Hill, Exmouth.

A discussion on member's problems is on the cards for the **Acton, Brentford and Chiswick ARC**, and that will be on June 16. The meeting is at the Chiswick Town Hall, High Road, Chiswick W4 at 7.30pm. Visitors and new members will be welcomed says W.G. Dyer G3GEH from 188 Gunnersbury Avenue, Acton, London W3.

After many months with no permanent meeting place, the **Taunton and District ARC** is now able to meet again regularly in the Basement, County Hall, The Crescent, Taunton. They meet first and third Fridays at 7.30pm and visitors are welcome. Geoff Wiggins G0FMF on Taunton 51526 has all the necessary information.

The **Wimbledon and District ARS** have an interesting lecture planned for June 26, Making Electric Light Bulbs by Ray G4SQG. All W&DARS meetings are held on the 2nd and last Fridays at 7.30pm in the St Andrews Church Hall, Herbert Road, Wimbledon. George Cripps

GRASSROOTS

G3DWW on 01-540 2180 has further details.

Todmorden & District ARS have a treasure hunt for the G4HYY 'Trophy on June 1 and a Children in Need Discussion on June 15. They meet 1st and 3rd Mondays at 8pm in the Queen Hotel, Todmorden. Contact G1GZB on 070681 7572 for all the latest details.

Alec G8GF talks about 50 Years of a.m. Radio on June 15 to the gathered masses of the **Stourbridge ARS**. They usually meet 1st and 3rd Mondays but I'm not sure what time and where. Hopefully Derek Pearson G3ZOM on Kingswinford 288900 can help on all those details.

The **Southdown ARS** holds its main monthly meetings at the Chasely Home for the Disabled, Bolsover Road, Eastbourne, starting at 8pm. Informal meetings are held on Tuesdays and Fridays at the clubrooms, Hailsham Leisure Centre, Vicarage Lane, Hailsham. Peter Wood G1UTH on 08926 63061 can supply all the information on the club.

The **East Kent RS** have a talk by Ken Willis G8VR on 2m DX on June 4 and a car rally on June 18. They meet at the Cabin Youth Centre, Kings Road, Herne Bay on the 1st

and 3rd Thursdays at 8pm. Brian Didmon G4RIS at 45 Millsbrood Road, Whitstable has all the details.

South East Kent (YMCA) ARC have a treasure hunt led by G4EGQ on June 10 and a lecture by G4HXE on solving TVI problems on the 24th. The club meets every Wednesday at the Dover YMCA at 8pm. John Dobson is the PRO and you can contact him on Dover 211638.

The **Farnborough & District RS** have a canal trip booked for June 10, organised by G4UQE. I'm not sure quite when or where they meet but M.C. Graffius is their Public Relations Officer and you can contact him at the Paddock, Diamond Ridge, Camberley.

The **Wigan & District ARC** meet every Wednesday about 7.30pm in the Poolstock Cricket Club, Keats Avenue, off Poolstock Lane, Wigan. Margorie Norton says they have a mixture of informal chats and more formal meetings in a comfortable atmosphere, and a growing membership of enthusiastic radio hams. Contact Margorie G0DTY on Wigan 47416 for more details.

Big Antennas Around the World by Al Slater G3FXB is on the programme for the **Bredhurst RATS**. Then they have a

Construction/Natter Night on the 18th and Compact Disc Players by a local rep of Thorn EMI Ferguson. For more information on these events contact Kelvin G0AMZ on Medway 376991.

The **Chelmsford ARS** have a Constructors' Competition on June 2, their newsletter mentions "valuable cash prizes!!" so no doubt lots of interest there. They meet at the Marconi College, Arbour Lane, Chelmsford at 6.30pm. Contact Ray or Ela (G3PMX/G6HKM) on 0245 360545 for more details.

Chesham & District ARS meets Wednesdays, 7.45pm in the Stable Loft, The Bury Farm, Pednor Road, Chesham. For more details ring Liz G0ETU on 09278 3911.

June 9 heralds an Activity Evening and June 23 is Box 88, Moscow by A. J. Slater G3FXB. All this is for the **Verulam ARC**. They meet at the RAF Association HQ, New Kent Road, off Marlborough Road, St Albans. For more details contact Hilary G4JKS on St Albans 59318.

The **Warrington ARC** have a full programme for the coming month. June 2 is Morse Receiver MkII by Bill Green G8HLZ, the 9th is Electromagnetic Waves, Thin Film cct RSGB film, the 16th is a

barbeque hosted by Debby and Mike Mansfield, the 23rd is an Open Forum and the 30th is Charles Wells G4ZZG with Rip-Van-Winkle's Story. They meet in the Grappenhall Community Centre, Bellhouse Lane, Grappenhall at 8pm. Paul Forster G0CBN on 0905 814005 can tell you more.

The **Pembrokeshire RS** meets on the 1st and 3rd Thursdays at the Tower Hill Further Education Centre, Haverfordwest. Paul Delaney at Rosedale, Studdolph, Steynton, Milford Haven can give you all the details.

A visit to Dungeness Power Station is planned for June 17 at **Hastings ERC**. They usually meet on the 3rd Wednesdays at 7.45pm in the West Hill Community Centre, Croft Road and every Friday at 8pm in the Ashdown Farm Community Centre, Downey Close. If in doubt then contact Dave Shirley G4NVQ at 92 Alfred Road, Hastings.

Cork Radio Club meets each Saturday night at Wilton Park House, Wilton, Cork, Ireland at 8.30pm. They welcome visitors, new members and all contacts on the 3.5MHz band. Try contacting John Ketch EI2GN, probably QTHR for more details. □

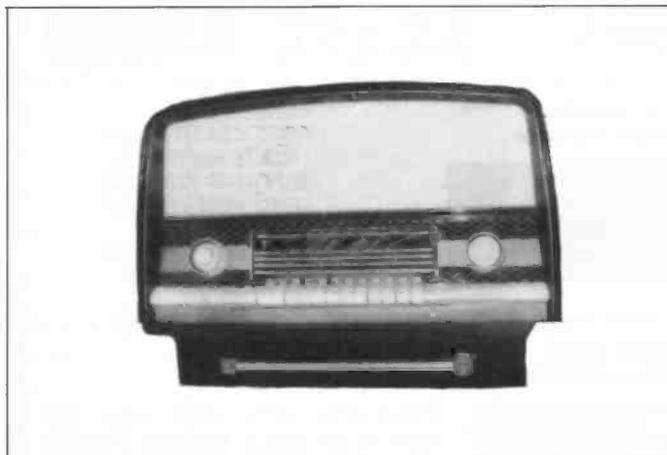
FIRST AID

Sir
I have obtained a radio receiver, which is in need of repair. The set is an excellent example of craftsmanship, as you can see from the photographs.

A service sheet would be the best aid, or even a circuit

diagram. It seems the normal channels cannot supply me with anything.

HERBERT GRANGER
17 FAKENHAM ROAD
LENWADE
NORWICH
NR7 5SE



AR 612 ORION

Sir
I am a radio, a Bush BAC.31 to be precise. I was operated from a vast battery until 1956 when I was fitted with a Bush 42 Power Unit so that I could be run from a 5 amp supply. Thus I saw near constant daily use until a few months ago when a 13 amp mains supply finally reached my home. (Things can be very slow to change in this part of Somerset!) Alas it is no longer possible to plug me in, but were it possible I would, of course, still work.

Incidentally, my master still has my original guarantee, in the envelope in which it was posted (bearing a 1 1/2d green postage stamp), my instruction booklet, the conversion booklet supplied when my power unit was fitted and a selection of old wireless licences. Even my little round pin plug has the original "shatterproof" ticket sticking to its back!

I have two friends, electric

fires run from the 5 amp supply. A Morphy-Richards convector which has burned away solidly since 1956 and has never had a new element or been repaired. My master still has his guarantee card, operating instructions and invoice. (A staggering £7.10s.6d) My other pal is a Baby Belling for which the purchase documents were lost.

Our master tells us there are special people called collectors who would love to give us a home, especially if they could see us now, crouching together in a corner, cold and silent. We are all of smart appearance apart from a few tear stains on our little faces. Would one of your readers take pity on us. Please.

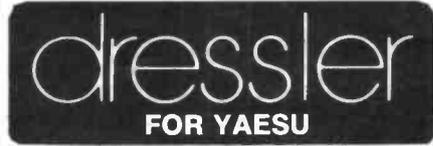
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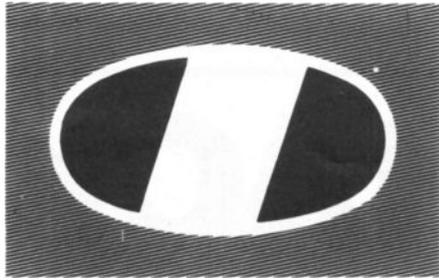
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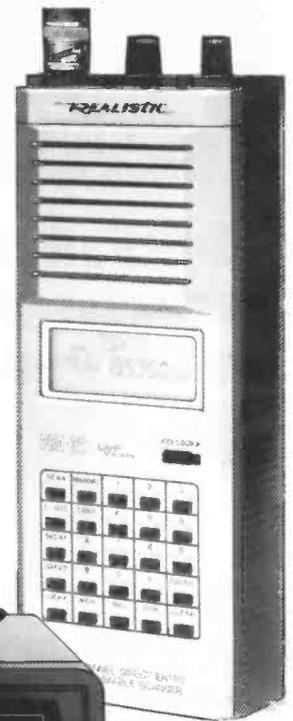
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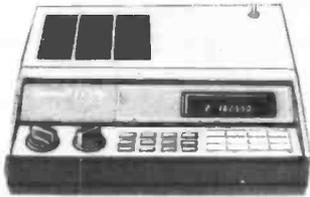
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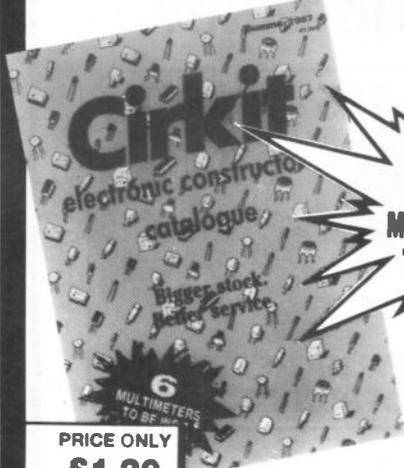
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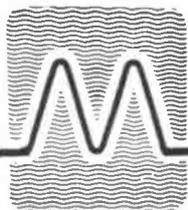
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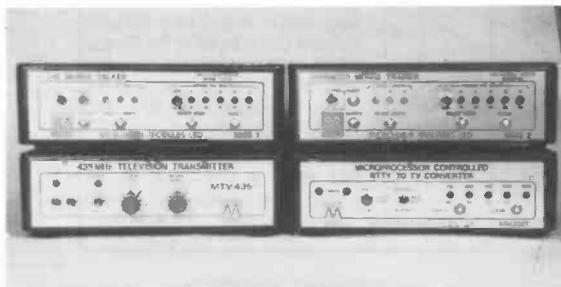
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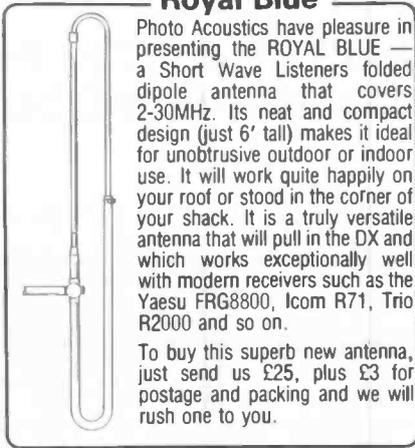
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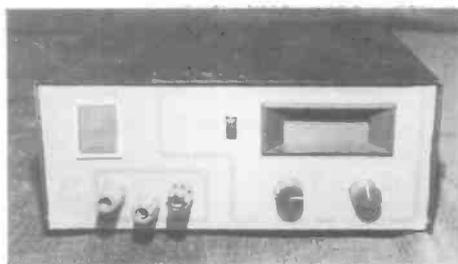
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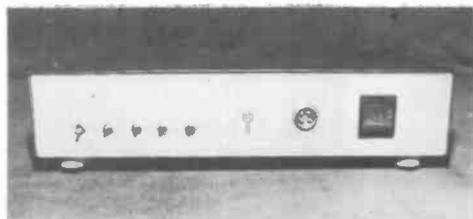
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An explanation and a practical grey line predictor

Ron Stone GW3YDX

From the start it was clear that the low bands peaked at around dawn and dusk locally, when conditions became enhanced. It was also evident that conditions became very good indeed when both ends of the radio circuit concerned were in semi-darkness and the great circle path between them was also on the border between light and darkness.

This path is known as the "grey-line" path for obvious reasons. Knowledge of the direction and character of the path allows the chance of working DX to be greatly improved, especially if directional antennas are in use. Why should grey-line propagation be so effective? The reasons are connected with the ionisation of the upper atmosphere, and the relationship between solar illumination and attenuation of signals at a given frequency.

The solar illumination of 3 points on the earth's surface is shown in Fig. 1. You can see, C is in full daylight, B is in the twilight zone, and A is in complete darkness. Without going into a lengthy explanation, the "D" layer will absorb low-angle signals during the day, as those signals pass through the layer obliquely. Higher angle signals will not travel in the "D" layer to the same extent, and will therefore be less absorbed. They will pass through and be reflected by the "E" layer. The lower the frequency the greater the loss. That is why it is more difficult to work around the UK on the 1.8MHz band in daytime than it is on the 3.5MHz band. The case for point "C".

At night the "D" layer is largely absent, so signals will be directly reflected by the "E" layer, at a greater distance above the earth's surface, giving greater distances. Point "A" is the example in Fig. 1.

The greatest distances are, however, achieved when the signals are bent by the "D" layer when it is created by the sun's rays at sunrise, or when it withers away at dusk. Those signals carry on to the "E" layer at a flatter angle which means that even greater distances may be covered.

It is obvious that the lower the original wave angle that can be created the better

Since first licensed, the author's activities have always had a clear bias towards operating on the lower frequency bands.

the chances for bending or "refraction", and the greater the distances achieved.

Another important benefit is that which can be derived by virtue of one's geography. Consider the typical situation on the 7MHz band. The evenings are full of strong broadcast stations at 59+40dB. There are also hordes of Eastern European amateurs who are very active. The QRM is awful. In the mornings all the Eastern European QRM, broadcast and amateur is well attenuated by the build-up of the "D" layer. If we are lucky we cannot hear them at all, and the weak DX stations far to the west can be worked.

Because of this, it is often easier to work Japanese stations via the long path over South America in the morning rather than try to work them over the evening short path. Remember that all those UAs and LZs have a much easier evening path to JA than we usually do.

The best propagation of all occurs when signals appear to become trapped in a partly illuminated "D" layer, or in between the upper edge of "D" layer and the lower edge of the "E" layer, to emerge only when the "D" layer has decayed at the distant end of the path. That seems to occur along the great circle of the grey-line.

We know when our own local dawn is so we know when the "D" layer is being built up. So too for the local dusk. How do we predict that dawn peak at the other locations than our own, and where the grey-line might be?

To arrive at the answer involves the use of a little geometry, not the use of one of the DX-aids which are available. There are various things on the market, such as the very expensive "Columbus" DX globe from West Germany, and the "DX-Edge"

from the USA. The DX Globe is very nice, but is somewhat overkill in the author's opinion. It is rather large and is the price of a second hand transceiver! The DX Edge (£15) is OK, but the map they use is the Miller circular projection (rectangular) which makes it difficult to estimate beam headings, especially for long paths. In addition the slides provided only include one for each month. At the spring and autumn equinox periods, which are especially good for VK/ZL DX, this is not really exact enough. Some paths are open for a few minutes only.

The ZL path on the 1.8MHz band is one such path. In the author's experience the path is quite reliable with signals peaking to even 599. However that all happens within a 5-minute period. Nothing is audible outside that slot. Predictions need to be reasonably exact.

The author has developed his own DX-Edge type of predictor which is shown here. First, however it is sometimes useful to be able to calculate sunrise and sunset times with greater accuracy than a chart may show. The maths are not difficult.

Calculating Sunset/Sunrise Times

A calculator with trigonometric functions can be used to compute the times, and there is nothing magical about the formulae, which are shown below:

Sunrise Time

$$= \frac{\text{Long W}}{15} + \frac{\cos^{-1}(\tan(a) \times \tan(\text{Lat N}))}{15}$$

Sunset Time

$$= \frac{\text{Long W}}{15} - \frac{\cos^{-1}(\tan(a) \times \tan(\text{Lat N}))}{15}$$

Lat N = Latitude North in decimal degrees north of the equator.

Long W = Longitude West of QTH in decimal degrees west of Greenwich.

a = angle of inclination of the earth in respect to the sun.

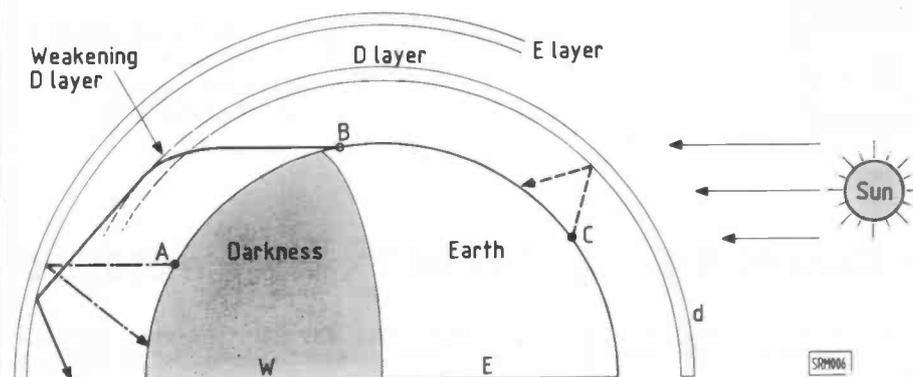


Fig. 1: Note how the sun's rays partly illuminate the upper atmosphere so that signals from B are neither reflected by the "D" layer, nor are they able to pass directly through and be reflected by the "E" layer, which is the case for the station in darkness at point A. They are instead refracted by the "D" layer for the station at B. Station C is in full daylight. Signals are reflected by the D layer so distances covered are short.

THE GREY-LINE DX PATH

Calculations are straightforward provided decimal degrees are used. The answer will be in decimal hours and will need translating back to normal.

To find the sunset in Japan on October 1 is therefore a matter of inserting the correct values into the equation as follows:

Sunset Time (Japan)

$$= \frac{-138}{15} - \frac{\cos^{-1}(\tan(-3) \times \tan(36))}{15} = 8.66$$

Translating 8.66 to normal means that the Sunrise time in Japan is 0840UTC. Note that the longitude is a **minus** value, Japan being 138 degrees **east**, or "minus" of Greenwich. Similarly, all southern hemisphere latitudes will have negative values.

Calculations as above can of course become rather tedious to perform for every day and for different locations. Various computer programs have been devised to take away a lot of the hard work. The author wrote one for a Sharp pocket computer. The program listing in BASIC is shown in Fig. 2.

Without doubt, however, the easiest form of presentation is a chart of some sort. The GW3YDX version is based upon an azimuthal equidistant projection with the world centred on the North Pole, and it uses a piece of transparent material marked with a line that shows the light/darkness boundary, or as we know it, the grey-line.

To make the chart it is first necessary to have a suitable map. One is shown at Fig. 3. It is then necessary to have to hand a table showing the dates and times of sunrise/sunset at various points on the globe. A suitable listing is given in Table 1.

Mount the map on a piece of hardboard or plywood. Glue it down. Then cut a circle from a piece of acetate or cellophane sheet. Overhead projector material is good. The circle should be the same diameter as the outer circle of the map. Stick a pin, or whatever, through the North Pole so that the circular slide is free to revolve around it. Draw an arrow on the circumference of the acetate, pointing outwards.

Select the date you are interested in, for example November 3. Then select the first location from the table. Estados Island (ever heard of it?) is off the southern tip of South America. On the map there is a small dot in a circle to show where it is. Sunrise there is 0848. The hours are marked on the outer "dial", so place the arrow against 0848. Mark a dot over Estados Island on the acetate with a water soluble pen. Revolve the slide so that the arrow lines up with the Sunset time of 2346, and mark another dot over the island.

Fig. 2: Computer program listing

```

699 "S" : CLEAR : PAUSE "SUNSET/SUNRISE GW3YDX COMPUTER
      PROGRAM"
700 INPUT "LONG WEST = ";W
710 INPUT "LAT NORTH = ";N
715 INPUT "ANGLE OF INCIDENCE = ";A
720 Y = TAN(N) * TAN(A)
730 Y = ACS (Y)/15
740 M = W/15 + Y
745 GOSUB 900
750 BEEP 1: PRINT "SUNRISE = ";H;"";S;"UTC"
760 M =W/15 - Y: GOSUB 900: BEEP 1: PRINT "SUNSET
      =";H;"";S;" UTC"
770 GOTO 700
900 IF M<0 THEN 920
910 IF M>24 THEN 930
915 GOTO 940
920 M=24+M : GOTO 940
930 M = M-24
940 H = INT(M): S = M - INT(M): S = S * 60: S = INT(S):
      RETURN
    
```

TABLE 1. SELECTED SUNRISE AND SUNSET TIMES

Date	Estados Is.		Auckland		Singapore		Bangkok		London		Tashkent	
	SRT	SST	SRT	SST	SRT	SST	SRT	SST	SRT	SST	SRT	SST
January	1	0749 0045	1706 0735	2307 1102	2341 1053	0809 1551	0252 1155					
	16	0805 0029	1713 0728	2306 1102	2339 1055	0755 1604	0243 1204					
February	2	0834 0000	1727 0714	2306 1103	2335 1100	0730 1629	0230 1216					
	15	0900 2333	1741 0701	2306 1103	2330 1104	0707 1652	0211 1236					
March	3	0937 2257	1759 0642	2305 1104	2324 1110	0635 1724	0148 1259					
	16	1005 2228	1815 0627	2304 1104	2319 1115	0610 1750	0131 1316					
April	3	1045 2148	1836 0606	2304 1105	2312 1122	0535 1825	0106 1341					
	16	1115 2119	1851 0550	2303 1105	2307 1127	0509 1851	0048 1359					
May	1	1146 2048	1907 0534	2303 1106	2302 1132	0441 1919	0029 1418					
	16	1214 2020	1921 0521	2303 1106	2257 1137	0417 1943	0013 1434					
June	1	1237 1957	1932 0510	2302 1106	2254 1140	0358 2002	0000 1447					
	10	1245 1949	1935 0506	2302 1107	2253 1141	0344 2016	2355 1452					
July	3	1245 1949	1935 0506	2302 1107	2253 1141	0351 2009	2355 1452					
	18	1229 2005	1928 0513	2302 1106	2255 1139	0404 1955	0004 1443					
August	1	1207 2027	1917 0524	2303 1106	2259 1136	0423 1936	0017 1430					
	15	1140 2054	1904 0537	2303 1106	2303 1131	0447 1913	0033 1414					
September	2	1103 2131	1845 0556	2304 1105	2309 1125	0519 1841	0055 1352					
	15	1034 2200	1830 0612	2304 1105	2314 1120	0545 1815	0113 1334					
October	1	1000 2234	1812 0630	2305 1104	2320 1114	0615 1745	0134 1313					
	14	0931 2303	1756 0645	2305 1104	2325 1109	0641 1719	0152 1255					
November	3	0848 2346	1734 0707	2306 1103	2332 1102	0719 1641	0218 1229					
	14	0827 0007	1724 0717	2306 1103	2336 1057	0736 1623	0230 1217					
December	3	0757 0037	1710 0732	2306 1102	2340 1054	0802 1558	0247 1200					
	12	0749 0045	1706 0735	2307 1102	2341 1053	0809 1551	0252 1155					

THE GREY-LINE DX PATH

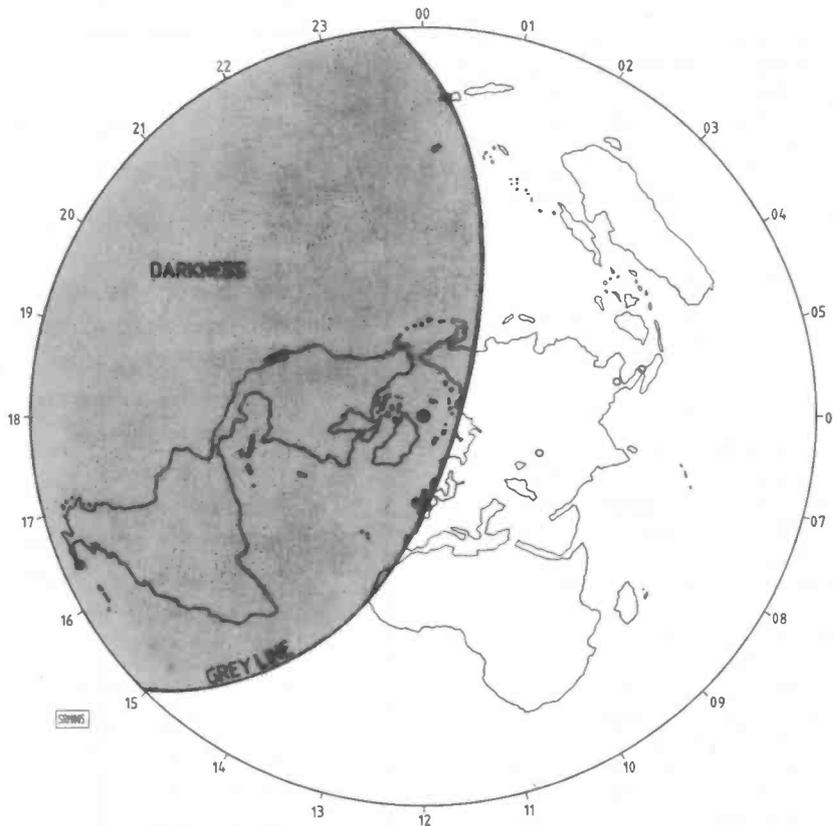
Continue in this way for each of the locations, which are also marked on the map. When the dots are joined up a curve will emerge — guess what — our old friend the grey-line! By way of illustration the grey-line over the UK at dawn on November 3 is also shown in Fig. 3. Note the ideal path to the North Island of New Zealand at the same time.

The curve allows the user to determine:

1. His own sunset/sunrise time
2. Sunset and sunrise time for that day anywhere.
3. The heading of the grey-line anywhere at a given time.

It is possible, of course, to extend the calculations and to devise a slide for each day of the year. There's not a lot of point. The fortnightly estimates based on Table 1 are good enough for all practical purposes. Being a poor radio amateur the author just rubs out old curves and puts in the new.

Besides assisting with predictions for I.f. DX the slide has been useful in other ways. There is not much point for instance, in joining a 7MHz band pile up for a KH6 when the slide shows quite clearly that it is mid-day in Hawaii. As a pirate detector the predictor has its uses! Good DXing!



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RALLIES

★ SWM will be in attendance.

June 7: The Southend and District Radio Society have their rally at the Rocheway Centre, Rochford, Essex. Doors open at 1.30am and there will be talk-in on S22.

Ron G6SOH
1 Eastwood Road
Leigh on Sea

★ **June 14:** The Royal Naval Amateur Radio Society are holding their famous rally at HMS Mercury, East Meon, Petersfield, Hants. Gates open from 10am to 5pm. Admission is £1 for adults and 50p for children. There will be the usual talk-in on 144 and 430MHz, all the traders are undercover in case it's wet. As regular visitors will know there is always plenty for the rest of the family; model boats, engine rides, arena displays, etc.

Cliff Harper G4UJR
Tel: 0703 557469

June 14: The 18th Elvaston Castle Mobile Rally will again be opening its doors to the public. The English Folk Dance & Song Society have been invited and there will be a craft marquee, as well as an escapologist, stunt driving, mini motor bikes, a bouncing castle and much more for all the family. Admission is free, but there is a 50p parking fee.

John Robson G4PZY
Derby 767994

June 21: The Denby Dale Radio Rally starts at 11am at the Shelley High School, which is on the B6116 near Skelmanthorpe. Talk-in will be on S22, SU22 as well as 28MHz f.m.

Gerald Edinburgh
Tel: Huddersfield 602905

★ **June 28:** The 30th Longleat Mobile Rally will be taking place at Longleat (where else!). It promises all the usual facilities in abundance. Over 70 traders great and small will be covering the whole range of equipment and components to be expected at a first class rally. There will be the Midsomer Norton Marching Band, the Bristol Morris Men and mini motorbikes for the children. Kids should bring pencils and crayons too – prizes on offer! Camping and caravan facilities available, and special arrangements made for coaches.

