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practical

Wireless

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Inside This Issue

Reviewed

THE KENWOOD TH-79E 144/430MHz TRANSCEIVER

THE ALINCO DR-M06SX FM TRANSCEIVER

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ISSN 0141-0857

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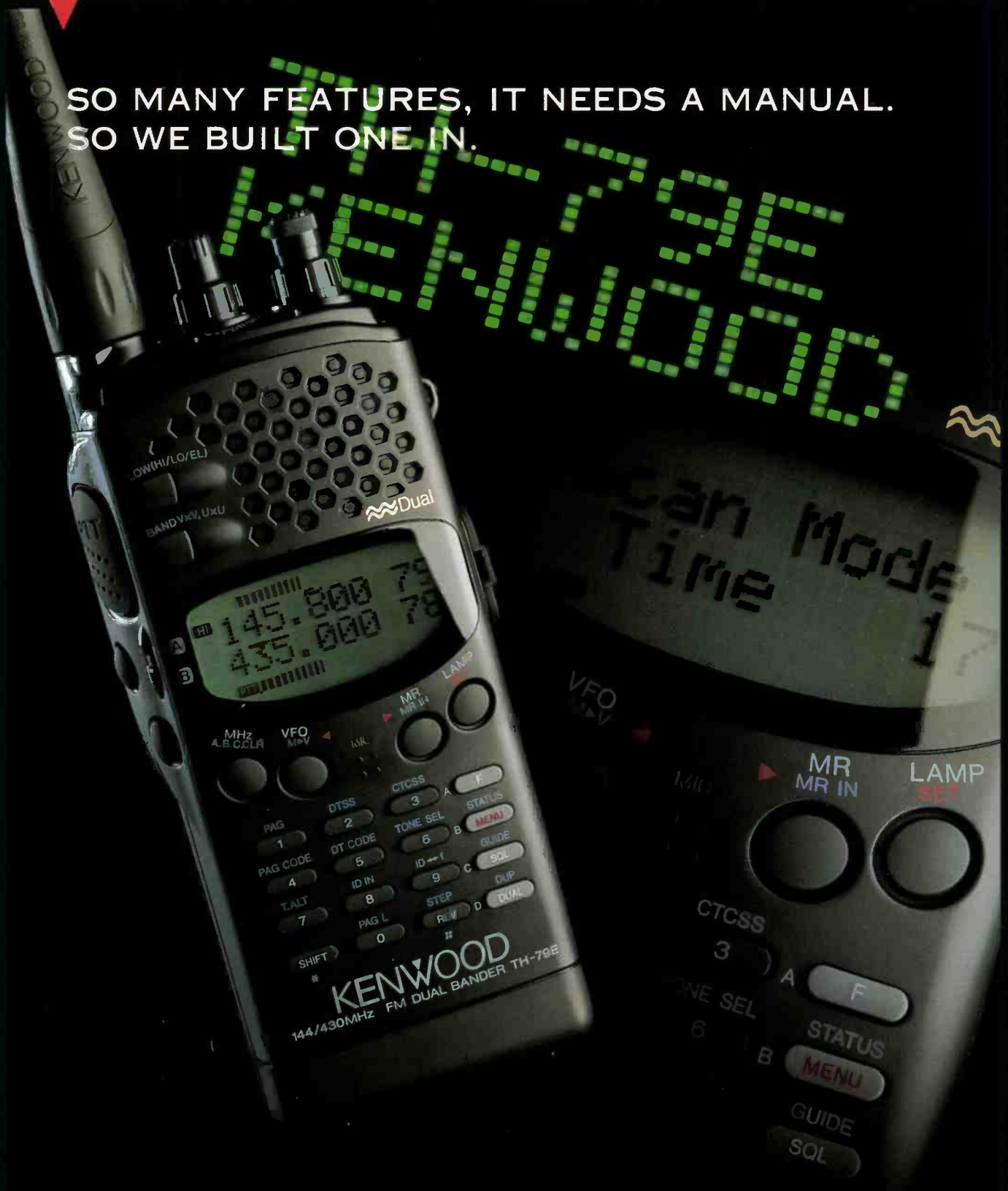

Kenwood's TH-79E marks a new high in user-friendly handheld tranceivers. This slim-line FM dual-bander features a dot matrix LCD menu, which helps you to access the many class-leading features of this stylish unit.

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practical Wireless

December 1994
(ON SALE NOVEMBER 10)
VOL. 70 NO 12
ISSUE 1053

NEXT ISSUE (JANUARY)
ON SALE DECEMBER 8

EDITORIAL & ADVERTISEMENT OFFICES
Practical Wireless
Arrowsmith Court
Station Approach
Broadstone
Dorset BH18 8PW
☎ (01202) 659910
(Out-of-hours service by answering machine)
FAX (01202) 659950

Editor
Rob Mannion G3XFD
Art Editor
Steve Hunt
Layouts Richard Gale
Technical Projects Sub-Editor
NG ("Tex") Swann G1TEX
Production/News
Donna Vincent
Editorial Assistant
Zoë Shortland

Advertisement Manager
Roger Hall G4TNT
PO Box 948
London SW6 2DS
☎ 0171-731 6222
Cellphone (0850) 382666
FAX 0171-384 1031

Advert Sales and Production (Broadstone Office)
Lynn Smith (Sales),
Ailsa Turbett G7TJC (Production)
☎ (01202) 659920
FAX (01202) 659950

CREDIT CARD ORDERS
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Front Cover: Front cover background featuring 1940 edition of Ordanance Survey map sheet no. 179 from Rob Mannion's vintage collection of railway maps.

Published on the second Thursday of each month by PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel: (0202) 659910. Printed in England by Southernprint (Web Offset) Ltd. Distributed by Seymour, Windsor House, 1270 London Road, Norbury, London SW16 4DH. Tel: 081-679 1899. Fax: 081-679 8907, Telex: 8812945. Sole Agents for Australia and New Zealand - Gordon and Gotch (Asia) Ltd.; South Africa - Central News Agency. Subscriptions INLAND £22, EUROPE £25, OVERSEAS (by ASP) £27, payable to PRACTICAL WIRELESS, Subscription Department, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel: (0202) 659930. *Practical Wireless* is Published monthly for $45 per year by PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW, UK Second Class postage paid at Middlesex, N.J. Postmaster. Send USA address changes to *Practical Wireless*, c/o Permit to post at Hackensack pending. The USPS (United States Postal Service) number for Practical Wireless is: 007075.

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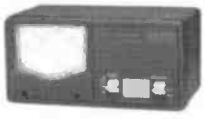

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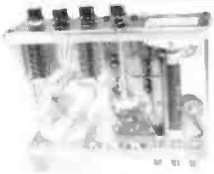

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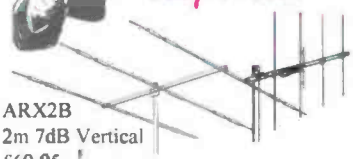

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CTU30	HF ATU 30w	£39.90

Antennae

AA2	HF Active Antenna	£8.90
AA4	25-1300Mhz Active Ant	£19.90
AB118	Active Air Band Antenna	£18.80
SPA4	Rx Pre-amp 4-1300MHz	£15.90

Microphones

AP3	Auto. Speech Processor	£16.80
CM2	Microphone+VOGAD	£13.50
MA4	Mic. Amp + Filter	£6.20

Accessories

ST2	Sidetone/Morse AF Osc	£9.80
XM1	Crystal Calibrator	£16.90
DFD4	Digital Readout for Rxs	£49.90
DFD5	Digital Freq. Counter	£54.90
CBA2	Buffer for Counters	£5.90

Hardware kits available for many of the mentioned PCBs.

Wood and Douglas

FM2T3	Single channel FM Tx 1.5W for 50/70 or 144MHz (no xtal supplied)	£42.30
70FM05T5	Single channel FM Tx 1.5W for50/70 or 433MHz (no xtal supplied)	£44.95
BPF	Band pass filter 144 or 432	£4.70
PS	PIN RF switch 144 or 432	£14.10
PA4/S	Rx Pre-amp, switched, for 50/70 or 144MHz	£22.95
70PA2/S	Rx Pre-amp, switched, for 50/70 or 432MHz	£25.85
144LIN25B	25W 144MHz linear	£50.53
70LIN3/10E	10W 432MHz linear	£58.25
TB2	1750Hz Toneburst	£5.30
PT3	Pip Tone Generator	£7.05
CWF1	CW Audio Filter	£7.50
SWR1	144/432 SWR detector	£9.99

Oak Hills Research

Sophisticated kits for the QRP'er

"Sprint" Monoband 2W cw Transceiver for 80 or 40m. DC Rx. QSK keying £99.95
"Spirit" Monoband 5W cw Transceiver for 80, 40 or 20m. Superhet. Rx. Keyer £192.50
"Classic" Dual band 5W cw Transceiver. 80+20 or 40+20m. (No keyer) £215.50
SCAF Switched capacitor Audio Filter for CW6 bandwidths to 108Hz. Variable f0 ..... £56.50
WM1 QRP in-line directional Wattmeter. 10W, 1W & 100mW ranges £89.95
KEY1 Curtis 8044ABM Keyer pcb £33.95
Keyer excepted, all Oak Hills kits are complete (Coils wound, boxes drilled and lettered)

Ask for full details of these kits.

TELFORD ELECTRONICS DISTRIBUTORS

TEST EQUIPMENT

HP8750A	Storage Normaliser	£350
HP8553B	Spectrum Analyser plug-in 110MHz	£200
HP8556A	Spectrum Analyser plug-in 300kHZ	£200
HP59313A	A/D convertor	£150
HP11683A	Range Calibrator	£250
HP8709B	Synchroniser	£200
HP3406A	Broadband sampling voltmeter	£150
HP5150A	Thermal printer	£150
HP3400A	RMS voltmeter 10MHz	£115
HP489A	Microwave amplifier 1-2GHz	£275
HP491C	Microwave amplifier 2-4GHz	£275
HP4204A	Oscillator 10Hz-1MHz	£150
HP8443A	Tracking Generator/counter	£400
HP8755	Sweep amplitude analyser c/w heads	£750
HP8565A	Spectrum analyser 0.1-23GHz	£POA
HP Spectrum analyser 182T main frame/8558B plug-in 100kHZ-1.5GHz c/w HP 8750A storage normaliser		£2000
Marconi TF2163S UHF attenuator DC-1GHz		£100
Marconi TF2162 step attenuator DC-1MHz		£60
Marconi signal source 6059A 12-18GHz c/w levelling amp. 6587		£215
Marconi signal source 6058B 8-12.5GHz c/w levelling amp. 6587		£215
Marconi TF2015 AM/FM signal generator 10MHz-520MHz		£165
Marconi TF2016A AM/FM signal generator 10kHz-120MHz		£165
Marconi TF2700 universal bridge (battery op.)		£125
Marconi TF2008 AM/FM signal generator10kHz 510MHz		£300
Marconi TF2370 Spectrum analyser 30Hz-110MHz		£800
Marconi 2955 Radio Comm. test set c/w results printer		£3250
Racal 9301A RF Millivolt meter10kHz-100MHz		£225
Racal 9009 modulation meter		£200
Racal MA1720 drive unit		£600
Racal 9082 Sythesized signal generator1.5-520MHz		£480
Racal linear amplifier 10Kw		£1500
Racal Dana 9932 instrument interface		£120
Racal Dana 9915M frequency meter 10Hz-520MHz (fitted FX standard)		£125
Racal Dana 9904 universal counter/timer 50MHz		£100
Racal Dana 9300 RMS voltmeter		£250
Racal Dana 5001 digital multimeter		£250
Racal Dana 202 logic state analyser		£300
Racal Dana 205 logic state analyser		£300
Phillips PM5520 monochrome test generator		£65
Phillips PM7832 SWR meter		£175
Phillips PM7841 power meter		£125
Phillips PM5132 function generator 0.1Hz-2MHz New		£350
Farnell sine square oscillator LFM-3		£85
Farnell signal generator SSG-520 S22 AM/FM 10MHz c/w		
Farnell TTS520 transmitter test set		£800 (2 items)
Farnell P.S.U. TSV 70 Mk11 0-35v/0-10A+0-70v/00-5A		£250
Farnell stabilized power supply L30-1, 0-30v/1A		£65
Wayne Kerr RCL Bridge CT492 (battery op.)		£65
Wayne Kerr auto balance universal B642		£200
Wayne Kerr universal bridge B224		£200
General radio meggar ohm meter 1863 up to 1T ohms		£125
Feedback electronic watt meter EW6004		£50
Norma precision watt meter D4155		£350
Norma multi function meter D4135A		£300
Nagra Recorders 1V-SJ+111 in stock		£POA
Racal store 7DS recorder		£350
EIP575 source locking microwave counter opt. 02-04 10Hz-18GHz		£1650
EIP auto Het 331 microwave counter 825MHz-18GHz		£650
Systron donner 6054B microwave counter 20Hz-18GHz		£700
Tektronik 191 constant amplitude signal generator 350kHz-100MHz		£65
Thandar TA 2160 20MHz logic state analyser		£275
Wiltron programmable sweep generator 6637A 2-18.6GHz		£3800
Schlumberger 7055 microprocessor volt meter		£250
Wavetek 20MHz sweep/modulation/generator type 193		£250
Kemo phase meter DP1 1Hz-100KHz		£95
Tektronik ascillascope 7854 c/w 7S11 plug-in/7T11 fitted with S1 sampling heads 1GHz		£1600

RECEIVERS

Redifon synthesized R1001 15kHz-30MHz all mode	£500
Redifon R500 brand new (back lit) HF	£1000
Nems Clarke special purpose receiver comprising of: 30-60MHz, 60-260MHz and 250-900MHz adaptor units, + spectrum display unit	£450
Redifusion VLF/LF in current use with Royal Navy Submarines	£750
Eddystone 1990R-2	£400
Eddystone 1990R-1	£400
Eddystone E958	£250
NEMS Clarke 1302A 50-260MHz	£185
Block paper capacitors: 240mf Min/270mf max 2500KV Brand New	£20
Vacuum capacitors: 7pf-1000pf 3Kv Brand New	£70
AVO meter 8 mk6 c/w case, leads, prods and clips Fully Tested	£90
Clansman rechargeable battery (fit PRC320) 24v New	£15
Clansman battery charger (for above) c/w leads	£45
Bird 43 Thruline watt meter	£100
Infra red binoculars	£125
Infra red filter (for use with above)	£15
Harris automatic antenna coupler 1.6-30MHz 1Kw	£500
Lightweight telescopic mast MA798 30ft	£295
Ex-Army 27ft telescopic mast c/w kit	£35
Optional antenna kit for use with above	£10
Storno personal radio telephone – complete	£50 for 2

SPECIAL OFFERS

VHF log periodic antenna type MA752 30-88MHz	£100
STARTRONIC power supply 0-30v/0-2A x 2 or 0-30v/0-4A	£25
UHER 4000 Taperecorder reporter L	£45
RHODE & SCHWARZ 0-2000MHz UHF attenuator 50ohm 0-140dB	£125
TRIO 20MHz scope 2 channel	£140
50 MHz counters from	£80
HP 431C microwave power meter 10uW-10mW. 10MHz-10GHz	£125

VAT to be added to all orders. Send large SAE for more details.

