

110 | SWM Review



Cover The Realistic DX-360 receiver is the subject of this month's review. A low-priced portable set, it covers the l.w., m.w., v.h.f. and s.w. broadcast bands.

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A WORD IN EDGEWAYS

Sir

As a novice at short wave listening I can enjoy and follow the new format of your magazine.

My interest is mainly h.f. aviation, and like Mr. Powell, I find the amateur bands and broadcast bands very boring.

I also have a Trio R600 with a Mizuho Sky Coupler KX-3 tuner and use a sloping dipole about 12m in length.

I have picked up Qantas, Speedbird and Singapore aircraft in contact with Darwin on many occasions. Darwin is very clear on 6556kHz but my best as yet is a Speedbird flight talking to Perth, Australia. I have also heard aviation weather reports from Hong Kong Radio.

The good thing about aviation listening is that you get the exact location of what you are tuned-in to.

I would like to contact Mr. Geoffrey Powell of Tamworth (Word in Edgeways, June 87) as I have very similar interests and would really enjoy getting a few tips on the QSLs he has received. I would enjoy doing similar things myself but don't know how to start.

**BARRY THOMAS
PRESTON**

Barry Thomas is not the only reader to respond to Geoffrey

Powell's letter regarding h.f. aircraft listening. I have forwarded Barry's letter on to Geoffrey and I will pursue the idea of publishing something in the near future on what is obviously a popular section of the listening hobby ED

Sir

I especially enjoy reading "Bandscan" for the latest broadcasting station news and, of course, I like the "Seen & Heard" section on long, medium and short wave broadcast bands as DXing broadcast stations is my main hobby.

I would like to see the magazine run a "Seen & Heard" section on "clandestine" (rebel) and "free" (pirate) radio stations if at all possible.

There is so much for the aspiring DXer to listen out for. For example there are the rebel stations such as Voice of the Libyan People, Bizam Radio, Voice of the Turkish Communist Party, Free Iran, Radio Solidarity, Radio Marti, etc. These stations are all against the particular politics of the government in their own countries, and some do not even broadcast from their own country. Other rebel stations are even militarily against governments such as

Radio Maro in Salvadore, which is used by the left-wing guerilla movement "FMNLF", and the arabic geurilla station in northern Chad against the government of president Hissein Habre.

Even the UK has clandestine stations, admittedly irregular, such as the extreme right Radio Enoch. Dublin also had a station run by Sinn Fein during the recent General Elections in Eire.

There are also the "Free Radio" (pirate) as well as the "Offshore" pirate stations offering even more listening.

As you can see there would be plenty for the DXer to listen to, and I'm sure that many logs would be sent in by readers if you could include rebels and pirates in future issues of SWM.

As the only other magazines that mention such stations are "underground" and not available in the shops, a news round-up with logs, etc of rebel and pirate stations would fill a very important gap for the radio enthusiast.

**GARY MARSHALL
LIVERPOOL**

Obviously there is some attraction in listening out for stations such as Gary Marshall describes in his

letter. However, for the UK listener there are problems with the legal position and trying to determine just what you can listen to and cannot. The UK s.w.l. is bound by the Wireless Telegraphy Act and this allows him, or her, to listen to "authorised broadcast stations" and amateurs.

It is difficult to decide, as far as UK listeners are concerned, whether the "rebel" stations are "authorised" or not. In any case does it really matter?

The position of the UK "pirates" is, however, definitely covered by the Wireless Telegraph Act and they certainly do not come within the definition of "authorised". Whilst nobody would be any the wiser if you listened to them — unless you were foolish enough to go around telling everyone — if SWM was to publish logs, frequencies and news of these stations then it is possible that we could be prosecuted and even closed down.

Geoff Arnold, Editor of *Practical Wireless* has promised to put together an article on what is legal and what is not for a future issue.

Meanwhile, if you have any further views on this thorny subject, let me know. ED

FIRST WORD

I trust that you have noticed the different paper being used for this issue. So many of you wrote complaining that the magazine was difficult to read because of the faint type and glossy paper that we have done something about it. We can't have disgruntled readers, can we! It was not possible to change earlier as existing paper stocks had to be used up, but this issue is printed on paper that is heavier, whiter and not quite so glossy. I hope that you all find it better on the eyes.

I have just recently managed to get a break from the office for a couple of weeks by flying down to Crete. This gave me the opportunity to take this month's review receiver abroad to try it out under the conditions for which it was designed. It makes you appreciate the BBC's World Service in keeping you in touch with what is going on both at home and overseas as well as providing entertainment. What I think of the set, the Realistic DX-360, is revealed in this issue.

To relieve the boredom of flying I decided to ask to see the flight deck of the British Airtours Tristar — I really wanted to

see what the systems being described by Godfrey Manning looked like "in the flesh". I was able to identify some of the instruments and what they were doing, but what I found most impressive was the way in which the aircraft seemed to know exactly where it was going and just when to "fork right" without any apparent human intervention. Of course, I should have realised — the computerised navigation system was at work. Just tell it where you want to go to and, hey presto, it remembers everything about the nav aids along the chosen route as well as being able to decide just how to fly to achieve the lowest cost or use the minimum of fuel — yes, there is a subtle difference. All very interesting if not much to look at! Still the view out of the front of the aircraft was spectacular.

I wonder how long it will be before Godfrey Manning gets one of these in his growing private museum? By the way, if any readers are interested in visiting Godfrey's museum, which is situated in the Edgware district of North London he

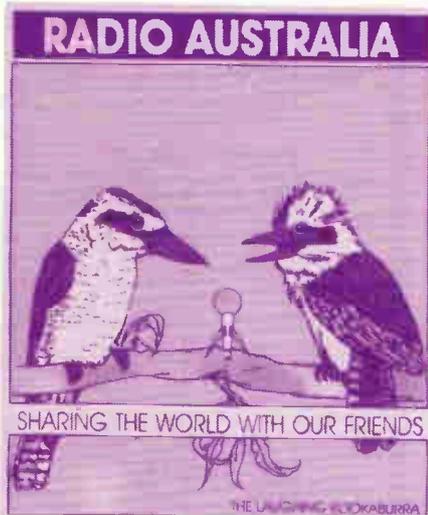
tells me that he would welcome them, but by appointment only. I will be pleased to forward onto him any letters from readers seeking viewing appointments.

There should be no difficulty in obtaining SWM through your local newsagent. He should be more than eager to take your regular order! However, in practice this is not always the case, and if he spins you any tales about non-availability or claims that he cannot get it, do not believe him. Tell him that the magazine is published on the fourth Thursday of each month and distributed by Comag.

You can obtain back issues directly from the Editorial Offices at Poole by sending a cheque or Postal Order for £1.45. This includes postage and packing. You may also use your Access or Visa card for mail or telephone orders.

Why not take out a subscription and ensure that you get your own copy? Subscription copies usually arrive a few days before the magazine gets onto the newsagent's shelves.

DICK GANDERTON



Radio Australia

Radio Australia launched a unique new daily propagation service in its 24-hour-a-day English Service on May 4. Already noted for its joint weekly Propagation Report with Radio Netherlands Programme *Media Network*, the new daily service complements the weekly survey heard on the DX programme *Talkback*.

The new daily report is produced with the co-operation of IPS Space Services in Sydney, and gives the latest global report, with details of the geo-magnetic field, the solar flux, sunspot number and the useful A-index, together with a forecast of conditions for the following twenty-four hours. The existing weekly reports on *Media Network* from Holland and on R. Australia's own *Talkback* will continue, with a review of the preceding week's conditions, and forecast for the following seven days.

Mike Bird introduces the new report at 0425, 0825, 1225, 1625 and 2025 Monday to Saturday.

St Columbanus Award

The Bangor & District ARS, G13XRQ, will be on the air from 12 noon on Sunday August 2 until 1800 (local time). It will also be on the air periodically between then and Sunday October 4. The St Columbanus Award will be available to any amateur who gains a total of 11 points — five for working the club station and one for each of six GI stations. Any mode, any band but no repeaters.

The awards cost £2 or the equivalent in IRCs. Please note the club station MUST be worked. You should send your applications to Dr Harry Squance G14JTF, 24 My Ladys Mile, Holywood, Co. Down, N. Ireland. More details from.

Stewart Mackay G14OCK
12 Lynne Road
Bangor, Do. Down
BT19 1NT

Open Day

On August 15, Lowe Electronics are holding an Open Day at their head office in Matlock.

This is your opportunity to see not only the latest in equipment from Kenwood but also visit the workshop facilities that have made Lowe Electronics one of the leading amateur radio companies in Europe.

To make the event even more special, other well-known names in amateur radio will be there for the day: Microwave Modules, J Beam Aerials, John Birkett from Lincoln, Strumech, and M & B from Leeds.

Personalities in Matlock on the 15th for you to meet will be Geoff Arnold, editor of *Practical Wireless* (also representing the new *Short Wave Magazine*), Andrew Steele, English programme director from the short wave station HCJB, and Simon Spanswick and Michael Murray from EDXC (European DX Council for short wave listeners).

The RSGB in the shape of Martin and Jenny

Shardlow (Martin is a regional representative) will be in the entrance hall, extending a warm welcome and answering any queries you may have on the society.

Talk-in on the day is in the capable hands of the local club, the TOR Amateur Radio Association and a 144MHz station will be found on S22 from around 9.30 using the callsign G8LOW. There will also be an h.f. station on the air, its callsign being G4LOW. Even if you can't make it to Matlock, look out for both these stations as a special QSL card will be issued on the day.

The club is also organising a Bring-and-Buy section in the parking area behind the offices. This will be your opportunity to rent table space for an hour or so and get rid of your surplus radio bits and pieces (note, this is not a car boot sale). Further details from David G8GIY on (0629) 2817.

Finally, for the children there will be FREE rides behind a scaled-down steam traction engine.

It promises to be a great day, *SWM* looks

forward to seeing you on Saturday, August 15, 10.00am until 5.00pm.

Lowe Electronics Ltd
Chesterfield Road
Matlock
Derbyshire
DE4 5LE
Tel: (0629) 2817

Short Wave Awards

Ten different awards are available from the East and West Radio Club (EAWRC) in Germany under the titles "Middle East Award", "Africa Award", "America Award" and "50 and 100 Countries Award".

For full details contact:

EAWRC Awards Secretary
Adolf Schwegeler
Bahnhofstr 56
D-5042 Ertstadt 1
FRG

DRIP

The Desert Radio Island Project has obviously stirred up some interest in the Hazlerigg & District Radio Club.

They hope to throw out a challenge to other clubs to put the HAM back into ham radio and to see just what can be done with a small amount of kit "junk" and a little bit of ingenuity.

The list of parts and bits took a lot of hard thought, testing and practical proving to show that the right choice had been made. Practical projects for both the h.f. bands and with some skill the v.h.f. bands and not just c.w. but f.m. and d.s.b. too have all been successfully built.

The list of parts to be used for DRIP is too large to be printed here but if you would like more details and fancy having a go then contact the Hazlerigg & District RC.

M Scott G8BGU
Wellview
12 Castle View
Ovingham on Tyne
NE42 6AT



BOOKCASE

RADIO DATABASE INTERNATIONAL

Editor-in Chief Lawrence Magne

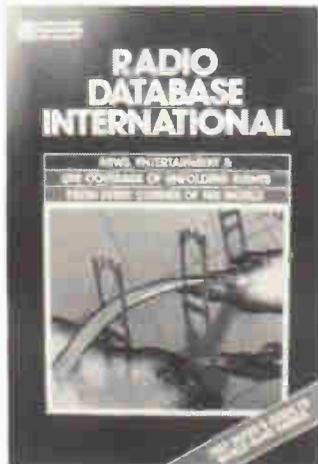
Published by International Broadcasting Services Ltd

Available from Interbooks, Lynton, Stanley, Perth, Scotland PH1 4QQ
254 x 177mm, 351 pages. Price £12.50 plus £1 P&P ISBN 0 914941 03 8

Radio stations all round the world can supply the listener with news, information and entertainment from almost anywhere in the world, all through the day and night. But you need a guide to find your way around.

The main section of this book is a chapter called Worldscan. It lists the frequency, country, station and location of the stations on that frequency, as well as the times they transmit in which languages and what times you are likely to hear them. All very essential information if you want to make the most of your radio receiver.

On the subject of radio receivers, which is the best one for you? Well, there is a large section of the book devoted to describing different portable receivers, giving a star rating to each one helping the reader decide what to buy.



Also included in the book are chapters that help you get the most out of your radio, whatever that may be.

FOUNDATIONS OF WIRELESS AND ELECTRONICS 10th Edition

by M. G. Scroggie assisted by S. W. Amos

Published by Newnes Technical Books

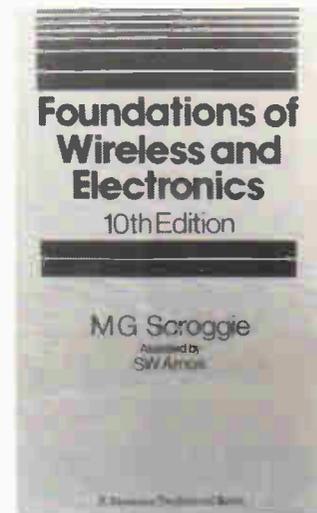
Available from Short Wave Magazine Book Service

210 x 131mm, 551 pages. Price £8.95 plus 75p P&P (paperback)
ISBN 0 408 01202 1

Since this book was first published in 1936 it has helped many thousands making acquaintance with the principles of radio and electronics for the first time — including me. It has been updated many times since 1936 to keep pace with new developments.

This edition covers the whole basic theory, starting with a sound explanation of the elementary principles needed in all branches of electronics. No previous technical knowledge is assumed and you need only basic maths to understand as they are used only when essential.

There are 27 chapters in the book, each divided into at least 7 sub-sections although usually 12 or more. So there are far too many to outline them all here. But, such subjects as power supplies, computers, cathode ray tubes, r.f. and i.f. amplification, a.f. amplification, detection, radiation and antennas, oscillation, triodes, inductance and capacitance are just a few of the topics covered.



An ideal book for the budding student, whether it be your first attempt at the field of radio and electronics or an attempt made after a long break out of the industry.

GUIDE TO BROADCASTING STATIONS 19th Edition

Edited by Philip Darrington

Published by Heinemann Newnes

Available from Short Wave Magazine Book Service

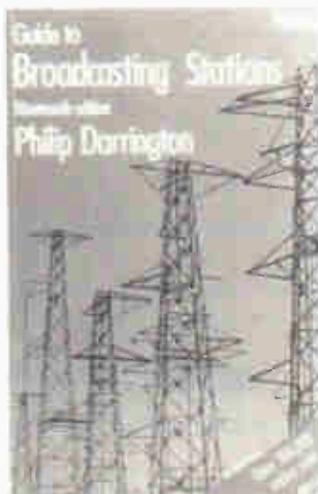
186 x 120mm, 247 pages. Price £6.95 plus 75p P&P (paperback)
ISBN 0 434 90303 5

This book has chapters written by a wealth of famous radio names: Pat Hawker, Jonathan Marks, Richard Lambley, S. Mukherjee and G. Wareham. So you can tell the kind of experience that has gone into the pages.

Around the world there are thousands of radio stations transmitting to people both near and far. This is all very well but if you don't know where to look for them it is difficult to gain any enjoyment from them. This book lists stations broadcasting in the long, medium and short wave bands. They are listed in some very useful ways.

Chapter 6 has the long and medium wave European stations in order of frequency, and Chapter 7 is the same stations in geographical order. Chapter 8 is the short wave station of the world in frequency order and Chapter 9 is the same stations geographically. This makes identifying signals much easier for both the DXer and the casual listener.

Other chapters are on such things as Standard Frequency Transmissions, A Guide to



Listening, Choosing a Short Wave Receiver, Writing Useful Reception Reports, An Anti-jamming Indoor Loop Aerial for Short Waves, Latin American DXing and Programmes in English and Programmes for DXers. All of which are a great help to the DXer whether they are new to the hobby or have been DXing for a long time.

RTTY AWARDS

by Ted Double G8CDW

Published by British Amateur Radio teleprinter Group

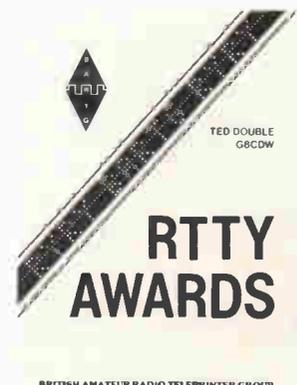
Available from BARTG

Components Manager,
Ffynnonlas, Salem, Llandeilo
SA19 7NP

207 x 145mm. Price £5.95 inc
p&p for BARTG members. £6.50
non members.

This new book by G8CDW, a well known name in RTTY circles, describes over sixty different international RTTY awards.

Many of the awards described are illustrated to show just what you are striving for. A must for both the s.w.l. and amateur interested in RTTY.



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	

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.

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
YG455C	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
NRD825	JAPAN RADIO COMPANY general coverage receiver, 90 kHz to 34 MHz	£1195.00	£7.00
Options			
CMK165	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
CD660	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
HS6	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

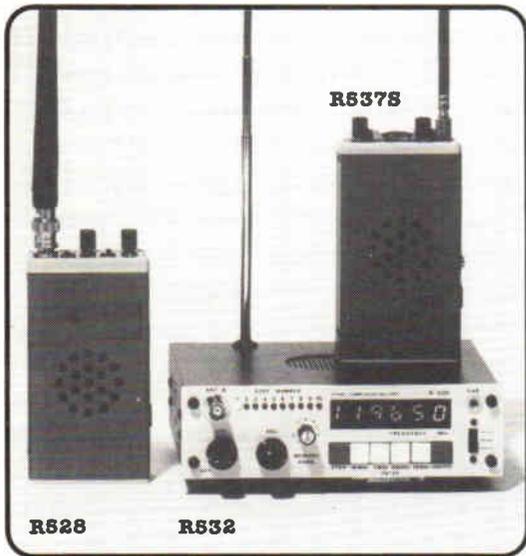
FREE

For more information write to us here at Matlock. Send 50p to cover postage and we will send you, by return of post a full airband information pack, together with a free copy of our "AIRBAND GUIDE".

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 adaptor	£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
RB144	Rubber helical aerial for portable use	£5.44	£0.75

AIRBAND AERIALS

LAB	Airband ground plane	£18.42	£2.50	UR43	50 ohm coaxial cable	£0.30	
MG125	Car aerial, magnetic base	£16.42	£2.50	UR67	50 ohm coaxial cable	£0.85	
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				

Prices and specifications subject to change without notice.

Head Office and Showroom

LOWE ELECTRONICS LIMITED

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Shops in **GLASGOW** Telephone 041-945 2626, **DARLINGTON** Telephone 0325 486121, **CAMBRIDGE** Telephone 0223 311230, **CARDIFF** Telephone 0222 464154, **LONDON** Telephone 01-429 3256, **BOURNEMOUTH** Telephone 0202 577760

Lorna Mower

When contacting any one of the club officials mentioned in these pages, please be a little considerate. If there is a telephone number, think before you ring, is it an unreasonable hour? The hard working officials give up much of their time for the clubs and just because you are up and about doesn't mean the rest of the world is. Right, now let's sprint around the country.

The **Acton, Brentford & Chiswick ARC** have a lecture called "Modern a.t.u. Techniques" on July 21. New members and visitors welcome says W. G. Dyer G3GEH, 188 Gunnersbury Avenue, Acton. The club meets at the Cheswick Town Hall, High Road, Chiswick W4 at 7.30pm.

Members of the **Ipswich RC** are putting on a demonstration station at Spectrum '87 being held at Copleston High School on July 4. On July 8 they have a report on the East Suffolk Wireless Revival and a Ragchew. They meet in the upstairs clubroom of the Rose & Crown, 77 Norwich Road, Ipswich at 8pm. Jack Tootill G4IFF on Ipswich 464047 can tell you more.

A Treasure Hunt with "valuable prizes" is scheduled for the **Midlands ARS** on July 21, apparently it's not as easy as last year. I think they meet at Henstead House, Henstead Street, Birmingham B5, but Norman Gutteridge G8BHE, 68 Max Road, Quinton, Birmingham can put you straight on all details.

The **Braintree & District ARS** have a day in Hatfield Forest booked for June 28 and a visit to the Museum of East Anglian Life on July 12. Then they have a car treasure hunt on July 19. The club meeting for July is Meters & Indicators - Principles & Practice by G3PEB on the 19th. They normally meet every 1st and 3rd Mondays at the Braintree Community Association Centre, Victoria Street, Braintree at 7.30pm. Derek Brades on 0376 44908 can always tell you more.

The latest edition of *QSU*, the newsletter for the **Wakefield & District RS**, has all the details on the club. June 30 brings an On the Air Nights for the club, July 7 there is a talk by G3WWF, July 11 is a barbeque at G4VRY and then there is the Annual Open Pitch & Putt at Holmfield Park on July 21. I'm not sure where they meet, but John Bryan G4VRY on Leeds 820198 will no doubt be able to tell you.

The **Verulam ARC** have an Activity Evening on July 14 and a lecture by John D. Heys G3BDQ called "Antennas for DX" on July 28. Visitors are welcome at all our club meetings says their publicity officer. They meet 2nd and 4th Tuesdays in the RAFA HQ, New

Kent Road, off Marlborough Road, St. Albans. For more information contact Hilary G4JKS on St. Albans 59318.

Contest Operating is on the programme for the **South Bristol ARC** for July 1, Dealt with by Mark G4KUQ. July 15 is a Home-brew Night by Jean G0AWX and the 22nd is a 144MHz s.s.b. activity evening. They usually meet every Wednesday at the Whitchurch Folk House, East Dundry Road, Whitchurch. Len Baker G4RZY on Whitchurch 834282 has all the details.

The **Sutton & Cheam RS** have a natter night on July 6 in the Downs Bar. July 17 is Wire Antennas for the DX Bands by Geoff G4FKA, this is held at the Downs Lawn Tennis Club, Holland Avenue, Cheam. If you'd like to know more about the club then contact Geoff Plucknett G4FKA on Epsom 21349.



A d.f. competition is lined up for those attending the **Rugby ATS** meeting on July 21. It starts from the club house and the fox will be within 3 miles of that point. The club house is the Cricket Pavilion, outside Rugby Radio station and kick-off is 7.30pm. More details from Kevin Marriott on Rugby 77986.

The **East Kent RS** meet at the Cabin Youth Centre, Kings Road, Herne Bay, Kent on the 1st and 3rd Thursdays at 8pm. On July 2, Paul G3VJF is v.h.f. testing and will test your v.h.f. rigs free. July 16 is a natter night and then July 25 is a barbeque More from Brian Didmon G4RIS at 45 Millsbrood Road, Whitstable.



Adapted to the R.S.G.B.

The **Yeovil ARS** have a.m. demodulation by G3MYM on July 9, then it's direct conversion receivers by G3MYM on the 16th, the regenerative receiver also by G3MYM on the 23rd and a natter-night on July 30. The club usually

meets on Thursdays at 7.30pm in the Recreation Centre, Chilton Grove, Yeovil. David Bailey G1MNM on Yeovil 79804 has all the necessary details.

A barbeque is planned for July 6 by the **Southdown ARS**. Meetings are held on the 1st Mondays at the Chasely Home for Disabled Ex-Servicemen, Southcliff, Bolsover Road, Eastbourne as well as in the Clubrooms, Hailsham Leisure Centre, Vicarage Lane, Hailsham on Tuesdays and Fridays. C. R. Evans G4VOS on Heathfield 3168 can tell you more.

The **Welwyn/Hatfield ARC** have a lecture on the Ten Metre Band on July 6 and a fox hunt on the 20th. They meet on 1st Mondays at Lemsford Village Hall, Brocket Road, Lemsford and 3rd Mondays at the 9th Welwyn Garden Scout HQ, Knightsfield, Welwyn Garden City. Kevin Dunwell G4WLG on 0707 335162 can tell you what time the club meets.

Operation Raleigh is on the programme for July 15 for the **Hastings Electronics & RC**. They meet on 3rd Wednesdays at 7.45pm in the West Hill Community Centre, Croft Road, Hastings and every Friday at 8pm at Ashdown Farm Community, Downey Close, Hastings. Dave Shirley G4NVQ on Hastings 420608 can tell you more.

The **Ripon & District ARS** meet every Thursday at 7.30pm in the Old Air Raid Shelter, which is behind Ripon Town Hall. June 25 heralds a talk by Tex G0FHP and on July 30th there is a bring and buy/Junk sale. Contact Liz Bulman at The Lodge, Lister House, Sharow, Ripon for more details.

On June 28 the **Wyre ARS** have a visit planned to Jodrell Bank, July 8 brings a VHF NFD debrief and G1TXV on video, July 22 is all about Microwaves and the 25th/26th is a WAB weekend at Pilling Sands with GB2WAB. The club usually meet on the 2nd and 4th Wednesdays at 8pm in the Breck S&SC, Breck Road, Poulton. Contact Dave Westby on Thornton Cleveleys 854745 for more information.

The **South East Kent (YMCA) ARC** have a natter night and Morse test evening planned for July 1. Other events lined up are a 2m Fox Hunt on July 8, a natternight and committee meetings on July 15, a visit to GODGS weather satellite station on July 22 and Mods to RXs for 160m Fox Hunting by G3ROO on July 29. They usually meet in the Dover YMCA, Godwynhurst, Leybourne Road,

Dover. John Dobson on Dover 211638 has all the latest news on the club.

Pam Rose, the never-tiring Secretary of the **Lincoln Short Wave Club**, has written with all the details. July 8 is Fibre Glass Techniques - Every Day Use by Ian Fulton G4XFC, the 15th is an RAE/c.w./activity and construction night with the 22nd being a talk on Ascension Island by Roger Hyde G3ZDW. They meet on Wednesdays in the City Engineers Club, Central Depot, Waterside South, Lincoln.

The **Warrington ARC** meet on Tuesdays at 8pm in the Grappenhall Community Centre, Bellhouse Lane, Grappenhall. On July 7, they have the RSGB film JARL visit to China. The 14th brings Paul Forster GOCBN talking about Language Laboratorys, the 21st is an Open Forum, the 28th is "Find the Buffet" with the host Mike Mansfield G6AWD and August 4 is the RSGB film Junction Transistors. Paul Forster, the club secretary, can tell you more on Warrington 814005.

If you go along to the **Fishguard & District ARS** meetings, then there is a field event at Silver Hill, Penycwm at 7.30pm on July 15. They meet Wednesdays at 7.30pm at the Club Shack, FE Centre, Ropewalk, Fishguard. Peter Gale on St. Davids 721398 can tell you more.

Bury RS have a Surplus Equipment Sale on July 14. They usually meet every Tuesday at the Mosses Youth & Community Centre, Cecil Street, Bury. The main meeting of the month is the 2nd Tuesday. For more details contact M. Jamil G1VQE at 29 Harrow Close, Blackford Bridge, Bury.

An interesting evening is planned for July 9 at the **Bredhurst R&TS**. They have G3VTT recounting his trip to the Dayton Hamvention in Ohio. The 16th brings a construction and natter night, the 23rd is British Army Radio Sets 1922 to 1955 by Bob Warner and the 30th is another construction/natter night. For further information on these events, contact Kelvin G0AMZ on 0634 376991.

The **Farnborough & District RS** have a beer and skittles evening on July 31. They seem to meet 2nd and 4th Thursdays, but M. Graffius (their PRO) at The Paddock, Diamond Ridge, Camberley can tell you more about the club programme.

G3MYD



G8YMD

South East Kent (YMCA) Amateur Radio Club

Stourbridge ARS have a talk by John G4CVU in July. They meet on the 1st and 3rd Mondays, but I'm not sure where Derek Pearson on Kingswinford 288900 can tell you the missing details.

July 6 sees a police dog handler demo at the Todmorden & District ARS and July 20 is a natter night. The club meets at the Queen Hotel, Todmorden at 8pm on the 1st and 3rd Mondays. G1GZB on 070681 7572 can fill in more details.



The Wimbledon & District ARS have an Annual Camp Planning Meeting on July 10 and a General Activity Evening on the 31st. Meetings are held on the 2nd and last Fridays at 7.30pm in St. Andrews Church Hall, Herbert Road, Wimbledon. George Cripps G3DWW on 01-540 2180 has all the latest info.



Video Cameras is the topic for GOETZ on July 1 and the 15th is a barbeque at the Exmouth ARC. They have a Club Open Night on July 29. The club meets fortnightly at the 6th Exmouth Scout Hut, Marpool Hill, Exmouth. More details from Michael Newport G1GZG at 30 Maristow Avenue, Exmouth.

There is a talk and demo on Data Transmission by G4XGN on July 28 at the Keighley ARS. Meetings start at 8pm in the Victoria Hotel, Cavendish Street, Keighley. For further details contact Kathy G1IGH on Bradford 496222.

The Chichester & District ARC have a Special Open Club Meeting for the public with demonstrations of amateur radio for Chichester 912 festivities on July 7. They meet in the North Lodge Bar, County Hall, Chichester on the 1st

and 3rd Tuesday at 7.30pm. Contact C. Bryan G4EHG on Chichester 789587 for the latest.

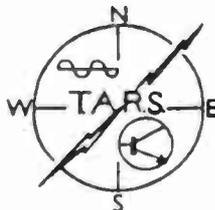
I think July 28 is a barbeque for the Dorking & District RS, it's a bring your own at 7.30pm at Devils Dyke, Brighton. If you want more details then contact John G3AEZ on 0306 77236.

The Chester & District RS have a full programme coming up. June 30 is Bert Donn G3XSN the Region 1 Rep. July 7 is a committee meeting, the 14th is computer interfaces by Derick G4UXD and Roger G8GWX, 21st is Receivers Pt 2 by Dennis G3EWZ and the 28th is Your Questions Answered. The club meet at the Chester RUFC, Hare Lane, Vicars Cross, Chester at 8pm. More from Dave Hicks G6IFA on Chester 336639.

Coventry ARS have Morse Tuition and a Night on the Air on July 3, 2m d.f. Contest on the 10th and a Night on the Air on the 17th. I'm not sure where they meet but Robin Tew G4JDO on Coventry 73999 does.

July 21 is a talk on direction finding at the Bury St Edmonds ARS meeting. They meet on the 3rd Tuesdays at 7.30pm in the County Upper School, Beetons Way, Bury St Edmonds. Chris G1FUU on Stanlon 50271 can tell you more.