Brian Goddard G4FRG
Tel: 0272 848140

July 12: The Worcester and District ARC are holding their Droitwich Rally at the High School, Droitwich. Entry to the rally is free, as is the parking. There will be all the usual trade stands there, as well as entertainment for the rest of the family. They have laid on free transport to the local strawberry fields.

Steve College GOAOC
6 Tweed Close
Worcester

August 2: The Rolls Royce Amateur Radio Club are holding their rally at the Rolls Royce Sports and Social Club, Barnoldswick. Doors open at 11am and talk-in will be available as well as trade stands, refreshments and other attractions.

L Logan G4ILG
19 Fenton Avenue
Barnoldswick

★ **August 9:** Hamfest '87 will be held at the Flight Refuelling ARS HQ, Flight Refuelling Sports and Social Club, Merley, Wimborne, Dorset. There is free parking and an entrance fee of 30p for adults (children free). Doors will be open between 10am and 5pm with plenty for all the family to do as in previous years.

Ashley Hulme
Wimborne 872503

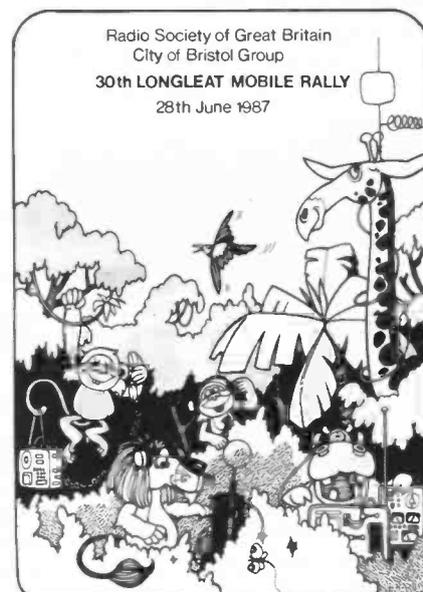
August 15: The Wight Wireless Rally will be held at the Wireless Museum, Arretton Manor near Newport. The rally opens at 11am and closes at 5pm, with talk-in on S22 and GB3IW. All the usual trade stands will be there and they hope to run some demonstrations on the day too.

Douglas Byrne G3KPO
Tel: 0983 67665

August 30: The annual rally of the British Amateur Radio Teleprinter Group is being held at Sandown Park Race-course. This year the exhibitors hall has been modernised and enlarged, so more trade stands. The catering and bar facilities are in an annex off the main hall for visitors comfort. There will be a car boot sale, ample free car parking and the rally will be open from 10.30am to 5pm.

Peter Nicol G8VXY
Tel: 021-453 2676

August 31: The Doncaster and District RAYNET Group are holding their rally at Bircotes Sports Centre, Bircotes. Doors open 11am (10.30 for the disabled). Admission is 50p.



September 6: The South Bristol ARC are holding the 1987 Bristol Rally at Hareclive Youth and Hartcliffe Community Centres, Hareclive Road, Hartcliffe. Doors are open between 10am and 5pm. There will be the usual bring and buy and general traders in the Community Centre and radio dealers in the Youth Centre. Admission 50p.

Len Baker G4RZY
Tel: 0272 834282

September 6: The West Kent Amateur Radio Rally is being held in the Angel Centre, Tonbridge, Kent. Doors open between 10.30 and 4pm. There will be talk-in on S22, SU8 and 29.5MHz f.m. using the callsign GB0WKS. The rally has free parking, a bring and buy, club stands, many trade stands and a stamp fair.

Nigel Peacock G4KIU
Tel: 0892 515678

★ **September 13:** The Lincoln Hamfest will be held at the Lincolnshire Showground and Exhibition Centre. It is the 6th such event, and in addition to the usual amateur radio stands they hope to have helicopter rides, model car racing, model aircraft displays, the police force, fire brigade and many others in attendance. There is ample parking, caravans by arrangement, refreshments and licenced bar with real ale!

Pam Rose G4STO
Gainsborough 788356

September 20: The Vange RS will, once again, be held at Nicholas School, Nicholas Lane, Basildon. Doors are open between 10am and 4.30pm with admission at 50p (disabled and children under 14 free). Weather permitting they will have a car boot sale as well as the usual bring and buy, raffle, refreshments and traders.

September 20: The Trafford Rally is being held at Old Trafford Cricket Ground, Talbot Road, Stretford. Doors are open from 10.30am to 5pm (10am for disabled). There is free car parking, a bar and refreshment available. Talk-in will be on S22.

★ **September 27:** The 1987 Harlow Mobile Rally will be in the Harlow Sports Centre. Doors open at 10am, but there aren't any more details at the moment.

Harlow & DARS
Mark Hall Barn
First Avenue
Harlow

★ **October 23/24:** The Leicester AR Show Committee will again be holding their rally at the Granby Halls. No more details yet.

Frank Elliott G4PDZ
Tel: 553293

November 15: The Bridgend and District Radio Club are holding their rally at the Bridgend Recreation Centre, Angel Street, Bridgend. Doors open at 11am (10.30am for the disabled). There will be free parking, a bring and buy, Morse tests (pre-booked with RSGB), bar facilities and talk-in on S22.

Dave George GW1OUP
Tel: 0656 723508



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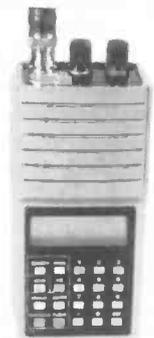
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Shortwave Propagation Services Expand

If you're searching for a weak station in a certain part of the world, it's quite a good idea to check expected propagation conditions before you stay up all night for nothing. In recent months, a number of new propagation information services have started. You can either use a rule-of-thumb guide, or feed the data into a propagation program for your home computer. The program will then calculate the best times for reception. One of the cheapest ways to get the solar indices is to phone an answering machine in the United States. This is operated by the Space Environment Services Center in Boulder, Colorado. Since you can dial direct, and you can get most of the information you want within 15 seconds, it works out very cheap despite the long-distance call. Call 010 1 303 497 3235 from the UK.

Propagation is an science unto itself, and there are plenty of excellent books about the subject. But, as a rule of thumb, if the A index is quiet, i.e. less than 8 and the Boulder K index is given as either 0 or 1, then conditions will probably be good for transatlantic DX from North America on medium wave. If K is higher than 1, then just get some sleep! Reception from Central America and the Caribbean is more likely in Europe when the K index is around 2 to 3, and the A index indicates an unsettled period, i.e. values up to 15. If A is active, i.e. between about 15 and 30, try for South American stations on medium wave and in the 60 metre s.w. tropical band. If the A-index is greater than 50, corresponding to a major storm, then reception is rather unlikely.

Other Propagation Services

The German Amateur Radio Club, (DARC) has started a recorded propagation service (in German) and is interested in feedback to the new reports. They also have some handy forms to keep track of the propagation data given over the phone. The address for further info is DARC, Postbox 1155, D-3507 Baunatal West Germany, and include some return postage in the form of two International Reply Coupons (ask at larger post-offices). The Radio Society of Great Britain has a Prestel style DATABOX that's open to anyone. On this you can also find solar data. The number to call is 0707 52242, and the service is free. In the United States, the Space Environment Services Center in Boulder Colorado USA has started its own public bulletin board. You call anytime for the latest propagation news updated every six hours, plus a lot of background information. Its all free, and no passwords are needed. You need of course to pay the telephone line costs, and have a computer modem capable of working at either 300 or 1200 baud, with American Bell 8-No Parity-1 system. The number is 010 303 497 5000.

The report goes out at 0825, 1225, 1625, and 2025UTC. In Europe, the release at 0825UTC comes in well at present on 9655kHz. At 1625UTC reception is also possible on 6035kHz. On Sundays, the reports from part of the *Talkback* programme. This is heard at 0310, 0710, 0910, 1240, 1710 and 2040UTC, — an excellent idea, and the station is to be congratulated for taking the initiative. If you agree, you might like to drop them a line to support the idea. The address is "Propagation Report", English Service, Radio Australia, 54 Portland Place, London W1N 4DY.

Shortwave Boom in USA

An executive order was signed by President Reagan on Friday April 17. Because of what the Americans sees as unfair trading practices by the Japanese, heavy tariffs have been imposed on Japanese products such as power tools, lap-top computers and colour TVs with screens larger than 18 inches. Existing stock is not immediately affected, but when shops have sold out prices of these goods to the US consumer will rise to almost double the current value. What about short wave receivers though and ham radio gear? We did a quick survey of 10 dealers in the United States, and discovered that although there are NO special tariffs on shortwave equipment, the Japanese manufacturers are unable to absorb losses from the poor exchange rate. Many higher priced short wave receivers have risen or are expected to rise in price by as much as £100. The days when it was cheaper to buy equipment in North America (if one was passing through of course) seem to be over.

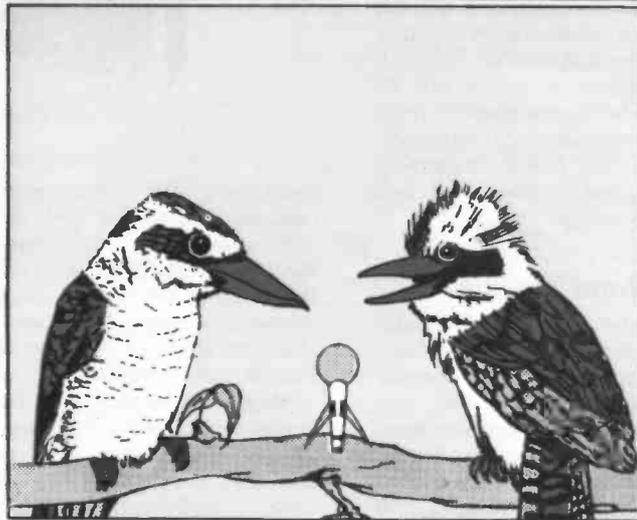
Australia on Line

At the start of last month, Radio Australia launched an invaluable new service for short wave listeners round the world. It's a propagation report, broadcast five times daily, Monday through Saturday. It does an excellent job in assessing current and expected conditions on short wave. The report is presented by Mike Bird, no stranger to listeners of Radio Australia's *Talkback* programme. It is based on information supplied directly by the Ionospheric Propagation Service in Sydney. Each report contains information on solar activity, the geo-magnetic flux, sunspot number, and "A" index. A forecast also is given for expected conditions for the next 24 hours.

Sony Confusion

Whilst Sony can justify its reputation for original thinking, the marketing managers in Japan haven't been very thoughtful when it comes to dreaming up new type numbers. A publicity campaign in Japan has been launched to publicise the new ICF7600 DA. "DA" standing for digital/analogue. Unfortunately, Sony have had a model called the ICF7600A or ICF7000AW in many parts of the world since the start of the decade. This is a completely different compact, travel portable with good performance for the price, but has a very serious drawback in that it doesn't include any coverage of important frequencies jsut outside the official short wave broadcast bands. Compared to similar priced sets from other companies, the old 7600A is now out-of-date, and not to be recommended. However, although production discontinued some time ago,

RADIO AUSTRALIA



SHARING THE WORLD WITH OUR FRIENDS

THE LAUGHING KOOKABURRA

you'll still see old stock in shop windows in Europe, the Middle East and parts of South-East Asia.

In 1984 Sony came out with a set called the ICF7600D in most parts of the world, with the exception of the North American market where it became known as the ICF2002. It was completely different to the older ICF7600A, but the similarity in type numbers caused a great deal of confusion in the European and Asian market place. Many short wave listeners have reported being told that they were the same by salesmen anxious to unload old stock, or simply unaware of the difference.

The appearance of yet another completely different receiver with the number ICF7600DA won't help matters. Some European Sony dealers tell us they have applied to Tokyo for permission to market it under a different name when it appears here in a couple of months. Sony in Britain however told us they will call it the ICF7600DA, and it will sell for £160 pounds incl. VAT as from this month. The ICF7600DA turns out to be fractionally larger than the older more expensive ICF7600D — about the size of a paperback book. It weighs 610 grams with the four penlight batteries, and that means that some compromises have had to be made.

There is no key-pad tuning on the new set, nor does the receiver cover the entire radio spectrum continuously between long wave right up to 30MHz short wave. Instead Sony have made a portable with 15 bands. Long wave, medium wave and v.h.f. f.m. account for three. The other 12 correspond to the familiar metre bands of 90, 75, 60, 49, 41, 31, 25, 22, 19, 16, 13 and 11 metres. Calibration of the pointer and dial tuning system is rather crude, but that's not such a problem as the dual-conversion radio has a liquid crystal display with readout to the nearest 5kHz. Five memories are offered to store the frequencies of favourite stations, and the frequency display can also be set to display the time or set the built-in timer. This p.l.l. synthesised receiver is clearly not an attempt to offer facilities available on more expensive Sony receivers for a lower price. Instead, Sony has picked features it believes the budget traveller needs and come up with a cheaper radio.

Pakistan World Service?

Pakistan opened a new federal television complex in Islamabad in April, and at the opening Prime Minister Mohammed Khan Junejo said that Pakistan Television should look into ways to serve Pakistanis living abroad, especially in the Gulf area where a lot of people are working in the oil industry. Mr Junejo said once developed nations started beaming television programmes over Pakistan via satellite, it would be more difficult for Pakistan TV to compete. It should use its new modern equipment to make more attractive programmes, and consider ways to get its programmes aired

overseas. At the present amongst the recognised shortwave stations, only the US Information Agency's VOA has a regular satellite radio and TV service to Europe, and is exploring ways to cover other continents in the long term. The BBC has recently announced it is investigating ways to do a similar job.

Indonesia's Expansion

Reception of the Voice of Indonesia should improve shortly. A new 250 kilowatt transmitter is being constructed at Padang Cermin in Northern Sumatra, and it should already be testing by now. Until now, two crystal controlled 100 kW transmitters on the outside of the capital of Jakarta have been the sole source of Indonesia's foreign service. Reception has been poor, even in South-East Asia. Presumably, the Voice of Indonesia will be using the new PALAPA satellite to feed the new Sumatra transmitter, in the same way that news from RRI Jakarta is fed to the hundreds of RRI and private stations across this huge country. At present, there appears to be quite a lot of invest-

programmes like those on the INTELSAT service. They require huge dishes (larger than 6 metres) and of course it's an expensive luxury item beyond the average person. Radio, on the other hand, remains cheap. You can find a four band portable with 2 short wave bands and reasonable performance for as little as £10 in down-town Bandung.

WRTH Shifts Address

The editor of the *World Radio TV Handbook* has moved operations from Copenhagen to Amsterdam as of last month. If you receive short or medium wave station data that does not correspond with the listing in the Handbook, then feedback to the new editorial address is appreciated. Write to WRTH, P.O. Box 50558, 1007 DB Amsterdam. The old address in Hvidovre is still valid for book orders and information about the WRTH Newsletter. The latter up-dates the annual Handbook, and includes receiver reviews.



Sony ICF-7600D

ment being made to improve government regional radio and TV services in Indonesia. Bandung started local TV for a few hours a day at the start of 1987, and the audio quality from studios like RRI Yogyakarta compare with any station in Western Europe. The modernisation though hasn't yet reached the headquarters in Jakarta. The foreign service English programmes can be heard in Jakarta on a local f.m. transmitter primarily intended for the diplomatic community. The audio quality is so bad that it would appear the studio equipment dates back to the early days of RRI in the late 1940s.

Travelling across Java in particular, you will see quite a lot of parabolic dishes outside larger homes. These are generally for the reception of foreign TV

Blue Eyes

Daily life in the Chinese province of Guangdong was thrown in confusion a few weeks ago when residents switched on their televisions for the lunchtime newscast. Viewers were shocked and horrified to see licentious pictures never before aired by Chinese television... at least that is how the *China Daily* judges the reaction. The report explains that a 20 minute extract from a film called *The Massage Girl* was broadcast by accident. A studio technician, Feng Boming, was trying to make a copy of the illegally imported video at the regional TV studio. But he was clearly unaware that his cinematographic activities were being watched further afield. Mr Feng, the report concludes, is unable to continue his career from his prison cell! □

KENWOOD R-5000 RECEIVER

Ken Michaelson G3RDG

During the course of the last ten years or so the Trio-Kenwood Corporation have produced the R-600, R-800, R-1000 and the R-2000. Now there is the R-5000, the latest of a very distinguished line of general coverage receivers. It is a general coverage receiver with a frequency range, as standard, of 100kHz to 30MHz. By the incorporation of the v.h.f. converter VC-20, the range is increased to cover the v.h.f. frequencies from 108MHz to 174MHz.

The unit I had for review had this converter already fitted and also the three optional extra filters, the YK-88C c.w. filter, the YK-88SN s.s.b. narrow filter and the YK-88A-1 a.m. filter. In addition the VS-1 voice synthesiser unit was installed. The latter is intended to help the white stick or partially sighted operator, when used in conjunction with a beep tone which is sounded when any of the microswitches are depressed, makes operation a simple matter. The beep tone sends the initial letter of the mode desired in Morse, "L" for lower sideband, etc. The only complication is that "f.m." is sent as F, and "FSK" is sent as R to be intended for the reception of RTTY. Unavoidable, but once known it causes no trouble. Each time a command is accepted by the R-5000 a beep is sounded, normally a short one with the exception that when the M.IN key is pressed for the second time to enter data into a memory channel, a long beep is heard.

There are dual digital v.f.o.s. and one can set them at different frequencies, switching from one to the other with ease by pressing the A/B key. There is a two position key at the right of the main tuning knob labelled HF/VHF which changes the receiver operation between h.f. and v.h.f. In the h.f. position this key functions on the h.f. v.f.o.s. only; in the v.h.f. position it operates on the v.h.f. v.f.o.s. only. In the event of the VC-20 not being fitted, this key is inoperative. One cannot, however, programme one h.f. frequency and one v.h.f. frequency and change between them. It is also possible to make both v.f.o.s. read the same frequency by pressing the A=B key with the same restriction mentioned above. The sensitivity varies from "less than 2.5µV" at the very lowest frequency to "less than 0.25µV" over the 1.8 to 30MHz band and 123MHz to 174MHz in the v.h.f. band. I had no means of checking this sensitivity but as far as operating was concerned, I found it very satisfactory over most of the tuning range but, in my opinion, not as sensitive as it might have been in the range 100-150kHz. This was shown by the higher figure given over the range. The figure given for stability was "less than plus/minus 10 p.p.m." and I had no reason to doubt it. During the time I used the receiver I never had occasion to retune due to drifting, even when copying RTTY or Packet Radio. The frequency readout accuracy was also given the same figure, and was confirmed by listening to the



Ken Michaelson G3RDG gives a user review of Trio-Kenwood's latest offering — the R-5000 general coverage receiver.

frequency standard WWV. The power required is 40 watts at 120/220/240 volts a.c. or 2 amps at 13.8 volts d.c. (using the optional DCK-2 d.c. operation kit). The weight of the unit is 5.6kg. (12.3lbs).

It is quite a small receiver measuring only 279mm wide by 96mm high by 307mm deep, which measurement includes projections, and is very similar in appearance to the TS-440S transceiver made by the same organisation.

The unit operates in five modes a.m. s.s.b. (u.s.b./l.s.b.), c.w., f.s.k. (RTTY) and f.m. When used on a.m., s.s.b., c.w. or f.s.k. it operates as a double conversion superheterodyne, but in the f.m. mode it functions as a triple conversion superheterodyne.

There are two antenna inputs available, 50 ohms unbalanced for coaxial feeders (S0259), and three terminals for a 50/500 ohms wire antenna. The R-5000 has 100 memory channels which store frequency, mode and which of the two antenna connections has been selected.

I'll try and give a brief description of how to "drive" the receiver. At the left hand side of the front panel there are six small key switches, a three way horizontal slide switch and a large push on/push off switch at the top, this is the POWER switch. Below are three small key switches marked, from left to right, VOICE, TIMER and DIM. The VOICE key brings the optional VS-1 into operation. A female voice announces the frequency, e.g. 14.200.200 "one four point two zero zero two zero zero". If this optional unit is not installed, nothing will happen when the key is depressed. The TIMER controls the time operation. When the switch is on, the timer has priority over the POWER switch, so if the receiver will not turn on, check this switch! The R-5000 has two 24 hour clocks each of which can be set

independently. The unit can also be programmed to switch on and switch off at predetermined times. In addition one can arrange to turn external equipment on and off, such as tape recorders etc, using the DIN socket labelled REMOTE on the rear panel. There are two warnings on this point, 1) never apply a.c. voltages to the remote connector, and 2) the relay contact capacity is limited to 30 volts d.c. at 1 amp. The DIM switch reduces the illumination of the display area. Very useful this for operation in the dead of night.

Below are three more push on keyswitches labelled from left to right, ON TIME, OFF TIME and TIME SET. The first two will display the time programmed for the R-5000 to switch on and off. To set the time use the TIME SET switch in conjunction with the HOUR and MINUTE keys. It is interesting to note that you can check the on and off times with the POWER switch either on or off, but you need to have the power on to programme the TIMER. Below these keys are the "record" and "phone" sockets, being a standard 3.5mm and the usual ¼ inch socket respectively.

To the right is an assembly of ten micro switches in two lines of five. These are labelled MODE/KEY and have two functions. The first is for the operator to decide on the particular mode he/she wishes to employ. The other two keys are at the left hand end of the lower line and are ANT 1 and ANT 2. (switching between the low impedance coax input and a high impedance long wire antenna). The keys are also labelled 1 to 5 on the upper line left to right and 6 to 0 on the lower line in the same direction. Keys numbered 7 and 9 also operate the "programme scan". Below this keypad are six horizontal keys in two lines of three.

They operate in the following manner: M>V places the contents of a chosen memory into the v.f.o. and SCAN initiates the scan mode. If this is pressed when using the v.f.o. it will commence the program scan, while if pressed when using the memory it will scan the memory channels. CLEAR cancels memory storage operations or an entry of a frequency when using the ENT key. VFO/M is used to switch between v.f.o. and Memory

KENWOOD R-5000 RECEIVER

operation, M.IN allows data to enter a memory channel and ENT enters directly a frequency keyed out on the numeric keypad, (the MODE/KEY above).

To the right of the tuning control are six keyswitches in three groups of two and marked at the top RESET, HOUR and MINUTE and operate the setting of the clocks. Below are A/B, (transferring the contents of VFO A to VFO B and vice versa) and FREQ.L, this renders the tuning control inoperative. Below this is STEP. This refers to the rate of increase or decrease in frequency when the tuning control is operated and varies with the mode in use. The last key in this assembly is labelled A=B and enables both the v.f.o.s to read the same frequency. In fact, in the unit under review, since it was fitted with the optional VC-20 v.h.f. Converter Unit, there were four effective v.f.o.s, VFO A and VFO B for h.f. and VFO A and VFO B for v.h.f. However, as I mentioned above, it is not possible to combine the two and change between VFO A (h.f.) and VFO B (v.h.f.). To the right of all this are four rotary controls, three of them concentric. Top left is labelled SELECTIVITY and is a five position switch, the positions reading in a clockwise direction being AUTO, N, M1, M2 and W. There are four different bandwidths available if the optional filters are fitted. The normal position for this control is AUTO, and in this position the i.f. bandwidth will then be selected by the receiver for optimum receiver characteristics according to the mode which has been chosen. Manual override is possible by simply rotating the switch to the position of desired selectivity. However, when in the f.m. mode the bandwidth is always 12kHz regardless of the position of the selectivity switch. SQL/NOTCH, is not effective against s.s.b., a.m. or f.m. signals but only operates on single tones such as heterodyne whistles or c.w. An interesting point here. When in the cw mode if the optional YK-88C filter is not fitted the NOTCH control acts as an audio peak filter, and one would adjust the control to give the best signal.

Below these NB/IF SHIFT and AF/RF. The outer ring controls the i.f. shift. This is of very great help in copying signals which have strong QRM on them. In fact it acts like magic and allows you to shift the i.f. passband without changing the actual centre frequency of the receiver. In operation when copying RTTY or FAX it was a simple job to cut out any type of interference and provide my modem with perfect signals for decoding. In fact, on one or two Meteo FAX transmissions, the station sent the information for the FAX picture on one sideband and its identification code in Morse on the other sideband. This would have made it impossible to copy had it not been for the IF SHIFT which when moved in the correct direction, cut out the interfering c.w. just like that. To the right of these two controls is another concentric rotary. This is the RF

and AF gain. The RF gain is controlled by the outer ring and the AF gain by the inner knob. The most important control, to my mind, is the main tuning knob, and this has a very smooth feel about it, making it a pleasure to use. There is provision for "frictional drag" to suit the operator, which is achieved by holding a silver coloured outer ring of the knob and turning the knob against this in either direction.

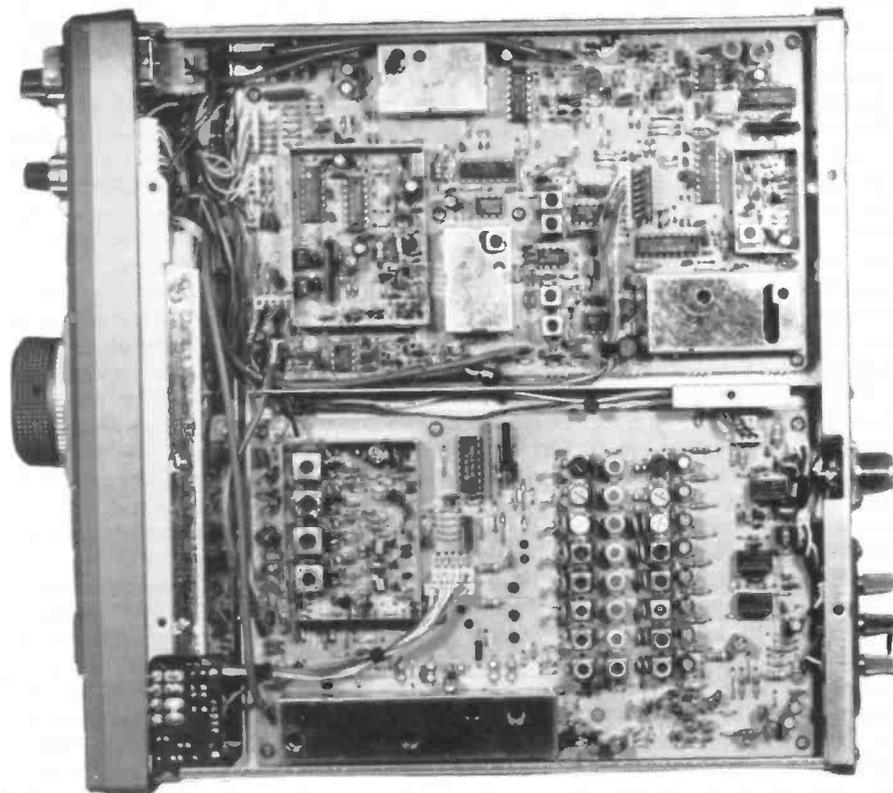
The final batch of controls on the R-5000 is at the bottom right. The HF/VHF switch changes the frequency range to v.h.f. from h.f. and vice versa. This switch does not operate when in the "memory" mode. Below this are two keys labelled across the top DOWN 1MHz UP. When in the v.f.o. mode each pressure of the UP key will increase the frequency readout by 1MHz, the DOWN key having the opposite effect. However, when in the "memory" mode each pressure of the key will call up the next memory channel. Incidentally, there are two other means of changing the memory channels, one of which I have not come across before. When in the memory mode one can turn the tuning control slowly clockwise to access the next channel upwards or turn it slowly anticlockwise to recall the next channel downwards. Most ingenious this. The third method, of course, is to use the keypad.

The last four "push on/push off" switches are, from left to right, Noise Blanker 1, Noise Blanker 2, Notch, and a.g.c. (press for fast out for slow). Noise Blanker 1 is intended for pulse type noises, (cars etc) while Noise Blanker 2 is designed to reduce "woodpecker" type radar noise.

One should note that neither of the noise blanker circuits are operative when in the f.m. mode. The last control on the front panel is the r.f. attenuator. As mentioned, it is a four-position rotary switch giving attenuation of 10dB, 20dB and 30dB in its three positions with an OFF position when pointing to 12 o'clock. Normally this is left switched off but it is brought into use when listening to, say, a powerful broadcast station.

The R-5000 has an excellent display area situated along the top of the unit and measuring approximately 160mm long by 10mm high. It includes the S-meter on the left which, in addition to being calibrated in "S" units up to 60dB over S9, shows the actual signal strength in μ V up to S9 and then mV to 60dB over S9. There is a seven-digit fluorescent display.