Callers welcome by appointment

Old Officers Mess, Hoo Farm, Humbers Lane, Horton, Telford, Shropshire TF6 6DJ
Telephone 0952 605451 – Fax: 0952 677978

EDITOR'S Keylines

Occasionally I'm able to pass on some really good news in 'Keylines'. This month's 'helping' is one of those rare occasions, as I'm pleased to announce that GB2SM at the Science Museum in London has been saved from permanent closure!

The tremendous outcry from the world of amateur radio (at home and from abroad) on the news of the impending closure of GB2SM even surprised me! Fortunately, the RSGB were already in consultation with the Science Museum regarding the possible re-siting of the station, but the outcry immediately following the closure announcement obviously made the Director of the Science Museum, Sir Neil Cossons and his colleagues, think again.

Although the RSGB were at the centre of the GB2SM protest and were actively pursuing a solution, I feel the huge surge of support for the retention of GB2SM from amateur radio in general helped. In fact, I was pleased to congratulate Peter Kirby G0TWW when he announced at the Young Amateur of the Year Award Ceremony on Sunday October 9 the fact that GB2SM is to re-open at the Science Museum after refurbishment and re-design. It was made even more a pleasure because it was one of the few occasions that everyone in amateur radio could be seen to be pulling together for the sake of the hobby.

It just goes to show that if we stand united we can protect our interests and those of people wishing to learn more about technology. It also shows that even dogmatic phrases "The decision has been taken" can be overturned and even reversed when faced by **united common sense and dedication**. Well done everyone!

Club Activities

We're now entering the peak time for radio club activities. Club secretaries everywhere are busy putting the final touches to their planned winter activities.

So, why don't you make sure you share the news of what your club is up to this winter? Donna Vincent and Zoë Shortland look after our 'Club Spotlight' page and they're always interested in what you're up to at your club.

In particular, Donna and Zoë are very interested in the logos which appear on the headed notepaper arriving on the 'Newsdesk'. Although some of them are obvious, others aren't and must have an interesting background story which could be shared with other readers.

The history of your club is also of great interest. How did it start? How long ago was it formed and what about the various 'club characters' over the years?

Personally, I feel that the very heart of amateur radio is the local club. That's how I managed to get into the hobby and I even managed to buy my very first 'proper' receiver (the receiver section of a B2 'spy' set) for 50p at a club junk sale.

I've got very special memories of the Southampton RSGB Group. There were some wonderful characters at the Southampton Club, including the late Jack Watts G2DSW. He was a wonderfully irascible chap and a great friend who stood no nonsense from me! I often feel his influence on how I approach the hobby, even now, 25 years after his passing.

Perhaps you've got memories of club members from the past. If you have (and who hasn't?) why not share them with other readers. After all, their legacy is our hobby which they helped pass on to us, shouldn't we do the same? And, don't forget that photographs are always welcome.

Winning Caption

I'm pleased to announce the winning caption from the competition I set in the July 1993 'Keylines'. My caption for the photograph of myself and the Kenwood balloon was "Two gasbags seen at the 1993 Dayton HamVention".

The winner, **John Tye G4BYV**, from Dereham in Norfolk came up with "This is the last time I go to Dayton on one of Kenwood's budget trips". Well done John (although Trio-Kenwood UK Ltd., say they aren't sure they're capable of carrying passengers of my size!)....I'll be sending your prize, a copy of *The ARRL Antenna Book*, very soon.

Croak For Help

To round off this month, I've got a cry (or should it be 'croak') for help. The reason why I'm asking for help from readers is that a VIP (very important pot) has met its end!

As many of you will know, Donna Vincent our News & Production Editor has a nickname - 'Toad'. She acquired the nickname when she joined us nearly five years ago and I bought her a special 'Toad' mug to go with her collection on the same theme.

The hand-crafted mug had a small toad sat in the bottom. As the liquid level dropped Donna was faced by her mascot. Unfortunately however, the mug was damaged when being cleaned and although it was repaired it exploded in the kiln on being re-fired.

Can you help? Do you know where we can find a replacement mug? I would even be prepared to have one made (the original was made to order) if someone can tell us where it could be done.

Repeater Data Card

Finally, by now you'll have found your free *PW* 144MHz Repeater Data card, which comes courtesy of Martin Lynch. The Editorial team hope you find it useful, and judging by the requests we get to up-date them...they're always popular.

Don't forget to support your local repeater group. They form another link in our hobby and like many other aspects of amateur radio...they're organised and maintained by enthusiasts who may not seek publicity but still need your help and financial support.

Rob Mannion G3XFD

COMPETITION CORNER - Wordsearch

U	B	B	H	J	T	E	G	I	M	Z	C	V	J	W
A	Y	Q	R	X	D	X	Y	U	V	B	H	D	W	F
E	B	V	E	Z	F	E	U	S	V	Y	S	O	O	M
L	T	D	J	V	P	L	Q	T	I	S	G	O	R	Y
C	N	K	G	N	I	H	T	R	A	E	Q	W	K	T
I	H	A	N	T	E	N	N	A	Y	U	D	N	S	E
M	U	L	T	I	M	E	T	E	R	S	H	E	H	C
K	J	I	G	U	L	P	U	L	C	W	G	K	O	H
S	T	S	E	T	N	O	C	E	H	F	K	R	P	N
O	T	J	P	R	Q	J	D	H	U	I	D	Y	S	I
S	N	O	I	T	A	C	I	F	I	C	E	P	S	Q
P	R	F	K	U	D	W	K	I	L	Y	P	M	D	U
C	V	O	C	N	I	L	A	S	P	F	I	X	V	E
V	C	L	J	O	A	S	S	W	P	T	V	L	A	S
G	N	I	H	C	T	I	W	S	D	N	A	B	F	R

Words To Find

Alinco
Antenna
Bandswitching
Contests
Earthing
Index
Kenwood
Multimeter
Plug
Specifications
Techniques
Workshop

Wordsearch rules:
Twelve different words have been hidden in the letter grid. They have been printed across (forwards or backwards), up and down, diagonally, but they are always in a straight line without odd letters between. You can use the letters in the grid more than once for different words. Once you have found all 12 words, mark them on the grid and send it, along with your name and address (photocopies accepted with the corner flash) to our editorial address, marked Competition Corner Wordsearch December 1994.

Send your entry (photocopies acceptable with corner flash) to: Competition Corner, Wordsearch, December 1994, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Editor's decision on the winner is final and no correspondence will be entered into.

FIRST PRIZE: A year's subscription to *Practical Wireless* or a £20 book voucher.
SECOND PRIZE: A six month subscription to Practical Wireless or a £10 book voucher.

❒ SUBSCRIPTION ❒ VOUCHER
Entries to reach us by Friday 23 December 1994.

Name .....

Address .....

.....

.....

.....Postcode.....

If you do not wish to receive future mailings as a result of entering this competition please indicate ❒

COMPETITION CORNER DECEMBER 1994

Send your letters to the editorial offices in Broadstone. They must be original, and not duplicated in any other magazine. We reserve the right to edit or shorten any letter. The views expressed in letters are not necessarily those of *Practical Wireless*.

RECEIVING You

The Star Letter will receive a voucher worth £10 to spend on items from our Book or other services offered by *Practical Wireless*. All other letters will receive a £5 voucher.

Antenna Ideas For The Novice By Dick Pascoe

Dear Sir
Congratulations on the article in *Practical Wireless* August entitled, 'Antenna Ideas for the Novice' by Dick Pascoe G0BPS.

I have only taken up this wonderful hobby since my retirement less than two years ago and my technical expertise is very limited to say the least. I have had no previous radio or electronic training prior to studying for the RAE.

I have spoken with others of varying ages to find a substantial percentage in the same boat. In other words, very little 'hands-on' experience and certainly limited theoretical and mathematical knowledge.

Please can we have more articles for all aspects of amateur radio but directed at the simple folk of this world. I wish I was a 'whizz kid', but never will be at my time of life and would like to enjoy the hobby as much as I can.

Congratulations to yourself, your staff and contributors in producing a most interesting magazine.
Anthony Baker G7POD
Bournemouth

Editor's reply: There are more practical 'Pascoe Projects' for novices coming soon Anthony. Dick G0BPS, like the *PW* team, will be pleased to read your favourable comments.

Incoming QSL Cards

Dear Sir
I have just read the letter 'Incoming QSL cards for G0S series' in *PW* for October. And I wondered at the time, do these 'wet behind the ears' operators know of the RSGB and what services they operate for the amateurs?

In my young days (the 1930s), we became s.w.l.s and not rule bending CBers and consequently knew of the RSGB. Alas, today it would seem that the aim of these ex CB operators is to break as many rules and regulations as possible using bad language, illegal antennas, linears, echo problems, etc. The one thing which **must** be kept secret is the home address.

This is one reason why today's RSGB Callbooks have page after page of particulars withheld from these ex CBers. They are not giving amateur radio a helping hand at all.

The same could be said of the Radiocommunications Agency's Radio Investigation Service. At least with the GPO we had a first rate radio interference service - FREE! and in most towns, a local RI office.

Nowadays with the DTI we have radio interference shambles and costs of £35 and no local RI officer on monitoring stations (as we had with the GPO).
B. J. Clark G3BEC
Somerset

Repeater Abuse

Dear Sir
In reply to Mr Mikolajczyk G4ZRE's letter concerning GB3CF, I am also at a total loss why repeaters are abused.

The Leicester repeater cannot be the only case, but why for the sake of a few individuals should another Midlands repeater go off the air? Remember GB3BM anybody?

The people causing the 'problem' are well known but are left to continue. Also, the situation is getting worse because a growing number of amateurs (callsigns are given) seem to find pleasure in doing the same by jamming or using foul language.

Now that I have got that off my chest, may I comment on two more letters in the same issue (October '94) of *Practical Wireless*. The first one 'Fifty year Morse test'. What does it matter how long it takes!

I may be wrong but after reading G3IJL's comments, the only impression I get is one of 'smugness'. Mr Sephton, the Morse test is like many other things, some can or some can't. To the people who at this moment in time can't (myself included) do indeed find it a 'beast'. Morse code, so I am told, is all about dedication and I think 50 years is a lot of dedication!

The second 'Morse test and the RSGB' also fills me with woe. Just because G3DRN can afford membership of the society which is there for 'all radio amateurs and s.w.l.s' he feels it is okay to question other people's incomes. What is the definition of a radio amateur these days? How much have you spent or are going to spend?

Amateur radio is a hobby at the end of the day and I hope we all can start treating it as one.
Bob Taylor G1WEX
West Midlands

Competition Corner

Dear Sir
Enclosed please find my entry related to Competition Corner - Spot The Difference, September 1994.

Hoping to win one of the prizes, I wish you all the best and I can tell you I am very satisfied with both magazines you print which I regularly receive and enjoy.
Giuseppe Babini
Italy

Dear Sir
Last year when you went to the Dayton Convention in America, you ran a competition on your return which featured a photograph of yourself in front of a balloon.

You asked your readers to send in a caption with a witty comment. I have looked in vain for the result of this competition and even asked one of your staff who was on the *PW* stand at the Blackpool Rally, who I must confess seemed rather vague about it, nonetheless, made a note of my comments in his book and promised to let me know something.

As you will no doubt have gathered, I sent in a caption which I thought was rather good, so you will understand my reason for wanting to know who did win.

I see from the August edition of *PW* that Donna 'Toad' Vincent was doing a write-up which has prompted this letter. I look forward to hearing from you.
Roy Aitken G4VCT
Lancashire

Editor's reply: The editorial team are pleased readers enjoy the competitions. However, I must apologise for not announcing the winner of the 'Two gas bags seen at Dayton' competition' (please see 'Keylines' this issue for the results). It's not censorship that held up the announcement, just our busy schedule (honest!)

Letter of Thanks

Dear Sir
This is a letter of thanks to show the appreciation I have for a fellow radio amateur.

Just before Christmas 1994, I held the callsign G7OTH and had been trying to gain some speed with the Morse to get a G0 call.

Despite spending up to two hours a day in front of my computer with one of the better Morse trainers, I just could not get my receive speed above 10w.p.m. No good for the test! I gave up after sticking at that speed for two months.

At the end of January, I was in a QSO on 144MHz with Peter G0SLN and happened to mention my Morse disaster. Peter then said that he needed some Morse practice as he was a little rusty and we arranged to do some practice on an evening. Unfortunately, I live in a radio black hole and my local GB2RS is right down in the noise, so the help from Peter was gratefully received.

Peter duly called me the next evening and we had four hours of Morse practice, during which I improved more than I had in the whole three months of slogging away with the computer. That was to set the trend and for the next three months until my test, Peter and I were to be found on 144MHz every night for up to four hours at a go, bashing away on the key.

Not only did Peter give me most of his free time, he also gave me his Hi-Mound key, a practice oscillator and copies of 'How To Learn Morse Code' books. Peter organised me a test date at a local-ish test centre, took me to the Peterlee amateur radio club for practice with Bill Raine G4RXR, one of the Morse examiners and also took me down on the day of the test, all at his own expense.

Not only that, but since passing the Morse, Peter has helped me a great deal in setting up my station, giving me not just advice, but also a large a.t.u., magnetic loop antenna, coaxial cable, a new iambic keyer, two sets of paddles, heavy duty components to make a second a.t.u. and countless other pieces of kit. Not once did he ask for payment of any kind. Thanks to Peter I have managed to assemble a credible h.f. station, even though I'm not working at the moment.

Without Peter's help I am sure I would not have my Class A callsign. He really has gone out of his way to help me onto h.f. especially considering he is registered disabled himself and sometimes has terrible trouble with a straight key due to hand pains. It really gives me heart to think that there are still amateurs like Peter who are willing to go so much out of their way to help someone. Hopefully I can return the favours someday.

Thank you Peter, you make me proud to say I'm a radio amateur.

Paul Moss G0UYF, G7OTH
Tyne & Wear

Editor's reply: Well done Paul and to all your helpers. Perhaps we could ALL help a little more in this respect. It's several years since I helped another amateur through the Morse test with tutoring...but the rewards (in satisfaction) are there to be had. After all...that's surely what our hobby is all about. And don't forget that friends like Paul's can be nominated for a *PW* Elmer Award.

★★★★ STAR LETTER ★★★★

Closure of GB2SM

Dear Sir
It was a great disappointment to read in your October 'Keylines' editorial of the decision to close-down GB2SM.

The reported comments by Graham Farmelow referring to the reaction of Radio Amateurs as 'We were expecting opposition from the Radio People' is not far short of a crude insult.