The Mid Sussex ARS meet every Thursday at Marle Place, Leylands Road, Burgess Hill at 7.45pm. July 9 is a bring and buy sale and the Sussex Mobile Rally is on the 12th. July 16 is an informal evening, but the club shack is closed on the 23rd and 30th. Contact Chris G0GMC on Hassocks 2937 for all the details.



The Torbay ARS have a business meeting and junk sale on July 25. The club meets on Fridays at 7.30pm at the EEC Social Club, Ringslade Road, Highweek, Newton Abbot. Contact John Dart on 0803 51995 for all the details on the club.

Between July 3 and August 28 there are no meetings at Loughton Hall for the Loughton & District ARS, but there are informal gatherings at the Wheatsheaf, about 8pm. David Thorpe G4FKI on 0525 714591 can tell you the necessary dates.

The Trowbridge & District ARC have a lecture on July 8 called Bee Keeping and Amateur Radio and the 22nd is a natter night. Ian Carter G0GRI on 0380 6656 can tell you more.

There is a visit to Pitsford planned on July 2 for the Northampton RC and July 9 is a discussion evening. They meet at Kingsthorpe Community Centre, Kingsthorpe at 8pm on Thursdays. Peter Saul G8EUX on 0327 51716 can tell you any more.

June 26 brings an Interclub quiz and social for Dunstable Downs RC, and then there is a junk sale on July 10. They meet every Friday at 8pm in the Chews House, High Street South, Dunstable. Phill G6EES can always tell you more on Dunstable 607623.

The Colchester Radio Amateurs meet at the Social Club, Severalls Hospital, Mile End, Colchester from 7.30pm on Thursdays. Informal meetings are scheduled for July 9 and 23. Further information from F. R. Howe, G3FIJ on Colchester 851189.

The Reading & District ARC have the annual club boat trip booked for July 28. For details of later events, talk to Steve Coleman G4YFB on Reading 867820.

DEADLINE DATES

Issue	Deadline
September '87	July 23
October '87	August 18
November '87	September 21

The Welwyn Hatfield ARC have a lecture on The 10m Band on July 6, a Fox Hunt on July 20 and a lecture on e.m.c. on August 3. 1st Monday meetings are held at Lemsford Village Hall, Brocket Road, Lemsford, 3rd Monday meetings are at the 9th Welwyn Garden Scout HQ, Knightsfield. More from Kevin Dunwell G4WLG on 0707 335162.

There is a Treasure Hunt on July 21 for the Midland ARS. Tom Brady G8GAZ can tell you where to meet on the 21st if you contact him on 021-357 1924.

The Coulsdon ATS have a construction contest on July 13. Their meetings are held on the 2nd Mondays and last Thursdays in the month at St Swithun's Church Hall, Groveland Road, Purley at 7.45pm. Contact Alan Bartle on 01-684 0610 for more information.

July 16 brings yet another barbeque, this time for the Eden Valley RS, it's at the QTH of Harry G3CUC. Martin G4FUI on Penrith 66728 can tell you more about it.

The Winchester ARC have a Technical Forum on July 17 and NO meetings in August. The club meets on 3rd Fridays at Durgate House, Eastgate Street, Winchester. Dick Murray on Winchester 880605 can tell you more.

There is a full month ahead at the Maltby ARS. July 3 is an Activity Night on the Air, the 10th is 3 in a Row (mini lectures by three members), the 17th is a Home Project Night, the 24th is an Amateur Radio Open Forum and the 31st is a Junk Sale. For further details contact Keith Johnson G1PQW on Rotherham 814135.

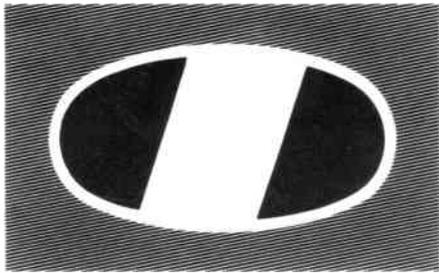
A Junk Sale is being held by the Derby & District ARS on July 1, then on the 8th it's DXTV Receiving Techniques by Keith Hamer, Light Railways is the illustrated talk by Clive Rawlings G0FWI on the 15th and July 22 is a Night on the Air. All meetings are at 7.30pm at 119 Green Lane, Derby. Jack Anthony G3KQF on Derby 772361 can keep you up-to-date.

That's the lot for this issue, unfortunately holidays have kept the number of clubs smaller than usual - don't worry, next month we'll catch up.



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REALISTIC DX-360 RECEIVER

Dick Ganderton G8V FH

The *Owner's Manual* that comes with the DX-360 describes the set as "a highly sensitive 9-band superheterodyne receiver, that's ideal for travel use worldwide." I don't know about the highly sensitive bit but certainly the set proved to be ideal for world-wide travel. More about that later.

The DX-360 is neatly styled in matt-black plastics with the dial, which is the conventional pointer and linear scales type, conveniently placed on the front panel. Also on the front panel are the slider controls for tone and volume and the six-position slider for band selection on short waves. Alongside the dial are two l.e.d.s. Both red in colour, the left-hand one is a low battery indicator while the other is a tuning aid.

On the top of the set are the push-on-push-off power switch and a bank of four linked push-buttons for mode selection — FM, SW1-6, AM AND LW. There is also a telescopic antenna, which extends to 705mm and can be swivelled in all directions, for use on s.w. and v.h.f. — an internal ferrite rod antenna is automatically switched into use when l.w. or m.w. are selected.

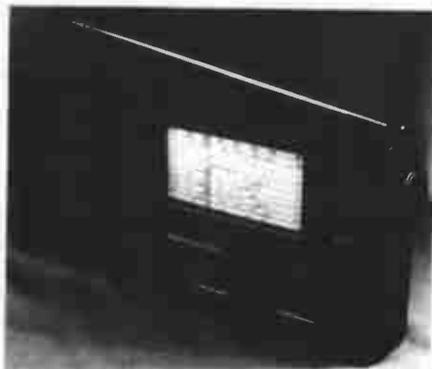
The tuning control is a straight-knurled plastics knob on the right-hand side of the set. A wrist strap is fitted to the other side, presumably so that you can swing the set around while parading on the beach! Below the strap are two sockets. The upper one allows you to use a 6V d.c. mains adaptor while the lower one is a standard 3.5mm jack for headphone use. Neither the adaptor or headphones are supplied with the set, however. The 76mm diameter loudspeaker is mounted behind the left-hand side of the front panel, while at the rear of the set is the compartment which houses the four AA size cells.

The twenty-page instruction manual provided with the set is readable and informative. Two pages are used to give the basic "driving" instructions and describe the features and controls, and a circuit diagram is provided which, as long as you have a magnifier, provides some interesting information on how the set works. The rest of the book is devoted to useful operational information for those new to s.w. listening. Even those "experts" with poor memories will find the listing of short wave broadcast stations and frequencies useful.

How well did the DX-360 perform and is it worth buying? I decided to take it with me on holiday to Crete to provide some entertainment and keep in touch with the news. I also thought that it would be interesting to see how well it travelled and what battery life would be like under conditions for which the set was designed.

Transporting it around was no problem. It fitted neatly into my wife's large handbag along with all the other items that she considers so essential to survival. (In return I had to fit her camera in with mine

Not all readers can afford expensive all-singing-all-dancing hi-tech receivers and we are continually receiving letters pleading for reviews of sets at the low-price end of the market.



for the flight out). The set was kitted out with four new Tandy "green" batteries just before leaving and a spare set of Duracell batteries were packed in the luggage just in case. The set was used mainly in the apartment which was at the back of a concrete building, set into the hillside about 100m above the sea. High, rugged hills rose immediately behind to the south, but there was a commanding view over the Gulf of Merabello to the north.

Obviously v.h.f. was going to be a problem, and it was. Not much was received on this band during the two weeks but back in the UK the set proves to perform reasonably well. On the local ILR radio station, 2CR on 97.2MHz, I found that I was suffering from my usual "image frequency" problems with my aircraft on the Hurn control tower frequency of

118.6MHz, (97.2 + 2 x 10.7MHz), as I live under the flight-path for airliners passing over from the west. Oh for a frequency change for either 2CR or Hurn!

Both the long wave and medium wave sections worked well enough, certainly in the UK. I didn't use it much in Crete. Being only a "mono-lingual" person I find non-English language stations rather difficult to understand.

The short wave section was the one that I found most useful, particularly for listening to the BBC World Service, occasionally leavened by short periods of Radio Moscow and other "foreign" English-language broadcasters.

The frequency coverage on s.w. is from 4.5. to 26.1MHz split into six bands. There are several gaps in the coverage as can be seen from the table, but the 60, 49, 41, 31, 25, 22, 19, 16, 13 and 11 metre broadcast bands are covered. The scales are marked in the time honoured manner with coloured lines showing where the broadcast bands are on the dial. A logging scale is also provided.

I found that tuning the set on short waves was not as easy as I would have liked. The tuning knob seemed to be connected to the "works" by a rubber tube giving rise to a spongy feel with springy backlash. This, coupled with the fairly wide filters made precise tuning rather uneasy, although once a station was tuned in the set was stable enough and could be switched off and left for several hours before switching back on again when it would still be on frequency.

The tuning indicator worked on all modes and bands but tended to be a bit too broad for most broadcast bands. I felt that I would have liked narrower filters to cut out adjacent stations on short waves and wished that I had packed the add-on audio filter described in this issue!

Over the fortnight in Crete the set was used daily for periods of around two hours each morning and two to three hours at night. With this sort of use the batteries just expired, that is the LOW BATT indicator came on, after 13 days. When this happened the set started drifting and the audio quality deteriorated somewhat and I had to put in the spare set of Duracells that I had packed. This sort of battery consumption seems to me to be acceptable and presumably the Duracells will give a greatly increased life. If you intend to use the set at home then it would obviously pay to invest in a suitable mains adaptor.

Overall I quite liked the set, and found it ideal for travel use. At a price of £59.95, it makes an ideal starter set for a youngster becoming interested in short wave listening and would not be money wasted if they wanted to progress to something more exotic.

My thanks to **Link Electronics, 228 Lincoln Road, Peterborough PE1 2NE. Tel: (0733) 45731** for the loan of the review set. The Realistic DX-360 is sold in the UK under the Tandy label. □

SPECIFICATIONS

Price	£59.95
Frequency Range	FM 88 — 108MHz LW 150 — 265kHz MW 520 — 1620kHz SW1 4.5-5.5MHz SW2 5.8-7.5MHz SW3 8.2-10.0MHz SW4 11.4-14.0MHz SW5 14.6-18.2MHz SW6 21.0-26.1MHz
Power Source	Battery 6V (4 x AA) Optional 6V d.c. adaptor
Power Output	660mW 10% t.h.d.
Dimensions	254 x 114 x 44mm



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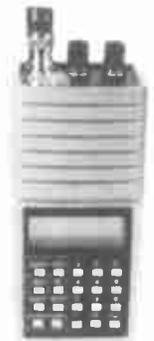
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RALLIES

★ SWM will be in attendance.

★ **June 28:** The 30th Longleat Mobile Rally promises to be at least as good as in previous years, with all the usual facilities in abundance. There will be over 70 traders, great and small. They will be covering the whole range of equipment and components to be expected at a first class rally. There will be a beer tent and the Longleat caterers will be there to provide fast food, not to mention the jacket spud stands. Children should bring along pencils and crayons for a competition (with prizes).

Brian Goddard G4FRG
0272 848140

★ **July 12:** The Sussex Mobile Rally will be held at Brighton Racecourse. Large area for free car parking, admission £1, disabled and children under 14 free. Refreshments, including hot meals are available in the Bars and the Cafeteria. For the family a free minibus service runs regularly to and from the seafront throughout the day, and a number of other diversions are available on the Rally site. For disabled visitors ramps, lifts and wide gangways ensure easy access for wheelchairs.

Mark Spillett G4UAW
0903 782594

July 12: The Worcester & 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 G0AOC
6 Tweed Close
Worcester

July 19: The Anglian Mobile Rally will be held at the Highwoods Sports Centre, Severalls Lane, Colchester, close to the A12/A120 interchange at Ardleigh. Doors open at 10am and there will be talk-in on S22.

E. Jacobs G6HQI
Tel: 0206 860403

★ **July 19:** The Cornish RAC are holding their rally at the Cornwall College, Pool, Redruth.

D. W. Howard
Rame Common Farm
Carrnkie, Helston
Cornwall

★ **July 26:** The Scarborough ARS are holding their rally in The Spa, Scarborough. Licenced bar and cafeteria available. Doors open 11am.

I. G. Hunter G4UQP
0723 376847

August 2: The Rolls Royce ARC are holding their rally at the Rolls Royce S&SC, 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 2:** The RSGB rally will be held at Woburn Abbey, Woburn.

Robin Hewes G3TDR
0784 56513

August 9: The Essex Area Group of the 934 Club UK are holding their 3rd annual Mobile Rally at Brentwood Halfway House, which is at the junction of the A127 and A128. The rally is open from 10am to 6pm. Both amateur and 934MHz stations will be in operation. Admission is free.

Frank Glendinning
5 Danescroft Close
Leigh on Sea

★ **August 9:** The Flight Refuelling ARS rally called Hamfest '87 will be held at FR S&SC, Merley Park Road, Merley, Wimborne, Dorset. Doors open between 10am and 5pm. There will be a bring and buy, craft fair, childrens entertainments and creche. There is free parking and entrance is 30p (children free).

Ashley Hulme G0CDY
0202 872503

★ **August 15:** The famous Lowe's Open Day returns this year, by popular request. Obviously to be held at Lowe Electronics HQ at Chesterfield Road, Matlock, Derbys.

Lowe Electronics
0629 2430

August 15: The Wight Wireless Rally will be held at the Wireless Museum, Arreton Manor, near Newport. The rally opens at 11am and closes at 5pm. Talk-in on S22 and GB3IW. All the usual trade stands will be there.

Douglas Byrne G3KPO
0983 67665

★ **August 16:** The West Manchester RC are holding the Red Rose Rally at the Bolton Exhibition Centre, Silverwell Street, Bolton. All the usual refinements. Doors open at 11am. Admission 50p.

Dave G1100
0204 24104

August 23: The Newbury & District ARS are holding a radio car boot sale at The Acland Hall and Recreation Ground, Cold Ash, Newbury. Gates open from 10am to 5pm. Pitches are £5 or £4 if pre-booked, inside tables are £10 (limited supply).

Mike Fereday G3VOW
0635 43048

August 30: The annual rally of the British Amateur Radio Teleprinter Group is being held at Sandown Park Racecourse. 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. Doors open between 10.30am and 5pm.

Peter Nicol G8VXY
021-453 2627

August 30: The Galashiels & District ARS are holding an open day at the Focus Centre, Livingstone Place, Galashiels. There will be trade stands, bring & buy as well as all the usual activities. They also hope to have Morse testing.

John G. Campbell G0OAMB
Tel: 0896 55569

August 31: The Doncaster & District RAYNET Group are holding their rally at Bircotes Sports Centre, Bircotes. Doors open 11am (10.30 for the disabled). Admission 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
0272 834282

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

Nigel Peacock G4KIU
0892 515678

September 13: Dunstable Downs Radio Club are holding The National Amateur Radio Car Boot Sale at the Shuttleworth Collection, Old Warden Aerodrome. Open from 10am to 5pm. Admission 50p.

Phill Morris G6EES
0582 607623

★ **September 13:** The Lincoln Hamfest Mobile Rally will be held at the Lincolnshire Showground on the A15. The rally usually opens at 10.30am. This year's attractions include helicopter rides, model car racing, model aircraft displays, the police, fire brigade and much more.

Pam Rose G4STO
Gainsborough 788356

★ **September 13:** The Scottish National Amateur Radio Convention will be held at the Magnum Leisure Centre, Irvine, Ayr. The leisure complex includes restaurant, cafe and licenced bar facilities, as well as water slides, etc., for the juniors ops. The PW Tennamast Scotland Trophy for the highest placed Scottish station in the PW QRP Contest will be presented.

Bob Low G0OECU
QTHR

September 13: The South Midlands Communications Open Day will be held at the SMCHQ at School Close, Chandlers Ford Ind. Est., Eastleigh, Hants.

South Midlands Communications
0703 255111

★ **September 13:** The Telford Rally will be held at Telford Racquet & Fitness Centre, Telford. Talk-in will be via GB4TRG on S22 and SU8. Doors open 11am (10.30am for the disabled). There will be lectures by MAXPAC on packet radio, G3RZP/G4FNC on linear amplifiers and G3SEK on Extra Long Yagi Antennas. Full catering and bar facilities are available. Morse tests will be available (pre-book with RSGB). There will be a huge flea-market, plus over 100 trade stands.

Martyn Vincent G3UKV
0952 55416

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technical software (swm)



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FEATURES

- Fully automatic recognition of CW, ARQ-FEC and BAUDOT No. 1 and No. 2 teletype signals with automatic decoding, independently of the shift position.
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- Swiss technology and quality — 1-year guarantee.

The POCOM AFR-1000 is extremely easy to use and very simple to operate. The AFR-1000 is simply connected to the loudspeaker outlet on the shortwave receiver. Operation is confined merely to choosing the mode required. No tiresome testing of the baud rate and shift position. Two LED's indicate the active operation states in each case.

The baud modulation rate measurement facility is a complete new innovation in a unit in this price range. Knowledge of the baud rate permits reference to special codes, specific radio services, etc., and makes it possible to shed light upon a radio teletype signal. The display is provided on the screen or printer linked to it to 1/1000 baud (e.g. 96.245 bauds) with quartz accuracy and within a measuring range of approx. 30 to 250 bauds.

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THE BIGGEST RADIO EVENT IN THE WORLD

The Dayton Hamvention 1987

Rev. G. C. Dobbs G3RJV

The statistics for the Dayton Hamvention held near Dayton, Ohio, every year are impressive: Over 300 Radio Trade Stands Under Cover; An Outdoor Flea Market with over 1500 Stalls; Over 25000 Visitors over Three Days. Some of the locals claim that it is "the centre of the ham radio universe". So when the G QRP Club decided to mount a stand at the Hamvention of 1987, I decided I would like to go. Then I was invited to lead a Forum on Home Construction; that clinched it. A bit of juggling with personal finances, some contriving of time off and I was away via Detroit to the Dayton Hamvention.

What is the Dayton Hamvention?

Amateur Radio Rallies are things of great delight to me. As an amateur radio constructor, I can spend a full afternoon seeking bargains in components and "bits and pieces", spend very little and return home and continue my enjoyment as I sort out my bargains. If you do not already attend any, have a look for events near you, they now seem to pop up in most parts of the UK, and go to one. Take a typical British Radio Rally, multiply it by ten and add some features that we never seem to think about and that will give just a flavour of what the Dayton Hamvention is like.

In 1951 a small group of radio amateurs planned a gathering called the South West Ohio Ham-Vention in a hotel in the centre of Dayton. It has been described as little more than an overgrown club meeting in fact some of the older members of the Dayton Amateur Radio Association criticised it as having deteriorated into a slightly out of control party.

Success

But the following year a younger group from the association set out plans for a larger convention "with class". They succeeded in securing the services of two crowd pullers: Phil Rand W1DBM, one of the biggest names then in amateur radio and an expert on Television Interference — the new amateur radio curse, and a German physicist to speak on that brand new invention — the transistor. The event was a great success and grew year by year eventually moving from the centre of the city to the current site, The Hara Arena, which offered more space.

The mid 1960s show the addition of the flea market, open air spaces that individual amateurs and small traders could rent to sell and trade a whole range of equipment,

When the G QRP Club announced their intention to go to the Dayton Hamfest everyone around them turned green with envy. G3RJV offered a crumb of comfort — he offered to tell us all about his exciting trip!

components and junk. Those who have seen the Hamvention through its thirty odd years claim that the flea market was the primary reason for the Hamvention's phenomenal growth in the early 1970s. Certainly there is nothing to compare with the 1500 or more stalls engulfing one side of the convention site. There are now over 300 Dayton Amateur Radio Association members required to make the event run each year.

What is it Like?

My lasting impression of the Dayton Hamvention is one of excellent organisation. Big events are difficult to run and a crowd of 25000 people all interested in amateur radio is quite a challenge. There are weak points, but considering the scale of the enterprise, the Hamvention runs very smoothly. Shuttle buses ease the parking problem, catering levels are such, that if you avoid the lunchtime rush, you can eat and drink cheaply without excessive waiting in line. The events and attractions are clearly promoted and easy to find. The brochure is a glossy 74 page book given to everyone who pays the \$8 entrance fee. In doing or seeing what I wanted, I was never defeated by lack of information or advice, just weariness.

The Flea Market

The covered areas contain over 300 stands and since they cost more to rent than the open air flea market spaces, the larger traders and groups use them to display and sell their wares. The major manufacturers use Dayton to display their latest state of the art goodies. Many of them launch new products or run special offers on their equipment and very often there is a chance to talk directly to the person who designed the equipment. Alongside the big names in the hobby are stands of smaller companies often with innovative and interesting ideas and products.

The outside flea market is just BIG. It is virtually impossible to do it justice in one

trip. It ranges from single radio amateurs trying to sell some of their equipment from their car boot, to major component traders with several made-up stalls, to junk and surplus traders, to dealers in vintage equipment, to speculators who seem to have bought out the world stock of one item, to sellers of far Eastern plastics electronic bric-a-brac. There are items from every era of radio from 1920s catswisker crystal sets mounted in wooden cases to last year's sophisticated equipment being sold to make money to buy this year's latest equipment. Compared with the British junk and secondhand market, the prices are amazingly cheap. The prices surprised me almost as much as discovering I could buy King Edward Imperial cigars at 63 cents for five at the local shops!

Forums

Some radio amateurs go to Dayton for the Forums. These are lectures or groups of lectures on a wide variety of subjects. At the 1987 Hamvention there was a choice of over 40 forums to attend. Alongside the amateur radio forums are a whole range of talks and activities for wives and children. The FCC run examinations for all grades of the American amateur radio licence and the keener types can even take on the challenge of Morse Code speed tests which begin at 25 words a minute and end at 99 words a minute . . . or when you drop out, or down.

Is it for the Short Wave Listener?

Obviously the event is targeted at the licenced radio amateur but Dayton offers something for many people. On my travels around the Hamvention I was surprised how much of it was slanted towards the s.w.l. One of the best attended forums was called "SWL & Utilities" by Brad Lovett KD9SF and Chuck Gysi.

The magazines which cater for the listener were very much in evidence, especially *Popular Communications*, perhaps the best known listener magazine in the USA. *Popular Communications*, which is published by the *CQ Magazine* group, had a huge display of books for listeners of every kind.

Books

I was surprised at the number of books, especially frequency lists for Utility and Service stations, aimed at the listener.

The Dayton Hamvention 1987

Although perhaps I had forgotten that listeners in the USA have none of the legal barriers to their listening that we have in the UK. Also, many licenced radio amateurs in the USA are also listeners. Most stations seem to have a general coverage or a scanner receiver in addition to the amateur bands communications equipment.

Receivers and Scanners

The display of receivers and scanners for sale was very impressive. If you wanted it, you could find it at Dayton and at a very favourable price. The dealers really battle over prices. What is more, should you want a slightly dated receiver, the prices on secondhand recent equipment were all well below the prices we might expect to pay. Perhaps the most interesting area for the listener was the flea market with its huge range of receivers from every era. Some of the real classics of listening like the Collins 75-A3 and the Drake 2B and 2C were all there and for sale at good prices. The problem is that some of these are a bit too big to smuggle back to the Motherland in a suitcase! I simply enjoyed looking over some of these classics of our hobby, especially the ones I had heard of but never seen before.

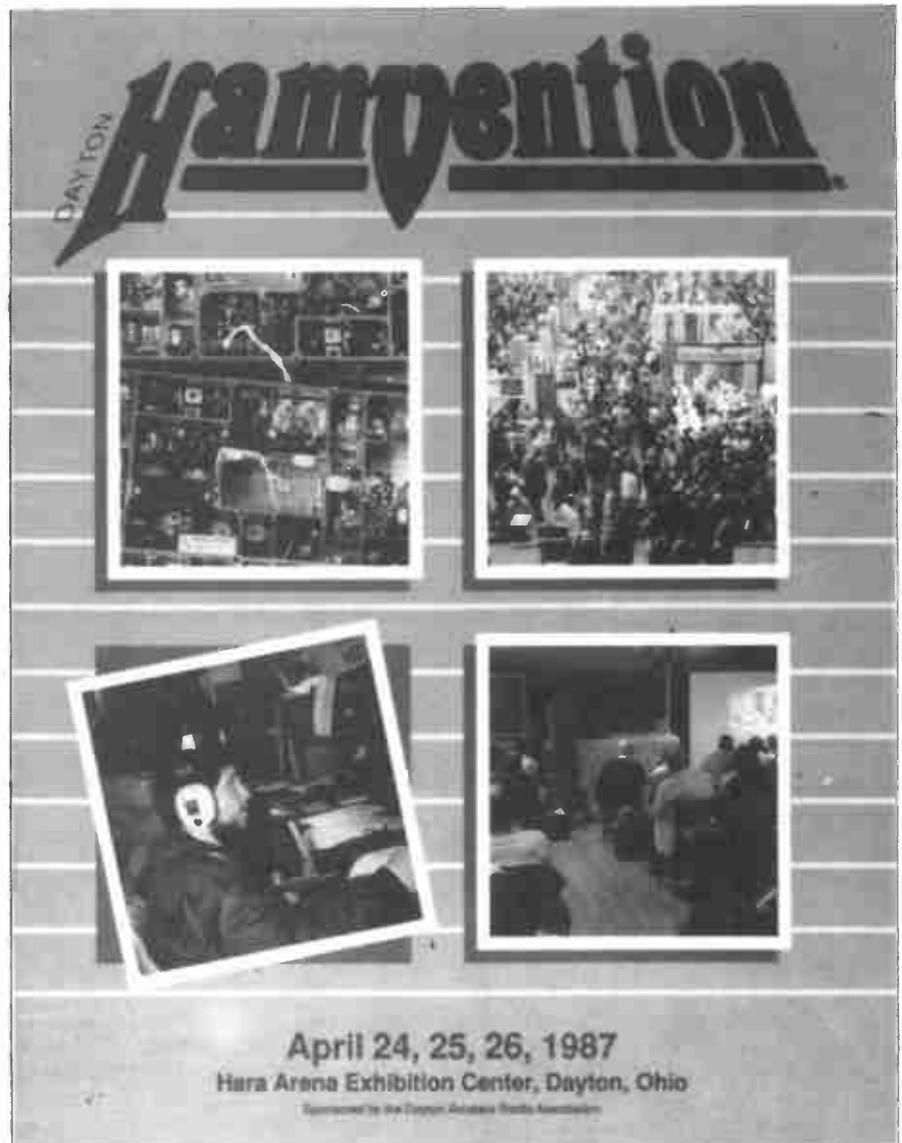
Going to Dayton

If you want to go to the Dayton Hamvention my advice is to plan early. It certainly pays to register in advance and to arrange a hotel booking in advance to assure a bed.

It is not cheap — the basic starting cost is an airflight to the USA. We chose to go via Detroit which is about 320km north of Dayton. Other UK visitors have their favourite routes. There is an airport in Dayton but it can only be accessed via internal flights in the USA. A hire car is useful and should cost less to hire and certainly less to run than in the UK. But DO take out extra insurance because the basic hire deal does not usually include

The Hamvention Association provide lodging information for the advanced booking of an hotel room.

The cheapest alternative is to book double rooms (usually two double beds) and double up to share the cost: about \$40 a night. Registration for all three days of the Hamvention costs \$8 in advance.



insurance against damage to the vehicle. . . dodgy when driving on the wrong side of the road! There are some good Apex deals on the daily flights from Heathrow to Detroit if staying for seven days or more which can also include the hire of a car.

The Dayton Hamvention is unique, worth visiting and certainly unforgettable.

Future intended dates for the Dayton Hamvention are:

April 29, 30, May 1 1988.

April 38, 29, 30 1989.

April 27, 28, 29 1990.

Booking only begins after January 1 of the year in question and advanced bookings close at the end of the first week of April.

Everything about the Dayton Hamvention is large. This is the cover of the programme, an impressive, glossy 76 pages plus covers with every detail you could want to know about. Lots of colour adverts help to make it bigger and better!

Details of the Dayton Hamvention can be obtained from: Dayton Amateur Radio Association, BOX 44, Dayton, OHIO 45401, USA.

Lodging Reservation Forms may be obtained from: Dayton Hamvention Housing, 1880 Kettering Tower, Dayton, OHIO 45423-1880, USA.

with Peter Laughton

DLF Improves Service

Europeans interested in events in West Germany are used to listening to the counterpart to Deutsche Welle, namely the Deutschlandfunk. Gradually reception on medium wave of this station has deteriorated in many parts of Europe, especially the UK, and so modernisation work is currently underway at the transmitter site at Neumuenster. In order to reach audiences in the Benelux though, DLF has started using a f.m. transmitter near the Dutch border. The transmitter in Kleef now puts out the daily Dutch programmes on 102.8MHz, covering most of the eastern and southern parts of The Netherlands.

Denmark's Future

The head of Radio Denmark's SW Service, Jorgen T. Madsen, has denied recent reports that the service is to close down in the immediate future. But the problem of finding a new transmitter site has not been solved. Equipment at the existing transmitter site on the outskirts of Copenhagen cannot be used at full power because of a nearby housing estate and possible interference to the international airport. Environmental groups have objected to some proposed sites on the grounds that wild birds might be electrocuted by flying into the masts. Radio Denmark hopes the problems can be solved soon, or the station will have to consider the long term future of its short wave service very seriously.

Hong Kong Nears Completion

In Hong Kong, the new BBC shortwave relay station is nearing completion. Engineers with the BBC's Transmission Planning Unit explained to us that the transmitter site with two 300kW transmitters is due to start system tests any day now. It will primarily be intended to improve reception of the BBC in the People's Republic of China. After running tone tests on un-announced frequencies between 5.8 and 26MHz to test the system, the new transmitter site is expected to start using the regular channels in preparation for regular programming towards the end of September. Reception in Europe will be difficult, but you might try 15.435MHz at 2245 or 7.160MHz around 1615UTC. BBC transmitter sites usually identify themselves at the opening and close of transmission.

The transmitter building at Alice Springs housing one of the new "shower" broadcasting transmitters.