I used the R-5000 for some weeks and was impressed with its performance. I used it in the evenings to winkle out some weak signals and was able to do that without too much trouble using the available facilities. I do not have a high gain antenna, it being a 3.5MHz trap dipole but even with this, I was able to resolve signals which when I first tuned them in sounded too weak to decipher. The i.f. shift had a lot to do with it, but when added to all the other items available to me made reception relatively easy. The quality of the 100mm diameter top mounted speaker was very adequate for normal listening of commercial stations, and gave crisp clear reproduction of all the amateur transmissions which were monitored. The R-5000 was also used for the reception of FAX weather broadcasts, where perfect stability is a must. In all cases the unit



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432-17X	17 Ele Crossed	2.2m	13.4 dBd	£56.55	A
432-17T	17 Ele Long	2.9m	15.0 dBd	£45.08	A
2M					
144-5	5 Ele	1.8m	9.2 dBd	£22.48	A
144-7T	7 Ele	1.6m	10.0 dBd	£27.77	A
144-8T	8 Ele Long	2.45m	11.0 dBd	£35.95	A
144-14T	14 Ele	4.5m	13.0 dBd	£53.72	A
144-19T	19 Ele	6.57m	14.2 dBd	£64.26	A
144-6X	6 Ele Crossed	2.5m	10.2 dBd	£45.71	A
144-GP	Ground Plane		Unity	£16.57	B
4M					
70/3	3 Ele	1.7m	7.1 dBd	£34.64	C
70/5	5 Ele	3.45m	9.2 dBd	£52.60	C
6M					
50/2	2 Ele		4.7 dBd	£32.00	A
50/3	3 Ele	2.39m	7.1 dBd	£39.95	A
50/5	5 Ele	4.77m	9.2 dBd	£59.90	A
CK50	50/2-50/3 Conversion kit			£11.50	B

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SF4 432	Stacking Frame	£29.75	B

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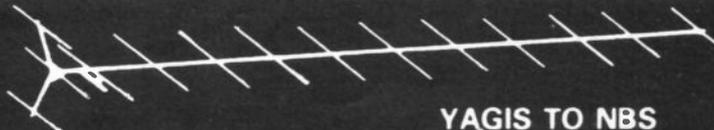
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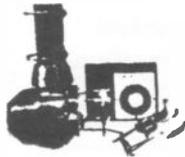
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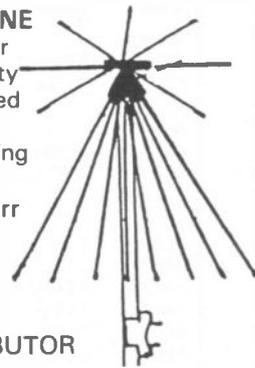


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performed perfectly. One thing that did disturb me was the generation of heat by the R-5000. After being in operation for some two or three hours the top cover reached a temperature of nearly 30 degrees Celsius and part of the rear panel was almost too hot to touch. However, it must be normal as I used the receiver for nearly a month and it was operating in the same manner when I returned it as it was when I originally received it. In passing, I must comment on the finish of the interior. The whole assembly, when the top cover was lifted off, was a picture. Gleaming plated screening and circuit boards and components all having the appearance of being carefully put together. Quite different to some I have seen.

Criticisms. Well, it is difficult to fault the R-5000, but I did find a recess in the tuning control for my finger, so that the knob could be spun round quickly. My main dislike was that of the type of microswitches used. They are the same as those on the TS-440S and I find it difficult to use a key when I have to depress it with my finger nail! Perhaps this is a personal quirk, but I do know that I found them awkward to use. I also think that the

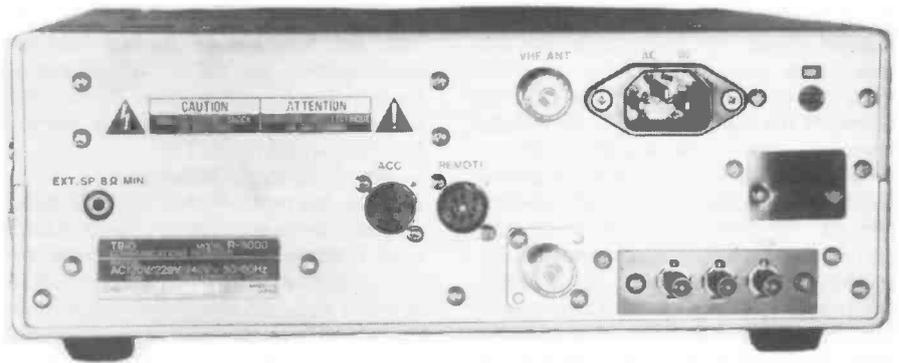
numbers on the MODE/KEY pad should be lettered in a more legible style. I found that I had to peer at the key to make sure what number it was that I was attempting to put into the unit! The dual operation of the keys, too, could cause confusion. It was necessary to concentrate when using the keypad. Apart from those few points I thoroughly enjoyed the operating of the receiver. It is a worthy successor to the previous models.

Prices of the R-5000 and the various ancillary units are as follows. All prices include VAT and are correct at the time of

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Thanks are due to **Low Electronics Ltd, Chesterfield Road, Matlock, Derbyshire DE4 5LE**, (telephone: 0629 2817, 2430, 4057, 4995) for the loan of the R-5000 for the purpose of this review.

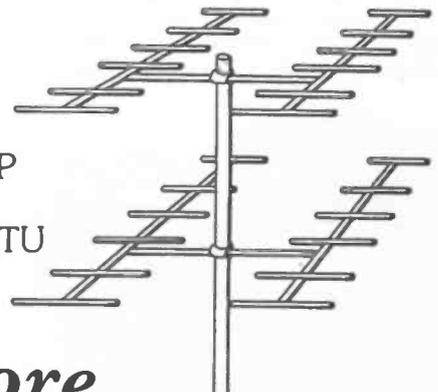
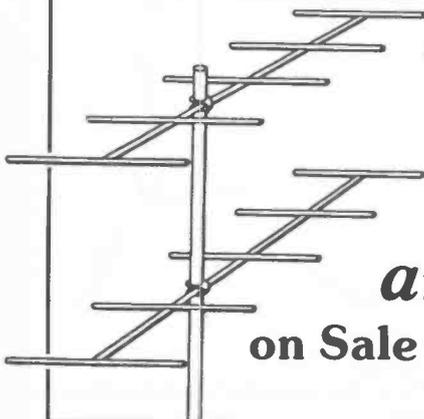


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AERONAUTICAL RADIO

Godfrey Manning BSc MB BS G4GLM

Part 2

Aeronautical communications were dealt with in Part 1 and reference was made to the v.h.f. band. The navigation part of this band (108-117.950MHz) contains two types of navigational facility on 50kHz channels and these are v.h.f. omnidirectional radio range (v.o.r.) radio beacons and one part (the localiser) of the instrument landing system (i.l.s.). In this article v.o.r. will be described along with the related distance measuring equipment (d.m.e.).

Non-directional Beacons

But first a simpler facility, the non-directional beacon (n.d.b.), will be considered. These older devices operate in the low- and medium-frequency bands (190-1750kHz approximately) and although the current trend is to replace these by v.o.r.s the n.d.b. is still in widespread use. An example is the Epsom n.d.b. whose callsign, EPM (dit, di-dah-dah-dit, dah-dah) in Morse code, can be heard using a conventional amplitude-modulated receiver tuned to 316kHz. Alternatively, even a car radio can receive the CHT (dah-di-dah-dit, di-di-di-dit, dah) identification from the Chiltern beacon on 279kHz.

Non-directional beacons are non-directional in the sense that their signal is identical no matter which point of the compass you are receiving it from (ignoring the effects of terrain on propagation). On board the aircraft the n.d.b. receiver incorporates the principles of direction finding which are well known to radio enthusiasts. As in the v.h.f. equipment described in Part 1 the n.d.b. receiver is actually in a radio rack in the case of larger aircraft, the flight deck unit being just a remote-control box. This controller (Fig. 2.1) is in fact labelled a.d.f. since the entire system forms an automatic direction finder. The frequency, which as usual appears in the window of the controller having been set by the (three) adjacent large knobs, is in kHz, the example in the figure being tuned to Epsom. Two antennas are needed.

For direction finding a loop antenna, mounted in the vertical plane, can be seen prominently mounted on the fuselage of

The first part of this series looked at communications between aircraft and the ground, and in this part the author describes the various navigational systems and beacons used to guide aircraft safely around the skies.

some older aircraft types. Later, such as on the venerable Douglas DC-3, the loop antenna would be found in a streamlined bubble suspended under the nose. Typical current airliners suppress their antennas into the fuselage to further improve streamlining, the DC-9, for example, having barely perceptible flat-topped bulges on top of the fuselage slightly behind the cockpit.

Also required is a sense antenna which resolves the problem that the loop alone can only define an imaginary line on which both beacon and receiver lie. From the aircraft's point of view the beacon could lie in either direction along that line, e.g. to the left or right; by comparing the signal received on both loop and sense antennas the bearing of the beacon from the aircraft can be found without ambiguity. On the DC-3 the sense antenna is a short, horizontal wire stretched beneath the nose whereas the DC-9's sense antennas are almost impossible to see, being found under the fuselage level with both leading and trailing edges of the wings.

Whilst in flight the a.d.f. is used to indicate the magnetic bearing of the currently-tuned n.d.b. from the aircraft. A special case of this function is where the beacon lies on the extended centre-line of a runway and hence may be used to guide the aircraft on to an i.l.s. approach. When operating in this manner the beacon is called a locator; furthermore, if the locator is sited in the same place as the i.l.s. outer marker (to be described in Part 3) then the entire facility is described as a locator outer marker (l.o.m.) It is important to note that the a.d.f./n.d.b. system cannot measure the distance between aircraft and beacon.

Direction Indicators

In the cockpit the directional display from the a.d.f. appears on an instrument known as a radio magnetic indicator (r.m.i.) or, sometimes, radio magnetic direction indicator (r.m.d.i.). This indicator consists of a compass on which two extra pointers are superimposed (Fig. 2.2.). On the periphery of the dial face are eight arrowheads disposed at 45° intervals, the one at the 12 o'clock position being larger than the others. This larger arrowhead is known as a "lubber line" and it represents the aircraft's heading, that is, the magnetic direction in which the aircraft's nose is pointing; this need not be the same as the track of the aircraft over the ground, due to the effects of wind and side-drift. The detection of magnetic north, which is used for indicating the heading, involves a device known as a flux gate which comprises a delicate set of electro-magnetic coils suspended in a wing-tip, but more detailed consideration of this is beyond the scope of this article. As in all directional instruments, the displayed information is shown relative to the aircraft's heading and hence the lubber line remains fixed at the 12 o'clock position whilst the compass card rotates underneath it. When looking at the r.m.i. display imagine the dial to be a plan view with the aircraft as its centre; the world revolves around the aircraft! The two extra pointers each show the relative direction of one n.d.b. The r.m.i. shown in Fig. 2.2. is therefore indicating a heading of 150° (note that the numbers on the compass card are in tens of degrees) and the two beacon pointers are showing that the n.d.b. tuned in on Set 1 is directly to the aircraft's right on a bearing of 240° whilst the n.d.b. on Set 2 is behind the aircraft and slightly to the left on a bearing of 010°. A plan view of the aircraft in this situation is shown as Fig. 2.3.

Considering the beacon pointers in more detail, one is mounted slightly in front of the other and consists of a single line which in Fig. 2.2 appears broken but on other examples may be a continuous



Fig. 2.1: Typical a.d.f. radio controller.



Fig. 2.2: Typical radio magnetic indicator.

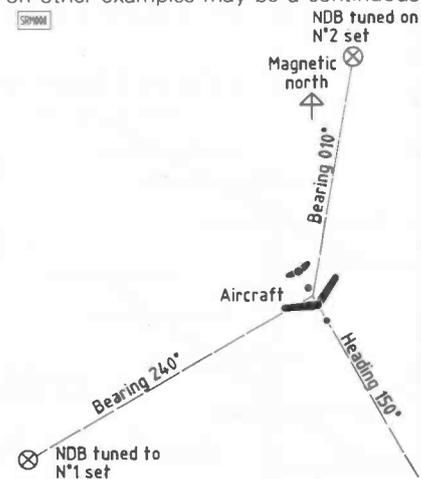


Fig. 2.3: Plan view of an aircraft and two n.d.b.s.

red line. The rear pointer in Fig. 2.2 is an arrow with two stripes to its body and in other cases may be coloured green. As just described, the single-line pointer is fed from Set 1 and the other pointer from Set 2 in the case of an aircraft with two a.d.f. sets. As an alternative, some light aircraft have a single-pointer display with a compass card which must be rotated manually as no automatic north-seeking equipment is fitted. Another variation found on some larger aircraft is to superimpose the coloured heads of the two beacon pointers around the outside of the compass card of the horizontal situation indicator (h.s.i.), an instrument which is further described below.

In operation the r.m.i. provides an indication of the aircraft's heading. Also the directions of the n.d.b.s are shown relative to this heading, i.e. if one beacon physically lies over the pilot's left shoulder then the corresponding pointer will also lie horizontally across the face of the r.m.i. pointing to the left (as if indicating 9 o'clock). Additionally the compass bearing over which the head of the pointer lies is the correct magnetic bearing of beacon from aircraft. Imagine standing in the middle of a field and noting that a particular oak tree is due south (180°) of you. Now, even if you turn around whilst standing on the same spot that tree will remain due south of you. What has changed in fact is your heading, i.e. the way in which your nose is facing.

Now pretend that you are an aircraft and that the tree is an n.d.b. As the aircraft turns the n.d.b. may appear behind, in front, or to the side, etc., of it. During these turns the magnetic north pole likewise moves around the aircraft as seen from the pilot's point of view. As seen on the r.m.i. dial, both the beacon pointer and the compass card rotated together during the turn; the head of the beacon pointer arrow remained overlying the appropriate bearing number on the compass card. Let us suppose that the pilot wishes to fly directly towards the beacon; he turns the aircraft until the beacon arrow points vertically up the dial of the r.m.i., at which moment the aircraft's heading becomes the same as the bearing of the beacon from the aircraft. This description ignores the effect of wind. As pilots would say, "still air is assumed."

In two special situations the r.m.i. beacon needles can behave in a particular, not very obvious, way. If the a.d.f. receiver is not tuned to an n.d.b. or alternatively if the previously-tuned signal is lost then the beacon needle will start to rotate randomly. It can do almost anything; complete or half turns, or even remain still despite a change of heading. One cause of this is flying past a mountain that now begins to "shadow" the n.d.b. signal from the aircraft. Unfortunately the other situation in which this erratic

indication occurs is when the aircraft directly overflies the n.d.b. facility — a common navigational procedure. The aircraft flies through the so-called "cone of confusion," that is, the space above the n.d.b. where the beacon needles are caused to behave erratically. If loss of signal is mistaken for overflying the facility then the pilot might wrongly conclude that he has already arrived at an intended navigational point and might commence a turn, only to fly in to the side of a mountain! To avoid this, the signal must be listened to by selecting the a.d.f. receiver on the station box (see Part 1). In the cone of confusion, a clear Morse identification will be heard whereas there will be no such call sign audible in the case of loss of signal. Any interference causing erratic r.m.i. needle behaviour will also be audible.

VOR

Next the more sophisticated v.o.r. beacon will be considered. Again, the beacon's position can be shown on an r.m.i. in the same way as that of an n.d.b. in which case it will be necessary to provide a switch, often built in to the r.m.i. instrument itself, to connect each pointer alternatively to the a.d.f. or v.o.r. receiver. Extra information though is also available from the v.o.r. facility and in larger aircraft is displayed on the h.s.i. or, in light aircraft, on a specialised v.o.r. indicator. The v.h.f. receiver and antenna were described in Part 1; for example the v.o.r. antenna on the British Aerospace Advanced Turbo-Prop (ATP) aircraft can be seen as a small horizontal protuberance below the captain's (left-hand side) cockpit window.

A v.o.r. beacon simultaneously transmits two signals on the same frequency. At the centre of the beacon's antenna complex is a single radiator transmitting a signal that is frequency-modulated by 30Hz. Surrounding this is a circle of phased antennas whose transmission is amplitude-modulated, also at 30Hz. On board the aircraft the phase of the two received signals is compared and depends upon the relative bearing of aircraft from beacon. If the aircraft is due north of the v.o.r. beacon then the two signals will be received in phase; when the aircraft is due east of the v.o.r. the phase

difference is 90°; when due south it will be 180° and so on for any other bearing of aircraft from beacon. An example of this facility is the v.o.r. close to Newcastle airport which is on 113.5MHz with a Morse identification of NEW (dah-dit, dit, di-dah-dah).

Radials

In operation the v.o.r. beacon is imagined to transmit signals along spokes that radiate outwards with the beacon at their centre, and called radials. Each radial is known by its bearing from the beacon. For example, if an aircraft is due east of the v.o.r. facility then it is also on the 090° radial (Fig. 2.4), when considering the bearing of aircraft from beacon. This would be appropriate if the aircraft is flying away from the beacon, so the v.o.r. indicator on the flight deck either has a flag that appears labelled FROM or else has an arrowhead pointing away from the beacon. Conversely, this same radial could be used if the aircraft is to be flown directly towards the v.o.r. and in this case, since the aircraft is arriving at the beacon from the east, a westerly heading (270°) will be necessary and either the indicator flag will now show TO or the arrowhead will reverse.

The two instruments mentioned before for indicating v.o.r. information are the horizontal situation indicator on larger aircraft (sometimes known as a horizontal station indicator or a flight compass) and the simpler v.o.r. indicator on light aircraft. The h.s.i. has the same lubber line and rotating compass card as the r.m.i. and again represents a plan view with the aircraft at the centre of the dial and heading towards 12 o'clock. Of course, the headings shown on both h.s.i. and r.m.i. ought to agree and this is a valid test of the correct functioning of these instruments. Airliners have dual systems, with the captain's h.s.i. fed from the same heading reference as the first officer's r.m.i.; hence, the captain's r.m.i. and first officer's h.s.i. are fed from a second, separate heading reference. Safety cross-checks are thus possible and the double redundancy inherent in this arrangement is a further safety factor.

The v.o.r. display, however, is quite different on the h.s.i. compared to the r.m.i. Only one v.o.r. beacon can be represented at a time on the h.s.i., and the selected radial is shown as a white line known as the beam bar (it is controlled by the v.o.r.'s radio beams). This line can move from side to side on its carriage but also the carriage itself can rotate. The required radial is selected by turning a knob either on the h.s.i. or the auto-pilot controller; the resulting bearing is displayed as three digits in a window. The position of this radial with respect to the aircraft is then displayed by the beam bar, just as if a map had been drawn with the aircraft at its centre. An arrowhead at either end of the beam bar normally

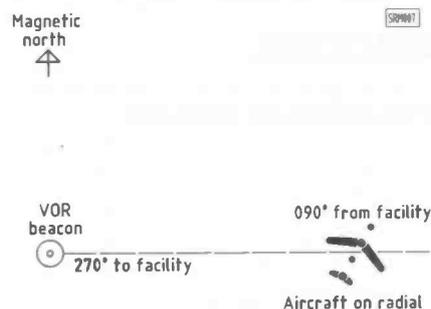


Fig. 2.4: Aircraft due east of a v.o.r. beacon.

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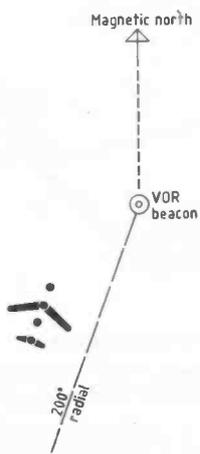
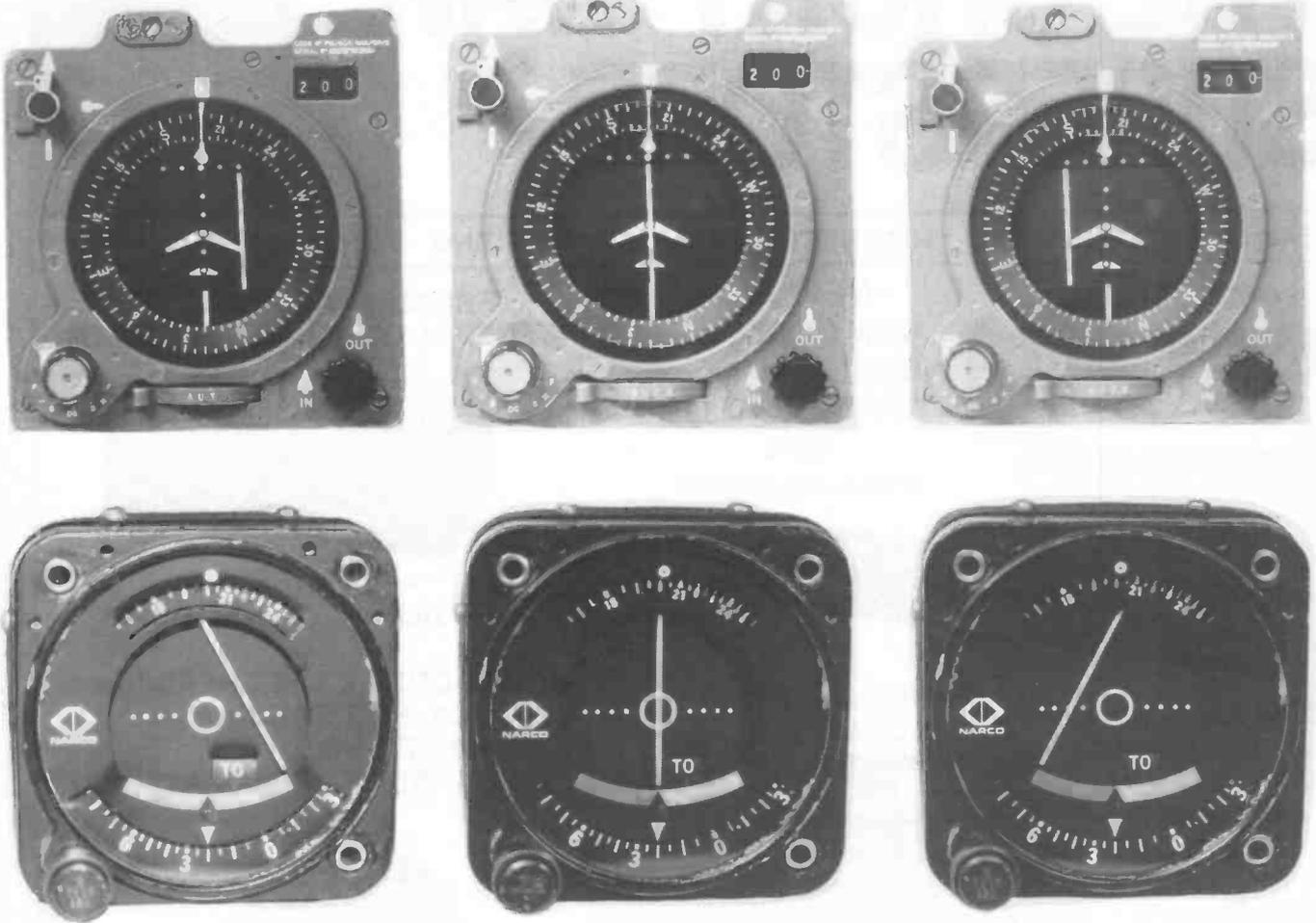
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AERONAUTICAL RADIO

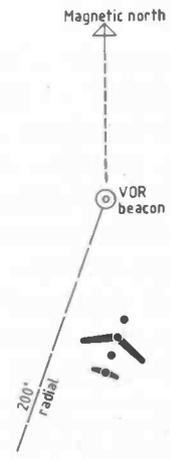
Fig. 2.5: Three situations using v.o.r.



(Left) Radial to right of aircraft;



(Centre) Aircraft on radial;



(Right) Radial to left of aircraft.

indicates the direction in which the beacon lies, thereby distinguishing the TO and FROM conditions although the example h.s.i. shown in Fig. 2.5 is unfortunately not equipped with such an arrow. Note the bearing of the selected radial in the window, top right of the instrument in the figure. When overflying a v.o.r. beacon, a "cone of confusion" effect is again seen on the r.m.i. and it is possible that the h.s.i.'s beam bar will also exhibit erratic

behaviour, with, in some examples, a red warning flag marked VOR swinging momentarily in to view across the instrument's dial face.

The light aircraft implementation of v.o.r. indicator, also seen in Fig. 2.5, does not include heading information. A compass-like scale is provided for selecting the required radial by turning a knob typically marked OBS (omni bearing selector). When the aircraft is flying along

the selected radial the pointer is centred and lies vertically. This pointer is pivoted at the top and so its lower end can swing either to the left to indicate that the radial is on the aircraft's left, or conversely to the right. To discover along which radial the aircraft is presently flying the OBS knob is turned until the pointer centres and then the bearing may be read off the scale. An indicator flag shows FROM or TO or OFF as appropriate.

AERONAUTICAL RADIO

The use of the v.o.r. system is clarified by Fig. 2.5 which shows an aircraft attempting to fly to the beacon on the 200° radial. Three cases are shown: aircraft not on radial, the radial being to the aircraft's right; aircraft exactly on radial; and radial to the aircraft's left. In each case, Fig. 2.5 show a plan view of the situation along with the indications expected of both an h.s.i. and a simple v.o.r. indicator at that moment. Notice that it is most convenient in this example to fly towards the v.o.r. with the simple indicator set to the 020° radial; this is the reciprocal of 200°, i.e. it is the same radial but in the opposite direction. This causes the TO indication to appear on the flag. Had the aircraft been flying away from the v.o.r. along this radial, then 200° would have been selected and the FROM indication would have been shown by the flag. The way in which the aircraft is flown in order to capture a given radial is the same technique as required for establishing on an i.l.s. localiser and is explained more fully in Part 3.

Distance Measuring

The v.o.r. system, just as the a.d.f. cannot give distance between beacon and aircraft but a related device, the distance measuring equipment (d.m.e.) can. It is usual for the ground-based d.m.e. station to be sited at the same place as a v.o.r.; not only are the two facilities co-located, but setting the v.o.r. frequency on the nav. set controller (see Part 1) will automatically select the paired-channel d.m.e. frequency as well. The Newcastle v.o.r. is co-located with a d.m.e. which is on Channel 82. The d.m.e. is a transponder system with the aircraft sending out a pulsed signal and timing how long it takes for the ground station's reply to be received. Since several aircraft may use the same ground station at once,

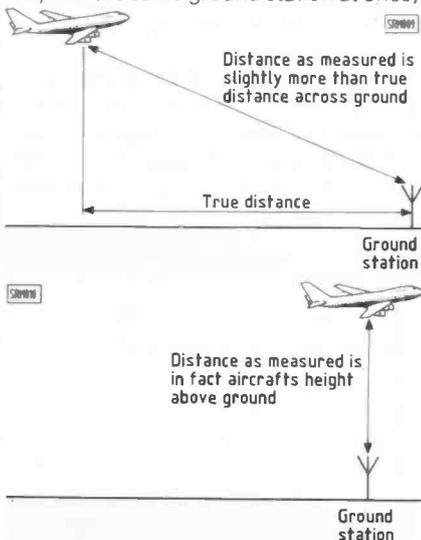


Fig. 2.7: Showing that d.m.e. measures in straight lines. (Top) Aircraft at a distance from the ground station; (Bottom) Aircraft directly overhead the ground station.

Fig. 2.6: Typical d.m.e. display.



the requests and replies contain a code to identify which aircraft is involved. The velocity of radio waves in air is known, as is the response time of the ground station; since distance = velocity x time the straight-line distance between aircraft and ground station can be computed. This distance is displayed in a manner resembling a car odometer (Fig. 2.6) either on a dedicated instrument as illustrated or else as part of the h.s.i.; the measurement is shown to the nearest one-tenth of a nautical mile. Most displays include a brightly-coloured flag that covers up the numbers if the signal is lost. There are 126 channels for d.m.e. in the range 962-1213MHz with 500kHz spacing. On Channel 1 the ground-to-air frequency is 962MHz and the frequency for the reverse direction is 1025MHz, the frequencies for the two directions always being separated by 63MHz. Military users are still equipped with an older version of d.m.e. known as TACAN (Tactical Air Navigation).

That d.m.e. is truly a straight-line measurement is seen by Fig. 2.7. When the aircraft is distant from the ground station, the direct line from aircraft to station is only slightly greater than the equivalent track projected onto the ground. The most helpful measurement would be obtained by raising the ground station on a very tall pole until it was at the same altitude as the aircraft; that this is not possible results in the slight over-reading of the distance. If instead the aircraft over-

flies the ground station then the d.m.e. indication will be the same as the aircraft's height above the station.