I note he intends to replace GB2SM with a data communication link system 'super highways'. This will result, presumably, in installing silent, impassive, impersonal and totally inanimate v.d.u. screens exchanging largely meaningless jargon and data, or possibly even two 'Nintendo' terminals squabbling with one another.

How encouraging, stimulating and invigorating and how insulting to the intelligence and intellect of the future generation!

I suggest that all caring Radio Amateurs 'dedicated' or not should send their QSL cards and an s.a.e. to Sir Neill Cossons, asking what are the **REAL** reasons for the closure of GB2SM.

R. P. Neave G4DAN
Essex

Editor's reply: I'm pleased to report that GB2SM has been saved! During the RSGB's 'Young Amateur of the Year' award ceremony at the HF Convention on Sunday October 9 it was announced that although GB2SM will close on November 7, it is to be completely refurbished and will reopen at the Science Museum site in London at a date to be announced (see 'Keylines' Editorial for further comment).

John Scott-Taggart

Dear Sir
One of your readers recently sought information concerning the ST900. John Scott-Taggart designed a number of receivers, details of which appeared in the magazine '*Popular Wireless*'.

As a very young schoolboy I acquired a batch of copies and, if I remember correctly, after the lapse of many years, this particular receiver was described in 1935/1936 shortly before the magazine ceased publication,

Scott-Taggart invented a special valve which enabled two stations to be received at the same time, intentionally I may add, tuning arrangements being provided both at the back and at the front of the cabinet. I think one programme would be on the m.w./l.w. bands and the other on the s.w. bands. How this was done eludes me, perhaps there were virtually two receivers in the box?

Another regular contributor to the magazine wrote under the initials W.H.S. When in the 1950s, one or two photographs of this old equipment appeared in *Short Wave Magazine*. I realised I had seen them before and it became clear to me that the anonymous contributor had been none other than the late Howard Thomas G6QB!

W. Parkin G8PBE
Cheshire

August Practical Wireless

Dear Sir
Just a very brief note of congratulations on the August issue which is really excellent that I have not got the appropriate words at my command to express it properly.

I was a bit late picking up my copy this month but I have just today had my first go-through and I am completely bowled over. In particular I like the new type and Artwork, but this is just one small point in what I consider to be the best issue yet.

Brian Fitzsimmons G0GGN
Colchester

Editor's reply: The Editorial team are pleased you enjoyed the 'Antenna Special' Brian. Readers have asked for more antenna-related articles...and we've got lots in the pipeline!

NEWS '94

Send in your news, photographs and product information to Donna Vincent at the editorial offices in Broadstone.

New From ICS Electronics

West Sussex based company ICS Electronics recently added three new AEA products to their range. The PK12 Packet Radio Controller, PK96 'High Speed' Packet Radio Controller, and the latest ICS-WeatherPlot up-grade for ICS-FAX III were all available for the first time at the Leicester Amateur Radio Show.

The first new product, the PK-12 is a 1200baud v.h.f. packet controller that measures just 147 x 134 x 34mm. The PK-12's size means it small enough to be portable or to fit into that last remaining corner of your shack. The manufactuers, AEA, have designed the PK-12 to be suitable for the newcomer to digital communications as well as to appeal to the established packet radio enthusiast. Its features include CFROM and DFROM commands that enable the user to program the PK-12 to accept or reject digipeater operation or connections as required. The PK-12 is available for **£139.95** including VAT.

The PK-96 is described as 'a high speed packet controller with the speed you need'. This single-mode data controller features 1200baud a.f.s.k. tone signalling, standard 18K of battery backed MailDrop memory, which can be extended to 110K and the manufacturer's say that the PK-96 eliminates bottlenecks and increases system capacity. The PK-96 costs **£239.95** including VAT.

The third new product is the ICS-WeatherPlot software up-grade for the ICS-FAX III. The FAX system allows synoptical (SYNOP) weather observation data to be received via radio and then plotted directly on a computer screen. The new software includes a library of user definable world maps and weather information that can be selectively plotted, after which the system will automatically plot Isobars and Isotherms. The ICS-WeatherPlot software doesn't operate in real time, it accumulates the information received and stores it for later plotting. West Sussex based ICS Electronics can supply the WeatherPlot software for **£89.95** inlcuding VAT.

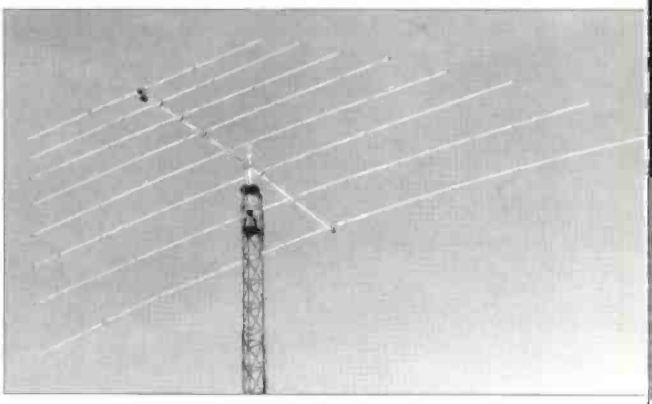
Additional information on the PK-12, PK-96 and the ICS-WeatherPlot software can be obtained direct from **ICS Electronics Ltd., Unit V, Rudford Industrial Estate, Ford, Arundel, West Sussex BN18 0BD. Tel: (01903) 731101.**

Cancelled Rally

The organisers of the Centre of England Rally - due to be held on Sunday December 11 1994 at the Sports Connexion Centre, Coventry - have asked the *PW* Newsdesk to announce that due to unforseen circumstances the event has had to be cancelled. They apologise for any inconvenience or dissapointment caused by the cancellation.

Licence Age Reduced

The Radiocommunications Agency have informed the *PW* Newsdesk of a change to the minimum age requirement for the Full Amateur Radio Licence. Following recent discussions it has been decided that holders of the Amateur Radio Novice Licence (A or B) who are between the ages of 10 and 14 and who have held the licence for at least one year can now take the examinations for a full licence.



Cushcraft Skylog

The Cushcraft Corporation of America have added a new antenna to their vast range. The ASL 2010 Skylog Periodic antenna is described as the answer for amateurs who would like a single antenna that can cover 14 through to 28MHz. The antenna design uses a single feed line and therefore there is no need to switch antennas when changing bands.

Features of the ASL-2010 include a boom that is 5.48m long, antenna gain of 6.4dBd and there are 8-elements, the longest of which is 11.58m. The ASL-2010 is made from aluminium and stainless steel and doesn't have traps so the wind load is significantly reduced.

The expected price for the ASL-2010 Skylog is £699 and more information can be obtained from the UK agents **Waters & Stanton Electronics, 22 Main Road, Hockely, Essex SS5 4 QS. Tel: (01702) 206835/204965**.

London Icom Dealers

Icom (UK) Ltd., have asked us to remind *PW* readers that the official London Icom dealers are as follows:

Dealer	**Telephone Number**
ARE Communications, Ealing	0181-997 4476
Haydon Communications, Edgware	0181-951 5782
Lee Electronics	0171-723 5521
Martin Lynch, Ealing	0181-566 1120
Radio Shack Ltd.	0171-624 7174

All Micro Show

Sharward Promotions will be holding their All Micro Show Radio Rally & Electronics Fair on Saturday November 12 at Bingley Hall, Staffordshire Showground, Weston Road, Stafford. The doors will be open from 10am until 4pm and there will be many exhibitors including The International Short Wave League, Ham Radio Products, Micro Discount, Microgenesis Ltd. and many more.

The entrance fee for the event will be £2 but children until 14 can get in **free.** There will be a talk-in on S22 and SU22 by the St. Leonards ARS and complimentary copies of *PC Mart* will be distributed throughout the day.

For more information you can contact **Sharward Promotions at the Upland Centre, 2 Upland Road, Ipswich, Suffolk IP4 5BT. Tel: (01473) 272002**.

Twrog's Rig Review

Twrog Press of Gwynedd, Wales have produced an A5 sized publication called *The Rig Review*. The 60-page *Rig Review* lists over 400 amateur band receivers, transmitters and transceviers sorted by manufacturer. The book covers over 25 years of equipment and describes each rig's main features and original price.

The Rig Review by GW4KYZ is available for £5 post free from **Twrog Press, Penybont, Gellilydan, Blaenau Ffestiniog, Gwynedd LL41 4EP**. A disk version of the publication is also available for £4 post free.

Scientific & Technical Library

The Public Domain Software Library Ltd., have just produced a new CDROM containg a collection of Scientific & Technical programs for DOS and Windows from their vast selection. The CDROM is supplied with a catalogue that lists all of the programs on the CD.

The catalogue is split into alphabetical sections giving the main category headings first and then subcategories where applicable. The subjects covered on *The Scientific & Technical Library* CDROM include Astronomy, Communications, Medical/Health, Scientific and Word Processing and of course amateur radio and electronics.

To obtain your copy of the *Libris Britannia Issue 4 The Scientific & Technical Library* send £39 to **The Public Domain Software Library Ltd., Winscombe House, Beacon Road, Crowborough, Sussex TN6 1UL. Tel: (01892) 663298.**

Equipment Stolen From MARS

The Midland Amateur Radio Society (MARS) unfortunately had their club headquarters broken into over the weekend of October 15/17 1994. The following equipment was stolen:

Icom IC-735 with mic., serial no. 16621
Yaesu FT-890 with mic. and a.t.u., serial no. 2121169
Tokyo Hy/Power a.t.u.

If you can offer any information call **Birmingham Police** on **0121-626 6162** or **Norman Gutteridge G8BHE** on **0121-622 3619** (days), or **0121-422 9787** (eves).

Martin Lynch Celebrates Four Years

On November 26 1994 Martin Lynch and his team will be holding an Open Day at their showroom at **The Electronics Hobbies Exchange Centre, 140-142 Northfield Avenue, Ealing, London W13 9SB**. The Open Day commemorates four years of successful trading in London for Martin G4HKS and celebrates Yaesu UK's first year in this country.

Martin and his team will be joined on the day by representatives from Yaesu, Trio-Kenwood, Icom, Alinco and Yupiteru. Books from the Radio Society of Great Britain will be on sale, as will *Practical Wireless* and *Short Wave Magazine*.

The doors will be open from 8am until 8pm and free food and refreshments will be available throughout the day. You will have the opportunity to see the latest equipment working and the chance to buy equipment at discounted prices. There will also be several raffles taking place with the chance to win equipment and accessories.

Martin says that judging by the interest shown in last year's shop opening this year should be an even bigger success. Not only will the Open Day give you the ideal opportunity to meet the 'Lynch Mob' but the manufacturers of the equipment that you use. So, make a date in your diary to visit The Electronic Hobbies Exchange Centre on November 26.

Satellite Update

As reported in the November issue of *PW* the Radio Amateur Satellite Organisation of the United Kingdom (AMSAT-UK) are seeking donations to help with the AMSAT-UK Phase 3D Construction Fund. A slip of the Editorial keyboard meant that we said that only 5% of the AMSAT membership had donated to the fund, this was in fact incorrect and should have read 5% of the **AMSAT-UK** membership. The Editorial team apologise for any embarrassment caused by this slip-up.

Konrad DG7FDQ, part of the Phase 3D Satellite building team, with the body of the new satellite, taken at Orlando Integration Site.
(AMSAT-NA photo, courtesy of AMSAT-UK)

Young Amateur Of The Year

The 1994 Young Radio Amateur of the Year ward has been awarded to 17 year old Robert Aley 2E1AXZ/G7SRR from March, Cambridgeshire.

The award was presented to Robert, together with the first prize of £300 by Roger Louth, the Radiocommunications Agency's Director of Mobile Services. The presentation was made at the Radio Society of Great Britain's HF Convention in Windsor on October 9.

Robert also received a certificate signed by Michael Heseltine, President of the Board of Trade and a trip to the Radiocommunications Agency's Radio Monitoring Centre at Baldock in Hertfordshire. Robert is a keen Novice Instructor and has given a number of talks to clubs and Scout groups and has even promoted amateur radio through his local library. His main interest is packet radio and Robert is an active member of the Amiga Amateur Radio User Group, he is also keen on construction.

The runner-up prize of this year's Young Radio Amateur of the Year was awarded to 16 year old Stephen Connor 2M1ARO/GM0TET from Glasgow. Stephen was presented with a £50 cheque as well as an invitation to visit the Baldock Monitoring Station.

Stephen's main interest is in construction and in particular in equipment design. He has also been actively involved in last year's National Field Day and has taught Morse for Novice courses as well as setting-up a number of special event stations.

Can You Help?

Mr Davey-Thomas G3AGA is searching for the holder or next-of-kin of the callsign **G3MPD**. So far he has been able to find out that the call was issued in 1958 and has apparently been dormant for many years. The SSL has no record of the holder and the RA and RSGB have been unable to help. If anyone can help please contact **G3AGA, QTHR** or telephone him on **(01736) 710454.**

Prize Draw Winner

The winner of the £50 Prize Draw for the October 1994 issue of *Practical Wireless* is **Mr John Warner** from **Bedfordshire**. Don't forget if you place an order for books from this issue your name will automatically be entered into the £50 Prize Draw.

NOVICE Natter

For Radio Beginners of all Ages.

Elaine Richards G4LFM, PO Box 1863, Ringwood, Hants BH24 3XD.

This month Elaine Richards G4LFM reports on Scout stations, interference and announces the name of 1994 PW Elmer Award winner.

The Novice Natter PW Elmer Award

Many thanks to all those who entered the Elmer Award nominations, hopefully your log books are on their way to you. Choosing a winner was very difficult, but finally it's **Alan Turland G7LNV** who gets first place. He was nominated by Alan Timmins for his help.

Alan G7LNV is an instructor on a local Novice Course has shown how his shack works, loaned magazines, etc. Alan Timmins is an Horologist by trade and a fellow of the British Horological Institute (BHI). And over the weekend of September 16/18 the BHI held its annual Exhibition of Time at Upton Hall.

As the senior instructor in clockmaking and restoration, Alan Timmins was at the Hall over the whole weekend. So were the Amateur Radio Club of Nottingham running a special event station - GB2BHI.

Alan spent more time in the station that he did in the workshop! He became fascinated by the whole thing and ended up marking up all the countries contacted to show the public what was going on! His interest taken (and that's where Alan G7LNV stepped in and took over), they are now heading towards the RAE in December - so good luck!

Second prize went to **Robert Snary G4OBE**, who was nominated (blamed) by his Mum, Margaret for getting her involved and interested in the hobby. She now sports the callsign 2E1AQS and says that she has had great encouragement from Robert ever since she used to listen to him using the radio on his way home from work.

Finally, third prize goes to **Andrew Cowan GM0UDL**, who was nominated by Martin Gill, who also commends the Inverness Club for their friendliness.

Many thanks once again for all the entries.