In May we had surprise reception of the BBC via the transmitters of Radio Australia in Shepparton. Because of mediocre reception of the World Service in the Pacific during the Fiji crisis, BBC requested to use 15.395MHz via Australia for a morning broadcast to the Pacific. This isn't the first time the two have got together though. A few years back during the severe bush fires in Australia, Radio Australia was strengthened thanks to a temporary relay by BBC transmitters.

Gain Some — Lose Some

The balance of deliberate interference is on the move again — thankfully in the direction of less jamming. First the bad news though. In April, Libya started jamming two to three frequencies of the BBC Arabic service. When London signs off at 20 hours, the same noise generators are put on to blot out the Voice of America in Arabic. Again, not all the channels are blocked, which makes one wonder why they bother. In Iraq, changes have been made to their jamming of Iranian broadcasts, the jammers there making more noise than they used to. And news has reached us that the Australian short wave over the horizon radar is now operational, and is being used to train military personnel. We'd be interested to hear from readers if anyone thinks they have heard this in operation. Fortunately, its design is different from the "Woodpecker" sounding system in the USSR.

The good news is that nine language broadcasts of the Voice of America are no longer jammed. These are the programmes beamed in Russian and eight other languages used in the USSR, mainly in the Baltic states. This follows a similar move earlier this year when Russian language broadcasts of the BBC once again became clear in the target area after some seven years of deliberate interference. However, VOA programmes

in Polish to Poland, plus Dari and Pashto to Afghanistan are still blocked.

Radio Liberty and Radio Free Europe say that some of the jammers previously used against VOA and BBC are now being used to block their channels more effectively. The Soviet Foreign Ministry recently acknowledged the fact that jamming of VOA had stopped — until this year the USSR had never publicly admitted that it goes on. Western experts say the Soviet Union still spends some £500 million a year on jamming.

Curiously on the same day the jamming stopped, Saturday May 23, Moscow began broadcasting to the USA on medium wave 1.040MHz. But since the time chosen, 1200-2200UTC, is during the daylight hours, the 150kW transmitter near Havana can't be heard much further than the Florida Keys. The United States Information Agency says there is no connection between the new programme and the ending of jamming to many of VOA broadcasts. No deals have been done.

Taking a Shower Down-Under

Whilst short wave transmitters for external broadcasters are being commissioned all the time, not many developed countries are investing in short wave domestic broadcasting. But in the vast Northern Territory of Australia, three 50kW stations are now in operation. Located at Katherine, Tennant Creek and Alice Springs, the tropical band transmitters have recently been heard under good conditions as far away as Europe.

The stations make use of what's called vertical incidence transmission, also known as "shower" broadcasting. Using a specially designed antenna, the radio waves are beamed up to the ionosphere in a narrow conical beam. They come down again in a more dispersed beam for normal reception within 450km in all directions.



Very little energy is lost as skywave, though a few kilowatts is enough for these stations to be heard on other continents when conditions are right.

The result is a new regional service with better programming for the Territorians. Elsewhere in Australia though, the future of regional s.w. transmitters VLH and VLR, both based in Lyndhurst Victoria is being scrutinised. Since 1928, regional programmes have been broadcast from this site. Later Radio Australia used the same centre for overseas programmes, the time signal station VNG is also based here. However, now that Radio Australia has discontinued its use of Lyndhurst the future may be in the balance. Elections are being held in Australia during this month of July so the course could turn either way.



The antenna system at ABC's new Alice Springs station.

Equipment Preview

Another Panasonic travel portable short wave receiver has been announced. To be called the RFB-40, it's a simplified version of the recently introduced RFB-60L from the same company. Both are pocket-sized, primarily designed for the traveller interested in keeping in touch with world events. The RFB-40 has less memory facilities and more restricted tuning. It'll be late October before it's available in the European marketplace.

Eddy Visser, technical advisor to the ESKABA company of Malmö Sweden has announced a special board designed to slot into the Japan Radio Company NRD-525. It comes in different versions, and claims to offer better intermediate frequency selectivity, less noise, and synchronous detection if desired. ESKAB claim the board can be installed without previous technical knowledge, although its use means there is no room to install the v.h.f./u.h.f. converter from JRC. The ESKAB board will be available from August onwards.

Gilfer Shortwave have announced publication of a second book of

independent receiver reviews by respected European author Rainer Lichte. Following the success of "Radio Receiver Chance or Choice" issued last year. Lichte has made an update paperback book of a further 100 pages. It includes measurements on sets such as the Kenwood R-5000, Grundig Satellite 650, and Icom R-7000. The update is priced at US\$12.95 (excluding postage), or \$19.95 with the original book as well. Further information from Gilfer SW, 52 Park Avenue, Park Ridge, NJ 07656, USA.

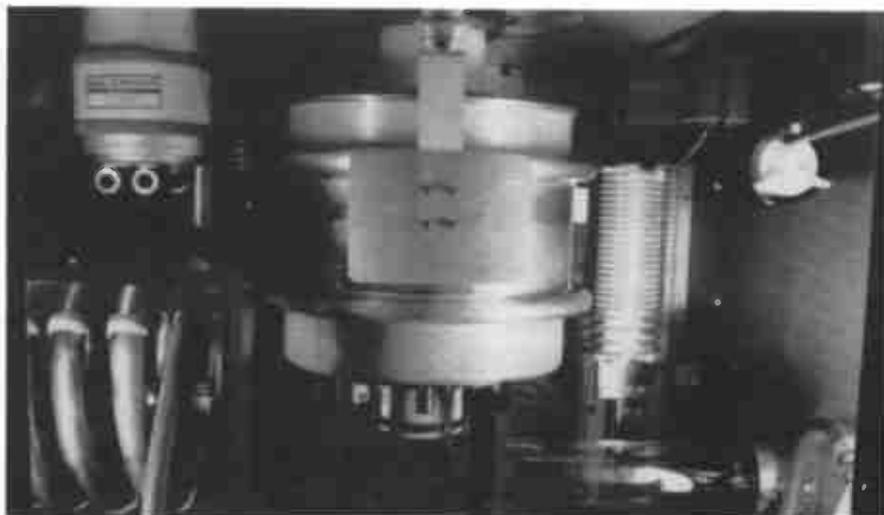
Finland Opens New Transmitter Site

If you notice that Finland is stronger on both the medium and short wave dial, then there is a reason. Juhani Niinisto, head of Finland's external broadcasts says that all three 500 kilowatt s.w. transmitters at the new transmitting centre at Pori have now been switched on. During the last few months the new senders have been replacing transmissions from the older transmitting centre a few kilometres away.

The old transmitter site is now part of history, being far too close to a housing estate to allow any further development. Finland is also building a new 600kW medium wave transmitter. An old 100kW transmitter in Turku is currently operating on 963kHz but its coverage is limited because of other users of the channel. Any day now though, the new transmitter is expected to become operational. We'll probably notice the full effect though later in the year when the nights draw in.

Interference Survey

A national survey in the United States has just been conducted for the National Association of Broadcasters. It shows that the public there doesn't complain about interference to its radio reception. A random sample of 1000 people were asked whether they ever had interference to their radio listening, especially on medium wave, from another station, nearby appliances or electric power lines outside. Sixty per cent said they did have this trouble, and of those three-quarters said they kept on listening regardless. But only 3.4 per cent ever bothered to phone the station to say they were having trouble listening. Nobody phoned the governing body on this matter, the Federal Communications Commission. In several recent proceedings, the FCC has stated its belief that interference to broadcast reception is not a problem because there are so few public complaints



The power amplifier and tank coil of the Alice Springs 50kW domestic short wave transmitter. (Photographs courtesy ABC.)



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ANOTHER FORTUNATE FIND

How restoring a fine receiver illustrates the perils of major modifications

Chas. E Miller

East Anglia has again proved to be a happy hunting-ground for communications receivers as far as I am concerned. On a visit subsequent to that which yielded the Marconi 1017 (*SWM* Nov '84) I found myself in a small seaside town chatting to the owner of the local second-hand store. He invited me to his house to inspect a receiver which he was using but was prepared to sell; by his description the set appeared to be a CR-100, so the invitation was accepted with enthusiasm.

However when I entered the tiny "shack", where the receiver took up a substantial amount of bench space, I found not a CR-100 but a CR-150 — a set of very similar appearance. On trying its performance I found it to be in working order but very much below par. The owner readily admitted that although he had not personally touched the "works", the man from whom he had acquired it had indulged in some pretty far-reaching modifications. Fortunately all the paperwork to do with them had been passed on with the set, so an attempt to sort them out would not be a matter of working completely in the dark. The suggested price, too, was favourable: just £13 including a power supply! I bought the set without hesitation.

On returning home I set about the task of evaluating the set from all aspects. In original form the CR-150 had covered 2 — 60MHz in five bands, in my example the 2 — 4MHz band had been modified to cover down to the 1.6MHz band, and another paper dial pasted over the existing one. This was the indication that very little of the original set remained intact. Although the modifications had unfortunate consequences I have no wish to criticise the person who carried them out, merely point out how very easy it is to fall into the trap of believing that up-dating valves and

components is a sure-fire way of enhancing performance. Generally speaking, old receivers such as this were designed around specific valves and alterations almost inevitably demand that circuit values shall be changed to suit.

As built, the CR-150 is a double-superheterodyne receiver employing 11 valves plus a voltage regulator (the h.t. rectifier is in the separate p.s.u.). The r.f. section contains two signal-frequency amplifiers, a mixer and a local oscillator; all these functions are performed by EF50s. The 1st i.f., at 1.6MHz, is passed immediately to the second frequency-changer stage, employing an X66 triode-hexode, and converted down to 465kHz. Two i.f. amplifying stages follow, using 6K7G r.f. pentodes. A DH63 acts as demodulator, a.g.c. rectifier and 1st a.f. amplifier. The 2nd a.f. stage employs an L63 triode as low-power output valve. A third 6K7G acts as b.f.o., and a second DH63 as a noise limiter and calibration oscillator. The STV 280/40 neon tube provides a stable 140V supply for such requirements as the local oscillator h.t. and a number of G2 voltages in the r.f. and i.f. sections.

Disappointing

I found that the r.f. valves had been replaced by EF80s; the second frequency-changer by an ECH81; the 6K7Gs by 6BA6s; the DH63s by 6AT6s, and the output valve by an EL91/6AM6. Virtually every component had also been renewed, value for value, with the original (except for a few obvious errors). The standard of workmanship, both mechanical and electrical, was extremely good — but what did it all achieve? As stated earlier, the overall performance was disappointing, particularly on the higher bands. It was

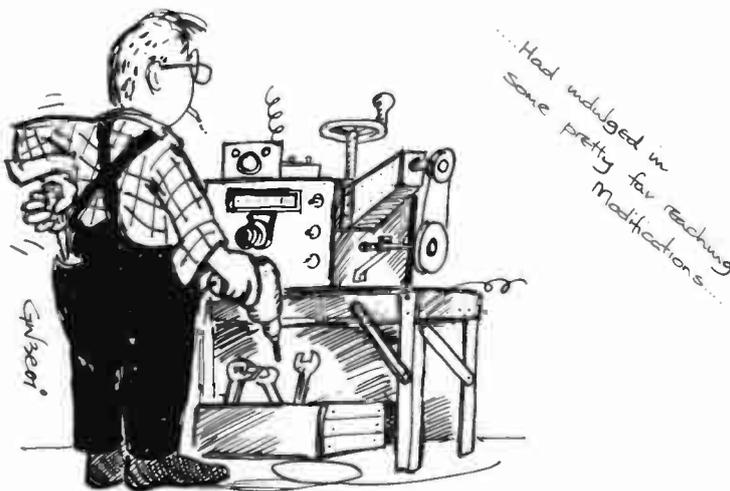
impossible to have the r.f. gain control at anything near maximum without incurring self-oscillation, and the meter provided for instant valve-checking gave wildly impossible readings. Sound output quality was poor, far below that to be expected from even an admittedly communications-only receiver. All these deficiencies had to be resolved before the set could be effectively employed in everyday service.

Valve Changes

My first attention was to the r.f. stages. The EF80 may appear at a casual glance to be of similar performance to the EF50, but closer examination of the characteristics of the two types reveals that there are fundamental differences which cannot be reconciled. One of the most serious, as regards automatic and manual gain control, is that the EF80 is a straight pentode, whilst the EF50 is of variable-*mu* construction — and specialised at that. According to whether the control bias is applied to g1 or g3, cut-off may be achieved with either -6V or -55V respectively. Maximum gm is 6.5mA/V. Given that the modifications did not permit a return to the original valves without a major and, at the time, out-of-the question operation, it appeared that the EF80s in the first three stages might be replaced to advantage by EF85s. These have variable-*mu* characteristics, a maximum gm of 6mA/V and internal capacitancies not too dissimilar to those of the EF50. This is an important consideration, especially at high frequencies, which may be overlooked. For the local oscillator an EF80 could be retained, since variable-*mu* characteristics are not required here.

The physical substitution of EF85s for EF80s is immediately carried out as the two types have identical basing; but the operating voltages differ from each other and from the EF50. It was therefore necessary to alter the various g2 and cathode resistors to obtain the correct conditions for the EF85s. When this had been done there was an immediate improvement in performance and stability, although still not up to optimum. The next item to be investigated, therefore, was the second frequency-changer.

Here again alteration to screen-grid and cathode resistors brought dividends, as it did when next applied to the i.f. amplifiers. The 6BA6, for instance, requires a standing bias of only -1V as compared to -3V for the 6K7G. Moreover, the resistor values employed in the CR-150 were on the generous side, making them far too high for the 6BA6s if maximum gain was to be realised. As an example, the cathode resistor of the 2nd i.f. amplifier had to be reduced from 470 ohms to just 68 ohms;



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that of the ECH81 from 330 ohms to 150 ohms. The sensitivity once again increased appreciably. Turning to the 1st a.f. amplifier, I discovered that the resistor values for the DH63 resulted in very low anode voltage on the 6AT6, and in fact the h.t. decoupling resistor had to be reduced from 22kohm to 2.2kohm to rectify this situation. Although this improved a.f. sensitivity, the output was still of poor quality — undoubtedly due to the mismatching of the EL91 to the loudspeaker via a transformer intended for the L63. The rA of the L63 is approximately 7.7kohm and that of the EL91 16kohm. The simplest way around this problem was to re-wire the EL91 as a triode, a great improvement in a.f. quality being obtained at once.

Having obtained a stable and sensitive basic receiver I now attended to the deliberate mis-alignment of the low band and the reinstatement of the correct dial readings. I found that the extra paper dial needed a lot of persuasion to come away cleanly, and in the event I had to tidy up the results with a fine marking pen. With the proper markings evident again the band was carefully and painstakingly re-aligned to the correct frequency limits. Final checking was carried out on MSF Rugby, which came in loud and clear at the precise 2.5MHz marking. As a matter of interest, the sensitivity of the CR-150 proved to be as good as most modern receivers (and far better than some) on MSF, which I often use for this type of check.

S-meter

When the other bands had been correctly aligned the overall performance turned out to be very satisfying. That it was maintained up to the highest frequencies was demonstrated by the ability to pick up a number of Band I TV stations in the days before they finally closed down. With this aspect of the restoration job completed it was time to do something about the S/valve check meter which, as mentioned earlier, was inaccurate on most ranges. The way in which the meter is operated is both ingenious and interesting and deserves a detailed description.

The meter itself is a simple 1mA f.s.d. type with an internal resistance of 100 ohms. The scale is calibrated to 1.0mA in 200 μ A steps, and below the section representing 0.4 — 0.6mA is a green arc to indicate "satisfactory". The method of checking the individual valves is to have an extra series resistor inserted into each anode h.t. feed, the values of these items being chosen very carefully so that at the rated anode current of each valve the voltage drop shall in each case be close to 0.25V. With a 470 ohm resistor in series with the meter movement its f.s.d.

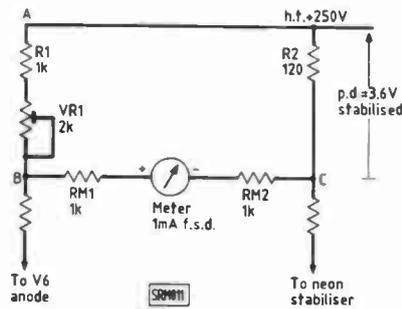


Fig. 1: The CR-150 S-meter circuit modified to give normal readings.

becomes approximately 0.5V, so that when it is connected across each h.t. series resistor in turn it should register the voltage as around half-scale deflection — or in other words, within the green arc.

It will be appreciated that the figures on the meter are purely arbitrary and have no bearing on the actual current passing through it. Also it will be seen that the values of the series resistors will require alteration if valves other than the originals are employed, with consequent changes to the anode current ratings. It was found that most of the resistors did, indeed, need to be changed: the correct values were calculated after direct measurements had been made with an accurate test meter. Once this work had been completed it became possible to check most of the valves (those omitted are the crystal check oscillator and the a.f. output) by the turn of a switch. The great advantage of this type of test is that no reference to a service manual is required; so long as the pointer lies within the green arc all is well. A double-pole switch connects the meter across each resistor as required. (A double-pole type is essential since some of the feeds are from the main h.t. lines and others from the 140V stabilised line.) A twelfth position on the switch converts the meter to its "S" facility; this arrangement, too, is worthy of note.

In its simplest form the S-meter is a milliamp meter connected in series with

the h.t. supply to a valve controlled by a.g.c. When there is no signal being received the meter will read the normal anode current, but as stations are received the resulting a.g.c. bias will reduce the anode current and cause the meter to read less, in proportion to the strength of the signal. This widely used method has the drawback of making the meter read "backwards" — i.e. the reading will fall with an increase of signal strength. In the CR-150 a completely different approach is adopted. By inserting a resistor in the h.t. feed to the voltage regulator a small, but constant, reference voltage may be obtained; it is, in fact, 3.6V. Included in the h.t. supply to V6, the 1st i.f. amplifier — and above the meter check resistor — is another feed consisting of a 1kohm fixed resistor in series with a 2kohm potentiometer (see Fig.1). The S-meter, plus an extra meter resistor of 1kohm, is connected between the bottom of the regulator supply. The pot. is adjusted so that in the absence of signals exactly the same voltage is dropped across this feed as is dropped across the regulator resistor, i.e. 3.6V. In this condition there will be no p.d. between the two points and the meter will register zero.

Now let us see what happens when a signal is received. Bias on the grid of V6 will reduce its anode current and thereby reduce the voltage drop across the supply resistors R1, VR1. The voltage across points "A" and "B" will thus become less than that across points "A" and "C", which is held constant by the regulator. It follows that there will now be a p.d. between points "B" and "C", with the former being positive with respect to the latter. The meter will register this p.d. in the correct mode as an increase in the scale reading. In practice the readings approximate very closely to the SINPO scale, times 5 (e.g. a reading of 0.6 on the meter approximates to a SINPO figure of 3). Very little had to be done to this part of the set to make it function with the change



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of i.f. valve — the most significant being the fitting of the correct value for R3 which had been changed previously.

Operating the CR-150

There are eight front panel controls plus a preset for the b.f.o. within the cabinet. The familiar "letter box" Marconi dial has, beneath it, a vernier calibration dial consisting of the equally familiar twin circular scales. Below this are the two-speed tuning knobs. On the left side of the cabinet, from top to bottom, are RF GAIN, BANDSPREAD and IF BANDWIDTH controls. The bandspread control tunes the second oscillator to give \pm kHz of the received signal. Passbands are 10kHz, 5kHz, 500Hz and 100Hz (this last via an a.f. filter). Bottom centre is the main ON/OFF switch, flanked on the left by the BAND CHANGE switch and on the right by the MODE switch (m.c.w. manual or a.g.c., c.w. manual or a.g.c.). On the right side the meter is, topmost and beneath it, its selector switch; bottom of all is the AFGAIN control. There are also two jack sockets for headphones or 600ohm lines. A sixth position on the MODE switch brings in the crystal calibrator.

The receiver warms up and becomes stable very quickly, after which tuning drift is negligible. The excellent tuning system

permits fast and accurate searching for known stations or for "browsing"; during the latter the operator is more likely to tire long before the available stations are exhausted! Sideband signals may be resolved with great ease and clarity. Obviously, the preset nature of the control must be seen as a disadvantage, but in practice this is not so: once it has been set — and I have had no occasion to disturb it since I put the receiver back into service — resolution may be obtained by very slight adjustment of the bandspread control, which in effect selects the upper or lower sideband as required. Normally there is no need to select the c.w./manual gain position of the mode switch as in these receivers the b.f.o. does not affect the a.g.c.; but in some cases, when signals are very strong, the r.f. gain may be backed off to advantage.

Stability

The stability of the set may be demonstrated by leaving it tuned to a commercial s.s.b. station such as one of the 24h weather services. The drift over long periods is extremely small, requiring only a touch on the bandspread control for correction. It can be fairly said that tuning s.s.b. is so easy and reliable as to make it

only marginally different to m.c.w. Incidentally, the a.g.c. characteristic may be varied by a plug-and-socket switch inside the cabinet to suit different operating conditions. For normal use the time constant is 0.2s for the m.c.w. mode, and 1.75s for c.w. This proves very effective in keeping the audio level sensibly constant over quite large variations in signal strength as shown by the S-meter, either during reception of a particular station or when listening to the members of a "net". Summing up, this is a very satisfying receiver to operate and shares pride of place alongside my typewriter with the 1017, ready for instant use.

Worthwhile

There must be many other fine old receivers standing idle due to what may appear to be poor performance. I hope that this story may inspire owners to invest some time and effort in restoring them to their former glory. As well as being something very well worthwhile doing for its own sake, the result will be infinitely more satisfying than the mere operation of a small, black imported box containing a few "plastic centipedes", intended to be scrapped should it fail!

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AUDIO FILTER

Rev. G. C. Dobbs G3RJV

Although my own interest in radio is the amateur bands, I have always owned a general coverage receiver to allow me to listen to signals on frequencies outside the amateur spectrum. Apart from the fact that I regard a general coverage receiver as a useful piece of equipment for testing oscillators in my home-built equipment, I also like to monitor the short wave broadcast bands from time to time. Over the years I have had an interesting collection of short wave receivers, including classics like the HRO and the AR88, to say nothing of the various receivers I have built.

This simple project will help your general coverage receiver sort out those c.w. and s.s.b. signals buried in the overcrowded short wave bands. So why not get out the soldering iron this weekend and build yourself this useful little circuit.



The Three Ss

Some of these older receivers, and certainly all of the home-built receivers have taught me the value of the "Three Ss" of a short wave receiver: Sensitivity, Selectivity and Stability.

Sensitivity is the ability of the receiver to pick up weak signals. Many short wave signals, usually the most interesting ones, are weak and require a sensitive receiver to make them intelligible. This is not simply a case of increasing the gain, (the amount of amplification the receiver gives the signal), because simply amplifying the signal will make not only the signal louder, but also the noise around it. The aim is to obtain a good "signal to noise ratio", that is receive the wanted signal without allowing it to be swamped by other signals and noise.

An added complication is the fact that all receivers generate their own internal electronic noise, which adds to the received noise. Sensitivity is therefore a compromise and complex problem in radio design. It is enough to say here that "turning up the volume" is not the final answer to receiver sensitivity, because not only does the signal required become louder, so also does the received noise and the internal receiver noise. The proper use of the gain controls is part of the skill of short wave listening. And never forget that the antenna system is one of the greatest aids to sensitivity.

Selectivity is the ability of the receiver to "select" the wanted signal, i.e. to be able to sort out one signal in a crowded band. The short wave broadcast and amateur bands are tightly packed with radio stations and a good receiver must be

able to select, or tune in the desired signal from the mass. This again is a function of receiver design and largely depends upon the number and quality of tuned circuits or filters in the receiver. In many older receivers the tuning rate, the actual physical act of selecting stations with the tuning knob, was an important factor and complex gearing systems were devised. In the more modern synthesised receivers it is much easier to control the rate at which frequencies are tuned and changed.

Stability is the ability of the receiver to "hold onto" a signal. Once the closely packed signals have been sorted out by a sensitive and selective receiver, it is of little use if the receiver tuning drifts away from the required signal. A receiver must have frequency stability to hold the required signal. Stability is inherent in the design of the receiver circuits and even in the physical construction of the receiver. Many home-built receivers suffer from instability, especially if their design is simple. The modern short wave receivers with synthesised or frequency locked oscillators should exhibit the sort of stability that we tentative receiver builders of old could only dream about.

Improving Selectivity

The latest in my long line of general coverage receivers is the Sony ICF 7600D. This is quite a departure for me as most of my receivers have been rather long in the tooth when I have bought them, but this little package seemed interesting enough to spend a little money to give me my coverage of the short wave spectrum. To someone reared on valved receivers which

require a bit of skill to "drive" and the risk of a hernia to move, this little receiver has been a source of delight. It may not be the most sophisticated receiver currently on the market but it performs exceedingly well for its size and price. It now lives on the corner of my study desk and provides me with my whole general listening requirements. I can monitor my favourite short wave broadcast stations by merely tapping in their frequency on the keypad and listen to Radio 4 in the evenings . . . to say nothing of the cricket on Radio 3 all summer and choral evensong on Radio 3 f.m. on Wednesdays and Fridays. It is a proper little workhorse of a radio.

The added bonus is that I can also monitor the amateur bands from my study desk. The sensitivity of the 7600D is such that it even does a useful job as an amateur bands monitor using its built-in whip antenna. The synthesiser makes the receiver stable and even offers me programmable options of my favourite amateur band frequencies, although I would have liked a little less synthesiser noise on the signals. The weakest point as an amateur bands receiver is the selectivity. The 7600D is really designed as a receiver for a.m. short wave stations and although it has a beat frequency oscillator (b.f.o.) to enable it to resolve single sideband and c.w. (Morse) signals, the commonest modes in amateur communication, its bandwidth is rather wide for such signals.

The bandwidth, to put it simply, is the amount of the radio spectrum the receiver listens to at any one time. Although we talk of radio signals as being present at a particular frequency on the dial, they occupy not one "spot" frequency but a small area of the spectrum. An a.m. (amplitude modulated) signal occupies about 6kHz of frequency space; a single sideband signal (s.s.b.) about 3kHz and a c.w. signal about 1kHz. The bandwidth of the receiver is the "window" it offers to radio signals, which in the case of an a.m. broadcast receiver has to be about 6kHz to receive the complete signal without distortion. The amateur bands are often crowded with signals so more than one of them can be received at one time through this window.

In order to receive a particular signal clearly we need to "close the window" a little to exclude others. The bandwidth of modern receivers is governed internally by filtering at an intermediate frequency (i.f.) in the receiver circuits. It is difficult to change this parameter without quite drastic modifications to the internal circuitry of the receiver.

Thankfully there is another alternative. The bandwidth of a receiver can be modified by audio filtering which can be done at the audio output of the receiver.

Audio Filtering

My 7600D, like many broadcast band receivers, is designed to give a reasonable

AUDIO FILTER

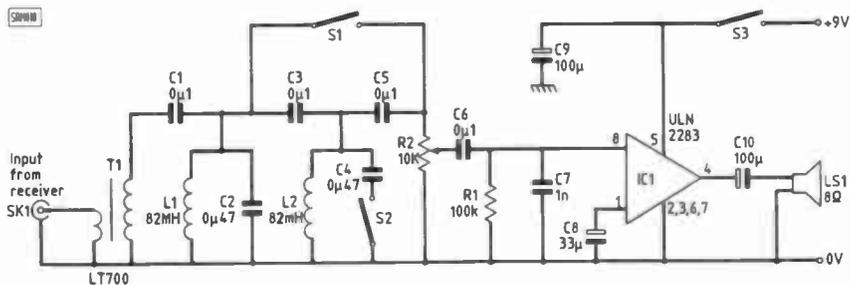


Fig. 1

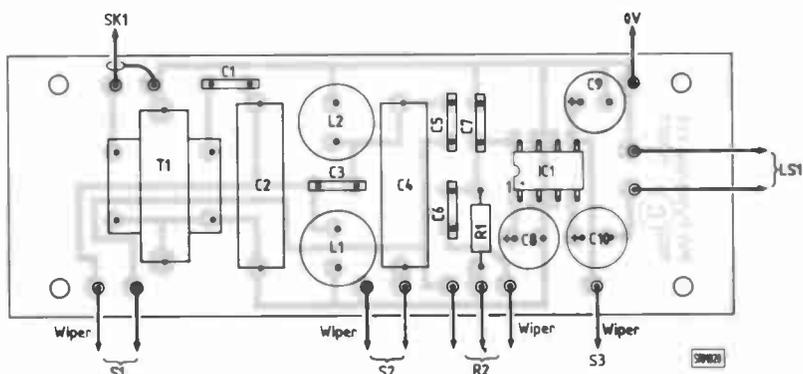
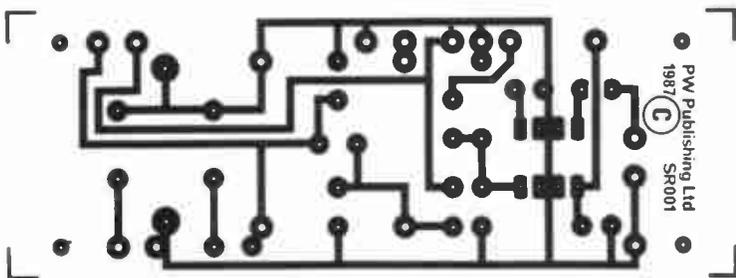
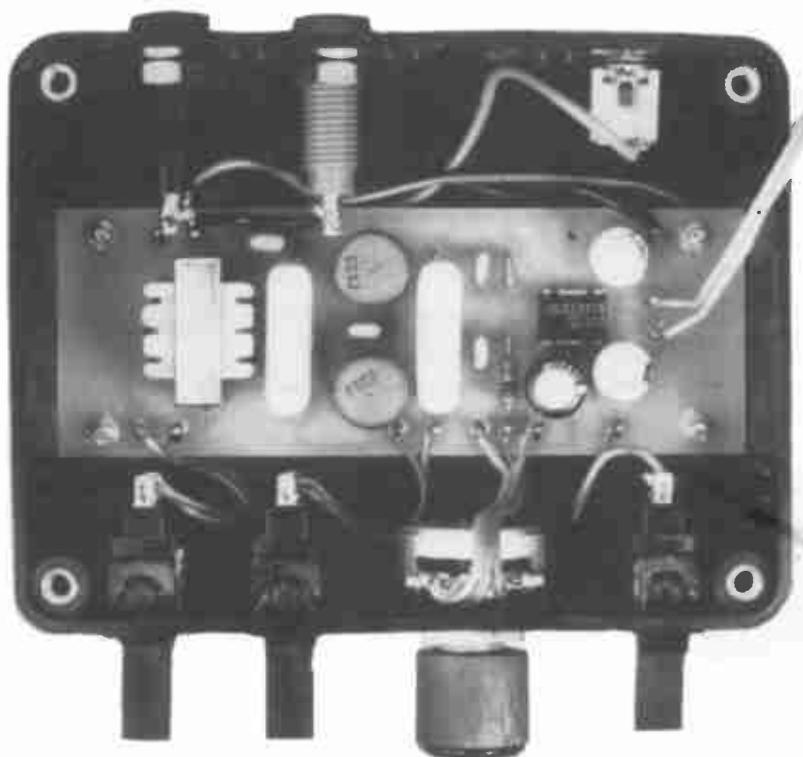


Fig. 2



audio frequency response so that music can be heard without losing too much of the high or low frequencies. Most amateur radio transmissions use s.s.b. or c.w. as their mode of operation, and both of these modes make use of a very limited range of audio frequencies. For s.s.b. the audio range between about 300 and 3000Hz and for c.w. between about 500 and 1000Hz are plenty wide enough to convey all the information. All frequencies above or below these ranges are not required and may well contain unwanted information in the form of adjacent stations.