This is not the same as altitude since the station itself might be on high ground. If the aircraft is at an altitude of 36 000 feet (ie FL360, see Part 1) then the d.m.e. indication will be just short of 6 nautical miles on overflying a sea-level located ground station (one international nautical mile = 6076 feet (1852m) irrespective of current latitude). On approach to the d.m.e. facility, the indication will reduce to about 6 and then begin to increase again as the aircraft overflies and continues past.

A further use of d.m.e. is to time one minute on a stop watch and observe the distance change during this period. Because speed = distance ÷ time an approximation of ground speed may be obtained and, when compared to true air speed, the effects of wind may be ascertained. To be at all accurate the aircraft must be flying on a track that is directly either towards or away from the d.m.e. ground station; also, the aircraft must not be too close to the station during the measurement because of the error mentioned above. A more accurate estimation of ground speed is provided by Doppler as will be described in Part 3.

This second part has described the principal *en-route* radio navigation aids available to aircraft. The concluding part will explain the workings of the i.l.s. as well as some other airborne applications of radio. I am always willing to assist with queries on aircraft equipment and visitors to my small collection of such items are welcome by prior arrangement. Also, donations of unwanted, old, or broken aircraft equipment, instruments and manuals are always appreciated, no matter how small and insignificant they may appear. □



Fig. 2.8: London's Gatwick Airport showing "The Satellite" (Gatwick Airport Limited)

Errata — Part 1 p32, column 1, para. 4, line 29. Smoke goggles are *separate*, not *serated*. P37, final column, para. 2, line 8 should read: "... on the flight deck, a chime sounds and a light flashes to alert the crew *that they must answer the call*. With this equipment, there is no need to tire the crew members by making them listen to all other aircraft's transmissions on a long flight ..."

VALVES AND RECEIVERS

John Roscoe G4QK

The response to my article on one-valve transmitters (SWM Dec '85) suggests that there are many valves still lurking in junk boxes, and many people wondering what they can do with them. Inevitably the answer very often is, not much — apart, perhaps, from enshrining them in a museum (any offers for a really rare 814?). However, it would be a pity to throw them out without first pausing to consider their potential uses. Because of the sheer numbers produced, American valves have survived in greater quantities than ours, so let's start by looking at them.

Putting the clock back 50 years (surely enough?), American valves used 2.5V heaters, generally on a UX 6-pin base. The HRO receiver of that date, which for many years was the only general-coverage receiver designed specifically with amateur requirements (L/C ratio and bandwidth) in mind, used four type 58 valves, two type 57s, one 2B7 and one 2A5. Shortly afterwards this range was replaced by 6.3V valves, and the HRO changed to the otherwise identical 6D6, 6C6, 6B7 and type 42. The only 2.5V valve I have ever found any use for is the 2A3 triode: a pair of these will sit across the 5V rectifier winding of a mains transformer to provide a simple unbalanced variable-voltage h.t. supply — see Fig. 1. (Astute readers may recall seeing this circuit in *SWM* some 35 years ago.) In my opinion all other 2.5V valves should be thrown away — including the 866 mercury-vapour rectifier; the Mullard RG1-240A is a much better valve.

The next development was the introduction of the "international" octal base, a big improvement — or was it? Close inspection will show that the 6J7 is just another 6C6, the 6B7 becomes the 6B8, the 6F6 is a direct replacement for the type 42 though given a higher rating, and the 6K7 differs little from the 6D6; and so on for the rest of the range. The octal series proliferated greatly, with the introduction of higher heater voltages and of single-ended construction. The valves were made in three varieties; metal, glass (G) and small glass (GT). Not all the variations exist as metal valves disappeared off the scene fairly early. On the whole the GT valves are the best, as the larger glass ones contain too much of the circuit inside. The sealing used in the base of the metal valves was not too clever and affected performance above 15MHz, so where the glass counterparts exist the metal ones are best avoided. (Yes, I know the metal 6L6 produced bags of r.f. in the B2 spy transmitter). There are limitations to the amount of power that a small valve can handle: a Japanese "807GT" tended to overheat and go soft.

About half-a-dozen of the early American television valves were only produced with metal envelopes, and of these the 6AG7 deserves honourable mention for having plenty of slope and a low grid/anode capacity. Fairly late on,

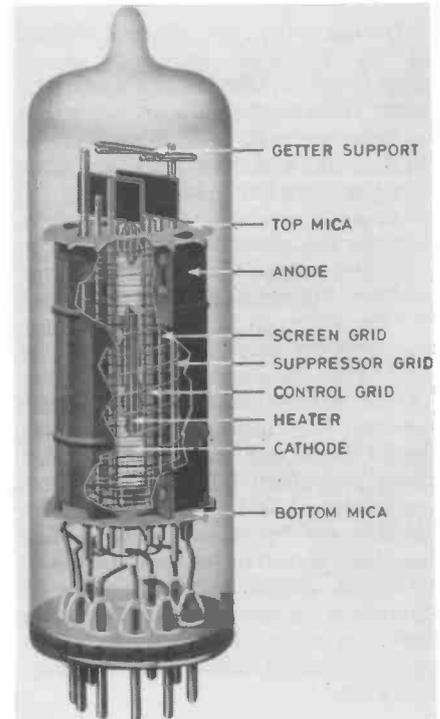
A look at some of the more common types of valve to have survived the last half-century — some useful, but others fit only for the dustbin! Plus ideas and hints on how to keep going the receivers they powered.

two octal valves with some performance were introduced, the 6SG7 and 6SH7. Next there were the double triodes 6SL7 and 6SN7, used in quantities in calculating engines like *Deuce* that kept the computer room roofs at the NPL and NEL permanently free from snow! These double triodes are useful for combining an audio stage with a b.f.o. or sidetone oscillator, for switching and el-bugs, and for the odd multivibrator.

Thus in many an odd corner lies part of the remainder of large quantities of octal-based valves — millions in the case of the 6J7G, 6K7G and 6K8. While they are perfectly satisfactory for a.f. use, judged by later developments their performance at r.f. is decidedly mediocre. But they do have some advantages: they, and the earlier UX series, have nice fat pins that make excellent contact with the valveholder. You never have any trouble in that area with an 807 or 6146.

In the meantime, what was happening on the British scene? Our valves, of course, used 4V heaters and were resolutely protected against hypothermia. While the American 2.5V valves required 2.5 watts on the heater, and the 6.3V ones 1.89W, our otherwise similar valves generally demanded 4W (I have never discovered why!). Eventually Mullard produced 6.3V, 1.26W valves, but by then the Americans were probably worried about the performance of car radios on flattish 6V batteries and did not follow suit; American cars — and BMW — were remarkably slow in adopting 12V electrics. The point is only of importance, of course, as far as portable gear is concerned.

Then along came radar and with it the



EL84 output pentode rated for 12W anode dissipation, primarily intended for use in a.c. mains operated equipment.

EF50 by the bucketful, to be followed by the EF54 and EC52. The r.f. performance of these valves really was an eye-opener to most of us, as at 30MHz they were just ticking over. Early in 1948 I built a driver unit using an EF50 v.f.o. followed by EF50 frequency multipliers, rather than the fashionable 6V6 or 6L6, and wrote it up for this journal. It worked very well, though it was a little less broad-band than I had expected, and I soon found that an EF50 tripler could drive an 807 red hot. It took a little longer to find out that, by good fortune, I had used the one variety of valveholder that could make contact with all 9 pins of the valve at the same time; it was really this problem that led to the downfall of the valve.

There were numerous blind alleys that led nowhere (remember the acorn, Nuvistor and secondary emission?), but there are a couple we could look at. The first is the "Mazda octal", introduced

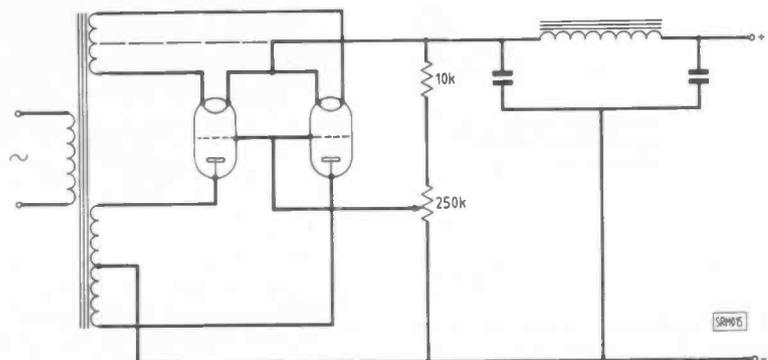


Fig. 1

VALVES AND RECEIVERS

42▷

because the valve stems used by Mazda, on which the whole assembly was built and which were sealed off after the gases were pumped out, were too fat to fit into the international octal spigot. Mazda therefore came up with a slightly larger, and misleadingly similar, spigot, together with different pin spacing and connections. (*Wireless World* asked them why had they not adopted triangular pins set in an oval base). During the last war the WRNS retaliated by producing a breed of radio mechanics with strong enough wrists to insert an ordinary octal valve into a Mazda octal socket. In spite of the SP61, Mazda octal valves should be discarded on sight. The second is the loctal range: these would be entirely forgettable, except that the neat little B2 receiver used four loctal valves, two 7Q7s and two 7R7s.

Receivers

So much for valves. How about the receivers that used them? Numerous articles have been written on how to improve the performance of various models, but rather fewer on how to get them to work when the valves you want are unobtainable. It is useful to have some idea of the relative advantages of various types of valve, and this information is also helpful when contemplating building a

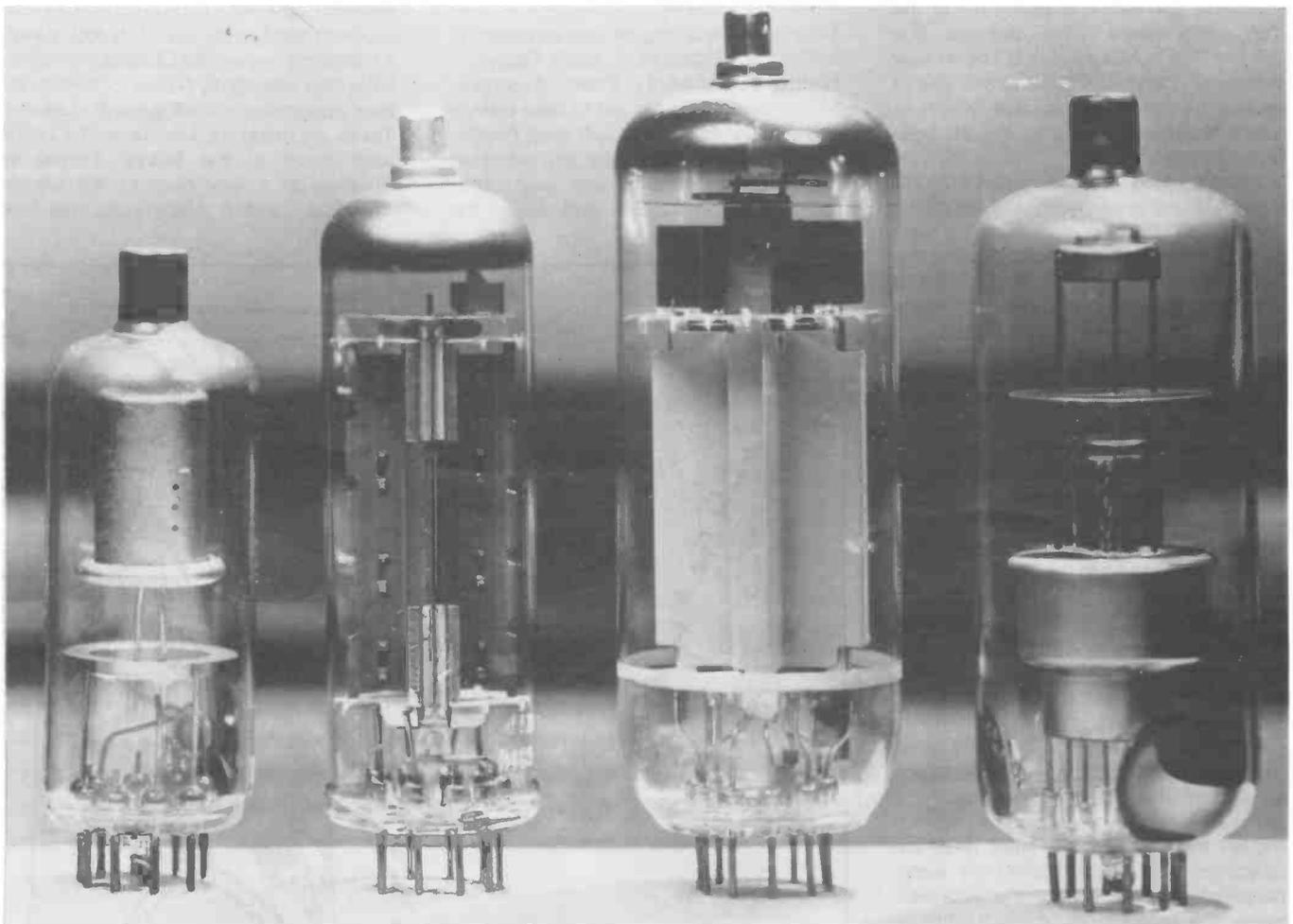


Mullard valves for audio amplifiers. EF86, ECC81, ECC84, EL84 and EZ80.

receiver from scratch. As an example, the HRO reached this country with 2.5V valves (not many of them, as the price of the receiver with a full set of coils and p.s.u. was the equivalent of a year's salary for a young man). They are easy enough to convert to 6.3V as the only components requiring alteration are the centre-tapped "humdinger" across the heater supply and the pilot bulbs, which burn out. The r.f. valveholders are mounted at a different angle, but the equivalent 6.3V versions of

the valves are a plug-in substitution — if you can get hold of them. If you can't you can either put in the nearest octal equivalent or consider trying to hot-up the performance of the set. One fatal solution is to put high-slope valves in the r.f. and i.f. stages, when the receiver will oscillate uncontrollably; the screening simply isn't adequate.

How did these receivers perform when they were new? My friend G4AB saw in the year 1939 by picking up WLW, KDKA,



Examples from the first range of valves to be designed specifically to meet the exacting conditions encountered in the timebase and e.h.t. circuits of colour receivers, GY501, PY500, PL509 and PD500. (Photographs courtesy Mullard Ltd.)

QTO LONDON

Leonard Moss

Part 2

Change Ships

No sooner had the ship gone alongside in Singapore, than I received instructions to pack my gear and report to the Company's office ashore. Here the staff clerk told me that I would be going as passenger round to a place called Balik Papan, there to relieve an operator on a tanker who was due for home leave. In the meantime he had booked me into the Adelphi Hotel. After being shown to my room I set about discovering just where this place Balik Papan was. From a map borrowed from the desk clerk I found that Balik Papan was an oil port on the east coast of Dutch Borneo just south of the line.

Two days later I boarded a small Dutch inter island steamer for Balik Papan. Amongst the twenty or so European passengers was a delightful little Dutch school mistress. Blonde and petite and perhaps a couple of years older than myself, she was returning to Makassar (Ujung Pandang) after holidaying in Singapore. I was completely captivated. Why she latched onto me I shall never know, perhaps I was the only other passenger in her age group. It was all very innocent of course. I can still recall how we marched off the effects of the huge dinners of rijstafel and nasigoreng along the deck, and gazed over the rail at the dark sullen waters of the Java Sea. She left the ship in Makassar and I never saw her again. I only hope that she was able to escape the Japanese holocaust, which, in a few short years, was to engulf these beautiful islands.

Disembarking in Balik Papan I found that my new ship was not due to leave for a few days. In the meantime I was accommodated in the club, passing the hours pleasantly enough swimming and watching the nightly outdoor cinema show.

The SS Volsella

A telephone call informed me that my ship was alongside. To my surprise I discovered the SS *Volsella* was not a tanker in the accepted sense, but was a case oil carrier, her cargo consisting entirely of oil in 45 gallon drums and 4 gallon tins. A small well found steamer of 2100 tons belonging to the Shell Company with a compliment of nine Europeans (Master and eight officers) and 30 odd Chinese ratings. After a hurried hand over the former RO departed down the gangway to catch that night's steamer for Singapore and home.

Alone at last I found that my new "domain" consisted of a half kW rotary spark transmitter, a fairly modern receiver, 250 watt emergency quenched gap set and an auto alarm. This latter piece of equipment had been installed for some inexplicable reason, as the ship was well below the tonnage at which its fitting became mandatory. For those unfamiliar with this apparatus, I should explain that it

Last month we left the author on board the P & O ship Ranpura as 3rd Radio Officer, wondering whether he would be transferred again when he arrived at Singapore. The story continues as he sets off as a passenger for Balik Papan.

is a means by which a 24 hour watch on the distress frequency can be maintained while only employing one operator. It consisted of a broadly tuned receiver fixed to accept a band of frequencies from about 490 to 510kHz. The receiver output was fed into a selector unit mainly made up of a series of relays. At sea the actual distress signal (SOS) is preceded by the transmission of 12 four second dashes with a one second spacing. In theory the first four dashes should be sufficient to activate the apparatus and cause bells to ring on the bridge and in the operator's cabin. In practice the heavy volume of signalling on 500kHz and bursts of static can and do activate the device erroneously.

Regular Trips

Volsella had four regular runs all based on loading in Singapore or Balak Papan — Formosa (Taiwan), West Australia, Madagascar and a run out to New Guinea and the islands of the south west Pacific. Three days after joining the ship we sailed for Formosa. Making our way north through the Sulu Sea and along the

western seaboard of the Philippines, 500kHz was full of American call signs and bug keys. The m.f. broadcast bands hitherto as quiet as the grave were alive with catchy jingles and commercials. Meanwhile I copied the Rugby Radio traffic lists on 15.8kHz. This was obligatory there being no other method (except ships with h.f.) of getting a message quickly from the UK directly to a ship in distant waters. Messages could of course be sent to a ship by cable via an overseas coast station — the thing was, which coast station? Then there was the additional cost of cable charges. After the traffic list, Rugby would broadcast his traffic in alphabetic call sign sequence, and heaven help the ship unfortunate enough to have a M, V, or Z call sign. He was in for a long wait. Each message was sent through once and repeated again 12 hours later, by which time it was assumed that the ship had intercepted the message and no further action was taken. It is interesting to note the GBR was quite audible all over the world by day or night on 15.8kHz using about 450kW with tuning fork frequency control.

The passage to Takao (Kao Hsiung) took about ten days. In those days Formosa was a Japanese colony, but most of the inhabitants were Chinese. Ashore I again noticed numerous Chinese women hobbling about on tiny feet. It was a traditional custom for Chinese women to have their feet tightly bound in childhood, thus preventing normal growth. Leaving Takao we made for Tamsui on the north west coast of the Island. Tamsui is situated up a river near to the capital Taihokyu (Taipei). Many years later this



little river was to be used as the location for a Steve McQueen, Richard Attenborough film *The Sand Pebbles*. Completing our discharge in Tamsui we sailed for Singapore.

At Puloe Bukom, a small island in the Rio straits just off Singapore we commenced loading for Madagascar. This was all new ground to me, and I looked forward to the trip with interest. Making our way through the Sunda straits we took departure from the famous volcano Krakatoa for the long haul across the Indian Ocean to Mauritius. Two or three days later I exchanged signals with the operator at Cocos Island, ZHH I think it was then, the last coast station I was to work until I raised Mauritius days later.

Silent Airwaves

Having now crossed the main track of ships from Colombo to Fremantle a great silence descended on 500kHz during the day. At night Australian, East Indies stations and other ships came through the static. By day only the occasional tramp steamer could be heard, most of them very distant. One evening the old man asked me to try and raise Mauritius and pass a message ordering essential stores required on arrival. About 2200 local time I could hear Mauritius/VRS about 2 to 3 in QRN. Starting up the set I gave him a call with little hope of success. To my amazement he came straight back telling me to go ahead on 425kHz. When I had finished I asked him QSA? and he gave me 2/3. We were still about 8 days steaming from Mauritius about 31 000km, not bad for a ½ kW spark set in QRN.

From Mauritius we went on to Reunion and Madagascar, calling at numerous small open ports along the east coast, Tamatave being the biggest. When we left Majunga for the return voyage we ran into bad weather, it was the start of the cyclone season. In those days the weather information available to ships was very poor by modern standards. My interception of a few synoptic reports from other ships had enabled the 2nd mate to build up a bit of a weather picture. To fill in a gap he asked me to call the French Naval station at Diego Suarez and get their barometer reading. I called Diego Suarez asking for this in English. Nothing happened. I tried again with the same result. Ever hopeful I tried once more, this time in my best school French something like "Priere demandons le hauteur de votre barometre SVP" (*roughly translated - could you tell me the height of your barometer please*). Pregnant pause, then back came the cryptic reply "Peutetre deux metres OK?" (*perhaps two metres OK*). Either he was mad or, much more likely, my French was pretty ropey. In desperation I sent "Oui mais quel dit le barometre" (*yes, but what does the barometer say*). This time back came the reply "965 a 967mbs". Success at last.

Conflict Problems

Back in Balik Papan our orders were for another Formosa trip and thence to Hong Kong for overhaul and drydocking. By now the conflict which had been festering for years between China and Japan had developed into open warfare. The Rising Sun was beginning to flex its muscles with a vengeance.

Approaching Takao I sent in the usual ETA message drawn up as usual in the Company's code, only to be told by JFG that he could not accept it until I supplied him with a plain language version. I went up to the bridge and told the old man. Growling about Japanese harassment he told me to pass it "en clair" which cost almost twice as much. On entering the port we anchored instead of going alongside the wharf. The pilot told the Captain that now only Japanese ships were allowed alongside. This was only one of the many ploys used by the Japanese to be difficult and at the same time make more money. The cargo now had to be lightered ashore, much more costly than discharging straight on to the quay. Furthermore no one was permitted to go ashore unless accompanied the whole time by a detective. It was also noticeable that no returned empty drums were loaded. Obviously the Japanese were hanging on to all the metal they could get. In both ports all the radio equipment was sealed up. Every switch was put in the off position and sealed with wire and lead by the customs, not to be broken until the ship left harbour.

Dry Dock

In Hong Kong the ships went into dockyard hands and all the crew accommodated ashore, the officers going to the Peninsular Hotel in Kowloon. Amongst the items to be carried out during the refit

was the complete refurbishment of the radio gear. A modern ½ kW c.w./i.c.w. m.f. transmitter was fitted together with an h/f/ transmitter of similar power. The latest type receiver (still a t.r.f.) and quenched gap emergency were fitted. To my dismay the auto alarm was retained, and completely new set of batteries was provided.

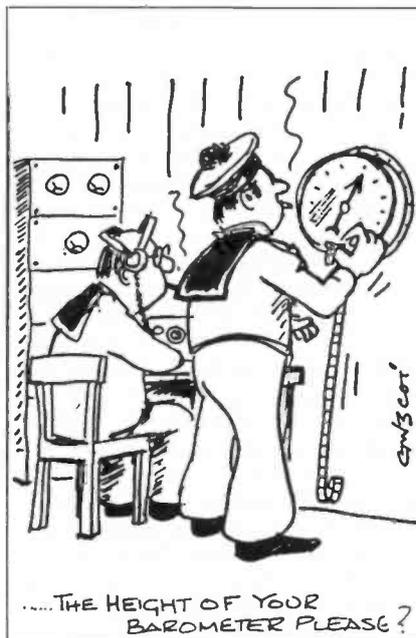
One of the great bails of a operator's life was battery maintenance. There was the emergency battery of 24 volts made up of 12 heavy duty cells. The l.t.s. for the receiver and auto alarm (4 accumulators), and two complete sets for each receiver of wet h.t. batteries. These were in glass cases containing 36 cells giving an output of 72 volts. All batteries were installed in a heavy lead lined teak box mounted outside on deck, while a large switchboard in the W/T office had charging and discharging facilities. All had to be topped up regularly, lugs and terminals greased, and specific gravities taken. An onerous chore.

After a very pleasant few weeks in Hong Kong we sailed again for Balik Papan. I was keen to try out the new h.f. set. It had all been tested and I had worked Portishead from the dockyard. When I tried it at sea however I was unable to raise anyone. It looked as if the tuning was out. I decided to try and back tune the transmitter on the receiver. Reducing the power to almost nil I brought the transmitter right on to the dead space of some ship working successfully on each band. The new settings were now somewhat different to those obtained in Hong Kong, and I can only surmise that the close proximity of cranes and the tin roofs of the godowns etc., when the initial tests were made, were responsible. Whatever the cause the set was now working like a charm.

Christmas Soon

Alongside in Balik Papan we started loading for Western Australia, and soon were on the way to Fremantle. Christmas was fast approaching. One day whilst still hundreds of kilometres from Fremantle I heard a British ship calling CQ on 500kHz. He followed his CQ with a rather fanciful statement "Ere QSO the world QSP GKT PCH DAN etc K". Then they fell on him, like vultures on a fresh kill. Ships were calling him from near and far. All the chaps without h.f. gear (and they were the majority) were not going to miss this opportunity of sending Xmas messages home without having to pay call charges (then 1s 6d per word) from Australian coast stations. Much later that night I cleared some traffic myself to GKT, and heard him hard at it, still grinding away, trying to clear the pile of traffic he had let himself in for.

We tied up in Fremantle late one Saturday evening. Next day a couple of us took the bus into Perth, the smallest but probably the most pleasant of Australia's



major cities. Two days later we were on the move again. Starting the Geraldton, working our way up the west coast, and calling at numerous small ports. In Port Hedland I was fortunate enough to meet the doctor in charge of the "flying doctor" base in the town. He showed me over his DH Rapide aircraft fitted up as an ambulance, and the well equipped radio station belonging to the service. The antenna masts were situated on a bluff behind the station, and the antennas fed by transposed feeds running up the side of the bluff on short posts. This station was in continuous touch with the remote farms and settlements in the "out back", and other Flying Doctor base stations. Each farm had a small transceiver capable of being operated by anyone, and powered by a pedal generator.

Our final port was Karumba, a tiny settlement of half a dozen houses, at the mouth of the Norman river in the south east corner of the Gulf of Carpentaria. Here we were to unload a quantity of aviation fuel for the use of Imperial Airways, as it was then. As soon as we had berthed the "agent" came aboard, remarking that we were just in time. An

aircraft, an Empire flying boat making a proving flight from the UK to Sydney was due next day. He asked if I would try to contact the aircraft by radio before it arrived.

Talking to Aircraft

Next morning I listened out on 500kHz. In those days before the introduction of the sophisticated system that we have now, aircraft often used the marine frequencies. Sure enough, about mid-morning I heard faint signals. And aircraft calling CQ and asking any ship to answer. I gave him a call which he answered at once. I then told him that we were lying in the river at Karumba. He came back "GADUT/Centaurus QAD VID (Darwin) ETA KARUMBA 1230 LOCAL PSEWX?". Almost to the minute GADUT landed on the river, much to the consternation of dozens of Aborigines lining the banks. After refuelling the aircraft departed for Brisbane and Sydney.

We returned light ship to Balik Papan, and arrived to find the place in festive mood. About 10am a gun salute was fired announcing the birth of HRH Princess Beatrix now HM The Queen of the

Netherlands, and shortly afterwards a messenger came on board, with an invitation to all hands to "wet the baby's head" in the Club that evening. By coincidence that day was my birthday also, a point that did not go unnoticed during the evening jollifications, but that is another story.

Looking Back

I made several more voyages in *Voisella*, most of them to "outaway places with strange sounding names", well off the usual track of ships, including two to the remote islands of the South Pacific. I was never disappointed. They were much as they had been described in the boy's books that I had read so avidly. I worked countless stations whose call signs I cannot recall, now probably totally different anyway. On the very rare occasions on which I have been able to contact some of these exotic places by amateur radio I can still see them in my mind's eye. No doubt the sea is still blue, and the sky. The stars at night just as brilliant, the breeze still rustles the palms. Pleasant memories indeed on a bleak English winter's day. □

VALVES AND RECEIVERS

◀ 39

LSA and JOBK on medium wave on a 1936 Eddystone 4-valve receiver with an untuned r.f. stage. So sensitivity and low background noise were achievable at some frequencies — though selectivity was another matter. The HRO had an admirable performance on 14MHz (I have five "pre-Mao" cards to prove it) and a deplorable one on 28MHz by modern standards; the CR-100, if anything, was even worse with a steady S6 noise level. If performance of this order is unacceptable, simple restoration would be a waste of time.