Useful Book

The International Short Wave League (ISWL) have recently sent me a copy of a useful book. But before you all say that it won't be of interest because it's only for short wave listeners let me tell you about it. It's called *The Official ISWL/DXCC Country & Prefix List* and costs just £2.50.

The country lists in the ISWL book are arranged alphabetically by country - Afghanistan, Agalega & St. Brandon Is., Aland Island, etc. Each entry shows the country, its prefix, continent, CQ Zone and ITU Zone.

You'll find the lists useful when you start thinking about entering for awards and contests. The final section is the ISWL Contest Prefix List, which will be useful when you're trying to work out which country a callsign comes from. For example, 5R, you'll find is Madagascar, CO is Bolivia and UA2 is Kaliningradsk.

The booklet has 30 A4 pages and costs £2.50 (or 4 IRCS or postage stamps to the value of £2.50). For a copy write to **The International Short Wave League, 10 Clyde Crescent, Wharton, Winsford, Cheshire CW7 3LA**.

Interference

Leslie Biss of Knaresborough has written to me with a problem that effects most amateurs at some time - interference.

Interference problems come in many shapes and forms but one thing is certain, it can very tricky to eliminate unless you use a logical approach.

Leslie's station comprises a Trio R-600 receiver that is fed by a loft mounted trap dipole. This is fed to the receiver via a switch box so the antenna can either be used as a conventional dipole or as a Marconi T on the lower frequency bands.

Leslie has many interests in radio, but of late has been particularly keen on searching out the various maritime beacons that may be found between the long and medium wave broadcast bands. In order to find these beacons he sets his receiver to s.s.b. but is suffering from extensive heterodyne whistles throughout the band. He's put some thought into the problem and thinks it may well be due to television timebase harmonics.

The real problem though is how to overcome the interference. The usual advice when tackling interference is to find the source and eliminate it. However, I don't suppose that will be a very popular solution in all cases if the other half is trying to watch their favourite 'soap' or the football! What you have to do is **minimise** the level of the interference.

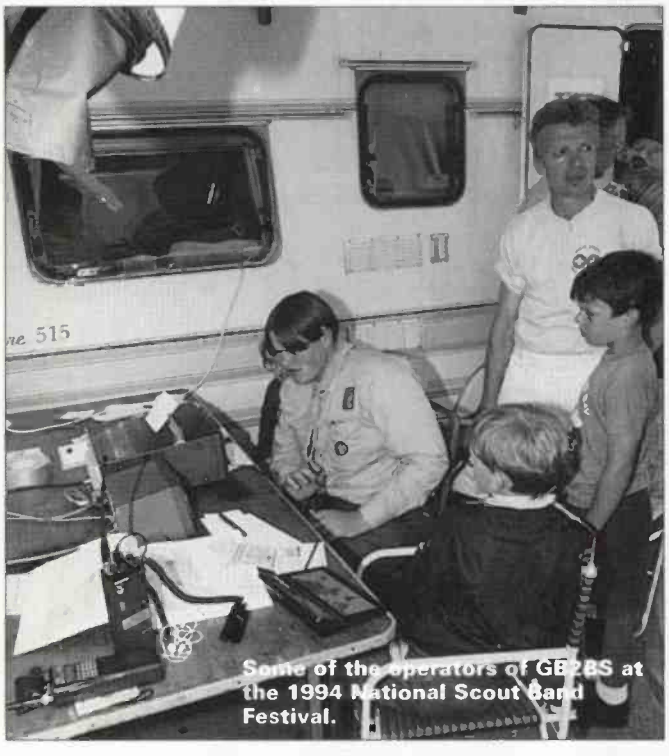
The first place to start is the antenna, as this usually has the greatest effect on interference levels. Loft mounted antennas are always very prone to interference because, not only is the wanted signal

Scouts On The Air

Six amateur radio Novice licensees had a busy day manning the special event station GB2BS at the 1994 National Scout Band Festival. The station was used to show 2000 Scouts what amateur radio is all about.

The operators of GB2BS included Matthew Kiteley 2E1CVC, David Hazeldine 2E1CVB, Nick Massey 2E1CRZ, Martin Stribblehill 2E1CSU, Ian Rogers 2E1CSW and Philip Lewis 2E1AQG. They are all members of the Scout movement.

It was Jamboree-On-The-Air (JOTA) over the weekend of October 15/16 and I'd really like to hear what the different groups got up to and how well (or not) they did. So, if you were operating a JOTA station, drop me a line with any stories (printable ones please!) and I'll include them in a future issue.



Some of the operators of GB2BS at the 1994 National Scout Band Festival.

weaker but, the antenna is close to all the main sources of interference, e.g. mains wiring and TV antennas.

In my experience, even a short external antenna is preferable to a loft antenna. It's also worth making sure the antenna is fed with screened cable to further reduce the chance of interference pick-up as the lead enters the house. If you're using a simple random wire antenna it's well worth considering a balun to perform the conversion to a screened cable.

If you're still having trouble after you've sorted the antenna you need to turn to filtering systems to maximise the wanted signal and reject the rest. There are three basic options here: **1. receiver filtering, 2. external analogue filters** and **3. external digital filters.**

The first step is to set your receiver to the narrowest bandwidth useable with the wanted signal. If it's c.w. for example you can happily work with a 300Hz bandwidth. You will often find that this single step provides all the interference reduction you need. If you're still having trouble, then the you can use your receiver's pass band tuning (if its got this) to adjust the position of the wanted signal within the 300Hz bandwidth. If, like many, you don't have pass band tuning or a narrow filter, you will have to use some external filtering.

Analogue filters come in several forms but probably the most popular are the Datong FL2/3 series. These well proven units have an excellent range of features, which include notch, peak and adjustable band pass filters. The FL3 even has an auto tracking notch filter. This is a great boon, as it can be very frustrating to have to continually readjust the manually tuned systems.

The latest development in external filters are the new Digital Signal Processing (DSP) systems. These are small processor controlled systems that provide remarkable noise reduction performance. One of the main advantages of the technology is that the filter can adapt itself to suit the signal.

For example a DSP notch filter can generally track and effectively eliminate around four or five heterodynes (whistles) at the same time. The only point you need to watch is that is doesn't take out the wanted c.w. signal as well!

The disadvantage with DSP is the price. They tend to be significantly more expensive than their analogue counterparts.

First Steps

For this month's edition of **First Steps** I'm looking at contests. So, don't forget to drop me a line if there's any aspect of amateur radio you'd like clarified.

Contests

The subject of contests is dear to many amateurs hearts and hated by an equal number. So, whichever side of the fence I'm on I shall upset someone!

Contests can be fun, they can also be a nuisance and newcomers to the bands aren't always welcome. This is mainly because newcomers may not be sure of what they should be doing and serious contest groups don't have time to waste.

One of the best ways to learn about contests is to get involved with a radio club entry. By doing it this way there will be people around to show you the ropes (quite literally if you are putting up huge antennas on the top of a windswept hill!).

Basically, the object of contests is to collect the greatest number of points in a given time using your station on the bands and modes permitted in any one of the many contests held during the year. You usually get points for each different contact you make and these points are multiplied by the number of different countries you contact.

Sometimes you get more points the further the station is away from you. Either way you want to contact as many people as possible in the quickest possible time. You have to exchange certain information to prove the contact was made, usually callsign, contact number, RST report and locator.

If you intend on operating a contest station, or contacting a contest station, you must have all this information worked out first. They won't thank you for dithering around. You'll also find that nearly all the RST reports are 599 no matter what state the signal is!

If you tune around during a busy contest you'll hear the station who was on the frequency first (usually they called CQ first) running the show. As they finish a contact everyone else starts saying their callsigns, the original station may say something like 'the LFM station go ahead'. If that's not you keep quiet until the contact is over and then try again.

Each contest station only wants to speak to you once on each band during the contest so they run 'check logs' to make sure they don't waste time on duplicates, so don't be offended if they start to exchange details, realise they've already spoken to you and cut the contact short.

Another thing to remember is that most contest stations don't want to chat about anything other that the necessary information. Sometimes during 24 hour contests on the quieter bands, stations have been known to spend a bit longer on a contact, but not often.

If you feel up to a challenge, talk to your local radio group about joining them on the next 24 hour contest. They're hard work but can be good fun.

Although, I must admit it's a few years now since I sat in a tent on top of a cold and windswept hill on a very cold and very wet March night calling CQ for hours on end - it's called getting old I think!

That's it for this month, keep sending your letters, I'm always pleased to hear from you.

Elaine G4LFM

CLUB Spotlight

Moved into a new club room? Won a contest? Got a funny story or news of a special event?
Send your information to the 'Club Spotlight' newshounds Donna Vincent and Zoë Shortland at the PW Offices.

Mid Glamorgan Amateur Radio Group

The **Mid Glamorgan Amateur Radio Group** now have a Novice course up and running, and are looking for prospective Novices for when the course finishes in March!

Members of the Mid Glamorgan Amateur Radio Group meet at Aberkenfig Sports & Social Club, Aberkenfig, Nr. Bridgend.

Activity nights are on the first Thursday in the month with a social drink on the third Thursday. Morse classes are held every Thursday as and when required.

For further information on the club or if you just fancy a visit (remember, 'It's good to talk'), you can contact **Tom GW0TOM** or **Roger GW3XJC** on **(01656) 733729**.

CARS Help Children

The **Crowborough Amateur Radio Society** (CARS) are running a Special Event Station in aid of 'The BBC Children In Need Appeal' on November 24/25/26 1994 at Jarvis Brook Social Club, Crowborough Hill.

On November 24 there will be a quiz evening (ample car parking available) and on November 25 and 26th CARS will set up their caravan in the car park of the social club. They intend to erect an antenna mast to support a tri-bander and an X700 collinear for v.h.f.

A log will be kept with a special note of the different countries worked. The purpose of this is to count up the total number of countries worked at the end of the period to calculate the monies pledged. The Reverend Iain Morrison, s.w.l. of Jarvis Brook and William Pickering G4DRB will act as scrutineers.

The contact for the Crowborough Amateur Radio Society is their Secretary **Mick Smith G6UUO** on **(01892) 661807**. The club meets on the 4th Thursday of every month at The Plough & Horses, Walshes Road, Jarvis Brook.

History of Spalding Society

The **Spalding & District Amateur Radio Society** was founded in May 1965 by Roy Harrison G3VPR, Dennis Hoult G4OO and the late Sam Whitley G3XBS.

With no real fixed abode, the club moved from time-to-time. They moved from the Grammar School, to the Granary at the QTH of G4OO, to the Ship Albion public house. Then they moved to the Teacher's Centre at Pinchbeck, to the White Hart Hotel an finally back to the Ship Albion public house and finally to their present premises, at the Club Room, Old Fire Station, Albion Street, Spalding.

Members of the Spalding & DARS meet every Friday evening at 7.30pm, and visitors are always most welcome to attend. Current membership of the Spalding & DARS is around 50 and has been at this level for the past few years.

There is a pleasant mixture of members who have a common interest in radio as a hobby. Some come from the field of professional communications, some from other professional fields and other members are from service industries entirely unrelated to radio or electronics.

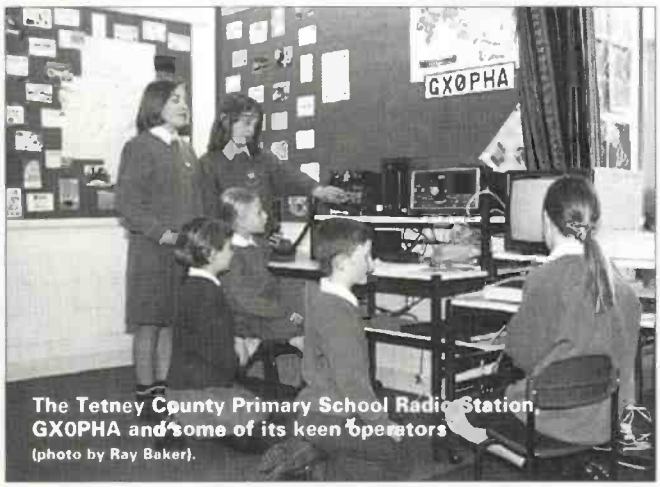
If you would like to find out more, you can contact **Dennis Hoult G4OO, QTHR** or you can 'phone **(01775) 750382.**

Club Logos

When sending in items for inclusion in 'Club Spotlight', if your club has a logo we would also appreciate a copy, so that it can be used when featuring your club. If there is a history behind your Club Logo we'd like to know about that as well.

Lincolnshire School Radio Club

The **Tetney County Primary School** in Lincolnshire has operated its own radio station, GX0PHA for the past four years. The station evolved after Headmaster Paul Hewitt G0NUE brought his own radio equipment into the school for a 'one off' demonstration to illustrate a project on communications. Paul had thought that the interest in Amateur Radio of nine to eleven year olds would be minimal and short lived, but he was wrong.



The Tetney County Primary School Radio Station, GX0PHA and some of its keen operators (photo by Ray Baker).

The original GX0PHA equipment set-up consisted of G0NUE's own radio gear. However, over the years the school has built-up its own collection by buying equipment with the help of local company sponsorship. The station is activated on Tuesdays and Thursdays between 1500 and 1615 hours by Paul and up to four pupils at a time.

The primary object of GX0PHA is to give every one of the pupils in the Tetney County Primary School a pleasurable experience and an insight into what the hobby of amateur radio is all about. It's hoped that if the pupils get a liking for the hobby they may follow it up in later life.

The station GX0PHA has generated a lot of interest in the local community, as it is one of only a few primary schools with a radio station. The BBC *Waveguide* program carried a broadcast all about the station in 1993. Paul and his radio club members have recently got involved with packet radio using the callsign GX0PHA @ GB7GBY.

A booklet called *Tetney Beam Station* which gives a history of one of the most important landmarks in the development of world-wide communication systems has been written by Paul Hewitt. The booklet is available from **Tetney County Primary School, Humberston Road, Tetney, Grimsby, South Humberside DN36 5NG** for **£2.75 including P&P**. All the proceeds that are raised from the publication will be used to continue developing GX0PHA.

Pontefract & District

The **Pontefract & District Amateur Radio Society** meet on Thursdays at 7.30pm in their club room at the Carleton Community Centre, Carleton, Pontefract. The society is always happy to receive new members and visitors to the meetings are welcome.

The members of the Pontefract club have recently completed the building and setting up of their new h.f shack. The funding for the new shack has been made possible by the members fundraising and working together. There will be an official opening of the h.f. shack in the near future.

For more details on the Pontefract & District Amateur Radio Society contact **Colin Wilkinson G0NQE** on **(01977) 677006**.

Southgate Amateur Radio Club

Since it was set-up in 1936 as the then Southgate and Finchley Group of the RSGB, the aim of the **Southgate Amateur Radio Club** has been to hold meetings, bring together amateur radio and electronics enthusiasts and to keep alive the spirit of Amateur Radio.