If the frequency response of the audio output of the receiver can be restricted to the required frequency range it should be possible not only to hear the required signal clearly but also to eliminate a lot of the adjacent interference. To this end, it has been common practice for radio amateurs to add audio filtering to improve the selectivity of their receivers.

There are two main approaches: RC active filters and LC passive filters. An active filter is one which contains one or more amplifier circuits, "active" because a power source is required, which are tuned by resistor and capacitor networks, (R and C), to accept or reject certain audio frequencies. A "passive" filter contains one or more tuned circuits made from inductors and capacitors, (L and C), which accept the required audio frequencies at the expense of those not required. In both types the more stages of filtering the narrower the audio bandwidth becomes.

A Practical Audio Filter

The circuit of the simple audio filter that I have used with the Sony ICF7600D for some time is shown in Fig. 1. The filter is a two-stage passive LC filter with a built-in audio amplifier. It can be plugged directly into the earphone socket of the receiver and should work well with most short wave receivers.

The earphone output from the receiver is fed to a matching transformer to increase the 8Ω output impedance to about 2kΩ. L1/C2 and L2/C4 are two tuned circuits resonating at around 850Hz, which is roughly in the middle of our desired range of audio frequencies. C1 couples the audio signal into, C2 between, and C3 out of the two tuned circuits. A switch (S1) takes C4 out of the circuit to increase the filter's audio bandwidth. I have designated these two switched positions as s.s.b. (without C4) and c.w. (with C4) although the filter bandwidth is still suitable for s.s.b. use in the c.w. position. Another switch S2 bypasses the filter and serves as a filter on/off control.

As the audio signal is reduced in the filtering process it is amplified by a low power, audio amplifier integrated circuit IC1 to give adequate loudspeaker volume. The volume control for this audio amplifier is provided by R2, while S2 is the on/off switch for the amplifier supply. It would be possible to use a suitable supply from the receiver (9 to 12 volts), but I built the whole

AUDIO FILTER

filter unit inside a small car loudspeaker case, with a PP9 battery to provide the 9 volt supply.

Building The Filter

The prototype filter is built on a small printed circuit board, the layout of which is shown in Fig.2. An alternative would be to use the same layout on "Perf Board". This is a laminated plastics board with a matrix of small holes spaced at 0.1 inch. The components can be mounted as for the printed circuit board except that the interconnections under the board are made with wires rather than copper tracks. Many of these links can be made with the surplus lead lengths on the components.

Construct the amplifier section first as this is easy to test. Build the circuit "backwards" from the speaker to C6, connect up the supply and speaker and touch the lead on C6 on the opposite side from ICI. A buzzing should be heard in the speaker. Then connect R2 into the circuit using miniature screened cable. Check that R2 has been connected the right way round to increase volume with a clockwise rotation.

The rest of the circuit can now be completed. Note that T1 must be placed the correct way around in the circuit. The high impedance side, connected to C1 and ground, has a centre tap wire which is not used in this circuit. The electrolytic

capacitors C8, 9 and 10 must also be wired the correct way round.

Using The Filter

The filter in its plastics box stands alongside the receiver and is plugged into the earpiece socket. The user now has two audio gain (volume) controls to use: that of the receiver and the one in the filter. I found after some experience of using the filter that it is best to set the receiver volume control at a level which enables the filter volume control to be used between

one third and two thirds of maximum. You will have to experiment a little for the best results. I usually begin with the filter on the s.s.b. position for finding stations and then switch to the c.w. position for addition selectivity. Again a few minutes use with the filter will soon show the best method of use.

Although this is a very simple form of audio filtering it does help the listener to resolve signals on the amateur bands and can be a useful addition to the listening station

YOU WILL NEED

Resistors

Carbon film 1/4 watt 5%
100kΩ 1 R1

Potentiometers
10kΩ (Log) 1 R2

Capacitors

Ceramic
1nF 1 C7
0.1μF 4 C1,3,5,6

Mylar
0.47μF 2 C2,4

Electrolytic p.c.b. style
33μF 25V 1 C8 (Greenweld)
100μF 10V 2 C9,10

Inductors

LT700 1 T1
82mH 10RB 2 L1,2 (Circuit 34-82302)

Integrated Circuits

ULN2283 1 ICI (Circuit 61-02283)

Switches

Miniature toggle
Single pole, on/off 3 S1,2,3

Sundries

Loudspeaker (8Ω); Printed circuit board;
Thin screened cable; Control knob.

Suppliers:

Circuit Holdings, Park Lane, Broxbourne,
Herts. Tel: (0992) 444111.

Greenweld Electronic Components, 443
Millbrook Road, Southampton, Hants
SO1 0HX. Tel: (0703) 772501.

The p.c.b. is available from SWM, Enefco
House, The Quay, Poole, Dorset BH15
1PP price £2.00 + 70p p&p.

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AERONAUTICAL RADIO

Godfrey Manning, BSc, MB, BS, G4GLM.

Part 3

As I hinted in the previous part of this series the instrument landing system (i.l.s.) is partly related in operation to v.o.r. In fact, i.l.s. consists of three parts: a direction (azimuth) guidance arrangement called the localiser (this is related in function to v.o.r.); a height guidance facility called the glide slope (or glide path); and up to three distance-to-go beacons called markers.

Instrument Landing System

The instrument landing system is a radio-beam navigational aid that allows aircraft to find the runway once they are positioned somewhere near the start of the final approach. Ideally, to approach a runway, the aircraft's track over the ground should exactly follow the imaginary extended centre-line of that runway. The aircraft should descend evenly along a line that rises gently at 3° to the horizontal and originates at the point of touch-down (called the threshold). The i.l.s. localiser and glide slope each respectively provide the guidance that is necessary to follow such an approach solely by reference to the cockpit instruments, e.g. if the visibility or cloudbase prevent the pilot from making a purely visual approach (i.e. one judged by eye and not radio beams, although special lighting arrangements close to the threshold do help).

During an instrument approach the pilot also needs to know the distance to go to touch-down, hence the need for distance marker beacons. These help the pilot to attain a suitable air speed, lower the undercarriage and flaps at the right time, etc., and they also correlate with the i.l.s. beams: if, after a pre-calculated time from having passed a marker beacon, the runway is not located then an error is assumed to have occurred and the pilot climbs safely away without landing. This occurrence would be called making a "go-around" as a result of a "missed approach."

When is i.l.s. used? On a typical holiday charter flight landing at a Mediterranean destination, the aircraft is flown to within sight of the land surrounding the airfield by en-route navigational aids (v.o.r., d.m.e. and a.d.f. as described in part 2). Then the landing is conducted visually, certainly in the final approach stage. The air-pressure or radio altimeters are accurate enough for height guidance down to a given limit but, eventually, if the ground is not in sight, the aircraft is too close to the surface for safety and a go-around must be initiated. On a clear day at better-equipped airports the same situation might obtain but an instrument approach is more likely to be used. Again, a pilot guided by i.l.s. can only rely on instruments up to a given safe height from the ground and after this height has been passed reversion is made to a visual touch-down. If runway not in sight — then go around!

In this, the final part of the series, Godfrey Manning explains how the instrument landing system works to aid the pilot in landing and how some other general navigation systems and radar are used.

Automatic Landing

Increasingly, a third variation is found with more sophisticated airborne equipment at certain suitable airfields. This is automatic landing. The idea behind autoland is twofold: firstly, if the pilot can guide the aircraft by the readings on the i.l.s. instruments, then why can't the automatic pilot also follow this guidance and land the aeroplane instead? And, since the autopilot can respond more quickly than a human pilot's reflexes, why not allow it to fly the aircraft all the way down to the runway, that is, assuming that the radio beams are first proven to be accurate enough at such a low height?

This extended use of i.l.s. is only available at certain airports and is still not routine. Pilots don't like it! Their workload is actually increased due to the cross-checking of the autopilot and the need to react quickly to disconnect it and climb out manually should it go wrong. But, in really bad visibility, the autoland equipment (guided by i.l.s.) can land the aircraft in conditions that are beyond human capability.

Categories

Weather minima (as they are called) are expressed as categories. All autopilots are equipped to at least Cat I these days: by the time you're within 200 feet of the ground, the runway must be in sight and the runway visual range (r.v.r.) must be at least 2600 feet. If on passing through this 200 feet decision height (another agreed technical term) the runway can't be seen, you now know what to do about it!

But imagine the scene on the flight deck. Two hundred feet is not a lot. The captain has been handling the aircraft down to the decision height by reference to the i.l.s. guidance, the first officer cross-checking. Also, the first officer is reading out heights: "Three hundred; two-fifty; decision two-hundred..." Now, at this point, there are just seconds to touch-down and the captain must raise his eyes from focussing close at hand on the instruments and now has to focus on the distance. If the runway can't be seen then he calls for a go-around. Cat II needs a decision by 100 feet when the r.v.r. must be at least 1200 feet and Cat III can't be flown by a human at all, requires auto land, and has no decision height. Cat IIIa means you'll probably see one or maybe two runway lights at any one instant just

before touch-down; Cat IIIb means sufficient visibility is present only for visual taxiing after landing, and Cat IIIc means you can't see anything at all so, after a perfect autoland, you wouldn't be able to taxi to the ramp!

To summarise, an entirely visual landing is quite possible in good conditions but otherwise the pilot flies the aircraft according to i.l.s. guidance until he reaches a point at which he can continue visually. If this point is not reached safely, the landing is abandoned. The instrument landing system is quite routine in airliners and is also often found in light aircraft. Less common is the use of the i.l.s. to guide the autopilot to make automatic landings, which is useful in conditions beyond the capability of a human pilot.

Exactly what category of weather minima may be accepted by a particular aircraft/aerodrome combination depends on both ground and airborne factors. In the aircraft, a reliable and proven system is necessary for the more demanding conditions. For autoland, multiple redundancy of both radio receivers and autopilots is essential. Also, the auto pilot must be equipped to handle flare-out and landing roll in addition to the conventional requirements of en-route flight. On the ground, radio beams of known accuracy are needed for guidance and sometimes local terrain (such as mountains) distorts the radiation pattern so much that autoland is always unsafe.

Ground Movements

Ground movement control must be instituted to keep taxiing aircraft clear of the runway when traffic is landing; the proximity of a metal airframe to the transmitting antennas can again distort the radiation pattern. At airports you will quite often see signs on the taxiways that say "Cat II/III Hold" and, during low visibility operations, taxiing aircraft must not go any nearer to the runway than these points (until cleared by air-traffic control) for the reasons just mentioned.

The radio equipment that makes it all possible relies on three separate frequencies. The i.l.s. localiser transmitter is mounted at the distant end of the runway and is prominently large at many airports. An array of side-by-side horizontal dipoles mounted in front of a V-shaped corner reflector is typical and the whole is painted in alternating orange and white stripes for visibility. On the BAC One-Eleven aircraft the localiser/v.o.r. receiving antennas are seen as a horizontally-mounted "V" shape, diverging towards the rear, and mounted on the cockpit roof. Part of the v.h.f. nav. band is set aside specifically for localisers (108.1-111.95MHz which includes 40 channels spaced at 50kHz as well as some unallocated frequencies). The glide slope transmitting antenna is a small array of just a few elements, mounted to one side of

the threshold and often atop an equipment cabin. Although the whole is fairly inconspicuous, the same colour scheme as for the aerodrome localiser antenna helps to identify it. The One-Eleven's glide slope antennas are mounted near the top of the bulkhead at the back of the nose radome. Forty channels separated by 150kHz (329.15-335.0MHz) are used for the glide slope and when the corresponding localiser frequency is selected on the remote controller (see part 1) the paired glide slope channel is automatically tuned on its receiver, too.

The actual pairing is, however, irregular and can not be deduced from a simple pattern. Received modulation at 90Hz means that the aircraft is left of the centre-line (localiser) or too high (above the glide slope). The opposite positional errors are indicated by 150Hz modulation. The localiser also transmits a Morse identification, just like that of a v.o.r. Incidentally, the identification "TST" (dah, di-di-dit, dah) in Morse means "Facility undergoing tests - do not use!" Any unexpected identification should be taken as an error, and again the navigational aid must not be used. In the case of i.l.s. the Civil Aviation Authority fly regular calibration test runs at major airports using Hawker Siddeley 748 aircraft such G-AVXI and 'XJ.

As an example of i.l.s., the runway 26 facility at Luton has a localiser on 109.15MHz, identity: ILJ (di-dit, di-dah-di-dit, di-dah-dah-dah) and a glide slope transmitter on 331.25MHz. Until recently, only half the channels were used (at twice the spacing) and Luton was the first airport in the UK to adopt a frequency on the newer, tighter-packed channels.

Markers

The i.l.s. markers are placed at a distance from the threshold (the outer marker), part-way from this point to the threshold (the middle marker), and immediately at the threshold (the inner marker). In part 2 the locator outer marker, in which an n.d.b. is co-located, was mentioned. Exact distances between the markers and the threshold vary. At Luton for example, the runway 26 outer marker is

placed 3.94 nautical miles from the threshold along with an n.d.b. (identification: LUT (di-dah-di-dit, di-di-dah, dah) on 345.5kHz). All markers radiate upwards in a tight fan pattern, on 75MHz.

All outer markers are modulated by continuous Morse dashes. You need to fly quite close to a marker in order to receive it; when the outer marker is overflown a blue i.l.s. marker light flashes on the pilot's instrument panel and the modulation is heard in the headset. The Luton middle marker is 1331m from the 26 threshold.

All middle markers are modulated by alternating dots and dashes; the corresponding instrument panel marker light is amber. Inner markers are of no value with today's high approach speeds as they would be overflown almost immediately before touch-down! They were modulated by a series of dots, and the marker light is white. Some airways also have fan-radiating position markers, though; these activate the white marker light too, and from the radio transmitting point of view are just the same as inner markers. The One-Eleven's marker receiver antenna is a slight bulge under the fuselage, in the midline, level with the wing trailing edges. Sometimes co-located distance measuring equipment is also provided, giving distance to threshold (again, Luton has one on 26 using 1052MHz and 1115MHz) - refer to part 2.

Position Indication

The aircraft's position is indicated in the cockpit in relation to each of the two i.l.s. beams. Fig. 3.1 shows a simple indicator still found in light aircraft. The localiser is indicated by a vertical needle which hinges at its top, resembling the arrangement of the simple v.o.r. indicator (see part 2, Fig. 2.5). If the localiser is to the aircraft's left then the bottom of the needle swings left, and *vice versa*. The glide slope needle rests horizontally and is pivoted about its left-hand end. It is usual to intercept the glide slope from below, in which case the right-

hand end of the needle starts off by being displaced upwards and gradually descends as the glide slope is acquired. Each beam needle has an associated warning flag; they can be seen in Fig. 3.1 as the power to the instrument is off.

Larger aircraft use the horizontal situation indicator (h.s.i., see part 2) to represent the localiser in exactly the same way as a v.o.r. radial is displayed. An additional horizontal bar moves up and down the display to indicate the glide slope and in v.o.r. mode, this extra bar is biased away out of sight. Fig. 3.2 shows a typical indication. Runway 27 is being worked; a westerly heading (270°) is being flown. The glide slope is still above the aircraft so level flight must be maintained until acquisition occurs; only then can the pilot lower the aircraft's nose and start to descend, aiming to keep the glide slope bar central in the display.

The runway is, however, rather left of the aircraft. Bringing the localiser beam bar within half an instrument's radius of the display's centre is described as becoming established on the i.l.s. How is this achieved? Just to fly a continuous left bank is wrong; the aircraft would go round in circles! The indication actually shows that the centre-line is left of the aircraft's track.

Imagine walking along a straight street, the road and the opposite pavement being on your left. Pretend that the pavement on your side heads off on your current track and that the opposite side's pavement goes in a straight line towards the runway. To cross the road, you would turn a little to the left and thus put yourself on to a new heading. You would walk this way in a straight line for a while, which would cause you to cross the road diagonally until the far pavement was reached. As you began to cross the opposite kerb you would now need a little right turn in order



Fig. 3.1: Simple i.l.s. indicator.



Fig. 3.2: Horizontal situation indicator type i.l.s. display.

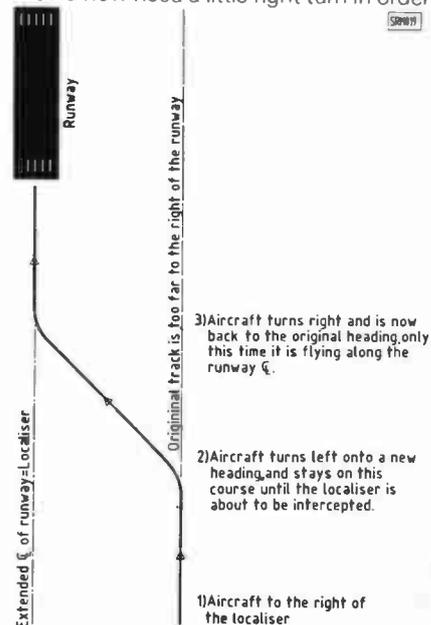


Fig. 3.3: Acquiring the localiser.

to re-establish your original heading which would enable you to follow the line of the newly-acquired pavement. So it is with acquisition of an i.l.s. localiser (Fig. 3.3.) or even a v.o.r. radial as in part 2.

Omega and Decca

The further uses of aeronautical radio will occupy the remainder of this article. Two systems are in use that give navigational fixes over a wide area of coverage: Omega and the Decca Navigator.

Omega is a very low frequency system (on 10.2kHz) consisting of 8 beacons world-wide. Their signals consist of accurately-synchronised pulses and by measuring the relative times at which the different transmissions arrive at the aircraft, a good estimate of latitude and longitude can be obtained.

Decca transmits on very high frequency typically between 70kHz and 127kHz. Four transmitters are grouped in to a chain, and several chains cover one country. The chain is again synchronised, with a master station at the centre and the remaining three transmitters being denoted red, green and purple. The phase differences between two stations is indicated on a dedicated meter (Fig. 3.4). The meters must be set up for the known position at the start of the flight, since there will be a whole family of lines on which the aircraft might lie that will share the same observed phase difference. By counting how many such lines have been crossed since take-off, the present position can be ascertained. More modern equipment is somewhat more automated than this basic arrangement.

Radar

Radar is one radio service that is popularly associated with air-traffic control. Two sorts of radar are in use: primary and secondary surveillance. Primary radar is the straight-forward type that is well known. A pulse of microwaves is sent out from a directional antenna and if any reflective object gets in the way an echo is returned. The distance of the

object is found by timing the interval between transmitting the pulse and receiving the echo; the speed of radio waves in air is known, as must be the propagation delays inherent in the electronic system. The antenna is also rotated and hence, by repeating the pulse transmission a large number of times per rotation, the actual bearings of reflections from all directions can be shown. This information is characteristically displayed on a cathode ray tube.

The problems with primary radar are that aircraft are not the only reflecting objects in the sky (clouds, rain and flocks of birds are among the other things that are picked up) and, despite high effective radiated powers, the return echo is bound to be a very weak signal. Secondary surveillance radar solves both of these problems by the use of an airborne transponder. The radar pulse is transmitted as usual but there is no attempt to receive echoes on the same frequency.

"Squawk" Numbers

In the aircraft, the transponder replies to received radar pulses by transmitting a coded signal on a different frequency. This code can include up to three separate items of information: the flight level, an identity number, and the presence of an emergency or identification condition.

The identity number consists of four digits each of which can be between 0 and 7 inclusive (the coding is a binary one, but expressed in octal). This is known as the "squawk" number, is allocated to the aircraft by the controller, and is set on the transponder's controller by the pilot. Large air-traffic control centres generate the image on their cathode ray plan position indicators by computer integration of the signals from several radar antenna heads.

The aircraft's current and most recent few positions are displayed, alongside the flight level and also the flight number or callsign which the computer works out by looking up the received squawk code in a reference table that also lists the corresponding flight numbers.

Primary Radar

Primary radar still has its uses (e.g. 3cm and 10cm wavelengths). One such is precision approach radar, used by the controller to talk the aircraft down on to the runway when i.l.s. would be unsuitable. Approach radar provides both height and azimuth displays but the aircraft can only be identified by being told to fly in a turn and by the controller looking to see which echoed "blip" behaves likewise on the screen. Airliners also carry primary radar, called cloud/collision radar (Fig. 3.5) and which is mainly used to



Fig. 3.4: Green Decca meter.



Fig. 3.5: Cloud/collision radar screen.

watch out for bad weather ahead. It can also map the ground, by turning the antenna to point downwards. Use on the ground is forbidden due to the danger to the health of airport personnel from the close proximity of microwave transmissions.

Radio Altimeters

The radio altimeter is similar in principle to radar. This airborne device sends a pulse vertically downwards from the aircraft and times the return of the echo from the ground. On the Douglas DC-9-32 there are two installations, each having separate transmit and receive antennas built in to the bottom of the fuselage in the midline and forward of the wing roots. Absolute height from the ground is displayed on a flight deck instrument, the radio altitude indicator (Fig. 3.6).

A typical radio altimeter does not give a reading unless at low height, e.g. within 2500 feet of the ground. The reading is not really of altitude: there is no reference to

sea level or aerodrome elevation. This indication is of greatest use during final approach, and will only agree with an altimeter set to QFE (see part 1) if the ground around the aerodrome is flat and at the same level as the airfield itself. If there is a valley just before the threshold, then radio altitude will appear to give a sudden but momentary increase immediately before touch-down! Fig. 3.6 shows a radio altitude indication of 250 feet. The pilot has set the arrow-shaped index "bug" to the decision height of 200 feet, by turning the knob on the instrument. When this height is reached the instrument's warning light comes on as a reminder. Fortunately the radio altimeter is most useful when a featureless surface prevents the pilot from seeing natural visual height cues, such as over mud flats or water; this flat type of surface is also able to provide consistent and accurate height indications.

Doppler

Doppler radio also works by bouncing a signal against the surface but this time it is the frequency difference between transmission and echo that matters. The Doppler shift in frequency is well known; if a fast-moving object makes a sound whilst passing a stationary observer, the pitch of that sound seems to change as far as the observer is concerned. Think about an ambulance going by with its siren sounding. Now, to the aircraft, the ground seems to rush by at (literally) a rate of knots and the return echo changes in frequency accordingly.

Doppler can therefore provide a ground speed indication, not only in the forward

direction, but also sideways. The aircraft might well drift sideways with respect to the ground because of wind and the instrument in Fig. 3.7 not only shows ground speed in knots (as three digits) but also has a pointer that indicates left or right side drift (as $\pm 40^\circ$). By integrating speed with time it is also possible to indicate the distance flown over the ground during any time interval.

Moving Maps

A rarity is the use of Doppler information to drive a moving map (Fig. 3.8). The pointer must be set to the aircraft's position whilst stationary before a flight; it then moves around the map automatically in keeping with the known ground speed and side-drift. The aircraft in Fig. 3.8 has left the v.o.r. at Honiley (near Birmingham) and is heading for the Westcott n.d.b. just north of Aylesbury, Buckinghamshire. Ahead and to the left is seen Heathrow airport, the eventual destination.

This series of articles hopes to have informed you about the use of radio by aircraft. Next time you fly, be it business, holiday, or pleasure, take a few moments to look around you at the airborne and ground-based equipment that I have described. 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. 3.6: A radio altimeter indicator.



Fig. 3.7: Doppler ground speed and drift indicator.

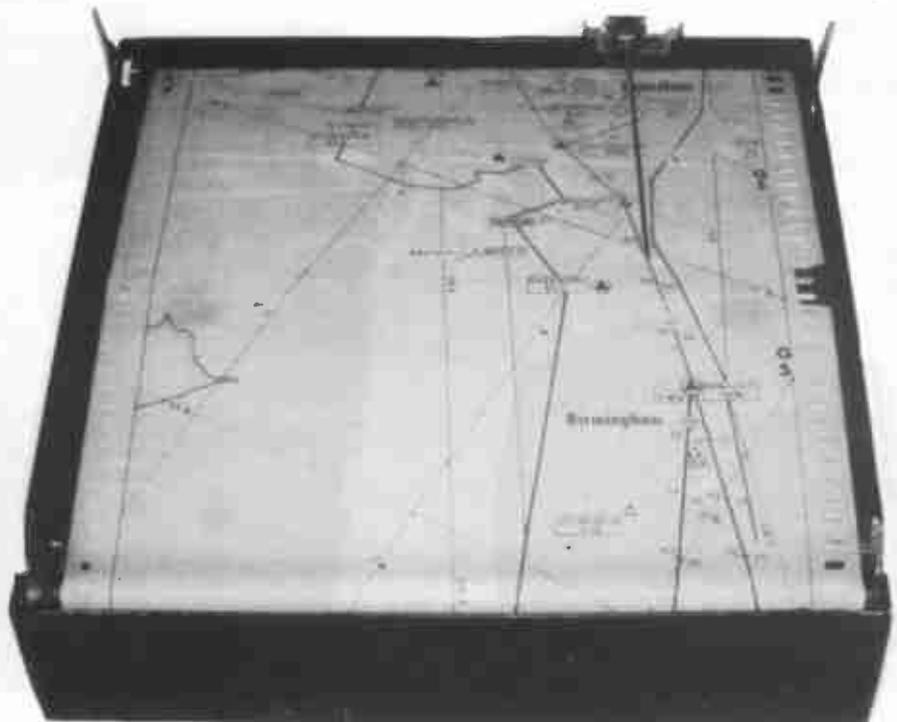


Fig. 3.8: Doppler moving map display. (Map courtesy of Racal Avionics Ltd.)

The future for international broadcasting?

In order to be able to appreciate part of the purpose of WARC-HFBC, it is necessary to be familiar with the current system for the administration of frequency planning. In simple terms, radio stations (or administrations) currently select frequencies which they wish to deploy for h.f. broadcasting, and submit these to the International Frequency Registration Board (IFRB) in advance of the start of the season. The IFRB collates all notified requirements and publishes them in the *White Book*, or *Tentative High Frequency Broadcasting Schedule*. This Schedule shows all the requirements, with technical details, including transmitter location and power, antenna bearing and target area. Information on potential interference generated by other stations using that channel for services to the same or nearby service (or target) areas is noted against each requirement. Many stations cooperate with a mutual "self-aid" agreement, whereby the worst cases of interference are resolved on a friendly basis with the IFRB becoming involved on rare occasions. The *White Book* shows only the frequencies within the allocated broadcasting bands, and stations do not necessarily have to adhere to the requirements which they have notified to the IFRB and which have been published in the *Tentative Schedule*. There is no restriction on the number of frequencies which may be used for a given service, as is clearly apparent if one looks at a listing of, for example, one hour of Radio Moscow World Service broadcasts. Thus a certain amount of chaos exists on the high frequency bands at present.

A World Administrative Radio Conference held in 1979 passed a Resolution stating that the "existing situation in the h.f. bands . . . is not satisfactory" and resolved that the use of h.f. bands for broadcasting should be subject to planning by a WARC to be held in two Sessions. The First Session, held in 1984, established the technical parameters to be used in planning, as well as the principles governing the use of the broadcasting bands in the h.f. spectrum. The IFRB was requested to develop computer programs and test procedures for the preparation of the application of the planning method.

It is necessary to understand that this planning method was to be run on the basis of the minimum number of frequencies needed to achieve an audible service to a given area: in some cases, this would mean an enormous percentage cut in the number of frequencies to be used — 60 per cent of some broadcasters' frequencies would be lost. At the same time, no guarantee of frequency continuity could be given.

Many international broadcasters openly admitted to scepticism about this planning method and thus it was under this cloud that the Second Session of the World Administrative Radio Conference for the

Everyone who listens to international shortwave broadcasting will be aware of the problems which currently beset the h.f. bands — overcrowding; duplication of services on multiple frequencies; jamming and so forth. The International Telecommunication Union, the United Nations agency responsible for the administration of all forms of electronic communication, has been attempting to resolve the problems with a series of World Administrative Radio Conferences. Simon Spanswick takes a look at the whole picture.

Planning of the HF Bands Allocated to the Broadcasting Service was convened in Geneva's International Conference Centre on 2 February 1987. More than 500 delegates from 131 ITU member administrations took part in the Conference, which ran in the three working languages of the ITU, English, French and Spanish. Seven Committees were formed, the most important looking at Technical Matters (Committee Four), Planning Method and Procedures (Committee Five) and Regulatory Matters (Committee Six). All but Committee Five ran to schedule, despite the complex nature of much of the work in the Technical Committee.

The problems surrounding agreement on Planning matters proved to be severe and Committee Five ran extremely late, resulting in the postponement of the close of the Conference from Friday 6 March until Sunday 8 March. The Conference worked until midnight for most of the last week, and until the early hours on the final night, and was thus able to achieve a conclusion with the publication of the *Final Acts* showing a tangible result for the work of the preceding five weeks.



The Conference adopted a partial revision of the Radio Regulations including:

- Frequency Allocations;
- Notification and Recording of Frequency Assignments;
- Planning and Procedures for the Broadcast Bands above 5.950MHz;
- Technical Parameters.

Planning the HF Bands

As already noted, the most sensitive area was the planning of the h.f. bands. I have already outlined the planning method which the IFRB had been testing and which was to prove unacceptable. A system whereby continuity would be disrupted to the extent that in a three hour broadcast, for example, one frequency would be used for the first hour, a different frequency would be used in the second hour, perhaps in the same band, and a third separate frequency in the final hour would not be tolerated by either listener or broadcaster. A further difficulty which became apparent was that if there were more broadcast requirements for a particular target area than could be accommodated in the available number of channels, then some of the requirements would simply not be allocated a frequency.