The whole range of octal/UK commercial receivers can be roughly divided into three groups according to their ease of dismantling and reconstruction. The easiest include the HRO and some Eddystone and Hallicrafters models. In these the valveholders are easy to change and the components are dispersed in single layers on a flat chassis. Then things become less accessible and more complex, as in the AR88. Finally, the BC-348 and its cousins are simply not intended to be dismantled at all. If the particular set is already working one solution is to fit a converter in front of it, and here the groups line up in the opposite order; all that metalwork provides excellent screening, and the BC-348 makes a fine

tunable i.f., whereas the screening on the HRO is hopeless and there would be breakthrough all over the place.

Only a few general ideas on reconstruction can be mentioned here. In most cases new h.t. decoupling capacitors will be required throughout because the original ones are too inductive, hygroscopic (AR88) or simply not there (HRO); changing valveholders and fitting reducing plates may also be unavoidable. But perhaps the most daunting task is replacing the wave-change switch, which may involve stripping out all the coils as well — so why not start with a receiver that doesn't have one! With modern valves adequate performance without undue complication should be obtainable with one r.f. stage and two i.f. stages. (Does this start to look like an Eddystone 358X?) The frequency-changer is obviously the trickiest part and some unexpected circuits may be encountered. When faced with a 500pF variable, plus considerable strays, coupled to a 3½-turn coil, the designer had to exercise great ingenuity to devise a circuit that would neither stop oscillating at one end of the range nor start "squegging" at the other. If the receiver coverage is to be restricted to the amateur bands, life is much simpler. At the same time

conversion to a double superhet with a high first i.f. might be feasible, particularly if the set is to be used as the basis of a transceiver; no single-tuned circuit will discriminate usefully between (28000 + 450)kHz and (28000 - 450)kHz.

Finally, back again to valves. I have made no mention of the B7G range so far merely because the B9A (novol) range is more comprehensive and more readily available from defunct TV receivers. The high-slope frame-grid valves (EF183, EF184 etc.) should be approached with caution — though they put on a stimulating performance when tamed — but the more mundane EF80, EF85 and EF89 can still improve things greatly. Valves like the 6B8 and 7R7 can be replaced by an r.f. pentode and external diodes, and the pentagrid 6SA7/7Q7 (identical), after some rearrangement of the circuit, may be replaced in some cases by an ECH83 and in others by an ECF80 or ECF82. American triode-hexodes can with advantage be replaced by British types, which have nearly double the conversion inductance, but not generally the other way round.

As usual there is much room for ingenuity, which always brings the satisfaction of making something out of virtually nothing. □



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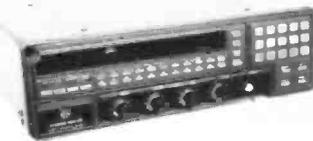
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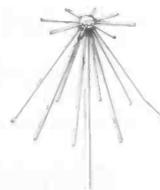
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SEEN & HEARD

AMATEUR BANDS ROUND-UP

Justin Cooper

c/o Short Wave Magazine, Enefco House,
The Quay, Poole, Dorset BH15 1PP

Over the years, quite a few people have wondered how long it would take to scratch up the basic 200 Prefixes heard, or to hear 100 countries, given that one is already a reasonably competent s.w.l. and has a reasonable set up — say, for example, a dipole for 14MHz, another for 3.5MHz, and a receiver with s.s.b. bandwidth, and based in Europe. DJ6QT was recently in 9L, and notes (in *DX News Sheet*) that he made some 6000 QSOs in 11 days with 140 countries. As a special effort for the Golden Jubilee DXCC, he made the 100 countries in just 30 hours operating. That was from a semi-rare spot; The quickest mainland W to the 100 countries seems to have been about 50 hours. 200 prefixes would take about the same time to work; possibly even a little less. Thus to hear the 100 or 200 should take less.

But it does bring up the question of what constitutes "hearing" a station. Judging by logs seen over the years, quite a few people claim a station on hearing half the QSO, which is fair enough provided that one is certain of which half you can hear! Remember the old rule — the chap sends his OWN callsign last at each over. (G9BF, this is G1BF, over). The problem arises when you hit a pile-up, and all we can say then is stick it out till you are SURE, and then check. For instance, is it working a European and too loud: is it the right time for propagation to that part of the world: if you have a beam, is the heading somewhere near right? If it fails any of these tests, don't claim it! But wouldn't it help everyone, if full callsigns and proper procedure were adopted in pile-ups . . . ?

New Country

Republica Arabe Saharaui Democratique is half the old Rio de Oro, EA9 (Morocco snaffled the northern part after the famous Green March) and we hear that negotiations are under way for a group led by EA2JG to go there — if this comes off it will be a new country in amateur radio terms; at the time of writing the only question seems to be "will DXCC concede it country status?" All being well this one will be the first two weeks of August.

Another group of EAs are hoping to activate Andorra C33A for the last three weeks in August.

The Mount Athos saga drags on; we hear that the question of acceptance of DL7FTs operations from there will take a long while

Name	Prefixes	Name	Prefixes
'Phone Only			
B. Hughes (Harvington)	3249	S. Field (Barningham)	735
E. M. Gauci (Malta)	3116	A. Vest (Durham)	605
Mrs. R. Smith (Nuneaton)	2622	N. Fox (Waketield)	595
E. W. Robinson (Felixstowe)	2564	L. Marquardt (Hereford)	526
H. M. Graham (Chesham)	1914		
M. Rodgers (Harwood)	1776	CW Only	
M. Ribton (Gillingham)	1773	F. Dunn (Chester)	2035
P. Oliver (Paisley)	1730	N. Melville (Edmonton)	1023
F. Dunn (Chester)	1566	J. J. Sales (Lancaster)	400
N. Henbrey (Northiam)	1513		
P. Davies (Market Drayton)	1371	RTTY Only	
B. Patchett (Sheffield)	1004	P. Lincoln (Aldershot)	535
Mrs. A. Sitton (Stevenage)	929	W. J. Prior (Lochcarron)	480
A. P. Lincoln (Aldershot)	888	N. Henbrey (Northiam)	334
G. Caselton (Orpington)	775		
R. G. Williams (Borehamw'd)	768		

Starting score 500 for Phone, 200 for c.w. or RTTY. Entries in accordance with HPX Rules, see p. 45 May '87 issue.

Annual HPX Ladder

Starting Date: 1 January 1987

Name	Prefixes
E. M. Gauci (Malta)	407
J. J. Sales (Lancaster)	400
Mrs. A. Sitton (Stevenage)	378

200 Prefixes to have been heard for an entry to be made, in accordance with HPX Rules. At score 500, transfer to the All-Time list is automatic.

yet; DXCC desk apparently asked for the licence original which was then lost in the post . . . why not just delete Mount Athos totally and be done with it since doubt has by now fallen (or been thrown) on every operation from that spot.

Letters

Firstly, a line from G3FEX, passing on a letter from Paul Fry, Eastleigh, who is now GOFUS. The last time Paul wrote was in February 1986, when he was asking about Mauritius broadcasters; since then, he has been bitten by the amateur bug, passed RAE, held a B licence, passed the Morse test and then gone on to an A licence and now a visit to Mauritius, included in which was a visit to 3B8CF, Jacky, probably the most active amateur in the country. Jacky has held licences as VQ8, VQ9, 3B6, 3B7, and 3B9 as well, to the delight of most of the world's DXers.

GOFUS passes on some notes about QSLing this station. First, a general point . . . be sure there is enough information on your card for a return card to be sent. Enclose a self-addressed envelope, and be sure it is CLEAR — recall the difficulty you have with some foreign addresses, and remember they have the same problem with OURS! Enclose return postage by way of IRCs for the desired postal mode.

(Alternatively, you could use an s.a.e., but to do so you have to buy the correct value of mint Mauritius stamps from the local stamp dealer.) Send to J. Mandary, 3B8CF, Shastri Road, Candos, Quatre Bornes, Mauritius. In more general terms this requirement, for s.a.e./IRCs is pretty general; the price of postage for QSLing is quite prohibitive for an active amateur in such a place as 3B8-land, on top of the cost of printing the cards. Additionally, Jacky is not prepared to accept QSLs via the Bureau system as he feels this route to be too slow. So — if you lack a 3B8CF card, check whether you have sent yours off correctly!

We would add to that a statement that most stations want to receive a sensible s.w.l. report which tells them something; we recommend you listen to several QSOs, logging the reports given, and compare with any other stations on the band from the same general area; and maybe include a pic of yourself at your rig and a personal letter. In sum, give the DX the desire to send you a QSL!

A little note from Geoff Watts reminds us of his Prefix/Country List, which covers all amateur prefixes since 1945, the current normal prefix, the special ones for the country, the CQ Zone it is in, and the ITU Zone and the ITU callsign block allocation, this last

being a useful guide to any future special or commemorative prefixes. Also, Geoff does a DXCC Countries Guide — handy for those coming back to the hobby after a break. One pound each, or \$2 (6IRCs) by airmail abroad. We might add that Geoff was for years the Editor of *DX News Sheet*, and he is still the only s.w.l. ever to have been elected to the DX Hall of Fame.

Now we come to David A. Whitaker (Harrogate) who writes both for himself and for White Rose Radio Society and their s.w.l. Contest. First, 1987's results: Most people seem to have more points and multipliers on 3.5MHz, and the leading s.s.b. s.w.l. station was H. Hofman of the Netherlands with a total of 69307 points, followed by J. Martin and A. Miller with respectively 62549 and 60069 points. On the c.w. side it was nothing like so close; R. Stanbridge clocked up 22137 followed by D. Piccirillo on 15236. It is noticeable that the winning c.w. score was the result of much more listening on 7MHz. Next year's White Rose s.w.l. Contest will be, all being well, in January 1988, and details can be obtained from David via the Club address: White Rose RS, POB 73, Leeds LS1 5AR. On a more personal note, after two years trying, David has got hold of a Kenwood R820 receiver — a rare bird, this — which has delighted him, especially on 7MHz; already it has lifted David's score higher on this band than for the whole of 1986!

Leighton Smart (Trelewis) uses a Grundig 1400SL Professional receiver to which he can attach a Windom, a longwire, or a 28MHz dipole. A later letter implies either that Leighton has dropped the dipole and wire, or that he is only using the Windom. The point is of some considerable interest when comparing the loggings with a Great Circle Map (this is the one that shows directions and distances correctly from a centre point such as London at the expense of distorting shapes) as it shows that Leighton's Windom is doing its best to favour N/S paths at the expense of the E/W direction. The Windom is an unpredictable beastie at the best of times, depending as it does on a single-wire feeder against an earth which is never anywhere near perfect save over the sea; indeed we suspect that Leighton's one is trying to operate as a top-loaded vertical. On a different tack,

SEEN & HEARD

Leighton's log is a model of its kind; times, and frequencies to 1kHz, a note of the other end of the QSO or a statement that the chap was calling CQ, and of course a note of the received signal strength, from which we can deduce that Leighton likes late sessions on 3.5MHz, and is careful to be sure he has collected the right end of the QSO. Good for him!

Now **E. W. Robinson** (Felixstowe) with his 90th list and letter. During the WPX contest, EWR found conditions pretty good, and this accounted for quite a lot of his new prefixes — not without quite a few hours on both days being put in. Interesting prefixes heard included H24SA on Cyprus, K4YT/P/4F in the Philippines, 4C2C in Monterrey, Mexico, while outside the contest DV3YL/P/9, Christine, heard at 1416Z — a good signal which held up for over an hour on March 10. This one was heard again on March 21, on which day also another YL from the same area, DX9HT, "Baby" was heard from Cagayan de Oro, Mindanao. Other highlights were a crop of JAs on April 6, the first since last September, and mid-afternoon hearings of VK3CDR and, weakly, VK9XP on Christmas Is. On the black side, EWR laments that he didn't satisfy his criteria for logging VU7APR; this one was working "split" and although he was monitored through umpteen QSOs, not once was he heard to use his own call sign!

Next the letter from Graeme Caselton who is also G6CSY these days, and wonders if anyone has heard his 1296MHz signals. Still, it is nice to know that G6CSY still listens on h.f., even if he doesn't fancy an A licence.

Angela Sitton (Stevenage) is now finding great interest in 144MHz, with s.s.b. and c.w., now that she has G1XEO. However, Angie is still interested in h.f. listening and adds her "prize" loggings as usual; on 28MHz it wasn't much more than a piratical CBer! That is a problem here, which is to be sure that they aren't coming up as "image" signals through spurious response

or overload conditions. If that is not the case so that you are sure they are in our band — what a lovely frequency for a bit of Morse practice! Turning to the log, the one we wonder about was a loud-and-clear S2PM, heard at 2345 on February 8. This, we suspect was our old pal Bangladesh Slim again — has anyone else any information on this one?

M. Probert (Basingstoke) notes that the textbooks group the months of February/April together in terms of propagation, and guesses that the reason is connected with the Equinox, when all the world has equal day and night. True enough; this is the time when the solar ionisation will also be equal, and so give everyone, wherever they are, equal chances of DX. On the other hand, since the majority of amateurs by far are in the Northern Hemisphere, things would seem to be best for us through the summer; but of course there is a fly in the ointment, and essentially that fly is static noise. Doesn't matter how good conditions are, if you can't hear them, you can't work them; so many tropical stations don't struggle too hard in the static season. Some idea of what we mean may be gleaned by those who have never heard it, by listening to 1.8MHz in a mid-summer storm, and comparing with the same band on a quiet winter night.

F. Dunn (Chester) has cracked the magic 2000 on c.w., but with one query in a signal signing FG/W2/FS. This one we think was in fact genuine, but another example of the modern DX tendency to not use complete call signs.

M. Ribton (Gillingham) recently

obtained a load of WW2 and post-war radio gear, which has resulted in a considerable reorganisation of the shack to make room; and there is a p.s.u. now required for the wavemeter CKB 74028 — 12-24V at 0.3-0.6A and 120-475V at up to 20mA. It certainly isn't a BC221 with those power requirements, but may be a relative. We would recommend building a p.s.u. to give the minimum voltages and currents, but to check that the result is correct voltage across the heaters of the hot valve. As to the CKB, that is probably a manufacturers code; J.C.'s own BC221AK has its type label at top right on the panel plus code letters and serial. A very useful tool, the BC221, even if you do happen to have a counter! On a different tack, Mike has been working on decoding the time signals from the standard frequency station on 4.525MHz which is a booming signal with him; Mike has cracked it and now has a small decoder card giving him accurate GMT at any time. Anyone interested, Mike will pass on the details via this column.

B. Patchett (Sheffield S9) has been practising his Russian on the air with the U-stations and finds this often results in long QSOs. On the other hand this cuts into s.w.l.ing time!

N. Melville (London N18) has just a list this time, and a reference to his receiver; this apparently was mentioned in his letter of February 4, which seems to have bypassed your J.C.

Error!

E. M. Gauci (Sliema, Malta) notes that his final total for the 1986 Annual was in fact 1206; we seem to have been trailing

along behind the times with Eddie's score since January — for which we hang our columnar head in shame. We hope we got it right this time!

What are the "loud shrieks" noted at around 14.096MHz? This enquiry comes from **Bill Prior** (Lochcarron), and of course it sent us to the receiver to have a listen on that frequency. As to what we found, there was some AMTOR nearby, lots of static, but nothing remotely sounding like the "loud shrieks". So — we want to know, and hope someone can tell us!

Just a short list this time from **Mrs. R. Smith** (Nuneaton) which we have taken in. The comment applies also to **Mike Rodgers** (Harwood) who rises to 1776 in consequence.

A. P. Lincoln (Aldershot) has now got all his HPX data to run under CP/M, using a Triumph Adler computer.

H. M. Graham (Chesham) sent his subs renewal along with his letter — naughty! — but we passed it on to the right quarter. On the bands it has been a lean period; nothing on 28, on 15 the best was 4X5000 — a commemorative for a seaport that has been around for 5000 years but which could not be copied — which doesn't say much for the operator! 14MHz was mainly Ws, EU, and the odd VK in summary.

Finally the letter from **J. J. Sales** G0AZJ who is back to s.w.l. since his FT-200 ate its p.a. bottles. On the subject of antenna wire gauge we can't imagine 200 watts producing enough to cause burn marks; more likely some sort of air pollution is the cause. The columnar linear amplifier isn't often called into play, but even with The Lot going out, we've never had any trouble from our thin wire antennas (28 s.w.g. or thinner).

Finis

That's all we have for this time, and we hope it's of interest to you. Don't forget, we can't report your doings, or answer your questions, unless you tell us about them, and of course, we like to have your entries for our HPX Ladder.

Deadlines Dates

Issue	Deadlines
August '87	June 17
September '87	July 20
October '87	August 19

DECODE

Mike Richards G4WNC
200 Christchurch Road, Ringwood, Hants BH24 3AS

A response at last! This month I have received several interesting letters from readers, but more of that later.

According to reports from several sources, it appears that

the revised legislation for packet radio is being incorporated in a much larger general legislative revision, which is likely to delay the outcome.

Activity is still growing at an

amazing rate, and judging by the sale of TNCs (Terminal Node Controllers) at the VHF Convention we are in for another sharp increase in activity. To illustrate the level of activity, on

April 20 I monitored between 14.103 and 14.107MHz and logged 20 stations in 25 mins! Just to whet your appetite here is a selection of packet stations logged during two evenings on

14MHz: ZS2WG (Prince Edward and Marion Is.), SU1ER (Egypt), LA6OCR (Norway), SV1MO (Crete), SV1IW, FE6GJM, CT1AMK (Portugal), EA1AEB (Spain).

RTTY & AMTOR

Comments and reports received indicate that propagation is starting to improve on the higher h.f. bands, so it may be worth spending some time monitoring the frequencies above 15MHz. All reports will be very welcome. On the amateur front there is still a fair amount of activity on 14MHz and 3.5MHz but nothing special to report this month, so I'm going to have a moan about two of my pet hates. First, there is a trend amongst AMTOR operators to leave out callsigns at the end of each over, which I find very frustrating, as one has to wait quite a considerable time before a station can be identified. As most stations are using equipment with programmable memories it is very simple to store the calls in one memory and send that memory at the end of each over. Next complaint is the operator who sends half a page of "RY" before starting the main text, this is totally unnecessary as a short burst of "RY" or a few seconds of "mark" is adequate to ensure the signal is tuned-in. That's that off my chest!

Here is a selection of some of the more interesting amateur stations from this month's RTTY and AMTOR log: 4X6LB (Israel), TA1D (Turkey), OD5NG (Lebanon), ST2SA (Sudan), 9H4B (Malta), 5NOALE (Nigeria).

FAX

The FAX scene is fairly static at present but for those of you who may not have seen an h.f. FAX chart I have reproduced one in Fig. 1. This 24 hour forecast chart was received on a modified Mufax machine and represents a good quality example of the type of chart transmitted by Bracknell on the h.f. bands.

ASCII

This month I received a very interesting letter from D. Kremp in Normandy who is enquiring about ASCII transmissions and where to find them. Your first question may well be what on earth is ASCII, well it's an acronym for American Standard Code for Information Interchange and has been adopted as a standard code for representing alpha-numeric characters in computers. The code uses 7 information bits as opposed to the ITA No2, (International Telegraph Alphabet No2) used for RTTY which requires only 5 bits. The main advantage of ASCII is that

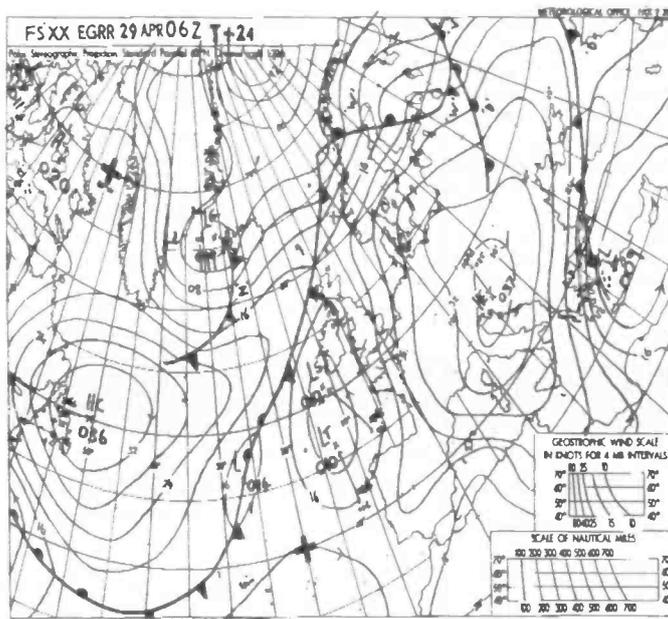


Fig. 1: An h.f. FAX chart

the 7 bits means that 127 different characters can be represented without the shift complications of the ITA No2 code.

As far as I am aware there are no stations transmitting ASCII on a regular basis. I have myself used ASCII to send data to other amateurs some years ago, including a full duplex link using 430MHz and 144MHz to link two computers together. The advent of packet radio at an affordable price has really made the whole process of data transfer much simpler and as a consequence ASCII is very rare on the amateur bands these days.

If anyone out there knows of any stations using ASCII I would be very pleased to receive details of frequency, shift and speed etc.

VHF Convention

What a glorious day we had at Sandown Park for this annual event. Rallies are a marvellous way to meet old friends and keep up to date with the latest equipment and junk supplies. I was working on the *Practical Wireless* and *Short Wave Magazine* stand with Elaine, (my better half). We had a very successful day and it was very gratifying to hear so many encouraging comments on the recent new look to the magazines.

I did manage to escape from the stand to have a look at the "bargains", particularly on the computing front. Probably the best buy was the Dragon computer at about £50 which, when combined with the software from Grosvenor Software⁽¹⁾ makes a very cost effective RTTY/AMTOR/Packet terminal. Next best buy was the Commodore 64 at about £80, for

which there is plenty of software. If a VIC-20 will satisfy your needs, then they can be purchased from about £20 upwards. For the computer enthusiast who is prepared to home-brew the software there was the usual selection of miscellaneous micros. As with all purchases it is always advisable to establish if there is any form of guarantee available before parting with your money or your "bargain" may turn into a liability!

Whilst at the VHF Convention I managed to attend the Remote Imaging Groups' lecture on weather FAX. Although the lecture was aimed at receiving weather satellites, the mechanical aspects of the FAX machines are basically the same as for h.f. G8LOK gave a fascinating talk describing his home built FAX machines which used everything from a kitchen drawer to a cricket stump in true amateur tradition! Despite the unconventional components the results were superb, with several examples on display on the RIG stand.

Book of the Month

The month's book is *Newnes Computer Engineer's Pocket Book*. This compact, (95mm x 196mm) book follows the lines of the other Newnes Pocket books which have been popular for many years. Its 203 pages sets out to combine computer related information from the world of electronics, computing and telecommunications. Probably one of the first complaints of the newcomer to computing is the vast amount of jargon and abbreviations in common use. Help is at hand as the first section covers a wide range of common abbreviations.

This is followed by a look at integrated circuit technology, including a functional cross reference for the 7400, 4000 and 4500 series of logic i.c.s. and includes a pin-out of the common packages. Having described the basic devices the book moves on to cover 8 bit and 16 bit central processing units (c.p.u.). The descriptions are obviously short and concise but they do include instruction set summaries for the 6502, 6809, Z80, 8086 and 6800 devices. The c.p.u. section is followed by further data on the various support devices including disk drives and controllers, memories and communication devices. Having covered the basic hardware, the next chapters deal with the software side of computing. One very useful part of this section is the decimal/hexadecimal/octal/binary/ASCII conversion table, which is very easy to interpret. Various common operating systems are described next and a command summary is included for CP/M and MS/DOS.

The final software section deals with high level languages and includes brief examples of some of the more common versions. The penultimate section deals with computer interfacing and covers the S-100 bus, Centronics interface, GP1B and RS-232 along with a brief description of the KERMIT file transfer protocol. The final section lists standard computer equipment faults and suggests probable causes.

Having used this book for several weeks I have found it to be very useful, so useful in fact that it now resides in my briefcase!

Readers' Stations

As mentioned earlier, I have received several letters from readers this month for which I am very grateful. As expected, some readers are concerned about publishing full details of their station in view of the regulatory problems of radio monitoring. I can sympathise with these fears and I am prepared to publish station details anonymously if requested.

From the response so far it would seem that the POCOMTOR 2010 decoder although expensive is regarded very highly as a "Rolls Royce" of decoders.

I have received a very interesting letter from Chris Kirby⁽²⁾, who is active on FAX, RTTY, TOR and SSTV (Slow Scan Television). Chris has a comprehensive receiving system utilising the following receivers, Racal RA-17, CR-100, B-40D and a B-41 for v.l.f. Chris has also built a home-brew v.l.f. converter which he uses with the RA-17. Antennas used are a 3-element triband Yagi for 14, 21 and

SEEN & HEARD

28MHz with dipoles for 3.5 and 7MHz. To decode the various modes Chris uses a Spectrum Plus computer with the G4IDE FAX program, which by all accounts is good value for money. SSTV is resolved using software by G1FTU. For RTTY and TOR Chris uses the RX-4 multimode receive program from Technical Software. The RX-4 program is unusual in that it does not require an external terminal unit to convert the received audio tones

into a digital signal for processing by the computer. The conversion process is software controlled within the computer and hence saves the cost of the terminal unit. Of course there is always a snag, and this generally shows up as poor performance when receiving noisy or poor quality signals. Having said that, Chris reports very good results from this particular program, and the supplied list on monitored stations confirms this.

Included with the above station report was a print-out of all stations logged including frequency, mode and speed etc. Some 250 RTTY/TOR stations are listed, also included is a brief description of the 5 figure coded weather system which is used by so many h.f. RTTY stations. Chris has very kindly offered to supply this information to readers of this column on receipt of £2.00 to cover copying costs and an A4 s.a.e. with 40p postage. My

thanks go to Chris for this comprehensive report.

That's it for another month, please keep those reports coming and don't forget all comments are welcome.

Addresses

(1) Grosvenor Software, 2 Beacon Close, Seaford, East Sussex BN25 2JZ.

(2) Chris Kirby, "Van Dyke", Robin Lane, Huby, York YO6 1HH.

INFO IN ORBIT

Pat Gowen G3IOR

17 Heath Crescent, Hellesdon, Norwich, Norfolk NR6 6XD

Last month we ran an item to assist those getting started with Weathersats by detailing the recent experience of John, G6SVJ of Uttoxeter, who kindly let us learn of his experiences in starting from scratch to finally getting excellent pictures from the "birds" in space. Some of the very first pictures taken as photographs from his screen are reproduced here.

MET-2 C1D taken at 1254UTC on 12 March, showing a good swirl

cloud over a quarter of earth's globe (Fig. 1). MET-2 C2D four minutes later, visible light (Figs. 2 and 3). Also visible light, MET-2 C3D (Fig. 4). MET-2 CO3, using x2 zoom, showing a good picture of North Italy and snow over the Alps (Fig. 5). NOAA-9, showing Britain relatively cloud free in the South East, as seen at 1330 on the same day again (Fig. 6).

Whilst we have given some degree of attention to the equipment used, its sources, and

some results, mentioning the right hand circularly polarised antenna John built from G1NSV's design, and the availability and sources of commercially made 137MHz satellite antennas, we did not say that one can easily make a very inexpensive antenna for NOAA and METEOR from the shack junk box in an hour or so at minimum cost in cash and effort.

Indeed, if one already possesses a 144MHz amateur band Yagi, or even a simple "turr.stile" crossed

dipole for 144MHz, this will lend itself quite well to weather satellite reception. The signals from the polar orbiting NOAA and Meteor satellites are very strong, and the average 144MHz antenna is wide enough in bandwidth to capture this with little loss. Even Yagis cut for the 144MHz band "beam" well, and although the s.w.r. at 137MHz may be somewhat higher than one would expect on the adjacent amateur band, the losses are very low.