The Southgate Club provide a meeting place and forum for those with interests in radio so that they can share their achievements, interests and discuss their problems. The club's activities inlcude talks on technical subjects, equipment sale, DF hunts, contests, informal meetings an demonstration stations.

Membership is open to all who have an interest in the many areas of amateur radio. Visitors and new members to the club are always welcome.

Meetings of the Southgate Club are held on the second and fourth Thursdays of the month. The second Thursday meetings usually take the form of a guest speaker, while the fourth Thursday meetings are informal but often carry a co-ordinated theme or activity.

If you would like to become a member of the Southgate Amateur Radio Club you should go along to Winchmore Hill Cricket Club, The Paulin Ground, Firs Lane, Winchmore Hill, London N21 3ER. All enquires regarding the club should be made to **Brian Shelton G0MEE** on **0181-360 2453.**

Club Rally Cancelled

The **Leeds and District Amateur Radio Society** are sorry to announce that their Electronics and Computer Rally, due to take place on December 4 has unfortunately had to be cancelled due to circumstances beyond their control. The club would like to apologise for any inconvenience caused by the cancellation.

Don't forget, a full 'Club News' listing is available from the *PW* Editorial Offices for a large stamped, self addressed envelope, marked 'Club News' Sheet.

CQ School Clubs

'Club Spotlight' would like to hear from anyone who is either a member or is involved with the running of a school radio club. It doesn't matter whether or not you have got your own school callsign or have only just got going -we are still interested in what **YOUR** club is up to!

There are many school clubs around, and our Editor Rob G3XFD helps out at one. Rob looks after the Radio Society at Clayesmore School (G0RSC), at Iwerne Minster between Shaftesbury and Blandford here in Dorset. We think there must be many people with interesting stories and news to tell about their clubs. So, write and tell us what you're up to and best of all...send us a photograph of your club and its members!

RADIO Diary

*** *Practical Wireless* & *Short Wave Magazine* in attendance**

If you're travelling a long distance to a rally, it could be worth 'phoning the contact number to check all is well, before setting off.
The Editorial staff of *PW* cannot be held responsible for information on Rallies, as this is supplied by the organisers and is published in good faith as a service to readers.
If you have any queries about a particular event, please contact the organisers direct.

November 12: The All Micro Show 8, Radio Rally & Electronics Fair is being held at the Bingley Hall, Staffordshire Showground, Weston Road, Stafford (A518 Stafford-Uttoxeter Road), AA signposted from Junction 14 on the M6. Doors open at 10am to 4pm. Entrance fee is £2 for adults and children under 14 free. As usual, there will be the local charity stalls, a licensed bar from 11am, refreshments, and free parking. **(01473) 272002.**

November 13: The Donegal/Tie Conaill Radio Club will be holding their annual mobile rally and junk sale in Jacksons Hotel, Ballybofey, Co. Donegal. Doors open at 12 noon and admission is £1. There is ample parking available. Also a bar, refreshments and food available all day. **Raymond EI9DM** on **(073) 37152.**

November 13: The Barnsley & District Amateur Radio Club will be holding its fourth Amateur Radio Rally at the Metrodome Complex in Barnsley Town Centre, less then two miles from Junction 37 M1. This is a **new venue**, all on one level with excellent disabled facilities, a licensed bar/restaurant and a separate cafeteria. The Rally will have all the usual amateur radio and computer dealers with radio clubs, specialists groups and a Bring & Buy. **Ernie G4LUE, QTHR. Tel: (01226) 716339** between 6-8pm and 6-7pm on Monday evenings.

November 13: The Midland Amateur Radio Society are holding their Radio/Computer Rally at Stockland Green Leisure Centre, Slade Road, Erdington, Birmingham. Doors open 10am, usual traders, local clubs, special interest stands, bring and sell tables, refreshments available and free car parking. Admission is £1. For further details contact **Norman G8BHE** on **0121-422 9787** or **Peter G6DRN** on **0121-443 1189 evenings.**

November 20: The Bishop Auckland Radio & Computer Rally will be held at the Newton Aycliffe Leisure Centre, Beveridge Arcade, Newton Aycliffe, Co. Durham DL5 4EM. Doors open 11am (10.30am for disabled visitors). **Nick G1XNI** on **(01388) 488533.**

November 27: West Manchester Radio Clubs 'Winter Rally' will be held at the usual venue of the Bolton Sports & Exhibition Centre, Silverwell St., Bolton (town centre). All the usual trade stands (over 75) societies, Bring & Buy etc., all at pavement level, with facilities for the disabled. Bar and refreshments available all day. Doors open 11.00am, 10.30am for disabled visitors. Admission £1, children free. **Dave G1IOO** on **(01204) 24104 evenings only.**

***November 27:** The Bridgend District Amateur Radio Club are holding their radio rally at the Bridgend Recreation Centre, Bridgend. Doors open at 11am (10.30am for disabled visitors). Food and refreshments are available all day. There is also a large Bring & Buy and talk-in on S22. Morse tests are available all day (photo ID req.). Further details from **Mike GW7NIS** on **(01656) 722199.**

November 27: The Coulsdon Amateur Transmitting Society are holding their Radio & Electronics Bazaar at HQ4 Purley Scout Group, Acess via public car park in Lion Green Road, Coulsdon. There is a flea market, sale of new and second-hand equipment and talk-in on G4FUR/P on S22. There will also be a lucky number raffle from admission ticket. Starts 10am to 1pm. **Andy Briers G0KZT** on **(0737) 557198.**

***December 11:** The Verulam Amateur Radio Club will be holding its Verulam Christmas Rally at the Watford Leisure Centre, which is located less than five minutes drive from the Junction of the M1 and M25 motorways. Trading will be from 10am to 4pm. **(01923) 222284.**

1995

January 28: The Lancastrian Radio & Computer Rally is being held at the University of Lancaster. There will be all the usual traders, refreshments, a bar and a Bring & Buy. There is excellent access to this rally, five minutes from either Junction 33 or 34 on the M6. Admission is £1. Doors open at 10.30am for the disabled and 11am for everyone else. Further details from **Sue** on **(01524) 64239.**

February 5: The South Essex ARS Radio Rally is being held at The Paddocks, Long Road, Canvey Island, Essex, (The Paddocks is located at the end of the A130). Doors open at 10.30am. Bring & Buy, trade stands and home made refreshments are available. Talk-in on S22. Admission is £1. Free car parking. **Roger G0LTO** on **(01268) 693786** or **Ken** on **(01268) 755350.**

February 12: The 4th Northern Cross Rally is being held at Rodillian School on the A61 between Leeds and Wakefield (near Jn. M1/M62). Doors open at 11am (10.30am for disabled visitors and Bring & Buy). £1 entry. There will be the usual dealers and groups, a bar and refreshments plus a Morse test on demand with two passport photos. Talk in on 144 and 430MHz. **Dave Gray** on **(0113) 2827883.**

February 25: The 10th Rainham Radio Rally is to be held at the Rainham School for Girls, Derwent Way, Rainham, Gillingham, Kent ME8 0BX. It is very easy to find from Jn. 4 of the M2 motorway the A278 or from the A2 from Rainham. Doors open at 10.30am, 9.30am for disabled visitors. There will be the usual trade stands, plus a few new ones selling computers and peripherals. Many special interest groups will be represented, ie. RAYNET, RNARS, Packet, KRGroup and Kent TV Group. There is also a talk-in on S22 GB4RRR, a Bring & Buy, licensed bar, and snacks and refreshments also available with somewhere to sit and eat. Admission is £1, children under 14 free. Further info. from **Martin G7JBO** on **(01634) 365980** any reasonable time.

***March 11/12:** The London Amateur Radio & Computer Show will be held at Lee Valley Leisure Centre, Picketts Lock Lane, Edmonton, London N9. Doors open at 10am to 5pm each day. There will be a trade show, lectures, Bring & Buy, on-demand Morse tests, disabled facilities, bars, restaurants, special interest groups and ample free parking. For further information you can contact **Steve White G3ZVW** on **0181-882 5125.**

Dayton '95 HamVention Holiday

"Gobsmacked' was the answer given by Arthur G0NDI and Anne Izzard G0NDJ when they learned they'd won TWO major prizes in last year's giant HamVention Prize Draw!

Please contact Andy Garside at **Gullivers Groups & Incentives, Fiddington Manor, Tewksbury, Gloucestershire GL20 7BJ** for further details of the *Practical Wireless* 1995 Dayton HamVention Holiday.

Arthur and Anne Izzard from Birmingham were one of the several husband and wife teams who joined the 1993 HamVention Holiday. However, although they expected to enjoy themselves they didn't think they'd more than cover the cost of their holiday with the prizes won from the giant draw (There's over $20 000 worth of prizes to be won every year!).

Although Arthur and Anne are both radio amateurs, your partner doesn't have to enjoy the hobby to get the most out of the *PW* HamVention trip. There's so much to see, so much shopping available and great company to be had on the holiday of a lifetime and it only costs £650 per person (based on sharing a twin-bedded room)!

You can join Rob Mannion G3XFD and the *PW* party when our 1995 holiday to the largest amateur radio show in the world starts on Tuesday April 25 at Gatwick when we fly out to Cincinnati. After transfer by coach to Dayton we'll be staying at the Englewood Holiday Inn for six nights. There's lots of places nearby to eat out, the Hotel has a good swimming pool and we're close to the HamVention itself.

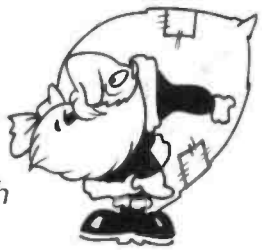
We've arranged a visit to the world famous United States Air Force Museum and there's also an optional shopping trip to see Cincinnati and the famous 'Skywalks'.

The £650 includes return flight, meals on the flight, transfers to and from Cincinatti Airport, six nights at the Holiday Inn, entry fee to the HamVention, excursion to Air Force Museum, all local taxes, US Airport taxes and the new UK Airport tax of £10. (We'll be pleased to arrange sharing of twin-bedded room if you're travelling alone).

For further details of the *PW* 1995 HamVention Holiday please contact our professional tour organiser Andy Garside. Alternatively, you can call Rob Mannion G3XFD on (01202) 659910 (between 1 and 2pm please) to discuss the holiday.

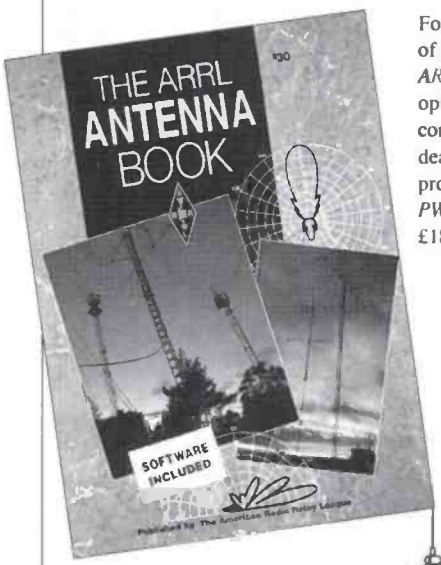
SPECIAL OFFER

BOOKS FOR CHRISTMAS

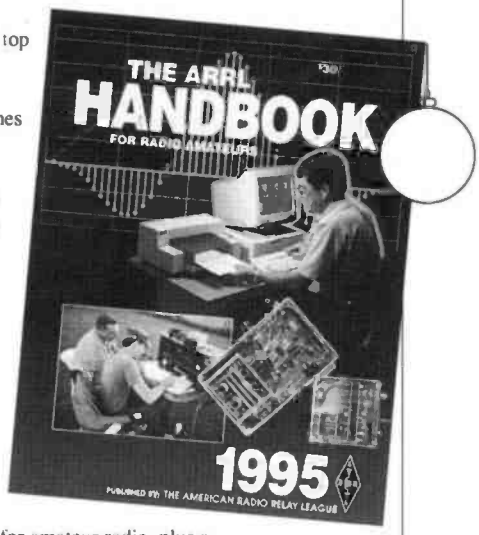


As Christmas is drawing near and we're all thinking of what we might like to find in our stockings, Rob Mannion G3XFD looks at some good reading which could find its way onto your bookshelf.

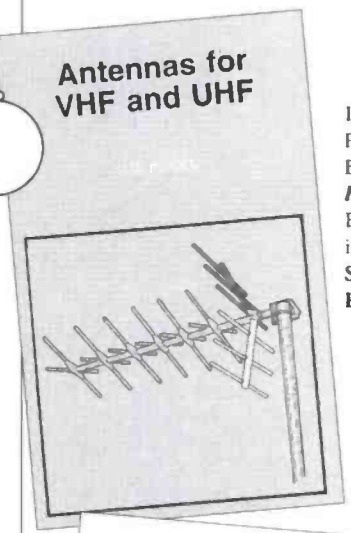
I've always considered that I must be a 'difficult' person to buy Birthday and Christmas presents for. However, my family say that it's not true...they have two clear choices....railway or radio books!



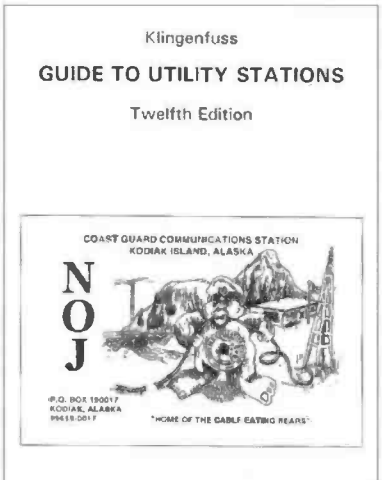
Fortunately, there's some excellent amateur radio books available and top of my list to Father Christmas would be the **new** 17th edition of *The ARRL Antenna Book*. I've said it before and I'll say it again...in my opinion this book is absolutely superb! **And**, the new 17th edition comes complete with an IBM PC software disk complete with programs dealing with the design and analysis of yagi antennas, forecast propagation, evaluate transmission lines and more. Available from the *PW* Book Service the 17th Edition of ***The ARRL Antenna Book*** costs £18.95 plus P&P £1 (UK), £1.75 (overseas).



Another one of my real favourites has to be *The ARRL Handbook For Radio Amateurs*. In fact, the ARRL describe the book in their pre-publication publicity material as being "a National resource" and an "instant classic". I agree, and as the 1995 edition is (to quote the ARRL "new from the ground up"...has to be a really good buy. It includes a Circuit Construction chapter, an AC/RF Sources section dealing with modern oscillator and synthesiser design, a special section on Mathematics for amateur radio, plus a Transceivers chapter. This section covers design, building and other considerations plus practical projects including a beginner's receiver, QRP transceivers and a 50W solid state linear amplifier. Available from the *PW* Book Service ***The 1995 ARRL Handbook For Radio Amateurs*** costs £18.95 plus P&P £1 (UK), £1.75 (overseas).