The Conference quickly agreed that such a system whereby all broadcasting requirements were not met, or which led to a lack of continuity within a broadcasting requirement, was unsatisfactory and could not be accepted. The IFRB, which had developed the system, could not, it was agreed, be blamed for the problems, since the Board had been following instructions of the First Session and these had been unsatisfactory.

Several groups with polarised opinions emerged from the lengthy discussions on possible improvements to the Planning System: South American countries wished to keep their domestic shortwave broadcasting without any planning restrictions; India and Pakistan, with some Arab and African nations, wished to see the immediate introduction of an improved planning system, whilst the bigger international broadcasters sought to have a period of thorough testing and proving of the improved Planning System before its introduction.

In the end compromise was reached with partial implementation of the improved h.f. planning system in specific parts of the short wave broadcast bands, namely the extension bands which had been allocated by WARC-79:

- 9.775 – 9.900MHz
- 11.650 – 11.700MHz
- 11.975 – 12.050MHz
- 13.600 – 13.800MHz
- 15.450 – 15.600MHz
- 17.550 – 17.700MHz
- 21.750 – 21.850MHz

The remainder of the h.f. broadcasting spectrum would be administered under an improved Consultation method using Article 17 of the Radio Regulations, and Broadcasters will have the choice as to whether their requirements are handled by the HFBC Planning System or under the consultation procedure.

The improved planning system will allow for frequency continuity, subject to any alterations "necessitated by variations in propagation conditions". It will take at least two to three years to test satisfactorily the new computer system and it will be necessary for a further competent WARC to be convened to assess the results and providing that these are acceptable to set a date for the application of the Planning System. It should be noted that the extension bands noted above were due to be released to broadcasting on 1 July 1989, but this will be delayed until after the next WARC.

Single Side-Band Broadcasting

One solution to the current congestion on the h.f. broadcasting bands is to do away with d.s.b. transmissions and replace them with s.s.b. broadcasting. This would result in a 100 per cent increase in the number of channels available for h.f. broadcasting and s.s.b. techniques enable reception quality to be improved. WARC agreed that all broadcasting "in the future" will have to be in s.s.b. and set a date for the cessation of d.s.b. emissions of 31 December 2015, subject to the confirmation of a future competent WARC. There are, however, problems inherent with the introduction of total s.s.b. broadcasting. Many transmitters currently in use around the world do not have the capability to switch to s.s.b. transmission (although certain makes such as Telefunken can have an s.s.b. module added to enable this mode of transmission), and similarly, many receivers are not capable of dealing with s.s.b. broadcasts. Whilst this may not be a problem in affluent countries in the West, it poses a major problem for the Third World, and there will need to be a massive global capital investment if this ideal is to be realised, and s.s.b. capable transmitters and receivers with synchronous demodulation provided. The ITU and member administrations are to urge manufacturers to start production of low-cost s.s.b. receivers by the end of 1990.

Jamming

The Conference discussed the subject of Harmful Interference, noting that it "has a negative impact on the use of the frequency spectrum", and that adjacent channels to those being directly affected may also suffer interference. It was observed that the successful implementation of an h.f. planning system could be undermined by harmful interference.

WARC urged administrations to avoid causing harmful interference and instructed the IFRB to organise specialised monitoring programmes to identify stations causing harmful interference. Summaries of the monitoring data are to be published.

Domestic Broadcasting

No agreement was reached on domestic h.f. broadcasting: several areas of the world, in particular South America, use short wave for domestic broadcasting and therefore require continuous exclusive use of specific frequencies day-by-day, year by year. Countries from these areas were, understandably, against any form of planning which might affect their application of fixed frequency broadcasting and made continued strong representations during the Conference that domestic h.f. broadcasting be dealt with separately to the planning system. No agreement was reached in this connection with delegates quoting from Article 17 of the Radio Regulations that "all broadcasting requirements, national and international, shall be treated on an equal basis, with due considerations of the differences between these two kinds of broadcasting". It was recommended that a future competent WARC includes the consideration of national broadcasting.

It should be noted that much of the domestic broadcasting currently on short wave is in the Tropical Zone and thus outside the scope of the WARC-HFBC considerations.

Other Matters

The Conference devoted much time to the consideration of technical specifications and definitions, with agreements reached in significant areas, including the improvement of the propagation prediction method; transmitting antennas; parameters for both d.s.b. and s.s.b. transmissions; measurement of r.f. protection ratios and of reception quality; the use of synchronised transmitters; and h.f. broadcast receivers.

The Conference resolved that broadcasting shall be prohibited in the band 7.000 to 7.100MHz and urged

administrations to cease operations in that amateur band immediately.'

The Conference also recommended that a future WARC consider the possibility of extending the h.f. broadcasting bands which might be possible as more fixed services leave short wave. Manufacturers were also to be urged to ensure that receivers covering the short wave bands include the 21 and 26MHz bands, and have digital display, so as to make reception easier and attract listeners to the h.f. bands.

Article 17

Article 17 of the *Radio Regulations* governs the Planning Principles and the Planning System and was the subject of discussion and ultimately improvement, in particular to the Consultation Procedures for the allocation of frequencies. The Article states that only one frequency should be used for each broadcasting requirement, and that the desired level of quality should be achieved with as few frequencies as possible. Improvements will follow the introduction of new computing techniques enabling the IFRB to offer assistance to administrations in resolving problems and incompatibilities in requirements.

Achievement . . . or an Exercise in Procrastination?

The Conference may be judged a success for the simple fact that it managed to end without having broken down in mid Session, as had been feared when some delegates with intractable positions on certain issues had seemed unwilling to compromise. But despite finishing almost on schedule, and producing a Final Acts document 83 pages long, can WARC be deemed to have succeeded? The answer is no, for it has failed to tackle and resolve some of the problem areas which it had spent much time discussing, including h.f. domestic broadcasting, and it has effectively postponed taking an ultimate decision on the h.f. planning system.

The 42nd meeting of the ITU Administrative Council in June of this year will consider the Recommendations of WARC-HFBC87 with an ultimate decision on whether a future competent WARC should be held, to examine the results of the tests of the improved h.f. planning system, being taken by the Plenipotentiary Committee in Nice in 1989. There is still, however, a question mark as to whether any future WARCs may be held — the ITU is, like so many other UN agencies, desparately short of money at this time, and may be unable to afford to hold another extremely costly WARC session.

With decisions postponed, the acronym HFBC may come to mean High Frequency Broadcasting Chaos . . . we can only hope for the successful adoption of a truly workable and equitable Planning System to bring some order to the short wave broadcasting spectrum. □



There are two problems in decoding and displaying FAX data on home computers, the first is the lack of a very accurate on-board timing signal needed to synchronise the computer to the incoming data, and the second is that graphical resolution of most home computers is not high enough to display the fine detail found in facsimile pictures.

To overcome the first problem, this package contains a ready built timing p.c.b. which plugs into the Spectrum's user port. I found this piece of hardware very impressive, its construction was to a very high standard, all of the components being of good quality, including the edge connector. This alone made up my mind about the value for money aspect of this product. Incidentally the timing p.c.b. is the only hardware used by the system, the computer is interfaced with the receiver via an audio lead connected from the receiver's external speaker outlet to the Spectrum's EAR socket. The technique used to resolve the second problem, that of relatively limited graphic capabilities of the Spectrum is ingenious, the program allows the user to select slices of the incoming picture, this means that the amount of information to be displayed per line of 256 pixels is reduced, which enables a much higher picture resolution to be achieved.

The software for the package is contained on a cassette tape, side one of the tape contains several examples of digitised Meteosat weather pictures together with a sample of off-air Weather Facsimile audio, for those people who have trouble with recognising FAX signals.

The program sports a wealth of useful features, such as real time display of off-air pictures, in addition to an on-screen 24 hour clock, which is a great help when logging or reviewing pictures stored on tape or from one of the five screen memories. The program is also capable of dumping screen information to the Spectrum's printer, to give an elongated hard-copy of your most interesting pictures. Another beneficial feature of the program is a type of pseudo grey-scale processing option, which I found advantageous in displaying cloud formation pictures.

The program is very "user friendly". The documentation accompanying the package only needs one good read and then occasional reference, as most of the program options are activated by single key operation.

On Test

The only Weather FAX station that can be received consistently from my QTH is Offenbach Meteo on 134.2kHz, this station is situated in West Germany. The picture contained in this article was received from this station via a PW "Taw" VLF Converter and my station's h.f. receiver. When the system was used in

If you've had your appetite whetted by the recent spate of articles on Weather Facsimile reception, G4IDE Micro Systems might have just the thing to stave off the hunger pangs, in the shape of a decoding package for the Spectrum computer. Richard Ayley G6AKG reports on what happened when he put the system through its paces.



conjunction with my somewhat inadequate receiver, with an i.f. band-width of approximately the width of a barn door, I was surprised how well the system coped, in spite of the heavy QRM generated by the portable television I was using as a monitor.

The system was very easy to set up and in under an hour I had the thing producing the type of pictures I had been hoping to receive. It takes a little time to become accustomed to lining up the pictures before they become too far advanced on the screen. The usual format followed by most weather FAX stations is, that when there is no picture information the station idles on white tone frequency.

So, to start with I tuned my receiver for the highest signal strength that was free of noise. Unfortunately only having a fixed frequency b.f.o. the resultant tone did not correspond to the program's set definition of a white tone. This wasn't a problem for the software as the discrimination point between black and white audio tones can be varied. Having obtained a point at which the display just turned white I sat back and waited for a weather picture.

Included in the instructions is a schedule of times for pictures from Offenbach, and it wasn't long before a picture arrived. The picture wasn't bad but it had an annoying thick white line down the centre, and the picture detail was very poor. On the next picture, having read the instructions more carefully, I realised I was trying to look at the full width of the picture and the white line was in fact the picture edge. Both of these problems were overcome, the first by using the two keys provided to slip the picture right or left across the screen and the second by setting the program to look at only half of the incoming picture.

The most exciting pictures received were those that originated from Meteosat and NOAA satellites, via the European Space Operations Centre at Darmstadt in West Germany, these pictures are processed and relayed to a terrestrial station, such as Offenbach. I used the screen dump facility to store my best picture into one of the five screen memories, mentioned earlier, this is alright for short term storage, say five consecutive pictures, but for future reference the program allows you to store these memories to tape. They can then be viewed later, by using the "FAX DEMO" header on the first side of the tape.

Helpful Hints

Other FAX stations tried on h.f. frequencies proved quite fruitful although frequencies above those of the clock oscillator used in the timing module and that of the computer made their presence known along with all their harmonics. This can be overcome to some extent by winding all the leads running to and from the computer on ferrite toroids.

Lists of Weather FAX stations can be found in the *Admiralty List of Radio Signals*, Volume 3, about £8 from HMSO, as does *Guide to Facsimile Stations*, distributed by Interbooks. For more information on meteorological matters, see *PW Weather Watch*, a three-part article by Jeff Maynard G4EJA, which started in the April 1986 *Practical Wireless*.

Please note that if you wish to receive and view weather FAX pictures you will need a licence. For further details write to the Meteorological Office (Met07), London Road, Bracknell, Berkshire RG12 2SZ □



The G4IDE Micro Systems FAX for the 48K Spectrum is available from G4IDE, 79 South Parade, Boston, Lincs PE21 7PN. The price for the program, timing board and detailed instructions is £17 in the UK and £18 overseas including P&P.

ATTENUATORS MADE SIMPLE

Ian Poole G3YWX

Attenuators find uses in many receiver applications as well. The 7MHz band (40m) is well known as a band where very strong signals are present and these can overload the front-end of a receiver causing intermodulation distortion which can mask some of the weaker signals. A simple attenuator can easily be placed in the antenna lead to the receiver to prevent the front-end being overloaded, thereby revealing some of the weaker stations.

Not only can attenuators be used purely for reducing signals strengths, but they can also be used to provide better impedance matches in certain applications. Some components, such as high performance ring diode mixers or power splitters, need to have a constant impedance presented to them over a wide range of frequencies so that they operate correctly. As an attenuator is a resistive network designed for a particular characteristic impedance, it will not only reduce the level of the signal but also reduce the effect of a mismatch which the source or load may present. In fact the greater the loss which the attenuator provides, the better it will mask the effect of source and load mismatches. However, it is usually found sufficient to use attenuators with a maximum loss of 6dB for this purpose and 3dB is often sufficient.

It can be seen, therefore, that attenuators find many uses within amateur radio and r.f. technology as a whole. Fortunately, they are quite simple to design and construct.

Designing Attenuators

There are two basic attenuator configurations which can be used, one being the "TT" section and the other the "T" section. They obtain their names from the arrangement of the resistors as shown in Fig. 1. In most cases there is little to

$$N = \frac{V_{in}}{V_{out}} \quad R_0 = \text{characteristic impedance}$$

$$R_1 = R_0 \frac{(N-1)}{(N+1)} \quad R_2 = R_0 \frac{2N}{N^2-1}$$

$$R_3 = R_0 \frac{(N+1)}{(N-1)} \quad R_4 = R_0 \frac{(N^2-1)}{2N}$$

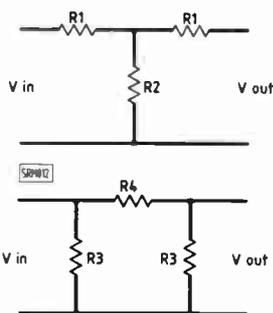


Fig. 1: T and π section attenuators.

Attenuators find uses in a great variety of applications. To take one example, many v.h.f. and u.h.f. linears on the market require less drive than they state and it is quite easy to overdrive them causing distortion to the signal and annoying splatter either side of the signal. It is a comparatively easy matter to construct a simple attenuator pad and include this into the amplifier input to reduce its sensitivity and prevent overloading.

Table of Resistor Values for 50ohm Attenuators				
Loss in dB	R1	R2	R3	R4
1	2.9	433	870	5.9
2	5.7	215	436	11.6
3	8.5	142	292	17.6
4	11.3	105	221	23.8
5	14.0	82.2	179	30.4
6	16.6	66.9	151	37.3
7	19.1	55.8	131	44.8
8	21.5	47.3	116	52.8
9	23.8	40.6	105	61.6
10	26.6	35.1	96.2	71.2
11	28.0	30.6	89.2	81.7
12	29.9	26.8	83.5	93.2
13	31.7	23.6	78.8	106
14	33.4	20.8	74.9	120
15	34.9	18.4	71.6	136
16	36.3	16.3	68.8	154
17	37.6	14.4	66.5	173
18	38.8	12.8	64.4	195
19	39.9	11.4	62.6	220
20	40.9	10.1	61.1	248

For values of attenuation greater than 20dB it is advisable to employ more than one section.

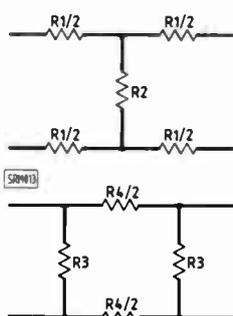


Fig. 2: Balanced T and π sections.

choose between the two types of attenuator but the "TT" section is probably used more often.

It is quite easy to calculate the values for each of the resistors in either of the configurations by simply putting the right numbers into the formulae. All that is needed is a knowledge of the characteristic impedance of the system and the attenuator loss expressed as a voltage ratio. The last point should be borne in mind when the attenuator loss is expressed in dBs as it is quite easy to convert this to a straight power loss, which will yield the wrong resistor values if used in the formulae.

The values calculated using these formulae invariably work out to be totally non-standard! However it is usually quite in order to use the nearest preferred value from the E24, or possibly E12, series of values without unduly disturbing the design.

Normally, attenuators are used in their unbalanced form as in Fig. 1, but occasionally it may be necessary to use a balanced one. This can easily be accomplished by distributing the series resistance equally between both lines, as shown in Fig. 2.

It is theoretically possible to make a single attenuator section give very large values of attenuation. However in practice it is often wise to use two or more sections in series. As a rule-of-thumb each attenuator section should be limited to providing a maximum of 20dB loss so that a 30dB attenuator could consist of two 15dB sections. In these cases it will be found that where the two sections join there will either be two resistors in parallel or two in series. It is quite acceptable then

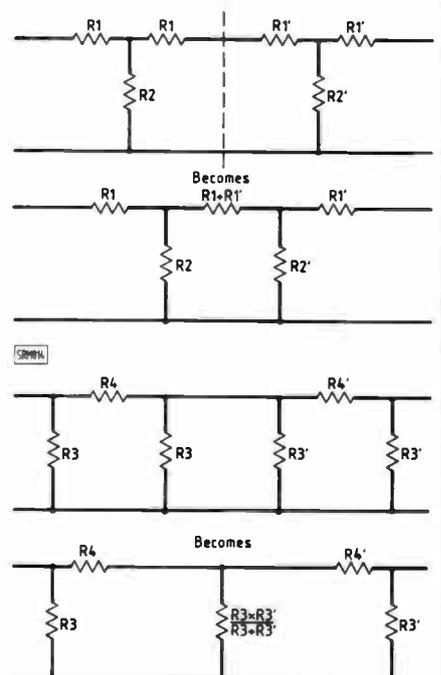


Fig. 3: Cascaded attenuators.

ATTENUATORS MADE SIMPLE

to lump these two resistors together to give a single resistor as shown in Fig. 3.

Construction

The construction methods which should be used when making up attenuators will depend largely upon the accuracy which is required and the frequencies being used. Not only will the constructional techniques alter the performance but so will the type of resistor which is employed. In any event, one of the major restraints will be the availability of the components from the junk box or resistor store.

The type of resistor which is used will probably, in fact, play the largest part in determining the overall performance. Although most of the more common types of resistor will usually be suitable, wire-wound kinds should be avoided at all costs and, being inductive, they will totally

destroy the performance at any frequency above a few kilohertz. Most of the standard types of resistor such as CR25, TR4 etc., will certainly be suitable up to 30MHz or so; at higher frequencies they become slightly inductive, though usable with reduced performance. At these higher frequencies the small 1/8 watt resistors, such as the CR16 series, are more appropriate. However, for even higher frequencies the new surface-mount resistors prove to be very suitable and are usable up to frequencies around 1GHz with very little trouble.

The other point to consider is the power rating of the resistors. In most cases attenuators will be used in small signal applications where the TR4, CR25 or CR16 types will be quite adequate, but for higher power applications, like reducing the r.f. power input to a linear, higher rating resistors will have to be used.

The other factor which will affect the

performance of the attenuator is the physical layout. It is probably most helpful here to say that the best approach is to employ good r.f. techniques and a bit of common sense — watching points like using an earth plane on a p.c.b., keeping leads as short as possible, and ensuring that the input and output are kept away from each other, especially if high levels of attenuation are being used. All these points will help to ensure that the attenuator performs as it is designed to do (and of course they are more important as the frequencies increase).

Conclusion

It can be seen that attenuators are indeed easy to design and build. Although they will obviously not find applications in every piece of equipment, they can be used to allow very large improvements in performance where overloading is a problem. □

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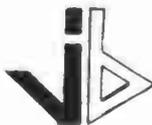


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SEEN & HEARD

AMATEUR BANDS ROUND-UP

Justin Cooper

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

This month we must start with the sad news of the passing of Mrs Ruth Smith of Nuneaton; a glance at the HPX Ladder in any issue of recent years will show her name near the top, and it was indeed her ambition to achieve the top spot. She was first introduced to s.w.l.ing by her son David who holds a G licence but works in Bahrain; and his leaves were usually announced in Ruth's letter by a gently humorous comment that this was a "good time to see to aeriels". Ruth Smith of Nuneaton was an s.w.l. of ability who will be much missed. Our sympathies go out to Ruth's husband and family in their sad loss.

Ladder

Those longer-term followers of this piece with sharp eyes will have noticed that the opportunity was taken to bring the HPX Rules up to date. However, while the good folk at Poole were helping your J. C. by doing this chore and thus saving his last two little grey cells for their proper work, sad to say a little error crept in . . . Like the entire Rule 3 of the old HPX Rules was omitted! However, you will see in this issue a re-run of the rules with the missing rule 3 now re-inserted in all its glory. Then, in future we will revert to the old routine of showing the Rules about twice a year.

Layout

Lots of us have the station, by necessity, stowed away in a corner, envying our more fortunate friends with their separate room for a shack; but even where there is plenty of space, the same prime considerations apply. When your author moved here, the thought of a separate shack was pure joy — but am just in process of bringing the station back into a corner of the living room, thus leaving the "shack" free for construction and use as a darkroom. Why?

Comfort

In essence, it can be summed up in a few words — Comfort, Convenience and Operability. If you can't operate in reasonable comfort, your operating hours will be restricted; if it is inconvenient to use the station for any reason, you will not operate, especially if there is rebellion from the distaff side to contend with about it. Operability, our third requirement, implies that

All-Time Post War HPX Ladder		All-Time Post War HPX Ladder	
Name	Prefixes	Name	Prefixes
'Phone Only			
B. Hughes (Harvington)	3249	A. Vest (Durham)	605
E. M. Gauci (Malta)	3116	N. Fox (Wakefield)	595
Mrs. R. Smith (Nuneaton)	2622	L. Marcquardt (Hereford)	562
E. W. Robinson (Felixstowe)	2564	CW Only	
H. M. Graham (Chesham)	1932		
M. Rodgers (Bolton)	1802		
M. Ribton (Gillingham)	1792	F. Dunn (Chester)	2035
P. Oliver (Paisley)	1730	H. Scott (Rievaulx)	1309
F. Dunn (Chester)	1566	N. Melville (Edmonton)	1023
N. Henbrey (Northiam)	1513	M. Rogers (Bolton)	202
P. Davies (Market Drayton)	1371	RTTY Only	
B. Patchett (Sheffield)	1063		
Mrs. A. Sitton (Stevenage)	929	W. J. Prior (Lochcarron)	480
A. P. Lincoln (Aldershot)	888	N. Henbrey (Northiam)	334
G. Caselton (Orpington)	775	C. R. Eve (Jersey, C.I.)	303
R. G. Williams (Borehamw'd)	768		
S. Field (Barningham)	735		

Starting score 500 for Phone, 200 for c.w. or RTTY. Entries in accordance with HPX Rules.

Annual HPX Ladder
Starting date January 1, 1987

Name	Prefixes
E. M. Gauci (Malta)	407
J. J. Sales (Lancaster)	400
Mrs. A. Sitton (Stevenage)	378
C. R. Eve (Jersey, C.I.)	296
M. Probert (Basingstoke)	260

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. Note, the Annual Table is a Phone only listing.

the equipment in use should be so set out that we can make the best use of it. Let's look at some of the points involved. First, most of us are right-handed; thus it is natural and comfortable to tune the receiver with the left hand, and make the log entries, switch from send to receive, key, and hold a microphone with the right hand. This dictates the siting of the receiver on the operating table.

The receiver main tuning knob needs to be at a height such that it can be used comfortably for long periods, which may involve chocking the receiver up a bit at the front — this bringing the front panel into better view at the same time; or if the tuning knob is too high it may be helpful to drop the back of the receiver into a recess in the table. The arm is most comfortable when tuning if it has something to rest upon while wrist and fingers are free, which means the tuning knob height is critical for comfort. The same goes for the height of the operating table surface — and above all for the height of the chair you use which should also be adequately padded for comfort.

To give some idea, J. C. is using a word processor to write this which is in a temporary location where the level of the box is 38mm lower than usual compared with the chair — and it is damnably uncomfortable! Search for, and find, the best layout you can within the limits of your particular shack, and you will be amazed how much more pleasure operating is.

Headphones

Finally, of course, you need light, power, warmth and ventilation. Your concentration will be enormously aided by the use of a pair of headphones, which have the additional advantage that they allow others using the same room to enjoy their entertainment without mutual QRM. Many a photograph has been published in these pages of a station which looks nice but must be an unmitigated pain to operate!

Letters

Nice to hear again from H. Scott (Rievaulx) who used to be a regular in the late seventies but

HPX RULES

1: The object is to hear and log as many prefixes as possible; a prefix can only count once for any list, whatever band it is heard on.

2: Only calls issued for amateur radio operation may be included. Undercover and pirate calls signs will not be credited, nor any MARS stations be claimed.

3: Where a suffix determines a location the suffix shall be the deciding factor, thus W1ZZZ/W4 counts as W4. Where the suffix has no number attached, e.g. VE1AED/P/SU, VE3UJ/P/SU, they are arbitrarily counted as SU1 and SU2 respectively, and the same holds good for similar callsigns.

4: The object is to hear prefixes not countries, thus there is no discrimination between say MP4B and MP4K which count as one prefix.

5: The /P, /M and /MM suffixes create a new series; thus G3SWM, G3SWM/P, G3SWM/M and G3SWM/MM all count as prefixes, and where it is known to be legal, /AM also.

6: When the prefix is changed, both the old and the new may be counted; thus VQ4 and 5Z4 both count.

7: G2, G3, G4, etc., all count separately, as do GW2, GW3, etc., and in the same way K2, W2, WA2 all count separately even though they may be in the same street.

8: Send your HPX list, in alphabetical and numerical order showing the total claimed score. With subsequent lists, it is sufficient to quote the last claimed score, the new list of prefixes, and the new total. Give your name and address on each sheet, and send to: LADDERS, Short Wave Magazine, Enefco House, The Quay, Poole, Dorset BH15 1PP. If possible to arrive before the deadline for that particular month.

9: Failure to report for two consecutive listings, i.e. four months, will result in deletion from the Table, although there is no objection to a "nil" report to hold your place.

10: 200 prefixes must be heard to gain entry onto the yearly table, and at 500 prefixes entry to the "all time" table is automatic. There is a c.w. only table, a 'phone only table and an AMTOR/RTTY table.

11: The prefix list is based on those shown in the current *Radio Amateur Prefix-Country-Zone List* published by Geoff Watts, 62 Belmore Road, Norwich NR7 0PU.

then found himself working away and unable to listen. Now he is retired and moved to Rievaulx which is in a National Park area of Yorkshire where it is unlikely that permission for a mast would be forthcoming; but the rig does quite nicely on a dipole at just 10m thank you! Seriously, there is always the thought of a temporary mast — it helps the impression if it falls down occasionally! — which is moved around the garden at regular intervals. Then, after a suitable period which is laid down in the Books of Words you have your mast permission as it were by default. That said, a dipole in the loft can be very good, especially if time is taken to ensure it is tuned up correctly — loft dipoles always need "pruning" to account for their surroundings.

Vital

Recently, B. Patchett (Sheffield) installed an FT-707 rig in his car so he could activate his G4VBP call; as he says, this increases the s.w.l. activity if one is to find and work DX. With a G-Whip on the Ford Fiesta the best DX was possibly the VK2 mobile, but there were also Ws, Russians, YCs, JAs, VKs, A71, HP1, 5N0, VE8RCS, KH6, JY3, 5A0A, 3G2EPB (QSL address wanted) TI2, PYs and UAOs, all worked, Brian is doubly pleased of course, as his pal with tower and beam missed some of these!!

Seriously, there is no doubt that the experience of being an active s.w.l. is a vital part of the make-up of a good operator.

Confusion

C. R. Eve (Jersey) was one of those confused by the omission of the old Rule 3 in the revised HPX Rules, which deals with suffixes. However, we wrote to him directly, and republishing this time will clarify the position for the rest of you. Sorry, folks. Mr Eve has dipoles for 21, 14 and 7MHz draped around the walls, a loop for 3.5 and 1.8MHz, and a Maplin a.t.u. and active antenna to feed the RF3100L Panasonic receiver. Grouped around the receiver are a Maplin audio processor, peak/notch filter and RTTY decoder coupled to a ZX-81 via a homebrew interface unit. A c.w. filter is on the stocks.

Dynamic Range

One thing that worries us a little is the presence of the "active antenna" in the chain; it virtually acts as a pre-amp and we wonder whether it is in fact doing more than reducing the system dynamic range. Most receivers can get

down to the level of the received noise on the h.f. bands without a pre-amp, so the extra gain at the receiver front-end serves only to bring up the noise; indeed, on 7 and 3.5MHz, the average receiver on our bands needs an attenuator in the antenna line to prevent overload.

Swamping

If one tunes everything up "on the nose" on 7MHz there is lots of noise and a few loud signals; add attenuation a dB at a time, and suddenly the noise will drop and lots of smaller signals appear. The receiver front-end is very wide indeed — hundreds of kHz at 7MHz — because of the damping of the antenna. Thus a big signal from a commercial can ride through the front-end to the mixer where it upsets the operating point a little towards non-linearity. Once that happens, every signal on the band and around it mixes with every other signal and they all create noise, swamping the legitimate signals. One adds attenuation until the biggest signal is reduced just enough to stop it overloading the mixer, and lo!, the problem is resolved. In general we can say that the addition of extra gain at the front-end of a receiver can only be justified if the receiver itself is "down the pan" to a serious degree; and the proper answer is to mend it!

New Prefix

M. Ribton (Gillingham) raises an interesting point — he claimed G6CWR/MA as a new prefix. Difficult, this one, but we incline to the view that /MA is only a variation called up by the /MM licence, and so should count as /MM. /AM on the other hand is totally different being aeronautical mobile.

Lean Period

Now to H. M. Graham (Chesham); Maurice says it was a lean period to review, with 14MHz full of S9 Europeans. Perhaps the pick of the crop was 3C1MB for a new prefix and country on 21MHz. Nothing was heard on 28MHz, although, as Maurice says, the surprise of hearing just one bit of DX on an apparently dead band is enough to make one continue checking, just in hope! We agree — after thirty years or more, it still startles one, even though reason follows up and says that, on 28MHz, there is propagation occurring but no-one about to take advantage of it.

Last time we mentioned Mrs A.

Sitton (Stevenage) as G1XEO — already that has been swapped for G0HGA, and Angie is bashing the key with 3 watts and the club's HW9. So far she has worked all round Europe, and of course tried — as yet without success — to work further afield. However, all that came to a dead stop when the p.a. transistors quit playing on a perfectly matched antenna, so it is back to s.w.l.ing for a while until the rig is operational again. On the question of QSLing, Angie never sends one, even to a new country unless she can add something useful, such as to tell the recipient he was being called but not hearing the replies, and this certainly helps the return rate.