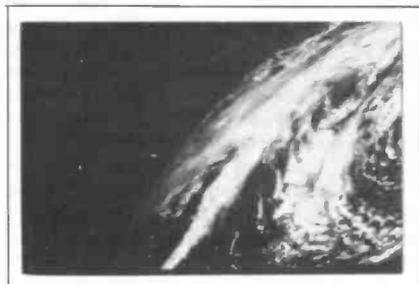


Fig. 1

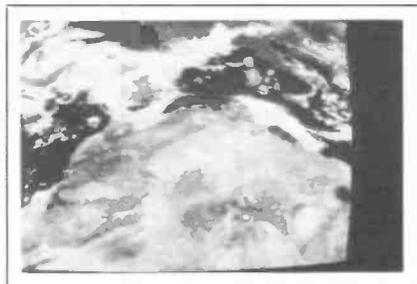


Fig. 2

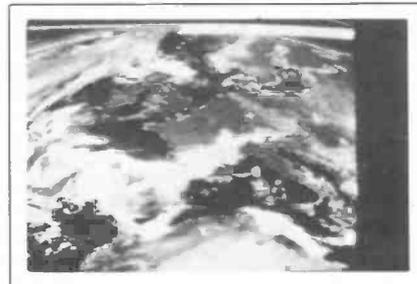


Fig. 3

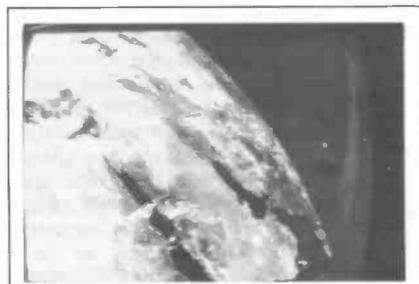


Fig. 4

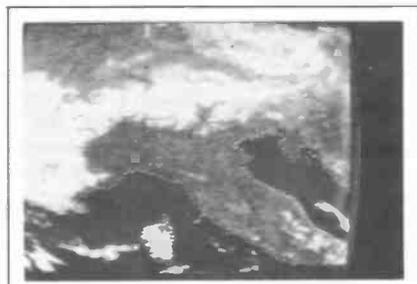


Fig. 5

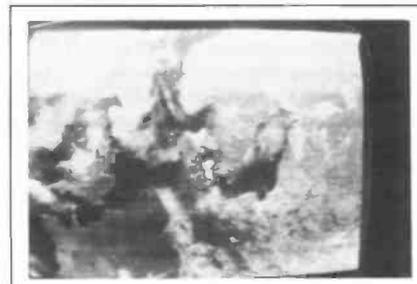


Fig. 6

Providing the local noise level is not excessive, (as it may be picked up by the non-matched feeder at 137MHz) a good picture can result. Remember though, that the average amateur Yagi, unless one is an Oscar fan, may not have a means of elevation to follow the high-angle, close-to-overhead passes, so the signal will be best when the satellite is at distance within some 15 degrees of the horizon, when in fact it is furthest away and giving the lowest signal

strength level.

As the observer will be more interested in local reception, and as the signal is in any case far stronger on a near overhead orbit, then a simple crossed dipole is recommended, which may be placed at a given height over a reflector to optimise the angle required. Such an antenna is shown in Fig. 8, with two dipoles at right angles right hand circularly polarised, placed above a wire netting reflector. The materials

needed are a short length of 52 ohm feeder, a length of 72 ohm low-loss u.h.f. TV type coaxial cable, two "chocolate block" connectors, a 50 x 50mm wooden mast up to 1 metre long, and some 3mm stiff cadmium copper wire or brass welding rod. If exposed to the weather, then pvc tape and some varnish is desirable to maintain durability and insulation.

AB, CD, EF and GH form the elements, each the stiff copper or rod suggested so as not to droop,

cut to 512mm long. These are bent over at right angles for 10mm at the ends, inserted, and connected tightly via the locking screws in back to back chocolate block connectors to set the rods at 90 degrees to each other, which is then bolted through to the vertical 50mm square mast as shown in Fig. 8.

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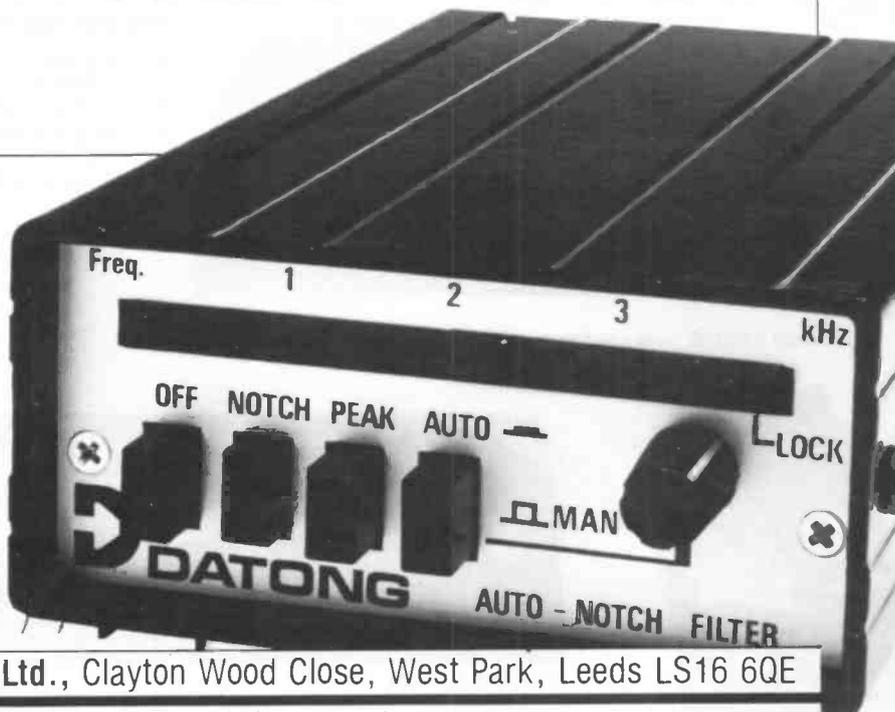
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wave section at the underneath end of the box as shown in Fig. 7. Other than where jointly connected, the cables should be taped so as not to connect with each other. The box should be pvc taped and varnished together with the mast in order to keep water out of the feeder.

G1 is a quarter wave matching stub to convert the pair of 72 ohm dipole centres giving 36 ohms when paralleled back to 72 ohms again, and is a 338mm length of 52 ohm coaxial cable, also shown connected in the base of the box in Fig. 7.

J connects to the base of this, and is a length of 72 ohm cable of the length required to take the antennas to the receiver, as short as possible. All coaxial connections should be taped and varnished on completion. If a 52 ohm receiver feeder is required, then a matching section is required, but the average v.h.f. receiver is not too fussy about this.

The antenna may now be mounted over a chicken wire netting reflector, with a minimum size of 1200mm square with a small mesh preferably not greater than 10mm hole size. A metal sheet, or even aluminium foil may be substituted. If placed 500mm above, strong signals will be heard when the satellite is over 30 degrees elevation over the horizon with very strong signals when overhead. If the chosen height is 1020mm, then the horizon passes are better, but overhead signals will be found weaker than the previous spacing. A good compromise giving a "mushroom" type pattern is to place the dipoles at 680mm above the reflector, when good signals will be heard from 20 degrees elevation and up at fairly even strength. Although the spacing differences effects the standing wave ratio, the system is very tolerant.

If a flat roof mounting is not convenient, or a ground emplacement too crowded by overlooking high buildings, then in place of the flat sheet, (wire reflectors parallel to the antenna) of 1150mm total length may be used, by drilling a snug hole in the mast at the same distance as the flat reflector would have occupied, and inserting the wire through the hole to form a crossed reflector in line with and below the antenna itself. The assembly may now be wall mounted on a longer mast in the clear.

Another good "all-rounder" first appeared in the pages of *Oscar News* in 1980, as a design for a 432MHz antenna for the Oscar satellites. This has been scaled up to 137MHz, and is shown in Fig. 9. Whilst not having

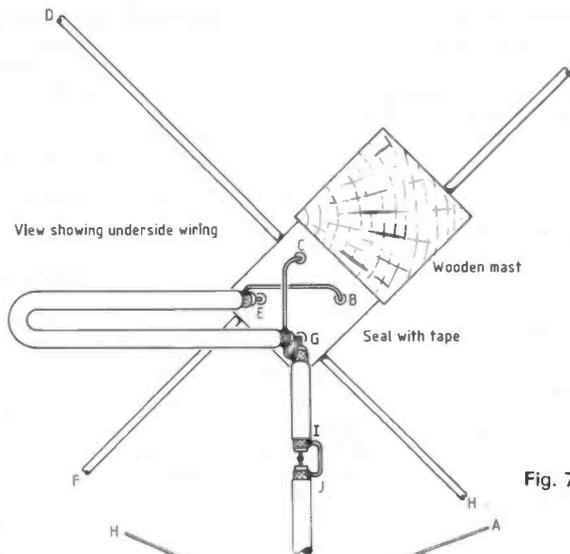


Fig. 7

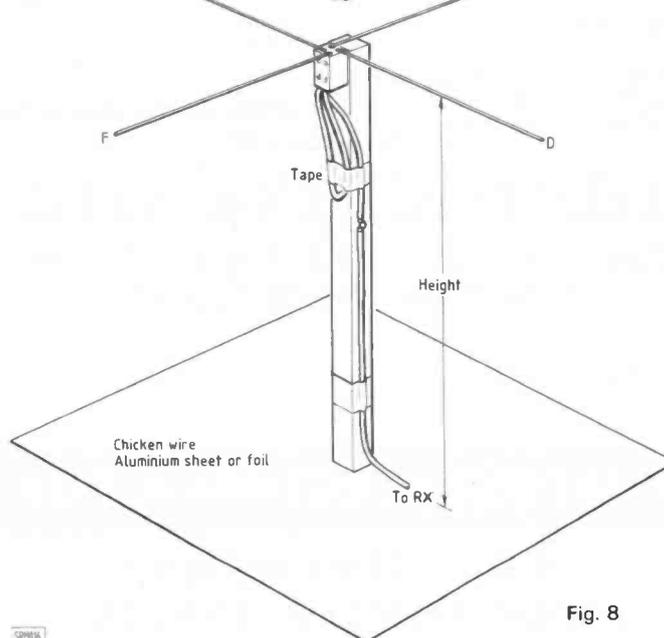


Fig. 8

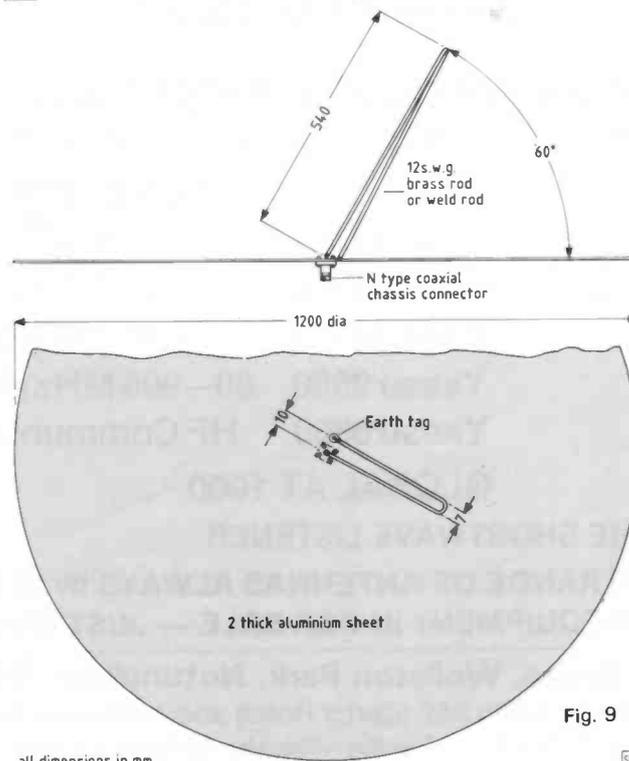


Fig. 9

the capture of our crossed dipole, it nevertheless performs adequately for passes above 10 degrees elevation if in the clear and unshielded by surrounding objects. The "sundial" pointer antenna is a folded "hairpin" to give a 540mm length made from similar material to our crossed dipole, or 12 s.w.g. brass rod, with 7mm spacing at the bend, and 10mm at the base, where one end enters a connector socket, and the other sees a ground connection to a tag at the centre of a 1200mm diameter 2mm thick aluminium sheet. The angle required is 60 degrees to the flat plate base. This antenna is very rugged, and works even better with a pre-amplifier. It has a 50 ohm impedance match.

Both of these antennas will also perform well on the UoSAT-1 Oscar-9 and UoSAT-2 Oscar-11 spacecraft on 145.825MHz, but should not be used for transmitting, as the s.w.r. will be high in the 144MHz band. They have insufficient gain to hear the Oscar-10 satellite well enough to resolve good signals unless it is close to earth at perigee.

Meteosat

Meteosat is a 2.1 metre diameter 3.2 metre high weathersat in geostationary orbit 36 000km over the equator at the Greenwich zero degree meridian, just south of Accra in Ghana, and retransmits labelled weather pictures to us on 1694.5MHz. It is quite an ingenious system, as the bare cloud and earth pictures are sent not by a camera store, but by a scanning system from the side of the spinning satellite. It works rather like a narrow telescope that focuses over an earth area of some six square kilometres. As the satellite spins at 100 r.p.m., it scans a horizontal line across the earth, and after each rotation a motor mechanism moves the "telescope" down a little lower, rather like a cathode ray tube electron beam, to scan the next horizontal line down, and so on until we start the first line of the next frame.

In this way it scans the entire surface of half the earth, processes the signal, and then beams the digitally encoded information to the European Space Agency computers in Darmstadt in West Germany. Here continental outlines are added as white marker dots superimposed to permit recognition of the area scanned when the cloud cover might prevent identification. This format is transmitted and uplinked back to Meteosat, from where it is then re-transmitted as a downlink back to earth at 1694.5MHz, where it may be captured by a dish and suitable installation.

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BAND II DX

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For many years, especially in areas of poor reception, the BBC's radio broadcasts in the long and medium wave bands were subject to interference from a wide range of domestic appliances, foreign stations in the evenings, static associated with local and distant thunder storms in addition to fading and a high level of background noise produced inside various a.m. receivers.

However, when the BBC began a regular f.m. service, in the v.h.f. band, then 88 - 100MHz, (known as Band II), from Wrotham in May 1955, the majority of dedicated radio listeners and dealers, welcomed the change and were delighted with a new clarity of speech, which added to their enjoyment of plays and talks and the ability to hear a wider range of musical instruments, during concerts, was greatly appreciated.

This brief account of the beginning of f.m. broadcasting may seem strange by present day standards, but it really was a breakthrough in home entertainment and I well remember one customer's excitement when he compared the sound from his 10 year old a.m. receiver with the new Cossor f.m. set which I had just installed. Tuning indicators have always assisted the listener and, in this case, the mid-1940s set had the "magic eye" in the top end of a horizontally mounted octal based valve whereas the Cossor had the latest "fan" type built in the side of a B9A valve and installed vertically. Most indicator tubes displayed a relatively large green trace on a screen which varied from the left and right toward the centre as the signal was tuned in.

My customer also agreed that the new 2-element v.h.f. beam on his chimney looked better than the long wire antenna strung across his garden. Some of those early f.m. receivers, made by such firms

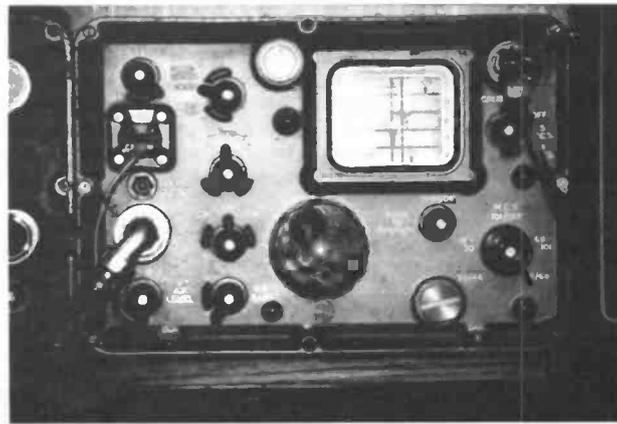


Fig. 1: An R216 receiver

as Bush, Cossor, GEC, Grundig, Philips and Pye, complete with 6 or more valves, large loud speakers and wooden cabinets are still in use today and sound quite good.

However, enthusiasts who acquire one of these sets for renovation should remember that they are over 25 years old and, that in addition to valve failure, many of the capacitors, resistors and sometimes the valve holders themselves, may also need replacement before the set can be properly used again. *Think twice and carefully before carrying out any work on early sets because they are mains operated and high voltages exist around all components, especially at the mains transformer, rectifier and smoothing capacitors.*

This also applies to specialised v.h.f. communications receivers like the Hallicrafters S27 and S36, made during WWII for the United States Navy and the Eddystone 77OR and the military R216

manufactured, with miniature valves and later technology, in the early 1950s. Although these specialised sets are tuneable from about 20 to 150MHz, a.m./f.m. and, with a pre-amplifier, are useful for DXing in Bands I and II during the Sporadic-E season, do keep in mind that they are heavy and large, well over 30 years old and spare valves and major components are not easily available. If you should be tempted and these sets are advertised periodically, then get some expert advice before working on any of these famous receivers from the past.

Band Conditions

The atmospheric pressure, fell sharply to 29.4in on March 27 and then slowly climbed back to 30.0in by midday on the 29th. This rise continued for a short period peaking at 30.4in around 2300 on the 31st and then taking a couple of days to slowly fall back

to 29.5in. The pen arm on my barograph then hovered between 29.4 and 29.9in until noon on April 11 when it rose sharply to 30.3in on the 12th, peaking at 30.5 from noon on the 14th to midnight on the 16th and then gradually falling back to 30.1 on the 19th. This rise and fall was followed by a similar pressure change between the 20th and 24th and although more openings were expected, band conditions did improve and some DX was reported during the peak pressure periods.

Between midnight and 0530 on March 30, Francis Hearne (Ilford) logged County Sound from Guildford and at 0800 he received BBC Radio Sussex and ILR Radio Mercury. "I was pleased to hear County Sound because it is the first station that I have been able to pick up situated to the west of London," wrote Francis. He also pointed out that co-channel interference from Radio Essex was coming up at the same time.

I heard many French signals, and a few inter-station "warbles", using an R216, Fig. 1, with an Antiference pre-amplifier and outside dipole, at my home QTH on March 21 and 29 and on April 1, 4, 12, 14, 16, 18, 23 and 24.

At 1700 on the 15th, I parked on the South Downs, near Harting on the Hampshire/Sussex border and checked Band II with my Plustron TVR5D and, while using it's own rod antenna, I heard "warbles" (most likely co-channel interference) around 90.5 and 93MHz, a Belgian station on 95.7MHz (possibly Egem) and several French stations between 98 and 101MHz. If your car radio has a v.h.f. band it is often worthwhile looking for DX in Band II whenever you stop on high ground, especially when the atmospheric pressure is high, or between May and August when Sporadic-E is about.

Make sure your reports reach
Ron in time for the August
issue, the deadline is June 20.

TELEVISION

Ron Ham

Faraday, Greyfriars, Storrington, West Sussex RH20 4HE

The engineering and publicity departments of most broadcasters are just as pleased to receive reports of their transmissions as the DXers are to have a QSL card in reply.

During the 1986 Sporadic-E season husband and wife team, Tony and Edwina Mancini (Belper) frequently received pictures from the USSR and their detailed reports to Radio Moscow were

acknowledged with cards showing Moscow's Lenin Library, Fig. 1 and the Bolshoi Theatre, which is on the reverse side of Fig. 2. Like many television enthusiasts the Mancinis use a camera to support

their reports and to record interesting pictures like the Estonia caption seen in Fig. 3.

Announcers, newscasters, programme presenters and participants frequently appear during

openings and the people from Poland and Spain, Figs. 4 and 5, received by Len Eastman (Bristol), last June and July respectively, are typical examples.

"I have just acquired a copy of *TV.BILDKATALOG*, from Aerial Techniques in Poole and I think it will help me to identify stations much more easily, especially the alphabet transcriptions, clock photo section and the comprehensive test card section," said Mike Bennett (Slough).

Band I (40-68MHz)

Ian Galpin G1SMD (Poole) has been DXing for the past 3 years and during last winter saw many "pings" of pictures from stations in Czechoslovakia and Poland as their signals were deflected by decaying meteor trails. Ian uses a JVC 3040 receiver with a dipole for Band I and long Yagis for Bands III, IV and V. At midday on April 14, he received strong pictures from Poland on Ch. R1 including cartoons, the "TP" clock, test

card and a schools programme.

During the same short opening, Len Eastman using a JVC CX610GB, received a test card, in colour, from the USSR on Ch. R1 and a maths lesson followed by the news on Ch. R2.

At 1310 Noel Smythe (Caerphilly) noted that the E. German test card DDK-2 was fighting for predominance with the Russian signals. Noel also logged a test card from Czechoslovakia and for most of that afternoon, and again around 1000 on the 15th,

he received pictures from Italy, complete with the RAI ident on Chs. 1a and b.

Len also copied strong colour signals from Portugal and Spain during the afternoon of the 20th when a Sporadic-E opening cast its spell over Chs. E2 and E3.

Simon Hamer (New Radnor), logged test cards from Italy on March 24, Finland, Poland and Switzerland on the 25th and Norge; Bremanger on the 26th. On April 5, Simon noted a Sporadic-E opening toward Scandinavia



Fig. 1: QSL card, Moscow

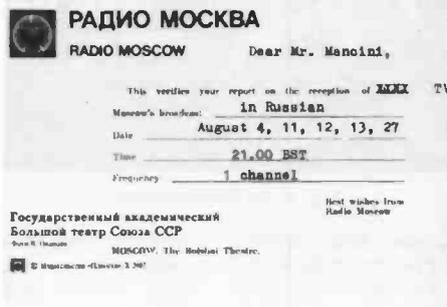


Fig. 2: Acknowledgement, Moscow



Fig. 3: Estonia



Fig. 4: Polish TV



Fig. 5: Spanish TV



Fig. 6: Belgian TV



Fig. 7: Belgian TV



Fig. 8: Weather report (unidentified)



Fig. 9: SSTV from Finland



Fig. 10: Swedish SSTV

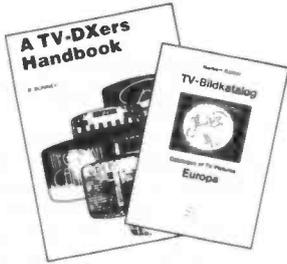


Fig. 11: USA SSTV



Fig. 12: "Tinker" looks on!

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when he identified signals from Denmark; Norge, Gamlem and Gulen; as well as Sweden. He also received ARD, Grunten on Ch. E2 on the 16th.

Between March 16 and April 15, The Mancinis logged a variety of captions, logos, programmes and test cards from television transmitters in Austria, Czechoslovakia, Finland, E and W Germany, Italy, Poland, Scandinavia, Spain and Switzerland. Among their haul of German and Norwegian regionals were DFF; DDR F1 and ARD; Grunten, NRD/KEIL, SWF/BADN and SWF/RBG (Raichburg) and Bremanger, Gamlem, Kongsberg and Melhus. The signal from Kiel was a first timer for the Mancini's log.

Tropospheric

During the peak of a tropo opening last November 30, I received strong pictures of the presenter, Fig. 6 and two pannel members, Fig. 7, taking part in a discussion programme from Belgium.

Noel Smythe watched a weather report, Fig. 8, from an unidentified station while a similar event was in progress. This year, on April 16, he saw a Belgian news

bulletin from RTBF and logged the W. German regional ident SWF-1/HGR, in Band III and found test cards from the French TDF-1 network, in the u.h.f. band on Chs. 24, 50 and 62. Noel also received Band III signals, often in colour, from the French Canel + for varying periods on most days in March and on April 8, 12, 14, 16 and 17.

Simon Hamer watched the Lunchtime Concert from RTE-1 and a test pattern from RTE-2 on several channels in Band III on April 12.

Although the Mancinis received poor to good pictures from RTE-1 on most days during the period, they only logged RTE-2 in spasms, from Sligo, on April 14 and 15. They also received spasmodic pictures from Canel +, on Chs. F5, 7 and 9, on 17 of the 26 days from March 21 to April 15 inclusive. Recently, Edwina and Tony installed a new German Kathrein antenna for Band III and are delighted with the way it collects signals from France & Ireland. On the 13th, they spent most of the day setting up the memory banks for the DX channels on their new Grundig multi-system colour receiver.

George Garden (Edinburgh) spent the evening of April 17 on

Cairn o' Mounth, armed with his JVC receiver and 3, independent, 48-element Jaybeam antennas and their respective pre-amplifiers for groups A, B and C/D. "I placed the antennas horizontally and, one at a time, I selected the 3 bands," wrote George. He added, "As signals were stronger with these antennas, comparing adjacent channels to locals was much easier." George's experiment produced clear, snow free, colour pictures from Chatton (Tyne Tees TV) on Ch. 33, Darvel (BBC 1) on Ch. 49 and Selkirk (Border TV) on Ch. 59. "There was strong interference on Chs. 33 and 41 and by carefully turning the large antenna on Ch. 33, I changed the picture to BBC 2, but I am not sure where this signal came from," said George, who identified the Chatton and Selkirk signals by their localised adverts.

SSTV

During February, Allan Sancto DD5FM (Grosskarolinenfeld), using a Sony ICF2001, a 10m long wire antenna, plus home brew a.t.u. and SSTV converter, received good quality pictures, on 14MHz, from stations in Finland (Fig. 9), Sweden (Fig. 10) and the USA (Fig. 11). However, it seems

that the strength of the signal from OH5ZJ required a second opinion from Tinker, Fig. 12, hi.

"The Sunday morning SSTV net on 3.730MHz gives good coverage to Cornwall from my QTH," wrote Richard Thurlow G3WW (March). He also reports that on March 22, during the Monday to Friday European net from about 0815 to 0900, he had a 2 way, 8 seconds, QSO on 7.039MHz with OE3GY/6. This was Richard's 2174th, first-time two-way, QSO on SSTV and while this was in progress, he received good pictures of the OEs snow covered QTH.

During the month prior to April 7, Les Hobson GOCUI (Rotherham) exchanged 24 seconds colour pictures with WA2FDL, 32 seconds monochrome with ZS2AO and 8 seconds monochrome with HA9SB, PY5BYE, VE3PT, WA2WFF, W10FV, W2GQC, W5ZR and YU5DZ on 14.230MHz. On April 5, Les worked LU1DDE, which is his best SSTV DX so far.

**Make sure your reports
arrive by
June 20**

LONG MEDIUM & SHORT

*Brian Oddy G3FEX
Three Corners, Merryfield Way, Storrington,
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In these days of ever increasing receiver complexity and rising prices it is perhaps worth remembering that it is possible to hear many of the broadcast stations with a simple home built receiver, provided a good antenna and earth system is installed.

Many interesting and ingenious circuits have evolved over the years, but a regenerative detector, which was the ultimate design in the early days of broadcasting, can still provide many hours of listening pleasure. The direct conversion principle has recently been employed in quite a number of simple designs including the relatively inexpensive receiver kits advertised in *Short Wave Magazine*. An added bonus to home construction is the remarkable sense of achievement obtained when hearing the first distant station!

Long Wave DX

(Note: l.w., m.w. frequencies in kHz, s.w. in MHz: Time UTC).

The l.w. band tends to be rather neglected by many listeners although a number of interesting

broadcasters can be heard in the UK. Using an HMV 2181 Arundel receiver in London, Phil Townsend checked the band during the daylight hours and logged Donebach, W. Germany 153 (SIO 454); Allouis, France 162 (555); Oranienburg, E. Germany 177 (222); Saarlouis, W. Germany 183 (555); Droitwich, UK 200 (544); Roumoules, Monaco 218 (354); Junglinster, Luxembourg 236 (555); and Kalundborg, Denmark 245 (344).

Rab Freeman has been checking the band during the evening in Port Glasgow and logged Konstantynow, Poland 227 (SIO 243) and Topolna, Czechoslovakia 272 (343) along with the stations noted by Phil Townsend. Rab says "I like the USSR programmes down there, as they play some very good classical music and the Russian pop music isn't all that bad!" Listening around 2030 Rab picked up the Moscow 1st programme via their transmitters in Kaliningrad 171 (SIO 343) and Minsk 281 (232) — he also noted that Radio Volga was relaying the same programme

via their Burg transmitter on 263 (354).

A QSL has been received by Tim Shirley of Bristol confirming his reception of Nador, USSR on 171 at 2100. He has recently logged the 100kW station at Kazan, USSR on 254 between 2359 and 0030 and is now awaiting their QSL.

MW Transatlantic DX

With the approach of summer the reception conditions for transatlantic m.w. reception are gradually deteriorating, but nevertheless many interesting stations are still being heard. In the past the signals from CJYQ in St. John's NF on 930 were often the first to be audible in the UK and acted as a good guide to band conditions, but this has not been the case recently despite the good conditions. Although Den Marriott picked up CJYQ in Bexleyheath one night at 2300, that was exceptional and the majority of DXers logged their signals around 0100.