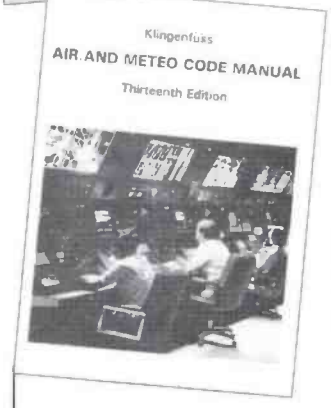


I'm always pleased to promote the work of *PW* authors, and Ian Poole G3YWX (who writes 'Specifications...The Mysteries Explained') has produced an excellent little book entitled ***Antennas For VHF And UHF***. The book, one of the budget-priced Bernard Babani publications, provides a well written, easy-to-read introduction to v.h.f. antennas. I reviewed it for our August 'Antenna Special' and I recommend it again. Available at the **Special Offer Price** of **£4.95** including P&P UK (overseas prices on request).



I'm a keen listener myself, and my trusty old Eddystone 750 keeps me in touch on the h.f. broadcast bands. So, with that in mind I must not forget that there are many really keen s.w.l.s out there clamouring for information.

To help the really keen listener, we've got two useful 'listening' books to offer you. The Joerg ***Klingenfuss Guide To Utility Stations*** - **12th Edition** is a must for the dedicated listener. The book covers from 0 to 150kHz, 1.6 to 3MHz and 3 to 30MHz, providing a comprehensive frequency, callsigns and details on a wide number of utility stations, including RTTY, FAX and weather stations. *534 pages*. Available from the *PW* Book Service at the **Special Offer Price** of **£14** plus £1 P&P (UK), £1.75 P&P (overseas).



The Klingenfuss ***Air and Meteo Code Manual*** - **13th Edition** has detailed descriptions of the World Meteorological Organisation Global Telecoms System operating FAX and RTTY meteo stations, message format with decoding samples. There's also detailed descriptions of the Aeronautical Fixed Telecoms Systems amongst others. *358 pages*. Available at the **Special Offer Price** of **£5** plus £1 P&P (UK), £1.75 P&P (overseas).

Happy Christmas reading everyone!

TO TAKE ADVANTAGE OF THESE SPECIAL OFFERS, USE OUR ORDER FORM ON PAGE 71

Kenwood TH-79E

Dual Band Hand-Held Transceiver

Richard Newton G0RSN is always delighted to try out a new hand-held, and in the case of the new model TH-79E from Kenwood...he seems to have found one which suits his needs very well.

Following the success and popularity of Kenwood's last dual band hand-held transceiver, the TH-78E, I was most excited when a new model was coming my way! This was when I was asked by the Editor and the team at *PW* to review the new Kenwood dual bander, the TH-79E.

The TH-79E is a **small** dual band transceiver, it covers 144 to 146MHz and 430 to 440MHz. And, with a dealer's modification, this coverage can be substantially extended.

The radio is supplied with a belt clip, carry strap, and a helical antenna with BNC fitting. There's also a 6V d.c. 600mAh NiCad battery pack, charger and the usual schematics and user manual.

First Impressions

My first impressions of the TH-79E was that it was a very well made, professional unit. It is small, but not so compact that it becomes unmanageable and is very smartly finished in dark grey plastics and metal.

The top of the TH-79E is home to the BNC antenna socket and two rotary controls. One of these is a two-in-one.

The single rotary control is the **On/Off/Volume** control. The dual control is the **Volume** control for the other band and the **ENC** control.

The ENC control has many uses, such as selecting memory channels. It also allows the operator to move up and down the v.f.o. ranges on each band, select tones and other advanced features.

There are two l.e.d.s on the TH-79E's top panel. These are both bicolour and show green on receive and red on transmit for each band.

Not Cluttered

The top panel on the transceiver is not at all cluttered. It would appear some thought has gone into making the controls easily accessible.

With the TH-79E there's no more trying to get large fingers into the small gap between even smaller controls! The **Press-to-Talk** control is well situated for both left and right handed operators, it's on the left side panel as the radio faces the operator.

I liked the rigid on/off slide design of the lock function switch. This shows a welcome return from having such a facility as a secondary function. I've never thought that this was a satisfactory method on hand-held transceivers.

No matter how good the design of a unit is to guard against accidental use, when kept in a pocket or clipped on a belt is always a risk. So, it's good to see a quick and easy method of key locking.

The **Speaker/Mic** and the external power sockets are to be found on the right hand side panel of the radio. This is as the unit faces the operator.

The rubber cover for the sockets caused a little inconvenience. If a Speaker/Mic was to be used permanently then I would suggest this be removed altogether, as when it's only hinged back it is cumbersome and unsightly.

Smart Indeed

The front panel of the TH-79E is a testament to the radio itself as it's well laid out, uncluttered and very smart indeed. At the top is a speaker, the audio out of which is of the highest quality.

To the left of the speaker are two rubber covered buttons. These are the **Output Power Level** control and the **Band** control.

The TH-79E offers versatile output power levels. With the supplied battery pack you can choose between 30 or 500mW or 1.5W.

On an external power source of about 12V d.c. the maximum output power is 5W. The other power levels remain the same.

I was supplied a large NiCad pack with the review radio. This pack supports 5W high power.

Although I could see a use for the high-power pack in certain circumstances, I didn't find it necessary. This was because most of the contacts I had were around town using simplex and via the local repeater.

Single Push

One thing really struck me with the TH-79E. It was that Kenwood have put all the most used facilities as single push controls.

Features such as **Memory**, **VFO**, **Lamp**, **Reverse** frequency monitoring and adjusting output power can be done with the single push of a button. It was marvellous!

The TH-79E offers a total of 80 memory channels. Each of these can be given a seven character identity.

The identity can be displayed instead of the frequency. So, I used it to programme in the callsigns of the local repeaters, once set up this can be toggled on and off very easily. The TH-79E has a comprehensive character library which is used when setting this feature.

Menu Key

Situated next to the DTMF keypad is the **Menu Key**. This gives the user access to the more advanced functions.

When using the Menu key, the functions and appropriate options are displayed. All you have to do is choose the one you want. Nothing could be easier (honestly!).

The **Squelch** control I was originally sceptical of. To use it you press a button and then rotate the ENC control to set the squelch. Actually in practice I found that this method was more than adequate.

Main Features

The TH-79E has the main features of most modern hand-helds. These include DTMF paging and DTSS squelch control, this uses DTMF tones to open the squelch only when a corresponding code is received.

Perhaps the better known way to control the squelch is CTCSS. The TH-79E supports CTCSS on transmit as supplied, this is needed for some repeaters.

If you desire CTCSS on receive, to enjoy the full CTCSS facility, it means that an optional extra has to be purchased. The optional CTCSS unit has to be fitted into the side panel of the TH-79E.

To Kenwood's credit they have made the fitting of the CTCSS unit as simple as possible. There is a hard plastics cover on the side which is easily removed and the CTCSS unit is simply plugged in.

Features Impressed

I would like to mention the features that I found on the TH-79E that impressed me the most. The first is the display.

The display is the familiar l.c.d. type. However, it's large and the characters are well defined and bold.

The main display read-out is made up of small l.c.d. dots, making the number or letter displayed very easy to read. Just about everyone I showed this radio to commented on how good the display was.

The large display can be back lit with a very effective green back light. This can be set to remain on for about five seconds after the last control is used, or toggled on permanently.

The other innovative feature of the TH-79E has to be the guide feature. And I'd better explain how I discovered this wonderful feature!

I had just been given the radio to review, I had taken it into work to get acquainted so to speak. I had found that programming the memories was so straightforward, I had not taken the handbook with me.

Unfortunately, I made a mistake and wanted to erase the memory channel. Do you think I could work out how to do that?

There wasn't a chance, **until** I saw a key labelled **Guide**. Well, I thought.. I'll give it a go! There, to my amazement, was a potted version of the handbook scrolling across the radio's screen. I erased the memory without further ado.

Previous Reviews

Those of you that have read any of my previous reviews may remember that my wife, Diane, does not share my enthusiasm for radio. This makes Diane a very useful asset when writing a review, as I can get a totally objective view of a radio from her!

When I showed Diane the TH-79E she was visibly impressed with the cosmetic design. More amazingly, after I had recounted the story of the Guide function she took the radio from me.

Before I could blink Diane was scrolling through the Guide menu. Here was a lady who although she'd never touched an amateur radio before had, in five minutes, programmed not only straight forward memories, but ones with split frequencies! Unfortunately she is still declining to take the RAE!

Easy To Understand

I don't think that I've ever come across a more easy to use, easy to understand radio with so many advanced features. The versatility of an 'all singing all dancing' hand held, is so often over shadowed by great skill to use it. Not so with the TH-79E!

The TH-79E was my constant companion for three weeks, and I found it to be a wonderful little radio. I had countless contacts using it, I never once received anything but a perfect audio report.

Those who know me, know I speak as I find and this is how I write a review. I have to say that as a rule I find that Kenwood manufacture radios to the highest quality, the TH-79E is no exception.

Kenwood have seemed to have concentrated on trying to get a balance between having advanced features and ease of operation. In my opinion they have gone a long way towards achieving this.

It was a pleasure to operate the TH-79E. I was only sorry to have to hand it back!

My thanks for the loan of the TH-79E go to Trio-Kenwood (UK) Ltd., Kenwood House, Dwight Road, Watford, Herts WD1 8EB. The TH79E is availble from any Trio-Kenwood approved dealer for £449.95.

PW

Accessories, including a useful soft carrying pouch are available for the TH79E.

Manufacturer's Specifications

General	
Mode	f.m (F3E)
Grounding	Negative ground
Dimensions	56 x 129.5 x 24.5mm (w x h x d)
Weight incl. supplied accessories	Approx. 325g/11.5oz
Microphone impedance	2 kΩ
Antenna impedance	50Ω
External Power	5.5-16V d.c.(13.8V d.c.)
Frequency steps	5, 10, 12.5, 15, 20 or 25kHz
Useable temperature range	-20° to +60°C
Transmitter	
Output power	30, 500mW and 5W (13.8V d.c. supply)
Modulation	Reactance
Maximum frequency deviation	within ± 5kHz
Spurious emissions	-60dB or less
Receiver	
Circuitry	Double conversion superheterodyne
First intermediate frequency	38.85MHz (v.h.f.) 45.05MHz (u.h.f.)
Second intermediate frequency	450kHz (v.h.f.) 455kHz (u.h.f.)
Sensitivity	0.16µV or less (v.h.f.) 0.18µV or less (u.h.f.) 12 dB SINAD
Squelch sensitivity	0.1µV or less
Selectivity	12kHz or more (-6dB)
Selectivity	28 kHz or less (-40dB)
Audio output (10% distortion, 8Ω load)	200mW or higher

The Design of ATTENUATOR NETWORKS

Vincent Lear G3TKN explains various designs for atteunuator networks.

An attenuator network is a device for introducing a specific loss between a signal source and a matched load. The loss introduced by the attenuator must be constant irrespective of the frequency of the signal source. This means that the attenuator network must be made up of pure resistances only, without reactive components (i.e. inductors or capacitors) in the circuit, since their reactances would change with frequency.

It's also important that the attenuator network does not upset the matched condition that would be expected to exist between the signal source and load. In other words, if we have a 50Ω output impedance from our signal source, the load into which this is feeding is also 50Ω. Under these conditions our attenuator network must have a characteristic impedance of 50Ω.

Important Relationships

Before I can go into the design of the attenuators, it is important that the relationships between voltage, power and decibels is fully understood. So, let's look at the following formulae:

$$dB = 10 \log P1/P2$$

This formula enables us to express a power ratio in decibels given two relative power levels. If P1 is greater than P2, then the answer will be positive, and if P1 is less than P2 the answer will be negative.

$$dB = 20 \log V1/V2$$

This particular formula enables us to express two voltage ratios in decibels. If V1 is greater then V2 the answer will be positive and vice versa, as in the above case.

However, in the design of attenuators, we generally decide how much attenuation (in dBs) we want from a particular network, and therefore to calculate the voltage ratio that this is equivalent to. This then enables us to use the formula described later.

If we let the ratio of V1/V2 = N, then the second formula above can be rearranged to give:

$$N = (\text{antilog of}) \; dB/20$$

For the non-mathematical it's not difficult, you simply decide how much attenuation you require, divide this by 20, then use the antilog - sometimes inv (shift) log function - on the calculator. The answer you get, will tell you the voltage ratio that this attenuation is equivalent to.

For example, let's suppose that we wish to know what the voltage ratio is for 10dB. Using the above formula, dividing this by 20 gives 0.5, and the antilog of 0.5 is 3.162. This will be the value of N that will be used in the later formulae.

Unbalanced Networks

The T and p attenuator networks are shown in **Figs. 1** and **2**. These are unbalanced networks, as they both have a common terminal that can be earthed. The balanced versions are shown in **Figs. 3** and **4**, but only the unbalanced versions will be considered here.

There is a difference in the function of the T and p networks and either may be used in a particular application. However, for a given characteristic impedance it will be generally found that one circuit yields more common or readily available value resistances than the other.

Standard 5% tolerance high stability resistors are acceptable in nearly all cases of simple attenuator designs. The variations in attenuation will be no worse than 0.5dB, and any mismatch in characteristic impedance will be in the order of only 5% or so.

Series Resistors

The diagram **Fig. 1**, shows that the two series resistors have equal values, these are shown as R1. The shunt resistor is shown as R2. To calculate the values for these resistors the two stages below should be followed:

1. Calculate 'N' (as shown previously) for the attenuation required.
2. Calculate R1 and R2 from the following formulae, when Rc is the characteristic impedance of the network.

$$R_1 = R_C \frac{N - 1}{N + 1}$$

$$R_2 = R_C \frac{2N}{(N * N) - 1}$$

For example, if you wish to calculate the values of R1 and R2 for a T network to give 15dB attenuation and have a characteristic impedance (Rc) of 50Ω. This is how you do it:

Using N = (antilog of) dB/20 where dB is 15 in this case, gives N = 5.623.

The nearest preferred values would give us 33Ω and 18Ω.

Equal Values

If we refer to **Fig. 2** for the p network attenuator, we'll see that R1 is the single series term, and the shunt resistors R2 have equal values.

A value of 'N' can be calculated in the same way as shown previously, and the values of R1 and R2 calculated from the following formula, by allowing Rc to be the characteristic impedance of the network.

$$R1 = Rc \frac{(N * N) - 1}{2N}$$

$$R2 = Rc \frac{N + 1}{N - 1}$$

Here's an example:- Let us suppose that we wish to again calculate an attenuator network to give is 15dB attenuation with a 50Ω characteristic impedance, only this time as a p network.

From the example we've worked the nearest preferred values would give 150Ω and 68Ω. So you'll now realise that the T network gives calculated values that are closer to the preferred values, than the p network for this particular example.

Improve Performance

Attenuator networks can sometimes improve the strong signal handling performance of receivers under certain conditions. The 7MHz band in the evening is a typical example. The improvement is achieved by reducing the input signals to a level that prevents them from driving the r.f. and mixer stages into non-linearity.