One Valve

It's YEARS since we last heard from anyone using such a simple receiver, but R. Pearce (Bungay) has built one using a 955 acorn valve. This receiver cost just £16 to construct, excluding batteries and headphones, and a first whirl round 14MHz s.s.b. yielded VE2AHT, YC7DB, YV5ANF, 5B4TI, CT1COX, KF4CS, W2KW/KV4, VE1GV, LZ1QI, YU2AA, and N1E1U. Ron has promised that next month he will send us a serious report on a month's listening with the simple receiver. Food for thought here for those who can't run to an "all-singing, all-dancing" receiver! There is no better way to hone one's skills than to use a one-valve or one-f.e.t. receiver for a few months before going on to the complex boxes.

M. Probert (Basingstoke) uses a Bearcat DX1000, a Yaesu FRT-7700a.t.u., and a home-brew 28MHz vertical arrangement fed with home-brew open-wire feeder — a great set-up until the TVs start their racket! Matt has been an s.w.l. since he was 12, starting with some wire wrapped round an old portable radio, and taken out of an upstairs window to a tree at the bottom of the garden; this was followed by a Trio 9R59DE bought for a fiver. Matt's first entry of 260 includes signals from all continents.

Finally among the letters we have the lists from M. Rodgers (Bolton) — an update to his long-standing 'phone entry, and a brand new one to go in the c.w. listing.

Antenna Wire

The question of what type and thickness of wire to use for antennas often arises in your letters. In general, we would say — use what you've got! Obviously, any antenna is better than none, but above this level wire gauge isn't too critical. The J. C. outdoor loop is invisible, and uses 28 s.w.g. enamelled copper. Outside dipoles need more thought; clearly 28 s.w.g. won't support the weight of a fat centre insulator and about 9 metres of heavy coaxial feeder. If you try it, the dipole (even if resonant when you put it up) will stretch and go off resonance as it does so, until a breeze breaks it. On the other hand, if the centre insulator is supported (this happens naturally with an inverted-V arrangement) and you replace heavy insulators and support lines with nylon fishing-line doing both functions, then you can get away with thin wire. The books always call for "hard-drawn" wire — take soft-drawn or normal wire of the same gauge and give it a tug and it becomes hard-drawn... if you have hefty stuff, the tug can be between the gatepost and the family car!

In pre-war days everyone used bare stranded stuff, but J. C. hasn't seen any for years. On the other hand there is some insulated stranded stuff about, as used by electricians, and this can be used; if appearances don't matter leave the insulation on. In fact if you have some of the stranded wire used for electronic wiring to MoD standards, leave the insulation on — stripping 9 metres or more results, from Murphy's Law, in a guarantee that a strand or three will have been nicked or cut. Tinned copper is quite OK, but until the elements dull they shine a bit, your new antenna will be horribly obvious.

Use ingenuity; we know of a vertical dipole hanging down the side of a house; it uses thin wire, the support string is the end insulator, the centre one is perspex; it and the thin coaxial are painted in two colours — the colour of brick and of cement as befits what is behind the coaxial. As it nears the window into which it goes, it hides behind a climbing rose... message received?

DEADLINE DATES

Issue	Deadline
September '87	July 20
October '87	August 19
November '87	September 23

DECODE

Mike Richards G4WNC

200 Christchurch Road, Ringwood, Hants BH24 3AS

Let me start this month by thanking all those who have written with reports and general comments. It's very encouraging to get such a good response and I will reply to every letter.

Packet

The general level of activity remains very high both on v.h.f. and h.f. This month saw a new country for my packet log when TF3KB, (Iceland), was logged on May 17 in QSO on 14MHz. Having scoured my log I think this was my first Icelandic station on any mode so I am well pleased with that. Did anyone else log this station?

May 1 saw the AMRAC AGM which turned out to be rather stormy. This club, which tends to specialise in packet, has grown tenfold in the past 12 months and now has some 700+ members. This rapid growth has led to a few growing pains, but I think the AGM has cleared the air and should result in a good positive direction for the future. Good luck to all at AMRAC.

RTTY & AMTOR

This month has seen an increase in activity with some interesting openings on 21MHz with the following as a sample: LU9DO, LU8DHT and LU1CIB (all Argentina), 5Z4TA (Kenya), CE3GN (Chile), PP8IT (Brazil), YV5GNC (Venezuela), JA3BN, JA2EJA (Japan). One call, EM6AAK, seems to have foxed a few listeners as the EM prefix is omitted from their call lists. This station is in fact from the USSR, as is the whole prefix range from EMA to EOZ.

Also during May, the early morning long path to Australia has been quite good on 14MHz. The signals have been very weak, but perfectly readable. The following stations were logged between about 0530 and 0630UTC in mid-May: VK3ADP, VK3COR and VK3VY (Victoria, Australia).

I expect many of you noted the 21st Alessandro Volta Contest on May 9 and 10. This Italian 24-hour contest gave many listeners a chance to log some new calls from exotic locations, but more on contests later.

Bill Cummins of Wirral sent in a very comprehensive log for this month which included some interesting countries, i.e. HC2LZ (Ecuador), TR8JLD (Gabon), YB5QZ and YB5NOF (Indonesia), JA3MQY and JA1BFK (Japan), 5ZEJ (Kenya), 9M2AX (Malasia), D44BC (Republic of Cape Verde), PZ1BS (Surinam) and YV5AS

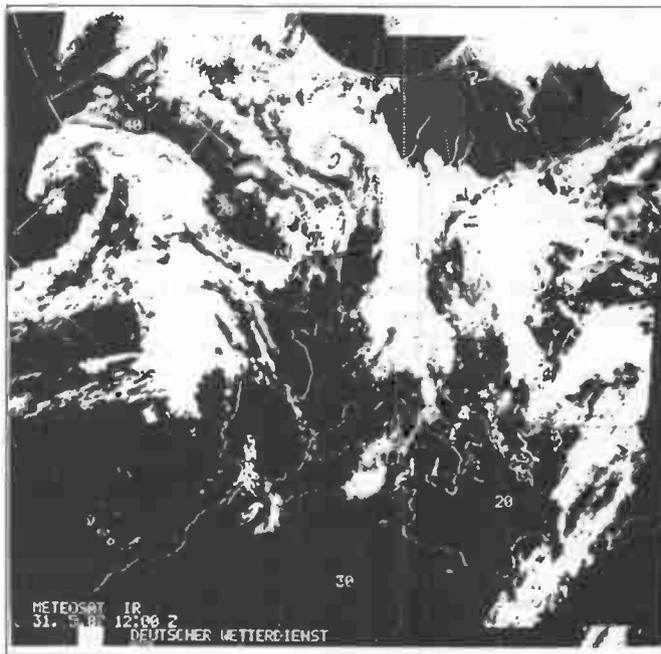


Fig. 1

(Venezuela). With the exception of the Japanese stations all these signals were logged on 14MHz. Bill uses a Trio R-600 receiver, Spectrum Plus computer and RX-4 multimode receive software from Technical Software. Judging by his log the equipment is working very well, thanks for the report.

FAX

Commercial activity has remained fairly uneventful but amateur FAX has been a little more active. The following German stations were logged on May 21: DJ3JN and DJ4SR. Both stations were on 14.106MHz using an IOC of 288 and a drum speed of 120 r.p.m. Picture quality was fair with the degradation due to interference from packet stations. The growth of packet activity has meant that there is severe congestion around the FAX calling frequency which makes clean copy almost impossible! Another problem for the RSGB?

My own receiving capability has been enhanced by the generous loan of a FAX-1 facsimile decoder from ICS Electronics. A sample picture from this unit is shown in Fig. 1. As can be seen the picture quality is excellent and rivals conventional FAX machines. Watch out for a full review of the FAX-1 in a future issue.

ASCII

After claiming last month that I didn't know of any ASCII

transmissions, I have since discovered that the ARRL (American Radio Relay League) transmit a news bulletin in 110 baud ASCII. The ASCII transmission follows the normal RTTY bulletin from W1AW according to the following schedule:

Mon-Fri 0200, 0500, 1600, 2300UTC.

Sat-Sun 0200, 0500, 2300UTC. Note that during American summertime the transmissions are one hour earlier. Frequencies used are: 3.625, 7.095, 14.945, 21.095 and 28.095MHz.

Commercial use of ASCII seems to be restricted to l.f. press transmissions.

Contests

As mentioned earlier contests bring a welcome increase in RTTY activity to the amateur bands. The recent Alessandro Volta Contest being a good example. To make best use of the increased activity one needs to know what bands are in use and the start and finish times of the contest. The following is a list of all known contests up to the end of 1987:

GARTG (German Amateur Radio Teleprinter Group)

This contest is split into four single contests distributed throughout the year. Each contest is also split into a shortwave section and a v.h.f. section. The bands used are 3.5 and 7.0MHz for the shortwave section and 144, 432 and 1296MHz for the v.h.f.

section. The dates and times for the final two contests are as follows:

Shortwave	
Sun. Aug. 30	0700-1100UTC
Sat. Oct. 31	1300-1700UTC
VHF	
Sat. Aug. 29	1200-1600UTC
Sun. Nov. 1	0800-1200UTC

GARTG SSTV Contest

This is one of the few SSTV contests so this is well worth monitoring. The bands used are 3.5, 7.0, 14.0, 21.0 and 28.0MHz. The operating schedule is as follows:

Sat. Oct. 10	0000-0800
Sat. Oct. 10	1600-2400
Sun. Oct. 11	0800-1600

17th SARTG World Wide RTTY Contest

Organised by the Scandinavian Amateur Radio Teleprinter Group this popular contest spans two days and uses the following bands: 3.5, 7.0, 14.0, 21.0 and 28MHz. Contest times are as follows:

Sat. Aug. 15	0000-0800UTC
Sat. Aug. 15	1600-2400UTC
Sun. Aug. 16	0800-1600UTC

If you know of any other contests that could be of interest then please write and let me know.

DX Tips

Have you tried monitoring the h.f. bands (10-20MHz) early in the morning? There are very often good openings at around 0600-0700UTC. On the amateur bands this opening shows up as weak but readable VK (Australia) signals on the 14 and 21MHz bands.

As we are now approaching the warmer months (I think), keep an eye open for Sporadic-E openings on the higher h.f. bands (25-30MHz). One quick way to spot an opening is to monitor the amateur beacons on 28MHz and then use your frequency guide to look for stations in the vicinity of the received beacons.

Book of the Month

This month I have been reviewing the *UK Listeners Confidential Frequency List* published by Walters and Stanton¹. This 124 page A4 size book, which is in its fourth edition, covers the frequency spectrum from 2 to 30MHz. One of the main differences between this list and the many others on the market is that this one concentrates on stations that are likely to be heard in the UK.

The first section is a general introduction for the newcomer which describes the type of receiver required and gives a brief description of some of the more common models. This section is rounded off with antenna advice and information on the type of RTTY and FAX signals to be found. The next section continues with a description of aeronautical and unusual transmissions.

The first part of the main frequency list shows the main band allocations which can be useful as a quick reference to find an interesting group of transmissions. This is followed by

a new and very useful section covering short wave broadcast stations. This broadcast section covers some 74 stations and includes frequencies and transmission times. I have found this broadcast section to be a very useful addition.

The next 105 pages comprise the main frequency list and covers the spectrum from 1632kHz to 29.6MHz. The format used is very clear with each band given its prime use as a heading. As well as the frequency and station name, the transmission mode, callsign and times are also given. For RTTY stations the speed, shift and sense

of the signal are also given, where available. The broadcasting stations mentioned earlier are also listed in the main frequency list. One other useful inclusion in this section is the amateur radio beacons on 28MHz. These are invaluable for spotting openings and sporadic E events.

Having used this guide for several weeks it has proved itself to be very useful and particularly easy to read, thanks to the large print. I can recommend it as a useful addition to the shack.

The *UK Listeners Confidential Frequency List* is available from *Walters and Stanton* price £5.95 + 80p p&p.

miss this one due to prior commitments, but I am making an attempt to get to several other events this year, and hopefully meet some of you. The schedule at present is as follows:

Cornish Mobile	July 19
Lincoln Hamfest	September 13
Harlow Mobile	September 27
Blackwood	October 4

During these events I will be working on the *PW & SWM* stand and would welcome all visitors. I should also be at the Longleat rally, but only as a visitor.

Finally I have a plea to make. Does anyone know of a source of RTTY, AMTOR or FAX software for the Amstrad PCW8256/8512 series of computers? If so please write with details.

That's it for another month but please keep those reports coming.

Addresses

(1) Walters and Stanton, 18-20 Main Road, Hockley, Essex SS5 4QS.

Deadline Dates

<i>Issue</i>	<i>Deadlines</i>
September	July 23
October	August 19
November	September 23

Rallies

As I'm sure you are aware we are well into the season of mobile rallies. The one rally of particular interest to the data enthusiast is the BARTG event at Sandown racecourse on August 30 1030-1700. Unfortunately I shall

INFO IN ORBIT

Pat Gowen G3IOR

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

Bert Green of Colwyn Bay is 70 years young, and first entered into amateur radio in 1939 with the call "2FLZ". After the cessation of hostilities, during which all amateur activity ceased, he came right back, and held the very first Class "B" callsign G8AAA, later getting his current call GW2FLZ.

Your author had the fortunate opportunity of meeting Bert when he recently came to East Anglia to visit his long standing friend Rex GOCKH of Norwich. An interesting dialogue resulted during which Bert described his new-found one-year-old hobby of weather satellites, how he built up his station for NOAA and Meteosat, and how the system resulted in some of the excellent photographs of weather systems that you see reproduced here.

Bert has been in amateur radio

for nearly fifty years, and throughout this time has experimented and practised with many modes, forms and bands. An additional hobby of his is the study of meteorology and climatology, in pursuit of which he has been taking temperature and barograph readings on a continuous basis for over thirty years. "Weather satellites fuse both my main fields of interest" says Bert. "To be able to study cloud cover alone is very welcome, but the additional reward in building and using a functioning self-constructed system itself is most enjoyable!"

This month we shall be looking at where GW2FLZ found his project sources and needs, his cost budget, at his equipment and his station, and some of the many NOAA and METEOSAT pictures

that have resulted.

Our first picture Fig. 1 shows Bert in the operating position of GW2FLZ, with an impressive array of communications equipment. The second shows his BBC computer, the colour visual display unit and the EPSON RX80 printer all used for the weather satellite side of operations.

A photograph taken from the v.d.u. screen, showing a pronounced cloud swirl off Portugal is shown in Fig. 3. It is a Meteosat Ch.1 Format D2 picture taken at 1810UTC on Monday April 27. "I particularly like Meteosat," says Bert, "as it gives me pictures twenty-four hours a day". To show that it is not exclusive, Fig. 4 is included, a NOAA-9 picture taken between 1415 and 1425 on Thursday April 23, giving a good view of north-

west France, Cornwall and Wales.

Meteosat again figures in Fig. 5, this time showing the "total disc", Ch.2. That means the whole of one side of earth as seen by the satellite in geostationary orbit over the equator at the Greenwich meridian, taken at 2126 on Monday April 20 this year. We return to Ch.1 with Fig. 6, to see Format D2 from Meteosat Ch.1 again at 2100 on the same day giving a good view of the cloud patterns and the added land boundary highlighting of Europe, the UK and North Africa.

On the same day again with Meteosat at 1530, Fig. 7 shows us a Ch. 2 total disc, whilst the following Fig. 8 shows us the North West Atlantic Format D1 with the earth edge curve clearly visible. The photograph in Fig. 9 is



Fig. 1



Fig. 2

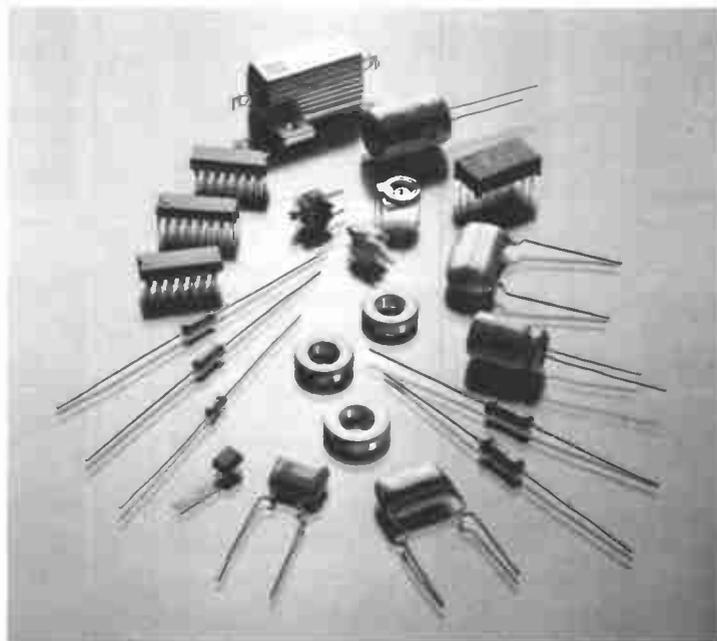


Fig. 3

Practical **Wireless**

The Radio Magazine

AUGUST '87 ISSUE



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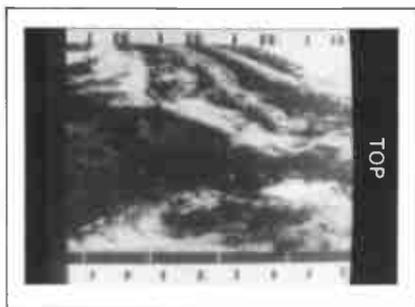


Fig. 4

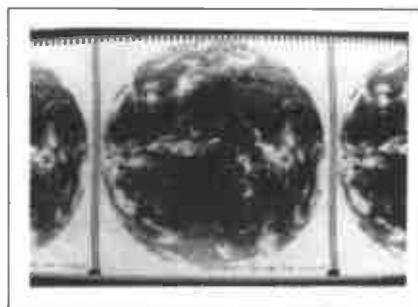


Fig. 5



Fig. 6

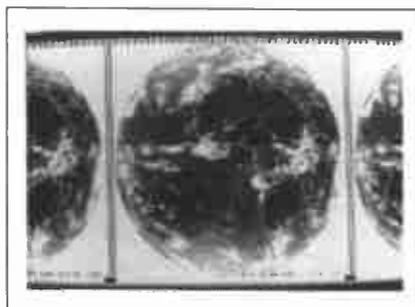


Fig. 7



Fig. 8



Fig. 9



Fig. 10

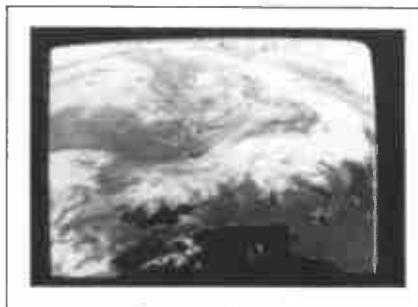


Fig. 11

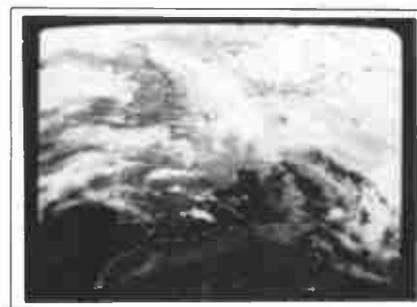


Fig. 12

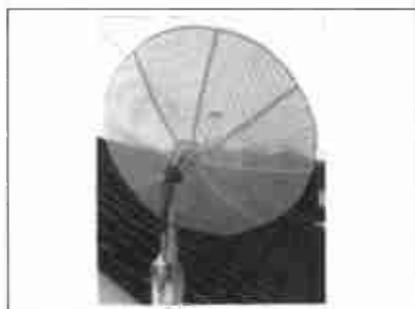


Fig. 13

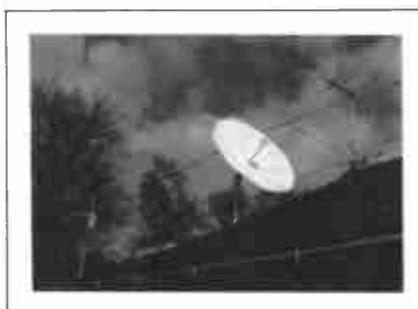


Fig. 14



Fig. 15

Ch. 1 Format D2 of Europe, showing North Africa and Southern Europe free of cloud cover at 1400UTC also on Monday April 20. Still on Ch.1 Meteosat, Format C3, Fig. 10 shows us another view of Europe.

The photograph in Fig. 11 is a Ch.1 Format D2 picture of Europe, taken at 1500 on Monday April 20, showing clearly the straights of Gibraltar and the Mediterranean Sea, similar to the screen shown in Fig. 12.

To bring us back to earth, Colwyn Bay to be precise, Fig. 13 shows the 1.3m in diameter home-made petal dish used for Meteosat. It was constructed from ribs and centre boss supplied by LMW Electronics of 102 Stamford Street, Ratby, Leicestershire, LE6 0JU for

£30.00, and from petals, a mounting bracket and a short scaffold pole obtained locally. Bert painstakingly drilled the holes to minimise the wind resistance, as the Atlantic gales can be severe at his location by the sea. The dipole feed also came from LMW at a cost of £34.50, as did the 1700PP head amplifier at £63.25, which is housed in a "Tupperware" box to give weatherproofing, as seen on Fig. 14. LMW also supplied the 1700RX1 kit and p.c.b. to make the down converter for £41.50, the 800L01 kit and p.c.b. at £28.50 for the 780MHz local oscillator, and the two crystals required, for £10.00.

The crossed two-element (folded dipole plus reflectors) 137-138MHz circularly polarised

antenna used for the NOAA satellites is shown in Fig. 15. This all came as a 2XY/137/C complete with phasing harness from Jaybeam at a cost of £35.58. The masthead pre-amplifier used with this was built from a MSK20 kit and p.c.b. supplied by Martelec Limited, 108 Queens Road, Farnborough, Hants, GU14 6JR, for £10.95. They also supplied the MSR20 v.h.f. wideband receiver kit and p.c.b. for £54.68, the Frame Store kit of parts (including all i.c.s.) and those for the 256K of memory for £78.37, and the LOK Syn. kit and i.c.s. too for £25.85. The pair of Frame Store p.c.b.s were supplied by Phil Seaford, who is Editor and Secretary of the Remote Imaging Group, for just £15.00. His address is 14 Nevis

Close, Leighton Buzzard, Beds, LU7 7XP. Phil also supplied the LOK Syn. p.c.b. for £5.00.

The station was completed with the purchase of 10m of H100 low loss coaxial cable from W.H. Westlake at £0.80 per metre, three 1A 13.6V fully regulated power supply units, type ER115 (ex British Telecomms) at £18.40 each from LMW. LMW also lined up the 1.7MHz down converter, the 780MHz local oscillator, the frame store and the LOK Syn. when built for an inclusive charge of £40.00, whilst Martelec performed a similar service for the 137MHz receiver for just £10.00.

The total outlay cost of the project cost came to £546.58, though some £560.00 all told when all plugs etc. are included. To this the cost of the v.d.u. with

SEEN & HEARD

Composite Video Input in Black and White must be added. It also took a lot of time and dedication, as some 1500 soldered points had to be made on the Frame Store Boards alone!

Bert concludes that he is very indebted to Phil Seaford of the RIG for expertise, advice and

Your deadlines for the next three issues are July 20, August 17 and September 21

assistance (and his patient XYL for answering his 'phone calls) and also to Chris Smith of LMW Electronics who was so very

helpful in the successful d.i.y. project.

Since GW2FLZ completed his station, RIG have made available a

137MHz receiver that is complete and working for £131.65, spun dishes are available for rallies for just £30.00, and Martelec are now at the point of marketing a Frame Store. If time is short but cash-flow less so, then Microwave Modules have a full colour version all built and working at a cost of nearly £2000.00.

BAND II DX

Ron Ham

Faraday, Greyfriars, Storrington, West Sussex RH20 4HE

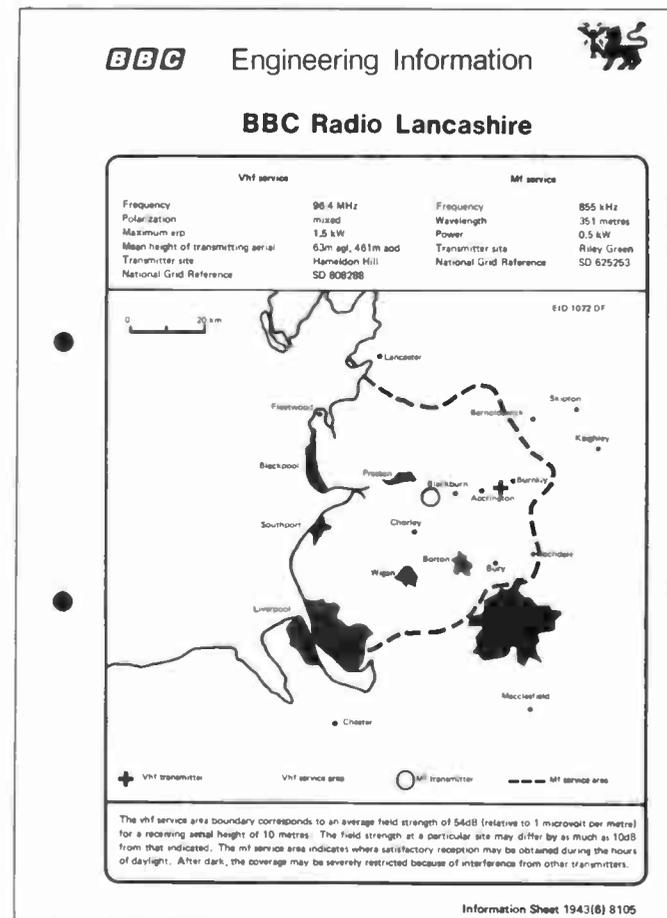
The frequency range of 88 to 108MHz, known as Band II or incorrectly as "the v.h.f. band", is used in most countries for their local and national broadcasting. By the stations using frequency modulation (f.m.) the listener can enjoy a better clarity of speech and a wider range of frequencies from musical instruments. The international use of Band II means that suitable receivers, mainly domestic, can be used and manufactured on a world-wide basis and consequently providing the radio enthusiasts and prospective DXers, with a fantastic variety of sets to choose from.

Whenever I visit Chichester or Horsham, I usually spend a fair bit of time browsing over the range of sets displayed by such stores as Army and Navy, Boots, Currys, Dixons, Rumbelows and Ultimate and have realised that broadcast listeners can easily include their Band II DXing with other interests like playing music, tape recording or watching television. In fact all of these features plus the long and medium wave bands, also good for DXing, are available in various compact and attractive looking units.

Receivers

There are too many manufacturers of good quality and reasonably priced sets to mention here individually, so before making a purchase, I suggest that you see what the shops have to offer because, a few pounds either way on perhaps a different style of equipment to what you originally had in mind, can often meet your specification and give a relatively better value for money. Briefly, it was the advent of the transistor in the late 1950s and the rapid development of low voltage components, integrated circuit technology and plastics that have made this choice possible.

Personally I like a receiver which has a well spread dial for Band II, a positive drive between the tuning knob and the pointer and one that has been sensibly calibrated, with the frequency divisions clearly marked on the scale.



The type of information available from the BBC Engineering Information Dept. Broadcasting House, London W1A 1AA

Antennas

The majority of sets are fitted with a telescopic rod antenna which, although normally used vertically, can be adjusted toward the horizontal. In many cases the vertical mode will provide good results for the reception of local and nearby national stations. But do remember, a large number of Band II transmissions are horizontally polarised and to obtain good signals when DXing, the angle of the antenna is very important. Some manufacturers make provision for an external antenna to be connected, in which case much thought must be given to the type and size required,

where it will be installed and is a rotator necessary.

If your answer is yes, then get some gen from one of our specialist antenna advertisers or have a chat with your local qualified antenna rigger. However, before deciding about this, give the gear a try with it's own rod antenna, familiarise yourself with the f.m. band and log what you can receive at your QTH under normal atmospheric conditions. The height of your installation above sea level and the possible screening by trees, nearby tall buildings, or even not too distant ranges of hills are all contributing factors to the

reception of v.h.f. signals. Although transmissions in Band II have a limited range, this can be roughly multiplied by 10 when the signal paths are influenced by Sporadic-E or tropospheric disturbances.

Sporadic-E

Several countries in Eastern Europe use selected frequencies between 66 and 73MHz for their national broadcasting (see *World Radio TV Handbook*). During a Sporadic-E opening between 0800 and 1100 on May 9, I logged some 25 f.m. signals from such stations. Typical of Sporadic-E propagation, these signals were subject to sharp and deep QSB. I found 9 more of these stations during a similar event at 1346 on May 18 and no doubt will find many more before the end of the 1987 Sporadic-E season.

Tropospheric

I managed to identify Belgian, French and German voices from the 16 foreign stations which I counted between 88 and 103MHz, during what seemed to be the peak of a tropospheric opening around 0830 on May 8. In addition there were many "warbles" scattered through the band indicating that a mixture of co- and adjacent channel interference was present on the weaker signals.

In Belfast, Bill Kelly logged BBC Radio Cymru on April 22, 26 and May 13, ILR Radio City (Liverpool) on April 23 and BBC Radios Lancashire and Aberdeen on May 8 and 18 respectively. He also received signals from Radio Telefis Eireann on April 24, 25, May 7, 8 and 18 and the private stations Sunshine Radio (Dublin) and Boyneside Radio (Drogheda) at 0400 on April 23 and 0455 on May 13 respectively.

While in East Sussex around 1600 on May 19 and using the Band II section of my Plustron TVR5D, with it's own rod antenna, I received strong signals from 2 French stations between 96 and 99MHz, however a further check at 1700 resulted in 3 more being found above 100MHz.

TELEVISION

Ron Ham

Faraday, Greyfriars, Storrington, West Sussex RH20 4HE

"A disappointing start," said **Simon Hamer** from New Radnor. "It would have been nice to start our report with our usual saying, 'here we go again', but the season just will not start," wrote **Edwina and Tony Mancini** (Belper), on May 15. "Band I seems very quiet, but we know it's the calm before the

storm," remarked **Ian Galpin** from Poole. These are typical comments, but when I combined all of your reports and picked the "small print" out of your letters, it soon became obvious that this period was not so inactive as it first appeared.

I often found that conditions,

especially tropospheric, would suddenly perk up for a short period, for example, on the 19th I was travelling in East Sussex and, as usual, I frequently checked the TV bands with my **Plustron TVR5D**. All was quiet until about 1700 and while in Burwash car park, I received strong negative

pictures from France on Ch. L5 in Band III. During the summer months it pays to tune through Band I for outbreaks of Sporadic-E and Band III for short life tropo-openings as often as possible.