It is interesting to note that

some of the broadcasters in the USA have recently been the first to be audible in the UK, with Boston's "Memory" station WMRE 1510 heading the list this time. Davey Hossack logged WMRE at 2215 in Winchburgh and heard another Boston station, WHDH on 850 around 2315 at SIO 322. At 2347 he listened to Radio Caribbean, St Lucia 840 which was putting in an SIO 423 signal! At 0045 two stations in the USA were noted — WWWE 1100 in Cleveland, OH and WVVA 1170 in Wheeling, WV. Around 0200 he tuned into Radio Paradise, St. Kitts on 850 and noted SIO 333 in his log. Two Canadian stations completed the log before closing down at 0345, namely CKYQ 610 in Grand Bank, NF peaking SIO 423 at 0237 and CFCB 570 in Corner Brook, NF noted as SIO 232.

Some of the signals from the Caribbean area have also been reaching the UK before midnight, in fact Alexander Little picked up the Caribbean Beacon, Anguilla 1610 in Glasgow at 2230 one night, but their signal was only

SEEN & HEARD

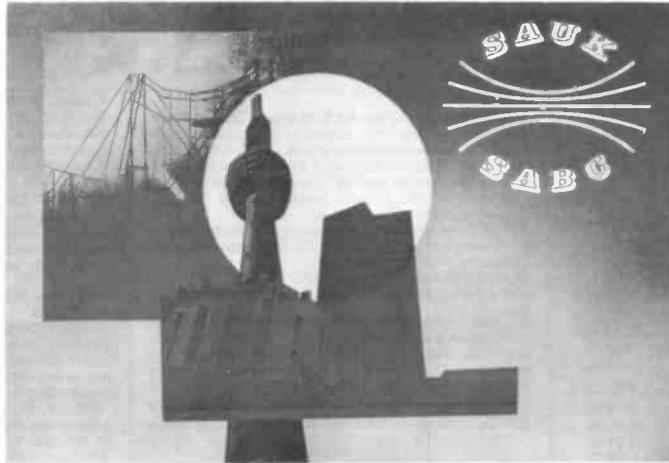
SINPO 13321. Alexander uses a 0.5m loop antenna with his Sony ICF-7600D receiver when DXing, however the loop is not connected directly to the receiver but is simply placed close to it so that inductive coupling can occur to the antenna built in the set. On 1570 he received the Atlantic Beacon located on the Turks & Caicos Islands for a new one, noting SINPO 22222 in his log at 0235. He has also been listening to the pop music broadcast by CKYQ on 610 — their signal was SINPO 33333 at 0230.

Encouraged by the recent reports from other DXers many listeners have been searching the band for new stations. Simon Hamer added eight Canadian stations to his growing list of DX in New Radnor, namely CBNA 600 in St. Anthony, NF; CIYQ 680 Grand Falls, NF; CKAC 730 Montreal, PQ; CBL 740 Toronto, ON; CHER 950 Sydney, NS; CBZ 970 Fredericton, NB; CHLR 1380 Moncton, NB and CFDA 1380 Victoriaville, PQ. Two stations in New York were also noted, WNBC 660 and WOR 710.

Several of the Canadian stations to be heard on the band were mentioned in the report from Rab Freeman — VOXM 590 St. John's, NF (SIO 322 at 0202); CBNA 600 (SIO 232 at 0145); CIYQ 680 (SIO 233 at 0147); CJCH 920 Halifax, NS (SIO 343 at 0150); CJYQ 930 (SIO 343 at 0119); CHNS 960 Halifax, NS (SIO 222 at 0205) and CKLM 1570 Lavel, PQ (SIO 333 at 0200). Those noted from the USA were WINS 1010 New York (SIO 232 at 0134); WHN 1050 New York (SIO 222 at 0136) and WCAU 1210 Philadelphia (SIO 243 at 0433). From other areas were the Atlantic Beacon 1570 (SIO 232 at 0425) and the Caribbean Beacon 1610 (SIO 322 at 0143).

Some listeners have not been so lucky and have yet to hear their first American or Canadian station. Despite several attempts and using four different receivers. Phil Townsend says he has heard no trace of the DX, so perhaps the level of electrical interference in the London area masks the signals. Writing from Mapperley, John Sheridan says "Transatlantic DX has been very poor on the nights I tried — CJYQ, WINS and the Caribbean Beacon were barely readable."

Needless to say "old timer" Bill Kelly has been taking advantage of the present conditions and putting his NRD 525 receiver to good use at all hours of the night in Belfast! His log includes Canadian CBNA 600 at 0155; CJYQ 930 at 0210; CBD 1110 St John, NB at 0145; CKJD 1110 Sarnia, ON at 0141; CKCW 1220 Moncton, NB at 0220 CBOF 1250 Ottawa, ON



South African BC QSL card sent to Tim Shirley

at 0130; CJMS 1280 Montreal, PQ at 0415; CKBC 1360 Bathurst, NB at 0120 and CKLM 1570 at 0405. From the USA were WNBC 660 at 0145; WINS 1010 at 0010; WHN 1050 at 0145; WBAL 1090 Baltimore at 0455; WOWO 1190 Ft. Wayne, IN; WCAU 1210 at 0310; WTOP 1500 Washington at 0425; WQXR 1560 New York at 0505. From other areas were XERED 1110 Mexico City, Mexico at 0230; Radio Globo in Rio de Janeiro, Brazil 1220 at 0110; Atlantic Beacon 1570 at 0401 and the Caribbean Beacon 1610 at 0045.

Using a DX 400 receiver with a home made loop antenna, Tim Shirley logged KTRB 860 in Modesto, CA at 2359; HRTU 750 in Honduras at 0130 and TGHF 740 in Guatemala at 0300 for new ones — all are subject to confirmation by QSL.

Other MW DX:

An impressive list of DX received during daylight has been sent along by George Millmore, who uses a Racal RA17 receiver with a loop antenna in Cowes, IOW. No doubt the nearby sea paths help to enhance the ground wave signals which reach him from stations in the nine countries detailed in his report, namely Belgium — Wavre-Overijse 540 & 621; Wolvertem 927 and La Louviere 1125; Czechoslovakia — Prague 639 and Litomysl 1287; France — Paris 585; Rennes 711; Brest 1071 & 1404; Strasbourg 1278; Nancy 1350 and Lille 1377; Finland — Turku 963; E. Germany — Burg 783; W. Germany — Frankfurt 594; Braunschweig 756; Neumunster 1269; Heusweiler 1422; Mainflingen 1539 and Langenberg 1593; Holland — Lopik 675 and Flevoland 747 & 1008; Italy — Verona 1601; Luxembourg — Marnach 1440; Sweden — Solvesborg 1179.

Some of the signals arriving here from an easterly direction have been attracting the attention of Tim Shirley, logging Cherbokarsy, USSR on 531 at 0200 also Radio

Moscow via Leipzig, E. Germany on 1323 and via Kaunas, USSR on 1386 around 0030. Some of the other interesting stations noted in his report were Zakyntos, Greece 927; Radio Tabriz, Iran 1026; Radio Stara, Bulgaria 1125 at 0200 and Munchen-Ismaning, W. Germany 1197 at 1600.

Robert Taylor has been testing out a new "Soooper Loop" antenna with his Toshiba PRF-11L receiver in Edinburgh and seems impressed with the results, hearing BBC Radio Ulster via Lisnagarvey 1341 at 1110 (SIO 444); BBC Radio Wales 882 at 1500 (SIO 444); RTE-1 Tullamore 567 at 1140 — this station was SIO 444 with the loop and inaudible without it! He also picked up Radio Sweden International via their Slovesborg transmitter at 1600 — their daytime ground wave signal was SIO 444. Using a National Panasonic DR28 receiver plus whip antenna, Bill Stewart has been hearing their broadcasts in Russian via the sky wave path at night in Lossiemouth, which rate as SIO 555 around 2200.

The broadcasts from Radio Sweden have also been attracting the attention of Leslie Lyon in Scarborough, who has just received their latest schedule of daily m.w. transmissions to Europe and via s.w. to other areas of the world. It includes a Great Circle map centred on Stockholm and is available free — see Station Addresses. Phil Townsend says he finds that their 1179 signal can only be heard in London as the daylight begins to fade — the sky wave path via the E layer of the ionosphere then makes reception possible and it's the same with Radio Norway via Kvitsoy on 1314.

In contrast, Phil finds that the reception of some of the nearer stations on the continent is quite good during the day — no doubt the relatively low, ground wave losses over the clear sea path helped him to log Belgium's Waver-Overijse on 540 & 621; Wolvertem 927 and Beltem 1512, also Lopik on 675, 747 & 1008 in the Netherlands. He has

also been hearing the BBC World Service from Orfordness on 648 at SIO 455, but their transmission on 1296 has deep fades present during the day. Another example of daytime ground wave reception via a sea path was mentioned by Ian Baxter who has been hearing Manx Radio 1368 on the Isle of Man at SINPO 44444 at noon in Blackburn. This station can only be heard after dark in many areas of the UK — their sky wave signal reaches Den Marriott in Bexley-heath well at 2325.

In an interesting letter from Christchurch, New Zealand, David Howe mentions that he has been hearing the VOA relay in the Philippines on 1143 in the early hours of the morning — apparently this station runs 1000kW and can often be heard above three Australian stations which share that frequency! He has been experimenting with the little m.w. reflex receiver design which John Ratcliffe uses in Southport, Australia and has found that the addition of the Q multiplier which John advocates seems to render the set insensitive below about 1000kHz — it would be interesting to know if other DXers who have constructed this little gem of a receiver have experienced this problem.

Judging by the times quoted in the report from Bill Kelly it is a wonder that he gets any sleep at all! He has certainly been busy during the night and logged several stations in the USSR — Rostov on Don 945 at 0015; Krasnodar 1089 at 0245; Minsk 1197 at 0315; Odessa 1278 at 0120; Kiev, Ukraine 1242 at 0125; Kaunas 1386 at 0430; Lvov, Ukraine 1404 at 0120 and Kaunas 1557 at 0415.

Bill picked up many other interesting stations too, including Sidi Bennour, Morocco 540 at 0430; Les Trembles, Algeria 549 at 0440; Batra, Egypt 621 at 0345; Sud Radio, Andorra 819 at 0355; Ksar es Souk, Morocco 864 at 0145; Las Palmas, Canary Islands 1008 at 0215; Ajaccio, Corsica 1161 at 0500; SER Mercia, Spain 1179 at 0200; Agadir, Morocco 1197 at 0140; Vatican Radio, Rome 1530 at 0420; Sfax, Tunisia 1566 at 2320; Cordoba, Spain 1575 at 0720; Genova, Italy 1575 at 0735; Pamplona, Spain 1584 at 2300 and Vatican Radio, Rome 1611 at 0315. However Bill seems to have missed one station in Italy which Simon Hamer picked up at 0003, namely RAI-1 on 900 in Milan!

The broadcasts from BRT on 1512 have been attracting the attention of many listeners following the report last autumn from John Greenwood that their signal strength reached a peak as sunset arrived in Brussels,

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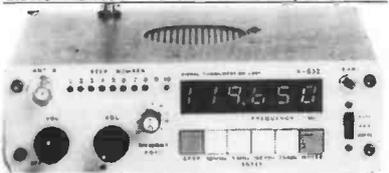
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AR2002 RECEIVER

Frequency range of the AR2002 is from 25 to 550 and from 800 to 1300 MHz. Modes of operation are wide band FM, narrow band FM and AM. The receiver has 20 memories, memory scan and a search mode which checks frequencies between user designated limits. The receiver has a push button keypad for easy frequency entry and operation. A front panel knob allows the listener to quickly step up or down in either 5, 12.5 or 25 kHz steps from the frequency initially chosen. The AR2002 has a front panel LED bar "S" meter. There is a front panel 3.5mm jack socket for headphone use.

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



THE R532 AIRCRAFT BAND RECEIVER £224

Specification. Frequency range: 110 to 136MHz, i.e. all NAV/COM channels. Number of channels: 1040 (25kHz steps). Sensitivity: Better than 0.75 microvolts 10dB/SN. Memory channels: 100 (10 banks of 10). Memories can be scanned automatically or selected manually. Power required: 12V dc negative earth 300 mA typical. (Display can be switched off to reduce consumption when operating portable). Size: 160x45x130mm. Weight: approx. 1kg. (including memory backup batteries).

R557S Hand Held Airband Receiver..... £69.50

R-5000 COMMUNICATIONS RECEIVER

The R-5000 is a competition class communication receiver with superior dynamic range, having every conceivable feature, and is designed to receive all models (SSB, CW, AM, FM, FSK) from 100kHz to 30MHz. With the optional VC-20 "VHF Converter Unit" coverage of the 108-74 MHz frequency range is provided.

Advanced microprocessor technology controls various features, including dual digital VFOs, 100 memory channels, memory scroll, memory and programmable band scan, superb interference reduction and other features for ease of operation to enhance the excitement of listening to stations around the world.

FEATURES

Covers 100 kHz to 30 MHz in 30 bands. Optional 108 to 174 MHz Coverage (VC-20).

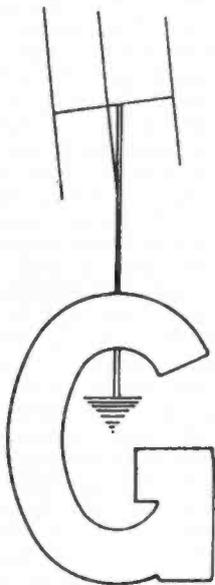
The R-5000 covers 100kHz to 30 MHz in 30 bands. An innovative digital PLL synthesiser system provides outstanding frequency stability and accuracy.

Through the use of advanced microprocessor technology, frequency, band and mode data of stations in the 108 to 174 MHz range also may be tuned, displayed, stored in memory, recalled and scanned. This is accomplished by using the R-5000 front panel controls and frequency display, which allows maximum convenience and ease of operation.

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SEEN & HEARD

Freq kHz	Station	ILR or BBC	DXer
603	Invicta Sound	I	D,F*, O,Q,S,V
630	R. Bedfordshire	B	A,O,P,Q,S,T,V
657	R. Clwyd	B	C,E,O,P,Q,S,U
657	R. Cornwall	B	G
666	R. York	B	B,E,G,O,P*,Q,S,U
729	BBC Essex	B	P,Q,S,T,V
756	R. Cumbria	B	C,E,U
756	R. Shropshire	B	C,O,P,Q,S
765	BBC Essex	B	C,D,O,P,Q,S,V
774	R. Kent	B	Q,S,V
774	R. Leeds	B	E,G,O,P,Q
774	Severn Sound	I	O,Q,S
792	Chiltern R.	I	O,P,Q,S,T
801	R. Devon	B	O,Q
828	R. WM	B	C,O,Q,S
828	R. Aire	I	E,P*,Q,R
828	Chiltern R.	I	O,Q,S,V
837	R. Cumbria	B	B
837	R. Furness	B	G
837	R. Leicester	B	O,P,Q,S,T
855	R. Devon	B	C
855	R. Norfolk	B	P,Q,S,T,V
855	R. Lancashire	B	B,C,E,O,P,Q
873	R. Norfolk	B	O,P,Q,S,V
936	GWR	I	C*,O,Q,S
945	R. Trent	I	A,G*,H,I*,J,K*,L,M,- N,O,P,Q,S
954	DevonAir R.	I	G*,P*,R
954	R. Wyvern	I	C*,O,Q,S
990	Beacon R.	I	L,O,Q,S
990	Hallam R.	I	P,Q
999	R. Solent	B	O
999	Red Rose R.	I	A,B,C*,E,O,U
999	R. Trent	I	O,Q
1026	Downtown R.	I	C
1026	R. Cambridgeshire	B	O,P,Q,S,V
1035	R. Sheffield	B	O,P,Q,S
1035	R. Kent	B	D,S,V
1035	NorthSound R.	I	E,G,U
1035	West Sound	I	B
1107	Moray Firth R.	I	B,C,U
1107	R. Northampton	B	P,Q,S
1116	R. Derby	B	C,O,P,Q,S
1152	LBC	I	V,R
1152	Metro R.	I	E
1152	BRMB	I	L,Q
1152	Piccadilly R.	I	O
1161	R. Tay	I	R*
1161	Viking R.	I	C,E,O,P,Q,R*

Freq kHz	Station	ILR or BBC	DXer
1161	GWR	I	C*
1161	R. Bedfordshire	B	O,Q
1170	R. Tees	I	E,G*,Q
1170	R. Orwell	I	D,R
1170	Signal R.	I	A,O,P,Q
1242	Invicta Sound	I	Q,V
1251	Saxon R.	I	D,G*,Q,V
1260	Marcher Sound	I	C,O
1260	Leicester Sound	I	P,Q
1278	Pennine R.	I	E,O,Q
1305	Red Dragon R.	I	C,G,V
1305	R. Hallam	I	E,G*,O,P,Q
1323	R. Bristol	B	C,O,Q
1323	Southern Sound	I	B,C,Q,T
1332	Hereward R.	I	O,P,Q
1359	Essex R.	I	Q,V
1359	Red Dragon R.	I	C,G
1359	Mercia Sound	I	F*,L,O,P,Q,S
1368	R. Lincolnshire	B	P,Q
1368	R. Sussex	B	V
1431	Essex R.	I	F*,Q,T,V
1431	Radio 210	I	Q
1449	R. Cambridgeshire	B	O,P,Q
1458	R. London	B	C*,Q,V
1458	R. WM	B	L,Q,S
1458	R. Manchester	B	B,C,O,P
1458	R. Newcastle	B	E
1476	County Sound	I	G*,O,Q,T,U
1485	R. Merseyside	B	C,E,O,Q,U
1485	R. Humberside	B	P,Q
1485	R. Sussex	B	C
1107	R. Stoke-on-Trent	B	A,G,O,P,Q
1521	R. Mercury	I	C,G
1521	R. Nottingham	B	O,Q
1530	Pennine R.	I	A,O,P,Q
1530	BBC Essex	B	C,V
1530	R. Wyvern	I	C,G,L,Q
1548	Capital R.	I	C*,G,Q,V
1548	R. Bristol	B	C*,G
1548	R. City	I	A,O
1548	R. Cleveland	B	E
1548	R. Hallam	I	G*,P,Q
1557	Chiltern R.	I	G
1557	Hereward R.	I	C*,O,Q
1557	Ocean Sound	I	C*,G*
1584	R. Nottingham	B	C,O,P,Q
1584	R. Shropshire	B	G,O
1584	R. Tay	I	U
1602	R. Kent	B	G,O,Q

although it was still daylight in Evesham. Deep fades have been observed on their signal about half an hour before sunset and Wyn Mainwaring noted that the rate of fading gradually increases with the approach of sunset in Cowes, IOW. Paul O'Connor recently observed fades at 30 second intervals around sunset in Birmingham.

John has been running a recorder on their signal and made twenty recordings prior to the March equinox which showed that the overall SINPO rating of their signal between 1830 and 1930 was falling from 5 to 3 — the main reason for this was the deep fading accompanied by audio distortion which began to occur more often and earlier during the programme. The introduction of daylight saving time and BRT's schedule change made things much worse, with an overall SINPO rating of 0 to 3 between 1730 & 1755, although things have improved since then.

Having studied the reception of their signal during the autumn and

spring, John has concluded that m.w. propagation at twilight over path lengths of 325-650km in March is less favourable than during September. After dark, the broadcasts from BRT reach the UK via the sky wave path and reception is usually good — using a Vega B212 receiver in Morden Sheila Hughes noted SINPO 54444 in her log at 2100.

MW Local Radio DX

The transmissions from the new Radio Trent extension for Derby and East Staffs on 945 have been logged by many DXers — see chart. George Millmore has been experimenting with home made loop antennas in Ryde and finds the signals from Radio London and Radio WM (both on 1458) provide a good test — if the loop is good it will separate them!

Short Wave DX

There are indications that we are at last on the upward slope of the next 11-year solar sunspot cycle, but it is unlikely that any

regular 25MHz (11m) broadcasts will be scheduled until a marked improvement in the conditions is noted. In a letter from "down under" Dennis Maxwell-Gill says that there are no broadcasts audible on the 11m band in Gordon, Eastern Australia either, so the band is virtually dead everywhere just now!

In contrast, there are a number of broadcasters who use the 21MHz (13m) band during the day — they beam their programmes to listeners in many areas of the world and those intended for Europe have been generally well received despite the rather unstable conditions which exist just now.

The daily transmissions to Europe from Radio RSA in Johannesburg on 21.590 make a good pointer to reception conditions as well as providing plenty to interest the listener! Their programmes in Portuguese, English and French commence at 1000 and continue until 1456 when listeners are asked to retune to the 19m band. Just

Note:

Entries marked * were logged during darkness. All other entries were logged during daylight.

DXers:

- A: Ian Baxter, Blackburn.
- B: Neil Dove, Lockerbie.
- C: Rab Freeman, Port Glasgow.
- D: Francis Hearne, Ilford.
- E: Michael Hill, Stockton-on-Tees.
- F: Davy Hossack, Winchburgh.
- G: Bill Kelly, Belfast.
- H: Mike Kitchener, Hitchin.
- I: Eileen Mainwaring, Cowes.
- J: Daniel Masterson, Stoke-on-Trent.
- K: John Nash, Brighton.
- L: Paul O'Connor, Birmingham.
- M: John Parry, Northwich.
- N: David Porter, Ludlow.
- O: Philip Rambaut, Macclesfield.
- P: Mark Rogers, Sheffield.
- Q: John Sheridan, Mapperley.
- R: Tim Shirley, Bristol.
- S: Roy Spencer, Nuneaton.
- T: Darren Taplin, Tunbridge Wells.
- U: Robert Taylor, Edinburgh.
- V: Philip Townsend, London.

imagine the thrill Ron Pearce experienced when he tuned into their signals with his little one valve receiver in Bungay! This set uses a single 955 Acorn valve and was originally described in

SEEN & HEARD

Practical Wireless for March '64 — it certainly shows what can be achieved with a few simple components and a little patience!

In Worcester, Edward Broadsmith has been listening to the programmes in English and Japanese from Radio Japan, which are relayed to Europe via a station in Moyabi, Gabon on 21.700 from 1500 until 1700. Their broadcasts are often well received in the UK — Peter Singleton listened to them in Blackpool for an hour from 1500 and noted SINPO 45434 in his log, but he says "I'd like to log Radio Japan direct from Tokyo as I feel it's like cheating taking it off a relay station". No doubt many DXers will agree with those comments, although some of the relay stations in use around the world are located in rare DX spots!

Of course some of the broadcasts intended for listeners in Europe are not in English! Those from the Voice of Israel, Jerusalem on 21.625 are in Russian between 1000-1030 & 1400-1525. Programmes in Russian, Turkistani, Kazakh and Uzbek are also beamed towards E. Europe from Radio Liberty via Holzkirchen, W. Germany on 21.510 between 0700 & 1600. Radio Free Europe broadcasts in Bulgarian via Gloria, Portugal on 21.500 from 1300 until 1800 and in Czech from 1000 until 1700 on 21.720.

When conditions permit, many of the broadcasts beamed to other areas of the world can also be heard in the UK. Some of these programmes are in English, such as those beamed to Asia by Radio Nederlands via their Madagascar relay on 21.480 which Philip Rambaut picked up in Macclesfield at 1210, or Radio DW in Cologne, who beam to S.E. Asia on 21.650 via their Kigali, Rwanda relay and to Australia on 21.680 via Wertachtal, W. Germany from 0900 until 0950. However, many of them are in foreign languages, with perhaps a few items in English, for example the programmes beamed towards N. Africa by UAE Radio Dubai on 21.650 are mainly Arabic from 1000 until 1500. Their signal is often good in the UK — Julian Wood noted SIO 333 in his log in Buckie at 1030.

Some of the broadcasts to other areas noted by Rab Freeman were Radio Cairo, Egypt 21.465 beaming to S.E. Asia (SINPO 35544 at 1332); Radio Pakistan, Islamabad 21.475 to Asia (35444 at 1044); VOA via Monrovia, Liberia 21.485 to Africa (24322 at 1759); Riyadh, Saudi Arabia 21.495 to Asia (23332 at 0916); Radio Prague, Czechoslovakia 21.505 to S. Africa (23322 at 1404); Radio Liberty via Holzkirchen, W.



Davey Hossack at his listening post

Germany 21.510 to N. W. Asia (34433 at 1233); and via Gloria, Portugal 21.530 to Asia (24343 at 1355); RSI beaming to the Middle East and E. Africa on SSB from Varbarg, Sweden (25433 at 1040); REE via Noblejas, Spain 21.575 to the Middle East (23322 at 1344) and FRI via Allouis, France 21.620 to E. Africa (23322 at 1340).

Many DXers have been listening for the 13m signals from WCSN, the new station in Boston, USA — Stuart Frost was one of the lucky ones to pick up their transmission in English to W. Africa on 21.640 from 1800 until 2000, however their signal was only SIO 222 in Wednesfield at 1930 and by 2000 it had tapered off into the noise.

There has been some improvement in the reception conditions prevailing on the 17MHz (16m) band and a number of interesting stations located in several continents have been logged by DXers during the day, however, if you intend to listen to Radio Australia on 16m, you will need to be up early! According to George Hewlett, who officially monitors their transmissions in Torquay, the best time for reception of their 17.715 transmission from Carnarvon, W. Australia is around 0630 UTC, however this time is gradually getting earlier.

Peter Singleton also found that 0630 is a good time to hear their signals and noted SINPO 44454 in his log while listening to their sports commentary at 0635! Sometimes it is possible to hear their signals later — Gerry Lovell picked them up with a SINPO rating of 43333 at 0748 one morning in Weston-Super-Mare, only to hear regular announcements that there was a fault from the studio in Melbourne which prevented the scheduled programme from taking place! Despite these glowing reports, it is important to remember that their transmission in English from 0100 until 0900 is beamed towards

Asia and is not intended for listeners in the UK! From 0900 until 1000 their station in Darwin, N. Australia takes over on 17.715 and beams programmes in Chinese to listeners in Central Asia.

Another DX station to look for in the morning is FEBA in the Seychelles on 17.855, logged by Phil Englehard in Macclesfield at 0615. Their programmes in English are intended for listeners in the Middle East and may be heard between 0600 and 0700 when conditions permit! Also listening in Macclesfield, Philip Rambaut logged All India Radio on 17.780 at 1214, broadcasting in Burmese to listeners in S. E. Asia.

UAE Radio Dubai beam their programmes in Arabic and English towards Australia on 17.775 from 0415 until 0600 and then towards Europe until 1500. Sheila Hughes says she likes the format of the UAE news bulletins and has been listening to their series of talks entitled "The Role of the Proverbs in Arab Society" with interest. Sheila logged their signal as SINPO 34433 at 1030 while listening with her Vega 206 receiver.

Radio Moscow uses a number of frequencies in the 16m band during the day. The two reports noted by Maurice Andries in Dendermonde, Belgium on their signals beamed to S. E. Asia at 1100 made an interesting comparison — 17.590 was SINPO 54544 but 17.645 was only SINPO 23543.

Using a new Sony ICF-7600D receiver in Stockton-on-Tees, Michael Hill has been hearing Radio Pakistan on 17.660 at 1100 — they beam towards Europe from 0715 until 1115. Their cricket commentaries are popular with many listeners — Ian Baxter noted SINPO 43444 in his log while listening to one of them at 1104 and Ron Pearce even picked them up with his little 1 valve receiver at 0905! Alexander Little also uses a Sony ICF-7600D receiver but adds a 30m wire

antenna to it when DXing on the s.w. bands. He has been listening to the popular *Mail Bag* programme from Radio RSA on 17.780 — their transmission on this frequency is from 1300 until 1556.

Using the Grundig Satellit 650 receiver shown in the picture, Davy Hossack logged Radio Algiers, Algeria on 17.745 as SIO 544 at 1600 — their programmes in French, Spanish and English from 0600 until 0005 are intended for E. Africa. In Corsham, Colin Diffell picked up two of the stations in the USA at 1600 — WYFR via Okeechobee, Florida broadcasting to Europe on 17.640 and VOA beaming towards W. Africa via Bethany on 17.785.

There has been a marked improvement in the reception conditions prevailing on the 15MHz (19m) band and many stations in several continents can be heard there during the day. A copy of the scheduled transmissions from Radio New Zealand was sent to me by Mike Bennett in Slough, which quotes their 19m broadcasting as being on 15.150 between 1830 & 2100; 2300 & 0145 and 0345 & 0730 UTC. Simon Hamer says "If you try 15.150 before Radio Baghdad gets on at 0500, you may hear Radio New Zealand".