Many transceivers in fact have switchable attenuator networks included in their front end. On some models reception of a weak signal, on 7MHz during the evening, would be impossible without the attenuator switched in.

It's generally accepted that one S-point is equal to 6dB change in signal level. By switching in a known amount of attenuation, an S meter on a receiver can then be checked and calibrated. However, if the gain of the receiver is not constant across the different bands, individual calibration checks will be necessary for each band.

To sum up, good quality, close tolerance, high stability resistors should be used for attenuation networks. In the applications above, power ratings of 0.25W are adequate. The network should ideally be built in a screened enclosure to ensure minimum leakage.

PW

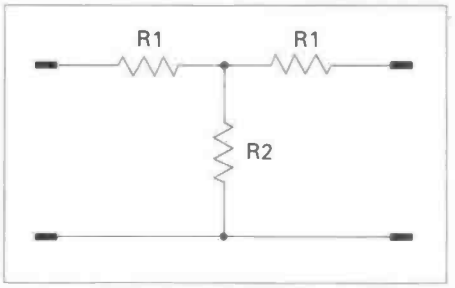


Fig. 1: An unbalanced T network.

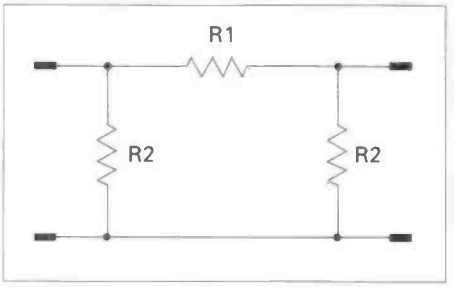


Fig. 2: An unbalanced p network.

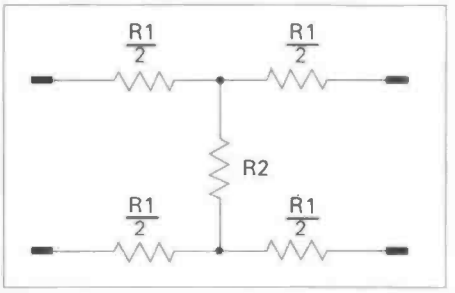


Fig. 3: A balanced T network.

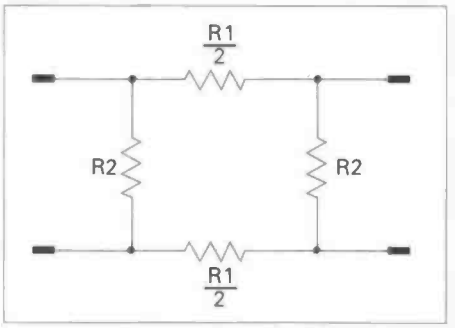


Fig. 4; A balanced p network.

Further Reading

'Maths For The RAE'
Ray Fautley dealt with transposition of formulae on pages 32-33 in the November 1991 issue of *PW*. This was only one part in his series presenting maths at RAE level.

'Getting Started The Practical Way'
George Dobbs shows you how to build a practical 0-60dB π attenuator pages 53-56, *PW* April 1991. The unit of 10dB steps is useful for cutting down signals to receivers or test equipment.

'A Constant Impedance Receiver Attenuator'
In the May 1990 issue of *PW* on pages 72-73, A. Langton describes an electronically selected π attenuator to go in front of a receiver. There is a table of selected attenuation factors, and a small BASIC program to calculate unusual ones.

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Your Own Radio Shack

Peter Wilkinson G0IIT offers some advice on setting up your own radio shack based on his own experiences.

Peter Wilkinson G0IIT's radio shack.

Now that you've passed the Radio Amateurs Examination, your thoughts will no doubt be concentrating on getting it together 'shack' wise. A corner of the living room, bedroom, garage, loft, caravan, garden shed, etc. in which to put the rig and related items.

Why is it called a 'shack? That's a good question, the term goes back to the early days of radio on board ship where the radio operator squeezed into a tiny hut affair (often between the funnels!), which had been fabricated no doubt long after the ship had been built, but don't quote me!

I chose a corner of the garage for my shack, partitioning it off, and false roofing it, all out of plaster board to make a small den. In the corner of that I put a caravan stove to provide warmth during the wet, winter months.

An intercom kept me in touch with the house and the telephone being left open in the receive mode. A table, some shelving and a chair made up most of the furniture. Later on I added another table and some more shelving.

Pride Of Place

The h.f. rig took pride of place in the middle of the table, with the Morse key on the right. An electrician friend had wired up the shack with plenty of sockets, an earth leakage trip and an isolator switch.

I dug in a radial earth mat under the lawn outside and bonded this to my new home-brew a.t.u. mounted on the wall near the rig. A 'long wire' antenna, about 120ft, stretched out over the garden served my purpose for 'Top Band', 7 and 3.5MHz bands. For 14 and 28MHz I used a vertical rod, mounted on the pole that held the other end of the long wire.

For local 'rag-chew' contacts I splashed out on a 144MHz rig and fitted a 6-element yagi on the slope. This sufficed for mobiles and home based station that worked horizontal.

When I had saturated myself with h.f. working, I took an interest in ATV and mounted a 430MHz 48-element crossed yagi on the pole for the 144MHz beam. This antenna gets priority at the top (the 430MHz that is) and eventually on the same pole I mounted side by side two 3cm horns for transmit and receive ATV microwave (**Fig. 1**).

I mounted a fire extinguisher near the floor and a doppler security alarm for wide area intruder cover. To add to the ATV equipment, I picked up an old Vic 20 computer which comes in useful for generating text and graphics and a cheap monochrome security camera for mug shots, Hi!

On the shelves are various and sundry items serving as test gear, radio magazines, boxes of components and tools. A carpet on the floor and a picture on the wall adds that little bit of comfort during the long hours waiting for a lift or G.... who said he would give you a call but never did Oh! and I mustn't forget the kettle and mug, ever handy for a quick brew.

With all or most of these preparations in place, the moment of truth arrives. The mug of tea is placed to one side, instructions not to be disturbed issued, a quick trip to the 'loo', all having led up to this moment of excitement!

Acquaint With Jargon

Several hours have been spent listening to 'rag chews', sorry QSOs, to acquaint yourself with the jargon and general handling of the rig, (at least in receive mode). But now's the red light moment. I wonder how many stall at this point.

The thought of your voice going out across space, probably to be heard by countless numbers of listeners, and if you fluff it, they will probably all roll about laughing their heads off, may worry you. Well, it's extremely unlikely, in fact, as you might not be heard at all, or if so, ignored. It might take quite a number of CQs before being answered.

Deep End

In any event, why jump in at the deep end? Why not reduce the transmitter power to just a few watts, have another amateur make the initial contacts on your behalf, and then take over when ready?

Local working at first will inspire your confidence, then gradually turn the wick up, er, increase the power. This is to reach parts only that famous brew can reach, in order to fill your log up with more distant contacts, to boggle the mind!

Here, no doubt, is where you can get a sweat on, Hi! Going further afield is going to put more listeners into your signal path, even those 'in other lands'. This is an action not to be indulged in lightly!

Hooking a fish is one thing, landing it is another. Working a foreign station is where attention to good operating procedure becomes the order of the day, with courtesy at the forefront.

Soon, long distance QSOs will 'make your day', and will no doubt lead to picturesque QSL cards landing on your doormat. These are the signs that you have arrived at the great portal of amateur radio. Congratulations, but where do you go from here?

By all means stay as you are if you wish. No doubt you'll soon be getting into a routine with a regular net of friends sharing your interests, or just looking for the odd contact here and there as it pleases you to do.

It takes all sorts in the amateur radio hobby. There are some who prefer to bash the key, never leaving the realms of the 7 and 3.5MHz bands.

There are others who hop, skip and jump all over the place, doing Packet, ATV, microwave, etc. Joining a local radio club that is active (not just suppin' a pinta) on club nights, for field events, lectures, construction and training make up so much more to this hobby.

PW

The antenna arrangement for ATV working at G0IIT's station.

YOUR FLEXIBLE FRIEND - The Digital Multimeter

Roger Doyle works for the instrument division of Wavetek Ltd. In his article Roger encourages us to take another look at the often under-used capabilities of the digital multimeter.

It's well-known that most multimeters are seldom used for more than the measurement of volts, amps and ohms. Indeed, many are used purely to check continuity.

Yet purchasers are often swayed by the wide variety of functions offered by the modern digital multimeter (DMM). This choice is often coupled with the 'advantages' of being seen using a sophisticated test instrument!

However, there's much to be gained by making full use of the multimeter functions. These add value to existing procedures, save time or even enable users to maximise their skills.

For example, DMMs employing an audible fault-finding tone -sensitive to both voltage and frequency are useful. They can considerably broaden the scope of basic continuity testing.

Additionally, quality control could be effected by combining typical functions. These can include autoranging and autorelate (autorel), permitting inputs to be checked against selected levels.

Also, the user should not forget that the available capacitance and low ohms ranges on most DMMs dramatically increase their potential. Using voltage and peak hold functions for identifying and quantifying spikes is another valuable asset in inspection and can make fault finding on power supplies easier at times.

Saving Time

In terms of saving time, DMMs operating in a modern logic environment have the potential to examine pulses in some detail. This application is evolving in both data and computer-controlled manufacturing technologies.

Similarly, the increased bandwidths of modern DMMs provide applications in duty cycle monitoring. Their swift reaction times and light loading when working with CMOS and in other areas.

The usefulness of DMM functions in low capacitance and low ohms areas often goes largely unused for communications and motor inspection, respectively. Today's DMM frequency ranges, which run as high as 2MHz, are natural allies in the inspection of modern solid-state switching, a mode becoming standard.

Superior Functions

The fact that some DMMs now have data recording and processing functions is of special interest to inspection personnel and other users. They can then use the meter to efficiently calculate on their behalf.

For example, the combined functions: averaging, maximum and minimum - come into their own in monitoring power lines or power supplies for voltage swings. They're also useful in power calculation situations and for measuring and recording many unattended devices under test. And these are only general examples.

Audible Fault Finding

In more detailed terms, a multimeter's audible fault-finding tone broadens continuity testing to include identification of broken p.c.b. tracks. They can trace dry joints, poor soldering and solder repairs, bad or noisy pots and connectors, and resistive tracking in general.

In the same way, high resistance continuity can be used to quickly establish safety checks in insulated or hazardous areas. On the other hand, extremely low resistance continuity enables operators to test in-circuit resistance without the removal of diodes and transistors. (The DMM voltages used for this are too low to forward-bias silicon diodes or transistor junctions).

Sophisticated continuity testing could also form part of many routine incoming inspection procedures. For example, this can be part of service routine, in rapidly hunting for specific voltage levels.

In professional when used in conjunction with autoranging and 'autorel' functions, both tolerance and batch testing could be done for prescribed limits and deviations. And operations which require the leads to be accurately 'nulled out' (including those for resistance and capacitance) are made easier by the autorel feature.

Modern Maintenance

Modern electronic equipment is perhaps characterised from a maintenance point of view by the need for power supply purity. Typically, this means low circuit currents and high-speed digital pulsed data operation.

However, modern electrical equipment has its own priorities in high tolerances, high-current solid state switching practice and an abundance of non-sinusoidal load conditions.

Out 'in the field' of operational

maintenance, there's also been an explosion in hard-wired or data-bussed sensor equipment. With power purity at the risk of spikes in electronics and efficient monitoring of harmonics vital in electrical areas, these particular problems may be monitored and controlled.

I'll outline some practical parameters which are often routinely monitored: transients on power lines, measuring motor in-rush current and momentary damaging spikes. Often, equipment is used for checking for multiples of the basic frequency (which can cause circuit breakers to trip), overloaded neutrals, overheated transformers and generators.

Therefore, efficient spike hunting requires the ability to record superfast 1ms events, using the DMM peak hold function. In this way, technicians could extend their activities to the checking of start-up levels on electronic ballasts and motors, switching power supplies of PCs and variable-speed motor drives, for example.

Using the meter's peak hold functions for trapping tiny transients in flight, close examination of motor control and general mains spikes can be made.

Also, the choice of circuit breaker sizing problems can be worked out. Similarly, the very rapid response times allow fault finding in r.f. peaking and nulling circuitry.

Important Considerations

In the harmonic spectrum, there are important practical considerations connected with sinewave functions. These, under real-time load conditions, can become remarkably complex.

Real time loading conditions call for true RMS measuring abilities. In other words, using the typical meter's a.c.+d.c./a.c. switchable inputs intelligently.

Using a meter provided with a facility for RMS measurements would cover areas such as switching power supplies. It could also cover solid state fluorescent light ballasts and the analysis of heating waveforms.

Taking a closer look at RMS, it's becoming increasingly important to monitor the output from power control circuits and input from sensor signals. Again, this is where both d.c. and a.c. voltages are present. In this, both average responding RMS measurements and crest factor functions are important, as provided by the modern DMM.

Averaging the total effective voltage is done through a DMM's average-responding converter. This first rectifies and filters the signal to get the average, subsequently converting it to RMS.

Under actual load conditions a true RMS level can also be measured from non-sinusoidal waveforms (complex or noisy signals) for which even rough correction factors cannot be easily computed.

Fortunately, today, DMMs have a typical bandwidth of 5kHz. This can provide a conversion accuracy of within 3dB.

Flexible Frequency

The modern DMM's meter's flexible frequency range and wide bandwidth is extremely useful. The flexibility vastly increases the operator's ability in terms of troubleshooting and checking the three inter-related quantities of frequency, duty cycle and pulse width.

For example, using a meter with a 2MHz frequency range, a maintenance engineer can investigate the internal frequency make up of switching power supplies (such as those found in common triac and 'smart motor controller operations.

Alternatively, armed with a DMM you can service intermediate frequency (i.f.) transformers on amateur radio transmitters and receivers. You can also give synchronous motors a clean bill of health and regulate governor speeds!

Generator maintenance can be undertaken (useful for 'field days' when the generator invariably breaks down!) And, in the consumer field, VCR CPU speeds, video camera and oscillator repair work can also be done.

Rapid response, audible fault finders and r.f. sensitivity allow DMMs to monitor and 'tweak' many intermediate frequency peaking and nulling circuits.

Examination Of Pulses

The typical modern DMM's wide bandwidth also allows for the examination of pulses of various widths. This allows duty cycle measurements and logic checks to be made in a variety of leading-edge fields.

The checks include pulse width modulation in digital communications and health checks of triac switching power supplies.

For the service engineer, there's a new facility with the square waves controlling air handling controls (fluidics) and the d.c. pulses controlling a host of stepper-servo motors - vital to a wide range of machines - and an array of new automotive checks from sensors to fuel injection circuits.

In the growing automation, robotic and field of computer control, the logic of scores of PLCs must be kept in good shape. This requires DMMs to detect extremely short pulses of up to 50 nanoseconds.