Band I

The Mancinis kept up their daily



Fig. 1: DX TV antennas

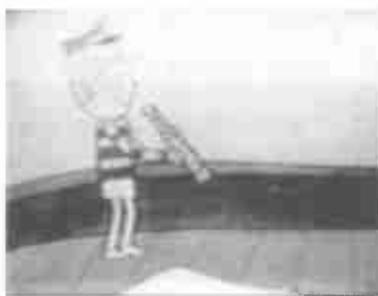


Fig. 2: Poland



Fig. 3: Spain



Fig. 4: Spain



Fig. 5: Russian programme received in India



Fig. 6: Russian programme received in India



Fig. 7: German Band III



Fig. 8: German TV



Fig. 9: German

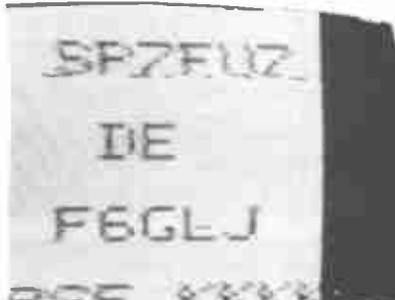


Fig. 10: French SSTV

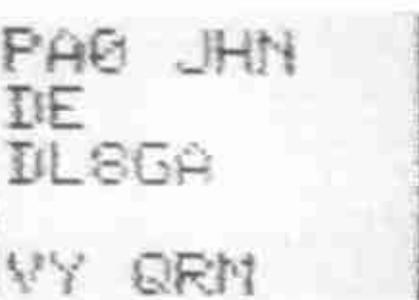


Fig. 11: German SSTV

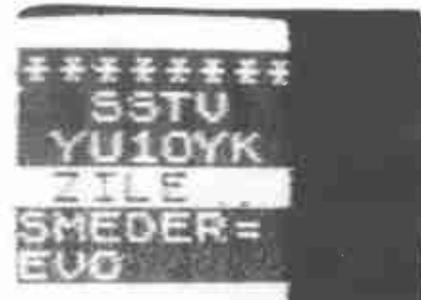


Fig. 12: Scandanavian SSTV

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p&p

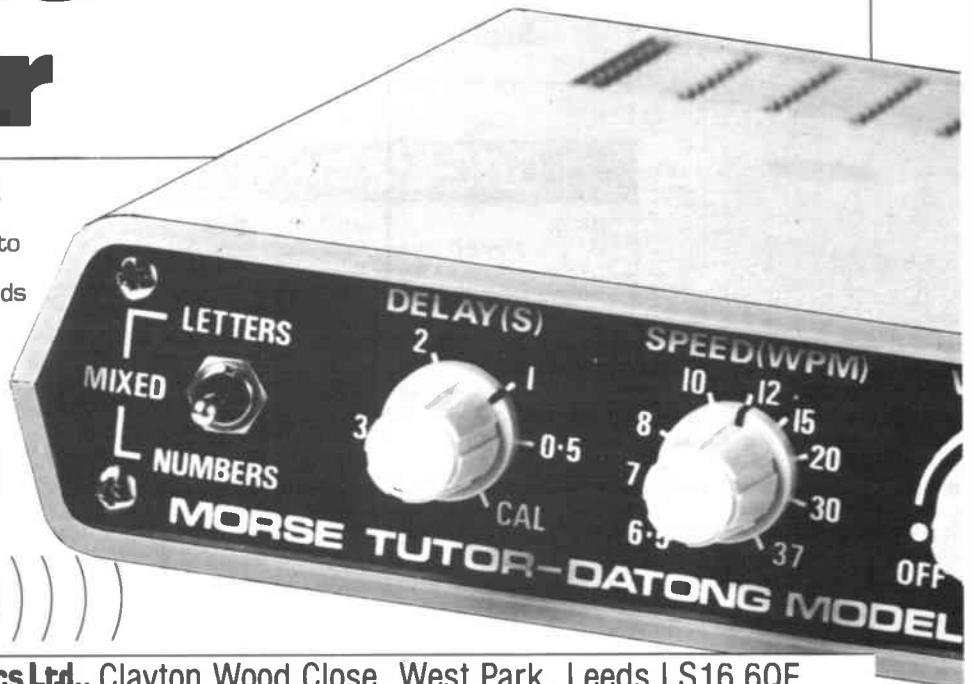
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viewing between April 18 and May 12 and on most days they were rewarded with some DX, such as test cards from Austria, Czechoslovakia, Germany, Iceland, Italy, Poland, Portugal, Scandinavia, Switzerland and Spain. Their haul of Norwegian regionals included Bremanger, Gulen, Hemnes, Kongsberg, Melhus and Steigen. Their log described glimpses of football from Germany, sport from Italy, news (dt) and documentaries from Poland, a variety show from Portugal and adverts (Telediaro), breakfast TV, cartoons, a childrens special (Hola Chicos) and show jumping from Spain.

"G8KBO and G3PFM reported openings to Portugal and Spain during the early evening of May 1 and Norway and Sweden on the 2nd," said Ian Galpin. He watched the Spanish programmes, *Avanci Telediario*, *Esta Tarde*, *Barrio Sesamo* and *Dibujos Animados* during the afternoon of April 20. Ian uses a JVC 3040 receiver with an indoor dipole, an 8-element beam for the u.h.f. bands.

Dave Coggins (Knutsford) also received pictures from Spain throughout the afternoon of the 20th and logged test cards from Sweden at 0630 on May 8 and 0935 on the 17th, Norway at 1145 on the 19th and Poland's TP clock logo at noon on the 18th.

A cartoon from Poland and the sport and TVE logo from Spain, seen in Figs. 2, 3 and 4 respectively, were received by Len Eastman in Bristol during the 1986 Sporadic-E season. In India, Major Rana Roy received strong pictures from the USSR, Figs. 5 and 6, during similar openings, at 1250 on May 9 and 1530 on the 10th (1986).

Simon Hamer received pictures from Italy and Spain on April 19 and Soviet news with the BPEMR logo on the 30th. Then in May he saw Soviet news and sport with the BPEMR and CTTOPT titles and a film from Sweden on the 3rd, football from Italy and folk singing from Spain on the 9th, news from Norway on the 10th, programmes from Italy on the 17th and news from Germany, test cards from Iceland and Poland, adverts from Italy, an American film and logo from Spain and a documentary from the USSR on the 18th.

I logged strong vision (49.75MHz) and sound (56.25MHz) on Ch. R1, during a Sporadic-E opening at 0840 on May 9 and by 1005 the disturbance had spread upward to Ch. R2, where I received good pictures on 59.25MHz and sound on 66.75MHz.

Between 0930 and 1225 on April 23, Richard Ayley (Poole) received signals, via meteor trail reflection, from Austria, Czechoslovakia, Portugal and Scandinavia and identified such insignias as ORF-FS1, Bratislava, RTP-Porto, DR-Danmark, Norge Bagn, Bremanger and Gamlem and Sverige. He again logged meteor scatter signals from Czechoslovakia, Germany and Norway and Sweden, around 0700 on May 4, 7 and 8, respectively. He also received Poland, via a brief spell of

Sporadic-E, at 0709 on the 7th. However, before 1100 on the 9th, he added the Hungarian test card scribed MTV-1 Budepestia, the TVR start caption from Rumania, a news broadcast from the USSR and a caption "Igrani film" from Yugoslavia to his log.

This caption, plus some teletext on Ch. E2 (48.25MHz), a clock showing 1300 on Ch. R1 and an east-European programme on Ch. R2, was also seen by Ian Galpin. Ian tells me that G4XMZ (Lychett Matravers) and G8PYP (Wimborne) are both using a Televerta and a dipole for DXTV and that around 1800 on the 8th, G3PFM and G6AKG were watching RTT Tunisia and saw an Arabic caption.

Richard uses a 42-element wide-band commercial Yagi for u.h.f. and modified amateur arrays for Bands I and III. These antennas, Fig. 1, are mounted on a 6m pole and can be rotated, by the "armstrong" method, through 360 degrees and the feeders are combined into one by a standard triplexer unit before entering his receiving system.

Tropospheric

"There was a very good tropo-opening to Europe early on May 8, when Bands III, IV and V were buzzing with French stations," wrote Richard Ayley. Around this time, I logged noisy test cards scribed NDR, WDR and PTT-

NED-1 from Germany and Holland in Band III and at 0904 I comfortably watched a German announcer with the ZDF ident, followed by the ARD/ZDF caption and the news programme *Heute*.

Conditions were changing rapidly because at 0910 a Belgian test card and the ZDF programme were fighting for predominance around Chs. E9 and 10. After these had faded, at 1027, a test card from Ireland (RTE-1) appeared on their Ch. D, via the back of my beam.

Band III pictures from Germany are often very strong in many parts of the UK around the peak of a tropo-opening as shown by a game and a weather forecast, Figs. 7 and 8 received last year by Noel Smythe in Caerphilly. The programme caption, Fig. 9, was seen by me in Sussex.

While the pressure was high (30.5in) on May 15, George Garden (Edinburgh), took his Teleton receiver and amplified loop antenna to Lawrence Kirk. At 0930 he received a very strong monochrome picture from BBC1 at Black Hill.

Simon Hamer logged pictures from the French TDF/Canal Plus network, on Ch. L5, on April 28.

SSTV

With conditions generally improving on the 14, 21 and 28MHz bands don't forget to keep a watch on the SSTV frequencies for DX. To Peter Lincoln in Aldershot, this is a matter of routine and among the many signals he copied last year were QSOs between stations in Poland and France, Fig. 10, Holland and Germany, Fig. 11 and Yugoslavia and Sweden, Fig. 12.

Deadlines

July
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September '87
October '87
November '87

LONG MEDIUM & SHORT

Brian Oddy G3FEX
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The new BBC 648 multi-lingual broadcasts on 648kHz have been attracting the attention of many listeners in Northern Europe. However, most of the reports received here from UK listeners mention poor or non-existent reception during daylight.

It certainly would be interesting to know just how well their broadcasts are in fact being received, so please spare a few moments to check 648kHz both during daylight and at night and send along a report for inclusion in this series.

No doubt the BBC will be interested in your reception report and will welcome your comments,

since these will help them to decide if this experiment is going to be a worthwhile venture. Please write to them at BBC, Bush House, London WC2.

Long Wave DX

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

Following my comments last months that the l.w. band tends to be rather neglected by DXers a number of interesting reports have been received this time, however it seems that there are a few problems associated with this band. One was mentioned by Daniel Masterson of Stoke-on-Trent, he logged Allouis, France

(2000kW) on 162 (SIO 555) and BBC Droitwich (400kW) on 200 (555) and says, "I heard several more stations but I was unable to obtain the station identification".

Writing from Evesham, John Greenwood says that he is now busy checking the programmes on the 16 (approx) long wave channels all around the clock and since he has no idea what to expect, everything is a surprise! He has already found that the l.w. broadcasters, except the BBC on 200kHz, rarely identify their transmissions in English.

Another point was raised by George Millmore of Ryde, I.O.W., he says that in the past he has

found a set with good selectivity is required for this band and since his communications receivers do not cover the l.w. band that presents a problem. Well, there is a very effective solution and that is to use a crystal controlled l.f. converter ahead of a communications receiver — Datong make one which covers 0-500kHz with a 28.0-28.5MHz i.f.

George used an old HMV Model 1261 receiver to log Doneback, W. Germany 153 (500kW); Allouis 162; Kaliningrad, USSR 171 (1000kW); Saarouis, W Germany 183 (2000kW); Montala, Sweden 189 (300kW); Droitwich 200; Roumoules,

Monaco 218 (1400kW); Konstantinow, Poland 227 (2000kW); Junglinster, Luxembourg 236 (2000kW); Kalundborg, Denmark 245 (300kW) and Tipaza, Algeria 254 (1500kW). Spurred on by these results he is now intending to make a loop antenna for this band!

Roy Spencer already has a loop antenna and he has been using it to good effect in Nuneaton with his Realistic DX-400 receiver. The SIO ratings noted in his log around 2030 were Allouis 162 (454); Saarlouis 183 (444); Roumoules 218 (434); Konstantinow 227 (433); Junglinster 236 (454); Kalundborg 245 (343) and Tipaza 254 (444).

Another way of overcoming the receiver problem is to consider using a car radio, they are usually quite sensitive and can be used with quite a short antenna. They are also nice and compact discounting the battery or p.s.u. **Paul O'Connor** uses a car radio with a 4m wire antenna in Birmingham and around 1600 logged Doneback 153; Allouis 162; Saarlouis 183; BBC Droitwich 200; Roumoules 218; Junglinster 236; Kalundborg 245 and Tipaza 254. **Phil Townsend** uses a Blaupunkt Turin car radio with a 10m wire antenna in London and also logged them.

In addition he noted Oranienburg 177; DLF Munich 209; Konstantinow 227 and Topolna, Czechoslovakia 272 (1500kW).

"The long wave band is perhaps the most predictable of the lot," wrote **John Parry**. He logged Tipaza, Algeria on 254 several times in Northwich, Cheshire so no doubt there will be a good deal of interference when the new I.w. station in County Meath, S. Ireland commences operations on that frequency next year! Writing from Redhill, **George Morley** says, "I was surprised at the signal from Algiers both by day and night".

George used a Trio R2000 receiver with a wire antenna to compile his I.w. log and the day/night SIO ratings he noted made an interesting comparison — Doneback 153 (SIO 234/243); Allouis 162 (555/555); Kaliningrad 171 (143/422); Oranienburg, E. Germany 177 (750kW) (143/344); Saarlouis 183 (355/345); Montala 189 (131/243); Droitwich 200 (455/555); DLF Munich, W. Germany 209 (500kW) (131/142); Roumoules 218 (121/244); Konstantinow 227 (111/254); Junglinster 236 (245/245); Kalundborg 245 (145/244); Tipaza 254 (143/245); Moscow, USSR 263 (2000kW) (121/133); Topolna 272 (131/244) and Minsk, USSR 281 (500kW) (000/121).

Rab Freeman has been checking

the band around 0615 in Port Glasgow and logged Donback 153 (SIO 243); Roumoules 218 (243); Konstantinow 227 (343); Junglinster 236 (232) and Kalundborg 245 (354). During the evening he noted Allouis 162 (344); Kaliningrad 171 (243); Oranienburg 177 (344); BBC Droitwich (455); Azilal, Morocco 209 (800kW) (333); Tipaza 254 (343) and Topolna 272 (455). Rab also heard Lahti, Finland (200kW) under the signal from Tipaza, Algeria on 254 at 2116 (SIO 222).

In an interesting report from Macclesfield, **Philip Rambaut** says he can hear Radio Monte Carlo, Roumoules on 218 during daylight, but after dark Oslo, Norway (200kW) appears on the frequency. His extensive log included Burgh, E. Germany on 263 (200kW) and all of the stations so far detailed.

Simon Hamer has also been checking the band in New Radnor and picked up Brasov, Roumania 153 (1200kW); Nardor, Morocco 173; Polati, Turkey 183 (1200kW); Tbilissi, USSR 189 (500kW); Leningrad, USSR 200 (150kW) — "Midnight in Moscow" tune heard under BBC Droitwich; RUV Reykjavik, Iceland 209 (100kW); Kiev, Ukraine 209 (500kW); Baku, USSR 218 (500kW); Erzurum, Turkey 245 (200kW) and Orenburg, USSR 272 (15kW) in addition to all of the stations mentioned so far!

Using a v.l.f./l.f. convertor ahead of his Trio R600 receiver to improve the I.w. performance, **David Edwardson** made a careful study of the band in Wallsend. He found that as darkness approached the more distant stations improved in signal strength — for example Tipaza, Algeria was S3 around 1935 but after 2000 it was S4. After dark the Russian stations appeared on 209, 236, 263 and 281 — whereas Junglinster 236 (2000kW) was quite clear at 1900, by 2000 there was heavy interference from Kishinev, USSR



"Sooper Loop" used by **Dave Mayhew, Yapton**

236 (1000kW). David listened to some of the broadcasts in French and noted football information and commentaries from the grounds similar to BBC Radio 2. It seems that Allouis regularly broadcast "le classement", which is the 1st division points and positions — if you are a football fan it may well be of interest!

Listening in Mapperley, **John Sheridan** heard most of the stations already detailed and found that twelve additional ones were audible at night — he was unable to identify them, but intends to concentrate on them in the near future!

MW Transatlantic DX

Due to the longer hours of daylight many of the DX signals are not audible until well after midnight. **Jim Willett** has been checking the band in Grimsby and noted a strange lack of signals from the USA, despite the fact that many of the Canadian stations were audible. It is also interesting to note that the signals from CJYQ in St. John's, Newfoundland were the first to be heard, whereas in recent months some of the stations in the USA have been audible well before them.

Using an RCA AR77 receiver, Jim logged CJYQ 930 at 0100; CKVO Clarenceville, NF 710 at 0040; CJCH Halifax NS 920 at 0055; CJFX Antigonish, NS 580 at 0100; CJB Chicoutimi, PQ 1580 at 0130; VOXM St. John's NF 590 at 0135 and CKLM Laval PQ 1570 at 0215. Two stations in the Caribbean area were also logged, R. Paradise, St. Kitts 825 at 0125 and VOA Antigua 1580 at 0140. CJYQ 930 was also noted at 0015 in the log from Den **Marriott** of Bexleyheath. He uses a "Sooper Loop" ahead of his Trio R1000 receiver while DXing and rated their signal as SIO 243. During another night he logged WINS in New York 1010 at 0104.

It seems that the longer daylight hours have not been bothering "old timer" **Bill Kelly** who has been up at all hours of the night in Belfast making the best of whatever the conditions have to offer! Bill heard quite a number of stations in the USA, but the times quoted in his log indicate that none were audible until 0100 and the majority were heard between 0300 and 0430!

The first signal logged by Bill from Canada was CBD in St. John, NB on 1110 with an exciting baseball commentary at 0050 followed by CKLM 1570 at 0220; CJRS Sherbrooke, PQ 1510 at 0245; CJYQ 930 at 0320; VOXM 590 at 0330; CKVM Ville Maria, PQ 710 at 0330; CBN St Anthony, NF 600 at 0345; CFRA Ottawa 580 at 0350; CKYQ Grand Bank, NF 610 at 0350 and

CBGY Bonavista Bay, NF 750 at 0410.

Bill listened to some of the programmes from the stations he picked up in the USA; a ball game broadcast by WCAU in Philadelphia 1210 at 0100; old time songs and melodies from WMRE Boston 1510 at 0245; a station ident and music from WTOP in Washington 1500 at 0250; news of a fire in Coney Island from WINS 1010 at 0305; a book review and a talk on drugs via WHN in New York 1050 at 0315; an Evangelical programme from the New China Baptist Church, broadcast by WBAL in Baltimore 1090 at 0325; a sports report from WGAR in Cleveland, OH 1220 at 0340; a station ident and music from WNEW in New York 1130 at 0405 and to WOWO in Fort Wayne, IN 1190 with a station ident and music at 0415. There were two stations noted in his log from other areas, namely Atlantic Beacon, Turks & Caicos Islands 1570 at 0220 and Caribbean Beacon, Anguilla 1610 at 0330 — there is certainly plenty to interest the DXer who can stay awake!



Harry Armstrong, Co. Armagh, N. Ireland

Listening in Johannesburg, S. Africa **Simon Illingworth** picked up three stations from the USA: WLAC Nashville, TN 1510 at 0312; WHAS Louisville, KY 840 at 0327 and WTOP 1500 at 0345. At 0349 he heard a weak signal from Canadian CKCW in Moncton, NB on 1220. He also logged the Atlantic Beacon on 1570, this was weak at 0338 but improved later.

Two listeners in London, **Alex Mackow** and **Phil Townsend**, have yet to hear their first transatlantic DX. Alex says he has tried several receivers and antennas without success. Phil has been using a domestic transistor portable with ferrite rod antenna in an attempt to

"null-out" unwanted signals, but has so far heard no trace of the DX. Perhaps the high level of electrical interference in cities is the real problem, but it doesn't seem to bother **Alexander Little** in Glasgow, who added five new stations to his DX list.

Using a 0.5m loop ahead of his Sony ICF 7600D receiver, between 2230 and 0130 Alexander logged Canadian CKYQ 610 (SIO 333); CJYQ 930 (222); CHUM 1050 (343) and from the USA noted WINS 1010 (333); WHN 1050 (333); WBAL 1090 (333); WNEW 1130 (232); WCAU 1210 (333) and WMRE 1510 (232). Two Caribbean stations were heard, ZDK Antigua 1100 (232) 2nd Caribbean Beacon 1610 (333). From S. America were Radio Globo in Sao Paulo, Brazil 1100 (333); Radio Coro, Venezuela 1210 (332) and Radio Globo in Rio, Brazil 1220 (333).

Other MW DX

In Randburg, S. Africa Leo Gieske has once again been looking for European medium wave stations. Already he has made a remarkable start by logging Nice, France 1350; Saarbrücken, W. Germany 1422; Marnach, Luxembourg 1440; Monte-Carlo, Monaco 1467; DLF Mainflingen, W. Germany 1539; Sarnen, Switzerland 1566 and Langenburg, W. Germany 1593.

Simon Illingworth also checked the band after dark in Johannesburg and logged Rome, Italy 846; Milan, Italy 900; Wolfsheim, W. Germany 1017; Sulaiyah, Kuwait 1134; Kaliningrad, USSR 1143; Rhodes, Greece 1260; BBC Orfordness, UK 1296; Zyyi, Cyprus 1323; Lille, France 1377; Ile Masirah, Oman 1413; Saarbrücken 1422; Marnach 1440; Monte-Carlo 1467; Vatican Radio, Rome 1530 and Nice, France 1557.

Using a Trio R600 receiver with a home made loop antenna in Bristol, Tim Shirley has been adding a few more stations to his growing list of DX — Valencia, Spain 1359 at 2000; Stargard, Poland 1503 at 2100; Tripoli, Libya 1404 at 0130 and subject to confirmation by QSL, Khon Kaen, Thailand 630 at 0330. Simon Hamer has been busy too, he logged Innsbruck, Australia 520; Torshavn, Denmark 531; Quarayyat, Saudi Arabia 549; BBC; Zakaki, Cyprus 720; Yurku, Finland 963; Tahdart, Morocco 1053; Saransk, USSR 1062; Jeddah, Saudi Arabia 1512 and Duba, Saudi Arabia 1521.

A Realistic DX150-A receiver with a 25m wire antenna was used by **Darran Taplin** in Tunbridge Wells to log Vatican Radio 1530 at 1820 (SIO 333); RSI Solvesborg, Sweden 1179 at

2310 (544) and RTE-2 via Athlone, S. Ireland 612 at 2313 (444). Two broadcasts in English were mentioned by Phil Townsend in his report, Radio Monique 963 with an Evangelical programme at 1700 and Radio Algiers 981 with news and pop music at 1900.

Some of the European stations logged during daylight by George Morley were Waver-Overijse, Belgium 540 and 621; Lopic, Netherlands 675; Flevoland, Netherlands 747 and 1008 and Lille, France 1071. **Robert Taylor** has also been checking the band during daylight in Edinburgh and noted RTE-1 Tullamore 567; RTE-2 Athlone 612; BBC Radio Ulster, Lisnagarvey 1341 and Manx Radio, Isle of Man 1368, all rated as SIO 444. It seems that Manx Radio can also be received well in Devon during daylight as **Michael Banbrook** of London recently went there on holiday and was surprised at the strength of their signal.

The new BBC 648 service from Orfordness on 648kHz was mentioned in several of the reports. From Northwich, John Parry says, "Nothing is heard here in daylight, though a signal is heard after dark. I would have thought with the power available it would be possible to hear it in daylight". Alex Mackow also noted that it can only be heard after dark in London. John Greenwood says, "BBC 648 may give quite good results in some parts of the UK right around the clock. Reception on m.w. is rather variable in the Midlands". In his report from Brighton, John Nash noted it as strength 5 at 1455 and Paul O'Connor quoted SIO 444 in Birmingham at 1700.

MW Local Radio DX

Once again there has been a good deal of interest in this aspect of our hobby. See the chart. The

reception of the new Radio Trent extension for Derby and East Staffs on 945 has been proving to be difficult in some areas of the UK.

Writing from Whiston, **Phil Johnson** says he is having problems in obtaining QSL cards from some of the local radio stations even though he encloses return postage, so he would like to see mention of the verification policy of most of the stations noted in *LMS*. It is perhaps important to remember that the majority of broadcasters are really only interested in the popularity of their programmes and how well they reach listeners in their normal service area (or chosen target area in the case of s.w. broadcasters). Any reports from outside these areas are really only of academic interest to them and this especially applies to tropical band and local radio stations.

Short Wave DX

The reception conditions on the h.f. bands have recently shown a marked improvement and it now appears that we are at least on the upward slope of the next 11 year solar sunspot cycle. However it will be some time before broadcasters consider it prudent to schedule regular transmissions on the 25MHz (11m) band, so it remains very silent just now.

Although daily variations in the reception conditions are apparent on the 21MHz (13m) band a general improvement in reception has been noted and it has been staying open until later in the evening.

There are a number of interesting broadcasts to be heard during daylight hours and one of the most frequently mentioned is UAE Radio Dubai on 21.605. Their signal is often very strong in the UK, in fact **Mike Kitchener** described them in his report from Hitchin as "coming in like a train at

1030!" A good deal of their transmission is in Arabic, but at 1030 and 1330 there are some interesting items in English which are well presented and feature Arab history and culture over the years. **Edward Broadsmith** has been hearing them in Worcester and also mentions their weekly *Mail Bag* broadcast on Saturdays and Sundays in which they discuss the letters and reports received from listeners and answer questions.

The reception of the broadcast beamed to Europe on 21.590 by Radio RSA in Johannesburg, S. Africa has been so good from 1300 until 1556 that one almost tends to forget the vast distance the signal has travelled to reach the UK! **Sheila Hughes** often listens to their interesting programmes in Morden while using her Vega B206 portable receiver around the house.

Another interesting broadcaster using this band was mentioned by **Leslie Hollis**, namely Radio Japan. They beam programmes to Europe in English and Japanese from 1500 until 1700 via a relay in Moybia, Gabon on 21.700. Leslie uses a Yaesu FRG-7 receiver with a long wire antenna in Grantham and logged their signal as SINPO 45533. **Ron Pearce** also picked them up in Bungay while using his little one valve (955) receiver — their talk on measurement proved interesting.

A variety of 13m broadcasts, often in foreign languages, are directed to listeners in other areas during the day and, when conditions permit, some of them can be received in the UK. John Parry heard Riyadh, Saudi Arabia on 21.495 with a broadcast in Arabic to SE Asia at 0705 and John Nash picked up Radio Cairo, Egypt 21.465 at 1356 (Malay to SE Asia); BBC Daventry, UK 21.470 at 1450 (WS to E Africa); REE Madrid, Spain 21.575 at 1421 (Spanish to Middle East) and Radio Moscow 21.575 at 1327 (WS to W Africa). Those noted by Rab Freeman were Radio Pakistan, Islamabad 21.475 at 1033 (Indonesian to SE Asia); Radio Liberty, W Germany 21.510 at 1529 (Turkistani/Uzbek to NW Asia); Radio DW Cologne, W Germany 21.560 at 0644 (German to Australia); RAI Milan, Italy 21.610 at 1333 (Italian to E Africa) and RFI via Allouis, France 21.620 at 1336 (French to E Africa).

The 100kW s.s.b. transmission from RSI via Varberg, Sweden on 21.555 is often well received in the UK from 0900. Their broadcast is in Swedish and is beamed to the Middle East from 0900 until 1100 and to E Africa from 1100 until 1600. If you have



Reception Report received by Darran Taplin, Tunbridge Wells from Radio Japan

SEEN & HEARD

Freq kHz	Station	ILR or BBC	DXer
603	Invicta Sound	I	E*,H,I,J
630	R. Cornwall	B	A
630	R. Bedfordshire	B	D,I,J,N
657	R. Clwyd	B	D,J,L,N
657	R. Cornwall	B	A
666	DevonAir R.	I	A,C
666	R. York	B	B,D,J,L,N
729	BBC Essex	B	H,J,N
756	R. Cumbria	B	J,L,M
756	R. Shropshire	B	C,D,J
765	BBC Essex	B	H,J
774	R. Kent	B	H,J
774	R. Leeds	B	D,J,N
774	Severn Sound	I	A*,C,I,J
792	Chiltern R.	I	C,D,I,J,N
801	R. Devon	B	A,C,D,G*,J
828	2CR	I	H
828	R. WM	B	I,J
828	R. Aire	I	D,J,N
828	Chiltern R.	I	A,C,J
837	R. Leicester	B	C,D,I,J,N
855	R. Devon	B	A
855	R. Norfolk	B	J,N
855	R. Lancashire	B	D,J
873	R. Norfolk	B	J,N
936	GWR	I	C,J
945	R. Trent	I	B,D,F*,H,J,K*,N
954	DevonAir R.	I	A
954	R. Wyvern	I	C,D,J,N
990	R. Devon	B	A,C
990	Beacon R.	I	I,J,N
990	Hallam R.	I	D,J
999	R. Solent	B	C,H
999	Red Rose R.	I	D,E*,L,N
999	R. Trent	I	J
1026	R. Cambridgeshire	B	D,J,N
1035	R. Sheffield	B	D,J,N
1035	R. Kent	B	N
1035	NorthSound R.	I	L,N
1107	Moray Firth R.	I	C
1107	R. Northampton	B	N
1116	R. Derby	B	D,J,N
1152	LBC	I	H
1152	R. Clyde	I	L
1152	Metro R.	I	N
1152	BRMB	I	C,I,J
1152	Plymouth Sound	I	A
1152	Piccadilly R	I	D,N
1152	R. Broadland	I	N
1161	R. Sussex	B	E*

Freq kHz	Station	ILR or BBC	DXer
1161	Viking R.	I	D,J
1161	GWR	I	C
1161	R. Bedfordshire	B	J
1170	Swansea Sound	I	A
1170	R. Orwell	I	N
1170	Ocean Sound East	I	H
1170	Signal R.	I	D,E*,J
1242	Invicta Sound	I	A*,H,N
1251	Saxon R.	I	D,J,N
1260	GWR	I	C
1260	Marcher Sound	I	D,I,N
1260	Leicester Sound	I	J
1278	Pennine R.	I	D,N
1305	Red Dragon R.	I	C
1305	R. Hallam	I	A*,D,J,N
1323	R. Bristol	B	C,D
1332	Hereward R.	I	D,I,J,N
1359	Essex R.	I	D,M*,N
1359	Red Dragon R.	I	A,C,M*
1359	Mercia Sound	I	D,I,J,M*
1368	R. Lincolnshire	B	J
1431	Essex R.	I	D
1449	R. Cambridgeshire	B	J
1458	R. London	B	A*,H,J
1458	R. WM	B	I,J
1458	R. Manchester	B	D,L
1458	R. Newcastle	B	N
1458	R. Devon	B	A
1458	R. Cumbria	B	M
1476	County Sound	I	D,E*,H,J,L
1485	R. Merseyside	B	D,M
1485	R. Humberside	B	A*
1503	R. Stoke-on-Trent	B	D,I,J,N
1521	R. Mercury	I	D,H
1521	R. Nottingham	B	D,J,N
1530	Pennine R.	I	D
1530	BBC Essex	B	E*
1548	Capital R.	I	E*,H
1548	R. Bristol	B	A,C
1548	R. Forth	I	A*,N
1548	R. Hallam	I	D,J
1557	Chiltern R.	I	D,E*
1557	Hereward R.	I	A*,J
1557	R. Lancashire	B	D,M*
1557	Ocean Sound	I	A*
1584	R. Nottingham	B	D,J
1584	R. Shropshire	B	I
1584	R. Tay	I	L,N
1602	R. Kent	B	D,H,I,N

a suitable receiver it provides a rare opportunity to discover the possibilities of s.s.b. s.w. broadcasting.