When conditions permit, Radio Australia can be heard in the early morning on 15.160 via the short path and on 15.240 via the long path — George Hewlett finds reception is possible from 0600 and often improves by 0630, however these times are getting earlier and may well be 0430 by mid-summer. Radio Pakistan broadcasts to Europe on 15.605 from 0700 until 1115 — Bill Stewart listened to their news bulletin at 0800 and noted SIO 333 in his log. Listening in London, Gregory Adrian has been hearing the programmes in French and English intended for W. Africa from Africa No 1, in Gabon on 15.200 — they commence at 0800 and continue until 1655.

The 19m broadcasts to Europe from UAE Radio Dubai can be heard on 15.320 from 1000 until 2050 — Leighton Smart has been listening to one of their items in English at 1330 and noted their signal as SIO 444 in Trelewis. Some of the other stations which can be heard during the afternoon were detailed in a report from John Nash of Brighton — Riyadh, Saudi Arabia 15.060 at 1415; VOIRI Tehran, Iran 15.084 at 1429; Radio RSA 15.185 at 1500 (not as good as 21.590); All India Radio 15.335 at 1330; VOA via their relay in Colombo, Sri Lanka 15.395 at 1620 and Radio Tirana, Albania 16.230 at 1333.

During the late afternoon and

SEEN & HEARD

Freq MHz	Station	Country	UTC	DXer
2.300	KCBS Hyesan	N.Korea	2300	R
2.340	Fujian 1, Fuzhou	China	2200	C
2.390	R.Huayacocotla	Mexico	2000	R
2.420	R.Sao Carlos	Brazil	0200	R
2.490	VOS.1, Fuzhou	China	2215	C
3.215	R.Orion	S.Africa	1800	I
3.220	R.Togo, Lome	Togo	1750	R
3.230	R.RSA	S.Africa	0320	F,I,J
3.250	R.Pyongyang	N.Korea	0115	J
3.250	SABC Radio 5	S.Africa	2145	C
3.260	Voz de Rio Carrizal	Ecuador	0530	C
3.270	SWABC Windhoek	Namibia	2040	C,I,T
3.295	SWABC Windhoek	Namibia	2130	C
3.300	R.Cultural	Guatemala	0500	C
3.305	R.Zimbabwe	Zimbabwe	2050	I
3.320	R.Suid Afrika	S.Africa	1850	I
3.325	R.Liberal	Brazil	0500	C
3.330	R.Kigali	Rwanda	0300	R
3.345	R.Zambia, Lusaka	Zambia	2100	I
3.355	R.Botswana	Gabaron	1800	I
3.365	AIR New Delhi	India	0110	C
3.365	GBC Radio 2	Ghana	2142	B,C,G
3.370	R.Belra	Mozambique	2054	I
3.380	R.Malawi	Malawi	2020	I
3.395	R.Zaracay	Ecuador	0300	C
3.395	ZBC Gweru	Zimbabwe	1850	I
3.905	AIR New Delhi	India	2304	C,K,R
3.915	BBC Kranji	Singapore	2308	F,K,R
3.930	R.Capital	Transkei	2030	I
3.955	BBC London, Daventry	England	1958	E
3.955	R.Suid Afrika	S.Africa	1852	I
3.965	RFI Paris	France	2004	E
3.985	SRI Berne	Switzerland	1815	E,F,J
3.995	DW Cologne	W.Germany	2013	E
4.000	Bofoussam	Cameroon	2100	C
4.010	R.Frunze	USSR	1600	C
4.045	R.Moscow	USSR	1843	P
4.050	R.Frunze	USSR	0110	C
4.055	Radio Moscow 3, Kalinin	USSR	1900	C
4.060	R.Moscow	USSR	1645	C,I,J
4.065	R.Moscow Ryazan	USSR	2045	K
4.080	R.Ulan Bator	Mongolia	2200	R
4.090	WYFR Oakland	Taiwan	2130	C,K
4.200	R.Beijing	China	2300	C
4.220	Xinjiang	China	0115	R
4.330	Xinjiang	China	0045	C,U
4.460	CPBS 1	China	2205	C
4.470	R.Movima	Bolivia	0201	H
4.500	Xinjiang	China	2325	C,Q
4.635	R.Dushanbe	USSR	1848	B,U
4.680	R.Nac. Espejo	Ecuador	0310	U
4.725	BBS Rangoon	Burma	1500	R
4.735	Xinjiang	China	2250	H,U
4.737	R.Mozambique Maputo	Mozambique	2330	U
4.740	R.Afghanistan	via USSR	1800	B,H,Q,U
4.750	R.Bertoua	Cameroon	2150	N,U
4.755	R.Maranhao	Brazil	2230	C,U
4.755	Sani R.	Honduras	2355	Q
4.760	R.Inca, Lima	Peru	0230	R
4.760	ELWA Monrovia	Liberia	2030	F,N,Q
4.765	R.Moscow	via Cuba	2359	Q,R
4.770	FRCN, Kaduna	Nigeria	2150	H,I,J,N,O,Q,T,U
4.775	R.Gabon, Libreville	Gabon	2317	U
4.775	R.Los Andes	Bolivia	2240	F,U
4.780	RTD	Djibouti	2335	U
4.780	V. Carabobo	Venezuela	0239	Q
4.785	RTM Bamako	Mali	2341	Q
4.790	R.Atlantida	Peru	0251	Q
4.790	Azad Kashmir R.	Pakistan	1630	C,U
4.795	R.Douala	Cameroon	2130	N,U
4.795	R.Ulan Ude	USSR	0235	Q
4.800	AIR Hyderabad	India	1640	C
4.800	LNBS Lesotho	Maseru	2143	I,Q,U
4.805	R.Nac Amazonas	Brazil	0133	Q
4.805	Voice of Kenya	Kenya	2250	U
4.805	R.Nacional	Sao Tome	2035	R
4.810	RSA	S.Africa	1940	N
4.810	R.Yerevan	USSR	2000	J,R
4.815	R.diff TV Burkina	Ouagadougou	2140	B,C,F,N,P,Q,U
4.815	R.Pakistan, Karachi	Pakistan	1735	C
4.815	R.Nac. Tabatinga	Brazil	0245	U
4.820	R.Botswana	Botswana	1852	B,G,I,J,L,N,U
4.820	La Voz Evangelica	Honduras	0245	H
4.825	V of Selva	Peru	0135	H,U

Freq MHz	Station	Country	UTC	DXer
4.830	Africa No. 1	Gabon	1815	A,B,C,D,G,H,I,J,L,N,O,Q,T,U
4.830	R.Bangkok	Thailand	0030	R
4.830	R.Relej	Costa Rica	0430	C,H,J,Q
4.830	R.Tachira	Venezuela	0214	Q
4.835	R.Mali, Bamako	Mali	2200	A,B,C,J,L,N,Q
4.845	R.Bucaramanga	Columbia	0220	U
4.845	R.Nacional, Manaus	Brazil	0030	A,F,H,P,Q,U
4.845	ORTM Nouakchott	Mauritania	2145	B,C,F,N,P,Q,U
4.850	R.Yaounde	Cameroon	2100	B,C,F,L,N
4.850	R.Capital, Caracas	Venezuela	0147	C,J,Q
4.855	R.Mozambique	Mozambique	2355	U
4.855	R.San'a, Yemen	Yemen	2345	U
4.865	V of Cinaruco	Columbia	0115	H
4.870	V of Revolution, Cotonou	Benin	2218	B,C,L,N,P,Q,U
4.875	R.Nac, Boa Vista	Brazil	0207	Q,U
4.880	R.Bangladesh	Dhaka	0100	C,D
4.880	SABC Radio 5	S.Africa	1800	B,C,F,G,I,J,L,N,P,Q,R,T
4.885	R.Clube do Para	Brazil	0129	F,J,P,Q
4.885	Voice of Kenya	Kenya	1855	B,C,I,N
4.890	R.Centinel del Sur, Loga	Ecuador	0230	U
4.890	ORTS, Dakar	Senegal	1800	R
4.895	Ashkhabad	USSR	1900	C,Q
4.900	R.diff Nat. Conakry	Guinea	2150	F,J,N
4.905	N'djamena	Chad	2210	U
4.905	R.Relogio, Rio	Brazil	2200	C,Q
4.910	R.Zambia	Zambia	1600	C,I,R
4.915	R.Ghana, Accra	Ghana	2155	I,L,N
4.915	R.Anhanguera	Brazil	0026	Q
4.920	R.Nat. N'djamena	Chad	2100	N
4.920	R.Quito	Ecuador	0215	F,J,Q,U
4.930	Ashkhabad	USSR	1819	B
4.930	R.Tbilisi	USSR	1857	B
4.935	SWABC Windhoek	SW.Africa	2300	U
4.940	Kiev	USSR	1816	B
4.940	R.Yakutsk	USSR	1840	J
4.940	R.Yaracuy	Venezuela	0320	U
4.945	Caracol, Neiva	Columbia	0401	Q
4.945	R.Illimani	Bolivia	0235	U
4.945	R.Nat. Porto Velho	Brazil	0343	J,Q
4.945	RSA	S.Africa	1850	F,N
4.950	R.Nac. Luanda	Angola	2319	U
4.950	R.Madre de Dios	Peru	2300	R
4.958	Azerbaijan	USSR	1930	C
4.960	R.Federacion	Ecuador	0317	U
4.960	AIR New Delhi	India	0540	J
4.960	R.Nat N'djamena	Chad	1900	C,G,L,N
4.970	Rumbos	Venezuela	0259	F,Q
4.970	R.Tarqui, Quito	Ecuador	0330	R
4.970	Xinjiang	China	2359	C
4.975	R.Timbira, Sao Lulz	Brazil	2125	F
4.975	R.Uganda	Uganda	2005	F
4.975	Dushanbe	USSR	0300	A
4.980	Ond. Azuayas	Ecuador	0430	R
4.980	Ecos del Torbes	Venezuela	0014	A,B,J,Q,U
4.980	R.Swaziland	Swaziland	1859	B,N
4.985	R.Brazil Central	Brazil	0128	Q
4.990	AIR New Delhi	India	0030	J
4.990	R.Barquisimeto	Venezuela	0140	U
4.990	FRCN, Lagos	Nigeria	1901	B,F,I,J,S
4.990	Radlo RSA	S.Africa	0315	C,F,J,Q
4.990	Yerevan	USSR	1635	C,F,J
4.995	R.Ulan Bator	Mongolia	2250	U
5.005	R.Nacioal, Bata	Eq. Guinea	1850	C,F,G,J,L,N
5.005	R.Nepal	Nepal	0040	R
5.010	R.Garoua	Cameroon	2100	C,J,N,U
5.015	Arkhangelsk	USSR	2035	F
5.020	R.Nac Caracas	Venezuela	2201	M
5.020	ORTN Niamey	Niger	1900	C,N,R
5.025	R.Uganda, Kampala	Uganda	0620	J
5.035	Alma Ata	USSR	0153	Q
5.035	R.Bangui	C.Africa	2026	C,F,N
5.040	PBS Fujian	China	2300	R
5.045	R.Cultura do Para	Brazil	2200	C,F
5.045	R.Togo, Lome	Togo	2026	B,F,N,P
5.057	Gjirokaster	Albania	2040	F,L
5.060	PBS Xinjiang	China	2320	C
5.060	Burmese Army R.	Burma	1250	R
5.065	RN Progreso Loja	Ecuador	0215	R
5.095	R.Sutatenza, Bogata	Colombia	0017	B
5.120	R.Mundo	Peru	0115	R
5.163	R.Beijing	China	2245	C
5.240	VOS 1 Fuzhou	China	0030	C
5.260	R.Alma Ata	USSR	2359	C
5.320	R.Beijing	China	2320	C

DXers:

- | | | | |
|----------------------------------|-------------------------------------|--------------------------------|----------------------------------|
| A: Gregory Adrian, London. | F: Neil Dove, Lockerbie. | K: George Morley, Redhill. | P: Philip Rambaut, Macclesfield. |
| B: Ian Baxter, Blackburn. | G: Phil Englehard, Macclesfield. | L: John Nash, Brighton. | Q: John Sheridan, Mapperley. |
| C: Eamon Crowe, Waltham Cross. | H: Davey Hossack, Winchburgh. | M: Michael Osborn, Chelmsford. | R: Tim Shirley, Bristol. |
| D: Alan Curry, Stockton-on-Tees. | I: Simon Illingworth, Johannesburg. | N: Fred Pallant, Storrington. | T: Leighton Smart, Trelewis. |
| E: Colin Diffell, Corsham. | J: Bill Kelly, Belfast. | O: Ron Pearce, Bungay. | U: Jim Willett, Grimsby. |

SEEN & HEARD

evening many interesting stations in N & S. America have been received by DXers in the UK. "A cracking signal" is how **Michael Osborn** of Chelmsford described the transmission from the new station WCSN in Boston on 15.270, noting SINPO 55445 in his log at 1630. **Darran Taplin**, who uses a Realistic DXDX-150A receiver in Tunbridge Wells, has also been getting good reception from the USA, logging WHRI in South Bend on 15.105 with SINPO 44433 at 1756 and WRNO in New Orleans on 15.420 as 33433 at 1841.

Another station in the USA, WINB in Red Lion, PA was picked up by **George Morley** in Redhill on 15.295 at 1716. His interesting report included Radio DW via their relay in Antigua, W. Indies on 15.210 at 2120 and Radio HCJB Quito, Ecuador on 15.270, noted as 44434 at 2137. Using a Sony ICF-7600D receiver in Hillingdon, **Jonathan Creaser** has been hearing two stations in S. America — RNB Brasilia, Brazil on 15.265 at 1825 and RAE Buenos Aires, Argentina on 15.345 at 2110. The local news, features and local popular music from RNB Brasilia have also been attracting the attention of Leslie Lyon at 1800.

George Morley has been hearing Radio Australia around 2200, beaming towards N. America on 15.395 and to S. E. Asia on 15.240 from their station in Shepparton, S. E. Australia.

The reception conditions on the 11MHz (25m) band have been generally good and there is certainly plenty to interest the DXer! During the evening Robert Taylor logged Radio Sophia, Bulgaria 11.720 at 1930; Vatican Radio 11.760 at 2045; Radio RSA Johannesburg 11.900 at 2130; RCI in Montreal, Canada 11.945 at 2020; RSI Stockholm, Sweden 11.955 at 2100. In Ilford, **Francis Hearne** has been listening to Radio Japan via their relay in Moyabi, Gabon on 11.800 at 2315.

There is also plenty to interest the listener on the 9MHz (31m) band at all times of the day and night! The band has been wide open to Australia in the morning. Den Marriott says "I had my small Panasonic RF-1150LBE portable on with whip antenna up, when this great signal on 9.655 came in and a voice said 'This is Radio Australia' — I could hardly believe it!" **Mike Kitchener** describes it as "their power house signal" — he also picked up their PNG service

on 9.760 at 0830 in Hitchin.

Simon Illingworth has been hearing the new Boston station WCSN on 9.465 in Johannesburg, S. Africa at 2000, but found their signal rather weak. It has certainly not been weak here — **Neil Dove** rated it as SINPO 55545 in Lockerbie at 2050 which compared favourably with the 55534 he noted for WHRI in South Bend on 9.770 at 2115 and 55545 for WYFR via Okeechobee, Florida on 9.852 at 2145.

The congestion which exists on the 7MHz (41m) band often makes reception difficult, however there are a number of interesting stations to be found there especially during the early morning and at night. Listening at 0700 in Cardiff, **John Berridge** picked up WCSN on 7.365, noting SIO 444. During the evening **Stewart Russell** has been monitoring the broadcasts from Radio Australia in Forfar and says that their signal on 7.205 is very good around 2000. **Graham Johnson** checked the band in Coventry and logged Radio Beijing, China on 7.055 at 2025, which is in the exclusive zone of the 40m amateur band. In Stoke-on-Trent, **Alan Curry** logged Radio

Korea, Seoul, S. Korea on 7.550 at 2030 and REE Madrid, Spain on 7.275 at 2315.

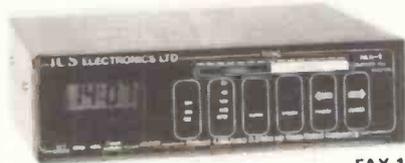
The reception of some 41m broadcasts can be confusing because relay stations are involved. The report from **George Efstratides** in Thessalouiki, Greece mentioned RHC Habana, Cuba on 7.140 at 2100 but this is actually relayed via Moscow, also Radio DW in Cologne on 7.285, which is relayed in Cyclops, Malta from 0100 until 0250.

There are some interesting stations using the 6MHz (49m) band — listening at 0620 in Northwich, **John Parry** picked up AFRTS via Bethany, E. USA on 6.030. **Daniel Masterson** is a regular listener to the programmes from Radio HCJB, Quito, Ecuador — their signal on 6.205 is usually SIO 444 in Stoke-on-Trent. He says "I enjoy their *Happiness Is* programme which starts at 0730 and ends at 0800". Tim Shirley has been monitoring this band during the evening and logged two stations for the first time — The Voice of the Lebanon, Beirut on 6.549 at 1815 and ABC Perth, W. Australia on 6.140 at 2100.

A number of new stations were logged on the 5, 4, 3 & 2MHz Tropical bands this time.

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STARTING OUT

Tropical Band Allocations				
	120 Metres	90 Metres	75 Metres	60 Metres
Europe & N. Africa	no allocation	no allocation	3.900-4.00MHz	no allocation
Africa	2.300-2.500MHz	3.200-3.400MHz	no allocation	4.750-5.060MHz
Asia	2.300-2.500MHz	3.200-3.400MHz	no allocation	4.750-5.060MHz
Oceania	2.300-2.500MHz	3.200-3.400MHz	3.950-4.000MHz	4.750-5.060MHz
N. America	no allocation	no allocation	3.950-4.000MHz	no allocation
South & C. America	2.300-2.500MHz	3.200-3.400MHz	3.900-4.000MHz	4.750-5.060MHz

The fact that a few high power medium wave transmitting installations can provide an adequate signal-to-noise ratio (40dB) in virtually all regions of the UK during daylight has already been discussed in this series (*SWM* May '87). Some of the larger and more highly populated countries around the world also find it economic to provide networks of m.w. stations to cover their entire area. However this is certainly not the case in Africa, Asia and South and Central America, where vast expanses of farmland, pasture, woodland, forests, jungle, desert or mountains separate the more densely populated localities, and the cost and complexity of providing such a network would be very considerable indeed.

A particularly high level of lightning activity exists near the equator and the effect of the discharges is to render reception on the m.w. band all but impossible for much of the time, so an alternative method for broadcasting has to be found. Fortunately the use of the lower frequencies in the h.f. region provides the answer to this problem.

The Tropical Bands

There are four segments in the lower h.f. region allocated to broadcasting, namely the 120, 90, 75, and 60m bands. These bands are usually referred to as the **tropical bands** since they are primarily intended for use in the equatorial areas of the world, although the 75m band is also allocated to international broadcasting in Europe and to amateur radio in the USA. The table shows the limits of the allocations and the countries concerned.

The transmitters and antennas used by tropical band broadcasters are quite unlike the high power transmitters and tall mast radiators used by many m.w. stations. Relatively low power transmitters (1kW) are often employed in conjunction with low and quite simple horizontal antennas to launch the radiation upwards at high angles towards the E layer of the ionosphere (see *Starting Out* last month) where it is reflected back down to the surrounding countryside irrespective of the nature of the terrain. However, during

the hours of daylight much of the radiation is absorbed as it passes through the lowest D layer to reach the E layer, especially around noon; hence the area covered during daytime is rather limited.

At sunset, on the other hand, single and multiple reflections take place to considerably extend the area covered by the signal. Later, the ionisation of the E layer weakens to allow signals to reach the higher F layer where a single reflection may extend the range by many hundreds of kilometres — see Fig. 1. Multiple reflections between the F layer and earth can extend the range by several thousand kilometres and enable listeners in many countries to hear the tropical band broadcasts at night.

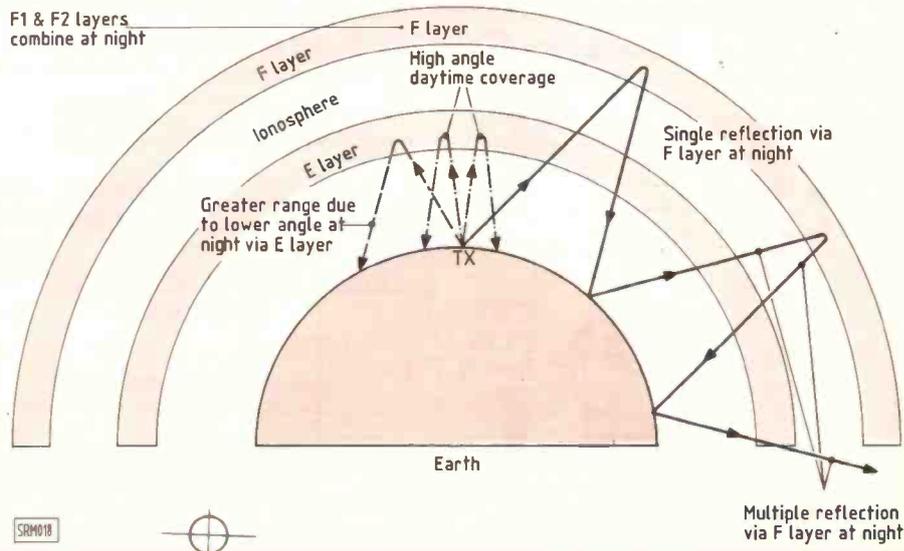
Although many of the stations broadcast throughout the day, some concentrate on the peak listening periods and only operate in the early morning or during the evening, local time. It is important to understand that the broadcasts on these bands are intended to provide a domestic service for the country of origin and are not of an international nature; hence the programmes are much like our own m.w. domestic services and consist of news bulletins, sports news, cultural and educational programmes, pop and classical music, discussion programmes,

etc., and many carry advertisements since they often have commercial backing. The broadcasts are usually in a common language most easily understood by local listeners, thus avoiding local tribal dialects which may cause confusion and misunderstanding!

Since these bands are allocated to other services in many areas of the world including Europe, the reception of these broadcasts in the UK is often difficult with much interference present. During the summer months high levels of static here may make reception difficult on the lower tropical bands; however the 60m band is usually free from this problem. Each band has its own characteristics, so let us now consider each of them in turn.

120m (2.3-2.5MHz)

Long distance reception is never possible on this band during daylight because all the signals reaching the ionosphere are absorbed by the D layer until sunset — even at night propagation conditions are usually unfavourable. Most of the stations run relatively low power, 300 to 1000 watts being typical. (There are a few stations in Australia and China which run 50kW, but very few listeners in the UK have ever heard them.) There are also a number of commercial services



STARTING OUT

operating on this band in Europe. Interference from static is often a problem during the summer months in the UK.

90m (3.2-3.4MHz)

There are many interesting stations to be heard on this band, most of them being located in Africa, Asia and S. America. Propagation conditions are usually best during the hours of darkness, but some stations may be audible during the late afternoon or early morning. A good deal of interference exists from the many commercial and official services operating on this band.

75m (3.9-4MHz)

This band is also allocated to international broadcasting, and a number of stations located in the Far East, Japan, China, India, Pakistan, Falklands, UK and Switzerland may be heard during the late afternoon and early morning as well as during darkness. Although many of the broadcasters use transmitter powers of between 1 and 20kW, some are of much higher power, namely 100 or even 250kW! Radio amateurs are permitted to use this

band in the USA and Canada; their s.s.b. signals may often be heard at night.

60m (4.75-5.06MHz)

This is the most active of the four tropical bands and many signals from 75 countries in Oceania, Asia, Africa and S. America may be heard — transmitter powers vary from 100W to 250kW! Reception is possible from about two hours prior to sunset until two hours after sunrise in winter — about one hour less in summer.

Although it is possible to hear some of these stations with a simple s.w. receiver plus whip antenna, to get the best results a good communications receiver and resonant half-wave antenna is necessary; these bands are really the happy hunting-ground of the experienced DXer, so don't expect too much with simple equipment! It is partly this difficulty which appeals to the many dedicated tropical band DXers around the world, who often spend hours searching for signals from some of the 130 or more countries involved.

Language identification recordings will certainly help you to identify some of the stations concerned and the charts in Seen

& Heard each month detail the frequencies and times of some of the stations which listeners have been hearing recently. An up-to-date guide book may also help you to decide which station you are hearing (see Appendix), although it is important not to guess the identity of a station hidden under severe interference by simply referring to a book!

When sending reception reports to tropical band stations remember that their broadcasts are intended for local listeners and not DXers, so your report will be of little more than academic interest to them. But a more detailed report may well help you to obtain that rare QSL (confirmation) card.

Appendix

The world frequency survey contained in the March and September issues of the *International Listening Guide* gives details of many of the tropical band stations. Write to Bernd Friedewald DK9FI, D-3588 Homberg, West Germany, for annual subscription rates to this excellent guide. □

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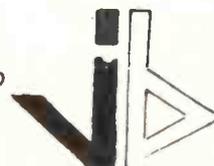


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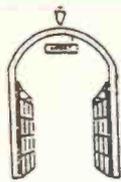
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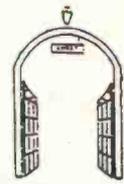
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(0272) 699352/559398



LISTEN OUT FOR

GB6BH. This station is being staged to raise money for the Barlborough Hall appeal. They are being sponsored for every contact they make in a 24 hour period from 1300 on July 4. The station will also be on the air from June 9 for general "nattering". Each contact will be QSL'd. They will be operating on the 3.5, 14, 144 (f.m.), 144 (s.s.b.) and 430MHz bands, as well as using RTTY. The equipment has been loaned by SMC (Jack Tweedy) Ltd.

Rev P McArdle GODAG
Barlborough Hall
Barlborough

GBØKCF. The Kingston Bagpuize with Southmoor church fete will be held on Saturday June 27 in the recreation ground of the village of Kingston Bagpuize. The first church on the site was consecrated between 1078-1107, and remained there for nearly 700 years. The present church was finished in 1800 and was designed by John Field of Faringdon. Well worth a visit. This is situated about 15km south west of the city of Oxford in WAB square SU49. This h.f. station will be operated by G0AOZ and G0GLB, with activity on both 14MHz and 3.5MHz s.s.b.

Roger Powell G0AOZ
Town Pond Cottage
Town Pond Lane
Southmoor
OX13 5HS



GB6HF. The Houghton-le-Spring Amateur Radio Club are holding a special event station to celebrate Houghton Feast. It marks the dedication of the Church to St. Michaels. It dates from very early days. Present day events include: a carnival, fairground, cycle racing, roasting of an ox, special church services and the special event station.

Operation will be on 3.5 and 144MHz from October 2 to 11. RAYNET will also be covering the charity cycle race as part of the week long event.

GD4IOM. On June 13 and 14, the Isle of Man ARS will operate a station from Peel Castle, St. Patrick's Isle, Peel, Isle of Man. An ideal station for those hunting the WAB awards.

Anthea Matthewman GD4GWQ
Tel: 0624 22295

GBØKCF

Kingston Bagpuize - with - Southmoor Church Fete, Saturday 27th June 1987

To Station

Contesting QSO MHz Mode

Date Time Call

Report Tx/Rx

Power W/E

Remarks

Mail Test For Qcc. Fax/Test Qcc Direct/To Bureau.

GB2SMC. Between August 8 and 23, it is planned to operate a special event station in connection with the celebrations for the 850th Anniversary of the founding of St. Magnus Cathedral in Kirkwall in 1137. The primary mode will be s.s.b. on the h.f. bands 3.5 to 28MHz. There might be v.h.f. activity too.

Bill GM3IBU
Crosslea
18 Dundas Crescent
Kirkwall

Have you Got a
Special Event Station
we should know about?
If so, write and tell us

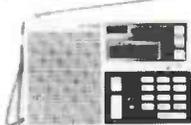
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VHF/UHF
FREQUENCY GUIDE
26-2250MHz
£4.95 + 80p p&p**



This guide has sold over 4,000 copies since its publication last August and is still selling well. Mainly because it is recognised as being of tremendous value and unique in radio literature. If you are one of the many who are curious to know who transmits where, in the wide VHF/UHF spectrum, then this is a guide that you should not be without. This book gives comprehensive details of all the main users of this part of the radio spectrum. The frequency range is subdivided into sections under appropriate headings for the type of services using the particular sub-divisions. All kinds of service are covered including land, sea, air and space. Full details are included of duplex splits for bases and mobiles plus some useful editorial. If you are at all interested in this part of the radio spectrum, you will find this a most valuable and absorbing book.

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