By early evening some of the broadcasts to W Africa from the USA and the Caribbean may be heard in the UK. The report from Neil Dove in Lockerbie noted WYFR via Okeechobee, Florida on 21.525 at 1815 (SINPO 45544); WCSN in Boston, USA on 21.640 at 1830 (55544) and the Radio Nederlands Bonaire, Nederlands Antilles relay on 21.685 at 1840 (35542).

A significant improvement in the reception conditions prevailing on the 17MHz (16m) band has been noted and it has often been staying open until quite late in the evening.

George Hewlett has continued to monitor ten of the frequencies used by Radio Australia on a daily basis in Torquay, he also checks two others occasionally! In connection with their 16m

broadcast to SE Asia via Carnarvon, W Australia from 0100 he says, "17.715 is usually heard from 0600UTC, somewhat depending on a jamming transmission. The English transmission now closes at 0900UTC and Radio Australia's Chinese service then takes over, possibly from Darwin, reception being poor." Their signal certainly seems to be reaching Greece quite well in the morning, since George Efstratiades of Thessaloniki listens to their round-up of sports news at 0845 on a Philips D-2225 portable with whip antenna!

Two of the stations located in the Far East may be audible in the early morning in the UK. KYOI, the "Super Rock" station in Saipan, N. Mariana Islands on 17.780 and FEBA Radio, Seychelles on 17.785. George Hewlett heard KYOI around 0645, they beam towards E Asia from 0600-0800. FEBA beam to S Asia from 0715-0850 and Jonathan

Creaser picked them up in London at 0800 (SINPO 23332).

Listening in Cardiff, John Berridge has been receiving the latest cricket news from Radio Pakistan, Islamabad on 17.660 at 1115. Their commentaries are popular with many listeners and their signal here is usually good. Alan Curry has been listening to them in Stockton-on-Tees and noted SINPO 5444 in his report. Ian Curry, Alan's 12-year-old son, has developed a keen interest in DXing and uses a Yaesu FRG-7700 plus a.t.u. and long wire antenna. He has been hearing UAE Radio Dubai on 17.775 with a bulletin of world news at 1034, noting SINPO 54334 in his log.

Two of the most popular broadcasters beam their programmes towards Europe during the afternoon, namely Radio RSA in Johannesburg on 17.780 and RCI in Montreal, Canada on 17.820. RSA broadcast in English from 1300 until 1556 and their signal is

Note:

Entries marked * were logged during darkness.

All other entries were logged during daylight.

DXers:

- A: Michael Banbrook, London.
- B: Jonathan Creaser, London.
- C: Colin Diffell, Corsham.
- D: Bill Eyre, Stockport.
- E: Bill Kelly, Belfast.
- F: Eileen Mainwaring, Cowes.
- G: Den Marriott, Bexley Heath.
- H: John Nash, Brighton.
- I: Paul O'Connor, Birmingham.
- J: John Sheridan, Mapperley.
- K: Darran Taplin, Tunbridge Wells.
- L: Robert Taylor, Edinburgh.
- M: Colin Watson, Cumbernauld.
- N: Jim Willett, Grimsby.

often good in the UK. Darran Taplin noted them as SINPO 43433 in his report. RCI broadcast their programmes in 8 languages from 1330 until 1800. Tim Shirley has been listening to their English edition around 1430 and found reception good. They

SEEN & HEARD

Freq MHz	Station	Country	UTC	DXer
2.380	FBS	Falklands	0130	Q
3.205	AIR Lucknow	India	0050	L
3.210	R. Mozambique	Mozambique	2104	S
3.230	R. RSA	S. Africa	0429	F
3.250	SABC R. Orion	S. Africa	0330	S
3.260	RRI Kupang	Indonesia	1900	H
3.270	SWABC 1	Namibia	2250	L,S
3.285	R. Belize	Belize	0310	N
3.300	R. Cultural	Guatemala	0550	N
3.300	V of Rev. Bujumbura	Burundi	1446	Q
3.325	R. Liberal	Brazil	0415	F
3.355	AIR Kurseong	India	1850	S
3.355	R. Botswana	Gaborone	1920	N
3.366	GBC Radio 2	Ghana	2200	S
3.380	R. Malawi	Malawi	1950	S
3.905	AIR Delhi	India	2200	H,S
3.915	BBC Kranji	Singapore	1940	H,S
3.930	R. Capital	Transkei	2210	L,N
3.931	R. Nac. de Cabo Verde	Cape Verde	2300	S
3.940	PBS Hubei, Wuhan	China	2145	K,L,S
3.955	R. Orion	S. Africa	2210	H,N
3.965	RFI Paris	France	1834	K
3.980	R. Pakistan	Pakistan	1900	S
4.060	R. Moscow Kharkov	USSR	1943	K
4.220	Xinjiang	China	2314	P
4.500	Xinjiang	China	2214	P,S
4.520	Khanty Mansiysk	USSR	2327	P
4.635	R. Dushanbe, Tadjik	USSR	0009	P
4.680	R. Paititi	Bolivia	0130	Q
4.710	R. Abaroa	Bolivia	2359	S
4.735	Xinjiang	China	2350	A,H,P,S
4.737	R. Mozambique	Mozambique	2300	S
4.740	R. Afghanistan	via USSR	1830	K,S
4.750	R. Bertoua	Cameroon	1940	M,S
4.755	R. Huanta 2000	Peru	0110	H
4.755	Sani R.	Honduras	2300	N
4.760	ELWA Monrovia	Liberia	1940	M,S
4.765	CRE Guayaquil	Ecuador	0302	H
4.765	R. Moscow	relay Cuba	2153	H,P
4.770	FRCN, Kaduna	Nigeria	2100	A,C,J,K,M, P,Q,R,S
4.780	R. Djibouti	Djibouti	2115	S
4.780	V. Carabobo	Venezuela	0452	B
4.785	R. Mali, Bamako	Mali	2230	S
4.785	R. Tanzania	Tanzania	1930	S
4.790	R. Atlantida	Peru	0220	B,H,M,S
4.790	Azad Kashmir R.	Pakistan	1920	S
4.795	R. Douala	Cameroon	2100	E,S
4.795	R. Ulan Ude	USSR	2150	S
4.800	LNBS Lesotho	Maseru	2017	M,S
4.805	R. Nac Amazonas	Brazil	0015	G,H,N,P,S
4.805	R. Nacional	Sao Tome	2330	H,S
4.810	R. Yerevan	USSR	2020	E
4.815	R. Ouagadougou	Burkina Faso	2000	G,M,P,Q,S
4.820	R. Botswana	Botswana	2030	M,P
4.820	Khanty-Mansiysk	USSR	2303	P
4.820	La Voz Evangelica	Honduras	0449	B
4.825	R. Ashkhabad	USSR	2020	E
4.830	Africa No. 1	Gabon	1830	D,G,K,M,P,Q,R,S
4.830	R. Reloj	Costa Rica	0400	B,E,F,G,J,N,P,S
4.830	R. Tachira	Venezuela	0203	B,E,G,H,N,P,R,S
4.835	R. Mali, Bamako	Mali	2120	G,M,P,S
4.840	AIR Bombay	India	0030	S
4.840	R. Bukavu	Zaire	2335	H
4.845	R. Fides, La Paz	Bolivia	0039	H

Freq MHz	Station	Country	UTC	DXer
4.845	R. Nacional, Manus	Brazil	0037	B,G,P,S
4.845	ORTM Nouakchott	Mauritania	2020	A,C,F,H,M,S
4.850	R. Columbia	Costa Rica	0444	B,K
4.850	R. Tashkent	USSR	2313	P
4.850	R. Cameroon, Yaounde	Cameroon	2034	A,C,D,E,M,O,P,S
4.850	R. Capital, Caracas	Venezuela	0415	E,G,J,N,P,R,S
4.865	PBS Gansu, Lanzhou	China	2055	M,O,P,S
4.865	R. Verdes	Brazil	0433	B
4.870	R. Cotonou	Benin	2143	A,G,H,M,P,S
4.870	EP Quelimane	Mozambique	0039	H
4.875	R. Nac. Boa Vista	Brazil	0228	P
4.880	SABC Radio 5	S. Africa	2027	M,Q,R,S
4.880	Swaziland Comm. R.	Swaziland	2300	S
4.885	Voice of Kenya	Kenya	2116	S
4.890	R. Centinela del Sur, Loga	Ecuador	0504	B
4.890	ORTS, Dakar	Senegal	2300	S
4.895	Ashkhabad	USSR	2015	E,P
4.900	R. diff. Nat. Conakry	Guinea	1946	K,M
4.902	SLBC Colombo	Sri Lanka	0200	S
4.905	R. Beijing	China	2105	E,M
4.905	N'djamena	Chad	1930	M
4.905	R. Relegio, Rio	Brazil	0507	B
4.910	R. Zambia	Zambia	2045	S
4.915	R. Ghana, Accra	Ghana	2100	P,S
4.920	R. Quito	Ecuador	0247	N,S
4.925	R. Bata	Eq. Guinea	2150	S
4.930	Ashkhabad	USSR	1818	B,P
4.930	4VEH	Haiti	0045	S
4.930	R. Tbilisi	USSR	2027	K
4.935	SWABC Windhoek	SW Africa	1810	S
4.940	R. Kiev	USSR	1835	B,E,K
4.945	Caracol, Neiva	Colombia	0526	G,J
4.945	R. Illimani	Bolivia	0450	N
4.955	RRI Banda Aceh	Indonesia	2300	I,O
4.960	R. Federacion	Ecuador	2155	A
4.960	R. Baku	USSR	1918	K
4.960	R. Nat. N'djamena	Chad	1945	K,M,O
4.970	R. Rumbos	Venezuela	0235	B,G,N,P
4.975	R. Timbira, Sao Luiz	Brazil	2120	H
4.975	R. Uganda	Uganda	1800	H,S
4.980	Ecos del Torbes	Venezuela	0330	B,G,H,N,P,R,S
4.980	R. Swaziland	Swaziland	2027	M
4.985	R. Brazil Central	Brazil	2359	G,P
4.990	AIR New Delhi	India	2350	E
4.990	FRCN Lagos	Nigeria	2150	A,D,G,Q,R,S
4.995	R. Andina	Peru	0150	S
4.995	R. Ulan Bator	Mongolia	2025	S
5.005	R. Bata	Eq. Guinea	2122	K,M
5.005	R. Nepal Khumaltar	Nepal	1700	S
5.010	R. Garoua	Cameroon	2000	M,S
5.010	R. Singapore	Singapore	0050	S
5.015	Arkhangelsk	USSR	2033	E,K
5.020	R. Nac., Caracas	Venezuela	0300	J
5.020	ORTN Niamey	Niger	2300	S
5.025	R. Rebelde, Habana	Cuba	0028	P
5.025	R. Uganda, Kampala	Uganda	2050	M,S
5.035	R. Aparecida	Brazil	0134	P
5.035	R. Bangui	C. Africa	2105	A,B,E,K,M,S
5.040	R. Tbilisi	USSR	1928	K
5.045	R. Cultura do Para	Brazil	0100	A,N,S
5.045	R. Togo, Lome	Togo	2037	E,K,M,S
5.057	Gjrokaster	Albania	2035	E,K
5.065	R. Candip	Zaire	0300	S
5.075	R. Beijing	China	2100	O
5.090	R. Pakistan	Pakistan	0100	S
5.095	R. Sutatenza, Bogota	Colombia	2355	G,J,N,P,S

DXers:

A: Gregory Adrian, London.
 B: Ian Baxter, Blackburn.
 C: Jonathan Creaser, London.
 D: Alan Curry Stockton-on-Tees.
 E: Neil Dove, Lockerbie.

F: David Edwardson, Wallsend.
 G: Bill Griffith, London.
 H: Davey Hossack, Winchburgh.
 I: Alexander Little, Glasgow.
 J: George Morley, Redhill.

K: John Nash, Brighton.
 L: Michael Osborn, Chelmsford.
 M: Fred Pallant, Storrington.
 N: Ronald Proudfoot,
 Newcastle-upon-Tyne.

O: Philip Rambaut, Macclesfield.
 P: John Sheridan, Mapperley.
 Q: Tim Shirley, Bristol.
 R: Darran Taplin, Tunbridge Wells.
 S: Jim Willett, Grimsby.

also broadcast in English and French from 2000 to 2100.

The programmes in Dutch and English from Radio Surinam International reach listeners in Europe via an RNB transmitter in Brazil on 17.755 from 1700 until 1745. Ian Curry logged them as SINPO 32232. Colin Diffell has been listening during the evening to some of the interesting programmes from Radio HCJB Quito, Ecuador on 17.790. Their transmission to Europe is in several languages between 1800

and 2230. Ron Pearce has also been hearing them on his one valve receiver!

The reception conditions on the 15MHz (19m) band have also improved and many interesting stations are to be heard there during the day. The Shepparton transmitting station in SE Australia is used to beam the programmes from Radio Australia to listeners in E Asia and the Pacific area on 15.160 and to the S Pacific area on 15.240 from 2100. George Hewlett reports

that around 0600 these transmissions may be audible in the UK via the long path, peaking up around 0630 until close down at 0730. The report from David Edwardson mentioned both of these transmissions and quoted SIO 333 for 15.160 at 0659 and SIO 242 for 15.240 at 0720. Radio Australia also use 15.240, but reception is almost non-existent on that frequency just now.

Some of the early morning broadcasts logged by DXers

include Radio RSA, Johannesburg 15.245 at 0700, noted by John Sadler in Bishops Stortford; Radio Japan via Moyabi, Gabon 15.230 at 0708 by Den Marriot; BBC World Service via Ascension Island 15.105 at 0735 by Daniel Masterson; PEBA Seychelles 15.115 at 0745 by Tim Shirley; SRI Berne, Switzerland 15.570 at 0835 by John Nash; KYOI N. Mariana Islands 15.190 at 0900 by Jim Willett.

David Middlemiss has been checking the band in Eyemouth

Seen & Heard



John Sadler, Bishops Stortford

and picked up the news in English from Radio Bucharest, Rumania on 15.250 at 1310. During the evening he listened to RCI Montreal, Canada on 15.150, broadcasting in French and English to W. Africa from 2100. He also logged the Voice of Vietnam, Hanoi on 15.010 at 21.25.

Using a Vega receiver in Scarborough, **Leslie Lyon** has been enjoying the programmes and items of news from WCSN, the new station in Boston, USA on 15.270 at 1700. Leslie has also been hearing WHRI in South Bend, USA on 15.105 at 2000. Writing from Johannesburg, **Simon Illingworth** says he has quite enjoyed listening to WCSN on 15.230 at 1800, but their signal is poor. Listening at 2322, **Alexander Little** picked up a rare one — Radio Discovery, Santo Domingo, Dominican Republic on 15.045 — their signal was SINPO 24322.

The reception conditions on the **11MHz (25m)** band have been fairly reliable and there is certainly plenty to interest the DXer! Radio Australia may be audible in the UK on 11.910 via the long path (across the Pacific), listen around 0500 is the advice from **George Hewlett**. Some of the other stations logged during the day include KTWR Guam 11.715 at 0830 by **Alexander Little**. Radio Bucharest, Rumania 11.940 at 1045 by **Darran Taplin**. Radio

Tunis 11.550 at 1010; Voice of Vietnam, Hanoi 12.035 at 1140; BBC via Kranji, Singapore 11.750 at 1531; WYFR via VOFC Taipei, Taiwan 11.550 at 1535; RFI via Moyabi, Gabon 11.705 at 1655; FEBA Seychelles 11.860 at 1700; Radio Beijing, China 11.600 at 1837 all by **Philip Rambaut**. Radio Prague, Czechoslovakia 11.690 at 1600 by **Daniel Masterson**. Radio Pakistan, Islamabad 11.615 at 1620 by **George Morley**. Radio Finland, Helsinki 11.755 at 1830 by **Leslie Hollis**.

During the evening many others were noted, Radio Portugal, Lisbon 11.795 at 1930; RCI Montreal, Canada 11.790 at 2100 by **John Sadler**. RAI Rome, Italy 11.800 at 1935, noted by **Michael Osborn** in Chelmsford. Voice of Israel, Jerusalem 11.655 at 1800; SRI Berne, Switzerland 12.035 (in slow German) at 1900; Radio Damascus, Syria 12.085 at 2005, noted by **Bill Stewart** in Lossiemouth. All India Radio, New Delhi 11.620 at 2000; Radio Kuwait 11.675 at 2000, noted by **Leighton Smart** in Trelewis. Radio RSA, Johannesburg 11.900 at 2100 by **Sheila Hughes**. RCI Montreal, Canada 11.945 (in French) at 2030; WYFR via Okeechobee, Florida 11.830 at 2200 by **Robert Taylor**. RNB Brazil 11.765 at 2015; Radio Marti, Greenville, USA 11.930 at 2150; RHC

Habana, Cuba 11.970 (in Spanish) at 2330, noted by **Davy Hossack** in Winchburgh. RHC Havana, Cuba 11.760 at 2250; Radio Japan via Moyabi, Gabon 11.800 at 2300, noted by **Gregory Adrian** in London.

The **9MHz (31m)** band has been "wide open" in the early morning and Radio Australia has been "booming in" on 9.655 from 0700! **Ian Curry** logged them as SINPO 54434 at 0745 and noted their transmission to the W Pacific area on 9.760 as 22222 at 0820. The band is also open to the USA and the Caribbean area in the morning. **Philip Rambaut** picked up VOA via Greenville 9530 and Bethany 9.550 and 0600 and **Jim Willett** heard Radio Nederlands via their Bonaire, Nederlands Antilles relay on 9.630 at 0700.

Some of the stations logged during the evening include REE Madrid, Spain 9.765 at 1800 by **Phil Townsend**. The Voice of Israel, Jerusalem 9.435 at 2000, noted by **Julian Wood** in Buckie. Radio Pyongyang, N. Korea 9.345 at 2000 by **Neil Dove**. WCSN Boston, USA 9.465 at 2150, noted by **Colin Godwin** in Malvern. The Voice of Vietnam, Hanoi 9.840 at 2030; RAI Rome, Italy 9.170 at 2200; Voice of Turkey, Ankara 9.560 at 2200 by **Robert Taylor**. AIR New Delhi 9.910 at 2220 by **Den Marriott**. SRI Berne, Switzerland 9.885 at 2054; ABC Perth, Australia 9.610 at 0005; Radio HCJB Quito, Ecuador 9.870 at 0229 by **Davy Hossack**. Using a pocket sized Sangean SG789 portable with whip antenna in Victoria, Australia, **Rod Adams** logged some interesting stations from 0515UTC; Vatican Radio, Rome 9.645; Radio Nederland, Hilversum 9.895; SRI Berne,

Switzerland 9.885; Radio HCJB 9.745 and Radio DW Cologne, relayed via Antigua, W Indies on 9.715.

Some of the broadcasters using the **7MHz (41m)** band remain on a particular frequency for many hours. For example Radio Polonia, Warsaw occupies 7.285 from 0600 until 2355 and broadcasts to Europe in eight languages including Esperanto. **Peter Vlietinck** has been hearing them in London and sent along details of the Radio Polonia DX Club which requires 12 reports for membership and 25 more for their first award.

While monitoring the **6MHz (49m)** band in the early morning, **Philip Rambaut** noted two Religious broadcasters at 0600; Adventist World Radio Forli, Italy 6.145 and Radio HCJB Quito, Ecuador 6.205. Listening in Selangor, Malaysia **Mat Jusoh** logged the BBC WS via Karanji, Singapore 6.195 at 1100; Radio DW Cologne via Cyclops, Malta 6.000 at 2100 and VOA via Kavala, Greece at 2145.

Station Addresses

ILR Radio Tay, P.O. Box 123, 6 North Isle Street, Dundee, DD1 9UF.

ILR Ocean Sound, P.O. Box 99, 99 Whittle Avenue, Segensworth West, Fareham, Hants. PO15 5PA.

Radio Botswana, Private Bag 0600, Gaborone, Botswana.

Radio Sao Tome, Caixa Post 44, Sao Tome, Sao Tome e Principe.

Radio Finland, Oy Yleisradio Ab, Box 95, SF-00251 Helsinki, Finland.

Radio Vaticana, 00120 Citte del Vaticano, Vatican State.

Deadline Dates

Issue

September

October

November

Deadlines

July 23

August

September

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STARTING OUT

Brian Oddy G3FEX

As well as **domestic** broadcasting, many of the world's broadcasters also provide an **international** service, since this gives an opportunity to inform listeners in other countries of their local news and events as well as their viewpoint on international current affairs. They usually offer a wide variety of programmes which are designed to hold the listener's interest and these are broadcast in a language appropriate for the chosen **target area** of reception.

The Short Wave Bands

By international agreement, eight segments of the h.f. region, usually referred to as the **short wave bands (s.w.)**, have been allocated to international broadcasting. The bands are located between **49 and 11m (6 to 25MHz)** and the limits agreed in 1979 are shown in the table. The frequencies used by the broadcast stations within these bands are allocated under agreements drawn up by the **International Telecommunication Union (ITU)** — an agency of the UN with 162 member states located in Geneva. However, overcrowding exists on these bands and many broadcasters now operate outside the 1979 band limits and some also use the **22m (13MHz)** band.

There are several books available which list the international broadcasters and the frequencies allocated to them and anyone new to short wave listening might well decide to look up a particular station and set their receiver to the frequency indicated, only to be disappointed to find the station inaudible. Unlike the l.w. and m.w. broadcasts, most of the s.w. ones may only be heard at certain times on particular frequencies during the 24-hour period. The reason for this is that international broadcasters make use of the **sky wave** signal from their h.f. transmitting installations to exploit the reflecting properties of the highest (F) layer of the ionosphere. Whereas the l.w. and m.w. domestic services rely upon the **ground wave** to provide a good signal-to-noise ratio in a given service area; the attenuation of the ground wave is too severe for international broadcasting.

The nature of the ionosphere has already been outlined (*SWM* May '87) to which it may be added that the degree of ionisation present is also related to the sunspot count and their appearance follows a regular cycle of events, reaching a maximum about every 11 years.

The angle at which the sky wave signal leaves the transmitting antenna and the density of the ionisation in the F layer controls the highest frequency that can be reflected back to earth. The highest frequency which can be reflected back when the radiation is vertical is called the **critical frequency**. If a wave with a frequency slightly greater than the critical value is sent up vertically it will penetrate

Band		ITU 1979 agreed limits	"Out of Band" limits in use	
(m)	(MHz)			
11	26	25 600 - 26 100		
13	21	21 450 - 21 750	21 450 - 21 810	
16	17	17 700 - 17 900	17 387 - 18 080	
19	15	15 100 - 15 450	15 010 - 16 230	
22	13	not allocated	13 605 - 13 860	
25	11	11 700 - 11 975	11 000 - 12 200	
31	9	9 500 - 9 775	9 010 - 10 870	
41	7	7 100 - 7 300	7 000 - 8 690	
49	6	5 950 - 6 200	5 145 - 6 995	

the ionosphere and be lost into space; however it is important to note that if the same wave is sent up at an acute angle it will be reflected back to earth.

The angle of radiation is one of the factors which determines the distance covered by a single reflection from the ionosphere — high angles are used to reach nearby areas and low angles, typically 7 degrees, are required for the longest distances. The maximum distance along the surface of the earth which can be covered by a single reflection from the F layer is about 4000km. In order to control the angle of radiation and the general directivity of the sky wave signal, many broadcasters employ directional beam antennas. These are often large curtain arrays, supported by masts 100m or more in height — and since a separate antenna is needed for each transmitter and wave band in use, many s.w. transmitting stations occupy large areas!

The maximum frequency which will be reflected by the ionosphere over any particular path is known as the **maximum usable frequency (m.u.f.)**. This depends upon the time of day, the season, the latitude and the period of the sunspot cycle. Radio observatories around the world make daily measurements of the critical frequency and thus are able to forecast the m.u.f. In practice it may be possible to use waves of up to four times

the critical frequency in international broadcasting.

In the area between the transmitter and the point where the reflected waves return to earth the signals cannot normally be heard, so this is called the **skip zone** — see Fig. 1. Sometimes, however, there may be some scattering of the signal from the lower layers of the ionosphere which may reach listeners within the skip zone.

When the reflected waves meet the surface of the earth they may be reflected back towards the ionosphere, and on reaching the F layer they are once again reflected back to earth — see Fig. 2. Multiple reflections of this type considerably extend the range of the signal — typically 3 reflections may be needed from the UK to reach India and 6 or 7 to reach Australia. It is also possible for the signal to travel all round the world in this way; this often results in an echo on the signal which is delayed by about 1/7 of a second!

So how then does a listener make use of all this? The answer lies in the application of up-to-date **broadcast schedules** which are obtainable from most broadcasters four times a year, in March, May, September and November. These take account of the seasonal changes in propagation and detail the best frequencies and times for selected target areas.

The *International Listening Guide (ILG)* gives an hour-by-hour summary of all s.w. broadcasts and details frequencies, languages used, target areas and programme details; as it is published four times a year it's up to date. The address for this was given in last month's column.

The *World Radio TV Handbook (WRTH)* is published annually. It covers every broadcasting country in the world and gives details of station frequencies, times of operation, interval signals, maps and addresses. The 1987 edition costs £17.95 (plus 75p P & P) from PW Publishing Ltd., Enefco House, The Quay, Poole, Dorset BH15 1PP

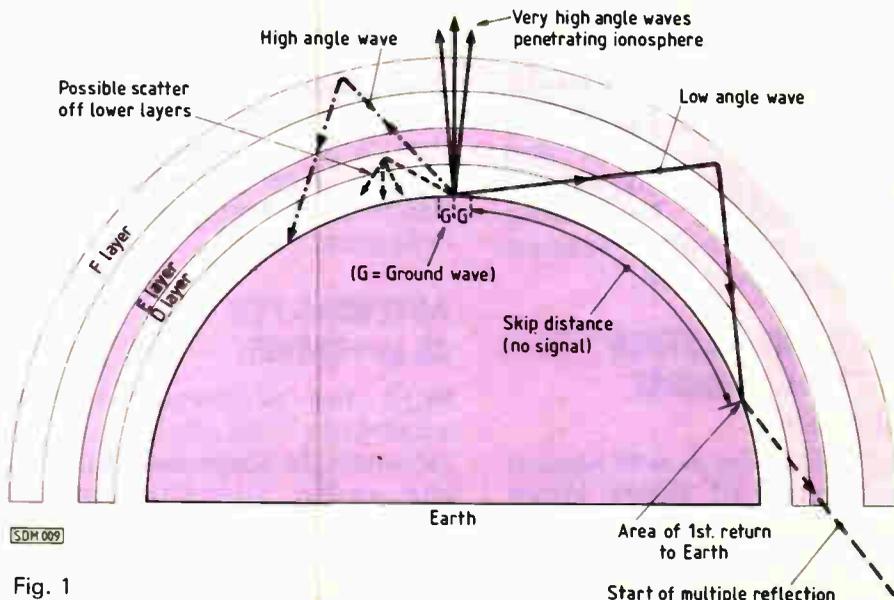


Fig. 1

LISTEN OUT FOR

GB2GJR: This station will be run from the Crewe Heritage Complex for the 21st Anniversary British Rail ARS and celebrating 150 years of railways with Crewe Heritage. They will be using all bands up to 430MHz from July 4 to August 16.

G. Sims G4GNQ
85 Surrey Street
Glossop

GB1ERS (GB7ERS?): This station will be on the air during the last week in July. This will be for the 84th East Reading Wellington Scout Troop Summer Camp at Thorness Bay, IOW. They will be operating on 144 and 432MHz s.s.b. and f.m.

GB0UWC: To celebrate the 25th anniversary of the United World College of the Atlantic, they are running a special event station over the August Bank Holiday period. They will be operating from St Donat's Castle in South Wales. The main mode will be s.s.b. on the h.f. bands between 3.5 and 28MHz.

Dr. J. Devonshire GW4LFF
St. Donat's Castle
Llantwit Major
S. Glamorgan

GB1CXI: The Treble One Squadron was formed on 1 August 1917, from a nucleus flight of No. 14 Squadron, at Deir-er-Belah in south-west Palestine. This station is celebrating their formation on August 1 and 2. They will be using 144MHz from the Squadron's current location RAF Leuchars. All contacts will receive a QSL card, as will all s.w.l. contacts.

Dave Bloomfield GM1RFM
QTHR

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.

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



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Chas. E. Miller is well known to readers of *Short Wave Magazine* for his prowess in unearthing rare and interesting vintage receivers

and restoring them to working condition. Here he describes the latest in a long line of Marconi sets which he has rescued and added to his collection.

ANTENNAS FOR 25 to 1300MHz

With the proliferation of scanners covering an increasingly large section of the radio spectrum the provision of a suitable antenna becomes more and more difficult. In this article

Alec Wood G8WHR looks at suitable antennas and offers a design for an easily-built discone.

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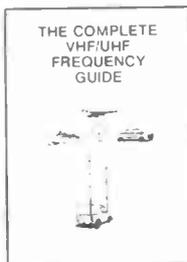
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