Detection and examination of such tiny slices of power are needed for troubleshooting CMOS and TTL circuits. In consumer areas, 'pulse taking' typically covers the checking of a VCR's CPU, and general computer maintenance.

Remarkable Capacity

The capacity ranges of today's DMMs, from 100pF to 2000µF, means they can achieve a great deal more. For example, they're capable of professionally troubleshooting both power supply filter and smoothing capacitors.

On the other hand, at the low capacity end they'll measure down to 100pF. This is useful, for example, in sensitive p.c.b. and surface mount work, checking small de-coupling capacitors. In addition, using the audible tone and a suitable resistance range, the meters can be used to rapidly and easily test capacitors.

Actually, many modern multimeters are practically computers in themselves. Because of this they can provide impressive accuracy.

For example, a typical 10,000 count resolution means operators can check drops in 480v lines to an accuracy of 0.01V; 5V lines to 1mV. This allows the proving of data and telecomm links to specified levels.

The ability of a DMM to take max/min and averages permits efficient power line monitoring and current consumption calculations. And, in the near future, their overall accuracy will also remain at a premium as new features in the latest models call for higher-than-average performance.

Around The Corner

In summing up my thoughts on the DMM, just around the corner are digital radio, high-definition TV, and massive expansion in personal mobile 'phones and cable channel facilities. So, in other words, I think the pursuit of excellence in the electrical and electronics fields is here to stay.

It's up to you to make full use of the impressive digital multimeter you may already own. By doing so you could add extra quality to the work you're doing today and prepare yourself for the test and measurement problems of tomorrow!

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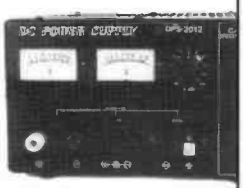

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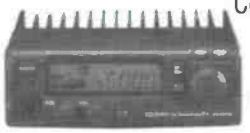

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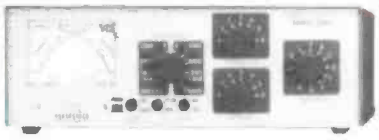

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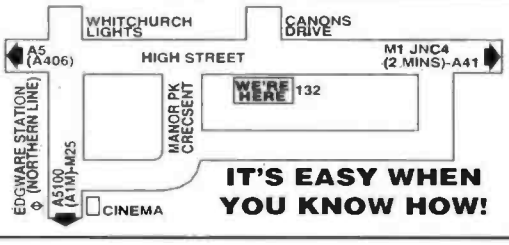

Bandswitching Using Diodes

Michael Darby says that although diode switching has been around for quite a few years it's still regarded as rather novel for bandswitching in home-brewed equipment. So, to encourage us to try it for ourselves, Michael outlines the techniques involved.

Virtually all receivers that can operate on more than one waveband have employed the standard wavechange switch. They have done so ever since the early years of radio when the wavechange switch replaced the laborious method of changing plug-in coils for waveband selection.

The use of wavechange switches has its disadvantages. They include those of long leads with the resulting undesirable stray capacitance which limits the highest frequencies which can be received at the upper end of the band.

In addition, long leads to a complex multi-band wavechange switches produce unwanted coupling between circuits. This problem can impair stability or produce unwanted responses in extreme circumstances.

Limited Reliability

A further disadvantage of the conventional waveband switch arises from its limited reliability. And indeed, any mechanically moving part such as a switch or volume control is likely to fail on average before the electronic components in a receiver.

You can reduce wear and tear somewhat by lubricating the wavechange switch. But this often results in the accumulation of dirt, etc., on the lubricated parts.

Apart from the undesirable electrical problems associated with the long leads to a complex wavechange switch, the switches occupy a relatively large amount of space in the receiver.

The switches must also be placed close to the tuned circuits. However, it may not be a convenient spot if the receiver designer wishes to employ this part of the receiver for other purposes.

Diode Switching

Philips/Mullard developed a different type of diode, the BA423 for band switching in a.m. receivers. A simple mechanical switch is, of course, still required, but this can be placed at any convenient point in the receiver.

The simple switch, if faulty is much easier to replace than a complex rotary wavechange switch would be. And I've shown a typical simple circuit showing the use of this diode for medium and long waveband switching in **Fig. 1**.

Similar principles can be used for the selection of long or medium wavebands. Additionally, the switching of a number of short wavebands can, easily be achieved in a more complex receiver for wider frequency coverage.

How It Works

To understand how it works in practice, let's first consider a circuit. I'll use the diode-switched radio frequency tuned circuits in **Fig. 1**, as an example. And, in this case, the wavechange switch S1 is in the upper, medium wave position.

The positive supply from the +10V line is connected by S1 through R2 to D2 (the band changing diode). This biases D2 into conduction, since the voltage from S1 exceeds that of the +3.3V supply applied to the diode through the long wave coil.

When the values used are as shown, a current of about 10mA flows through D2. Incidentally, the BA423 has been designed so that it has a low forward resistance of only about 0.9Ω when 10mA of forward current flows through it.

The small value of resistance from the diode is in series with the capacitor C2 (which has a low impedance at radio frequencies). This is effectively connected across the long wave coil (L2) and therefore almost shorts out this coil.

With the arrangement in **Fig. 1**, the long wave coil is inoperative. The receiver is then able to tune the medium wave band by means of L1 in parallel with C3 and the trimmer C4.

Similarly, the current flowing from S1 through R1 and the diode D3 causes the long wave oscillator coil L4 to be shorted out. This happens when S1 is in the medium wave position and the oscillator also tunes the medium wave band.

Padder Capacitor

The capacitor C6 in series with the local oscillator section of the main tuning capacitor is the normal 'padder' capacitor. This effectively reduces the value of C7 so that the oscillator operates at a frequency above that of the signal frequency being received.

The difference frequency generated by the local oscillator (l.o.) is of course the required intermediate frequency (i.f.). In a tuned radio frequency (t.r.f.) receiver, the oscillator section is not required.

Long Wave

When S1 is in its lower wave band position, the diode D2 is reverse biased by the +3.3V supply. This is applied to it through the long wave coil, the other end of the BA423 being earthed.

The diode now has a very high impedance. So it no longer shorts out the long wave coil.

The medium wave coil is therefore in series with the long wave coil across the tuning capacitor. However, as the medium wave coil has far fewer turns

than the long wave coil, the series combination of the two coils together act as a long wave coil and the receiver tunes the long wave band.

Similarly, in the other part of the circuit, D3 is biased in the non-conducting direction by the +3.3V supply applied to it through the long wave oscillator coil. Both L3 and L4 in series are effectively connected across the oscillator tuning capacitor in series with C6 and the oscillator operates at frequencies suitable for the long wave band.

Vitally Important

When tuning the medium wave band, it's vitally important that the forward a.c. resistance of the BA423 bandswitching diodes should be quite small. This is because the resistance is in series with the parallel tuned circuit and will damp the oscillators and reduce the circuit gain and selectivity.

In other words, the effective quality or Q factor of the tuned circuit is reduced by any appreciable impedance of D2 in the forward biased state.

The BA423 has been designed so that it has little effect on the Q factor of the tuned circuit. For example, if the circuit is tuned to about the centre of the medium wave band, the value of C3 will be of the order of 200pF.

A typical value for the Q factor of the medium wave tuned circuit (almost entirely determined by the coil L1) is 80. The effective series resistance of the tuned circuit is:

$$\frac{Z}{Q} \quad \text{where } Z = \sqrt{\frac{L_1}{C_1}}$$

or about 12.5Ω in a typical case.

In the presence of the forward-biased bandswitching diode D2, the new value of Q

$$\frac{Z}{\text{total R}} = \frac{Z}{(12.5 + 0.9)} = 74.6$$

Thus the Q is lowered from 80 to 74.6 by the 0.9Ω diode series forward resistance. The effect on the selectivity of this slight reduction in the value of the Q factor is negligible.

Diode Voltage

The diode biasing voltage of a nominal value of +3.3V is readily obtainable. It can be provided by a zener diode circuit, such as that shown in **Fig. 1**.
Fortunately, the diode supply is not at all critical as regards to the exact value of the voltage. So, a standard 3.3V zener diode is quite suitable for this purpose.

Microprocessor Control

It's possible to carry out diode switching of the receiver bands under microprocessor control (or other electronic control). If this is required for any purposes it can be done by the application of either +10V nominal or 0V to S1 in the circuit of **Fig. 1**.

In any case, the resistors R1 and R2 should each be close to the tuned circuit to which they feed current. This of course also applies to the BA423 diodes, but the radio frequency voltage on the line to S1 should be very small.

If more than two bands are to be tuned, the number of BA423 tuning diodes associated with each tuned circuit section will be one less than the number of bands. For example, in **Fig. 1**, two bands are to be tuned, so one tuning diode is required in each tuned circuit.

Specially Designed

An interesting feature of the BA423 bandswitching diode is that it's has been specially designed to have a low capacitance when reverse biased. Typically, this will be approximately 1.6pF.

In the case of the medium and long wave receiver, this capacitance in series with the relatively large value of C2 (in **Fig. 1**) and the inductor L1, can produce a slight spurious resonance at just under 3MHz.

The spurious resonance causes no problems, as it's well outside the upper end of the long wave band being tuned when D2 is reverse biased. If D2 had a relatively large capacitance when reverse biased, spurious resonances may occur in the band being tuned.

This form of diode switching could be very useful to home-brew enthusiasts. Why don't you try it for yourself?

PW

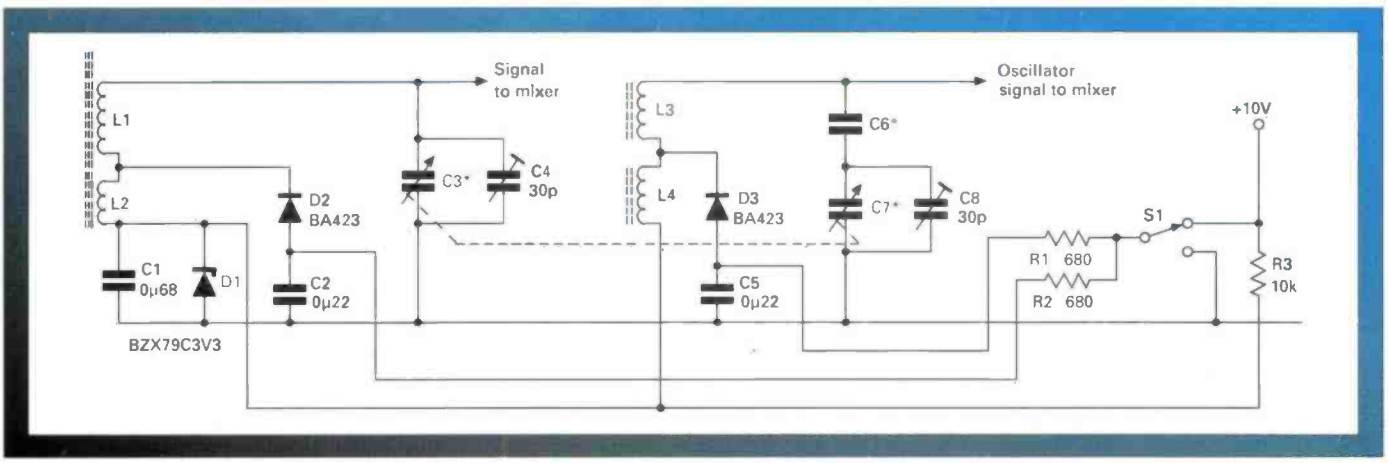

Fig. 1: A long and medium wave band receiver using the bandswitching diode D2 for switching the signal frequency tuned circuit and the bandswitching diode D3 for switching the oscillator circuit.

EARTHING - Ever Checked It?

Is your earthing system safe and adequate? So asks Noel Orrin G3BBK. Then he explains how to check it out and how, if necessary, you can improve it.

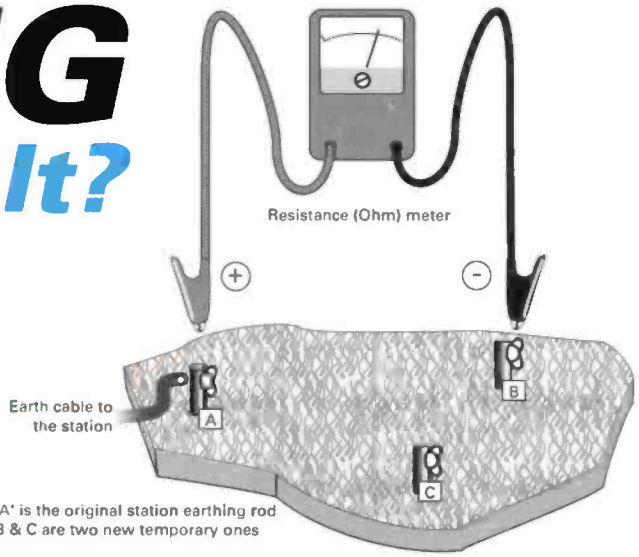

Fig. 1: A small section of ground can become an effective earth, if you follow G3BBK's advice!

I wonder how many of you have ever done more than provide a system earth, perhaps reluctantly if it involved a bit of digging? Having run a reasonably heavy conductor indoors, do you use it for evermore without a further thought?

I will look upon this article as half successful if it makes you think again about effective earthing. And I'll regard it as having fully succeeded if it makes you do something about your system.

Functional Or Pretty

Most, if not all, things fall into either, or both, of the 'functional or pretty' categories. For example our much beloved black boxes are, I suspect, mainly bought for their eye appeal. Who can resist an attractive front panel layout?

I doubt though, if anyone has ever considered an earthing system as other than functional. So, let's agree there's no point in having it unless it's able to function well.

Before proceeding further let me explain that I am not talking about counterpoise 'earths', radials, etc., I'm discussing true earths in the sense that we are trying to verify an efficient contact to 'mother earth'.

There are several reasons for needing an effective earth connection, such as:

a) To minimise our chance of receiving an electric shock from the mains. Imagine the 'live' side of a circuit accidentally coming into contact with a metal cabinet, or something you are most likely to touch. I know you are saying that's why there are three pin systems of mains distribution. But when was that last properly checked out?
b) To reduce the ever present worry of r.f.i., t.v.i., and other forms of interference.
c) To safely dissipate surge induced transients due to nearby lighting strikes.
d) maximising our antenna efficiency when using Marconi antenna system.

And I'm sure you can probably think of a few more!

Great Lengths

In professional transmitting stations, engineers go to great lengths to ensure that they have a good (low resistance and impedance) earth. This usually involves dozens of buried radials, in a site partially chosen for the conductivity of the terrain.

At your home station you have to make the best of your own little plot of land. Our homes are seldom chosen with amateur radio as a prime consideration (not if the XYL has any part in the decision). However, we can at least make the best possible use of whatever you have.

Our first requirement is to verify the d.c. resistance of your present system. If it proves to be on the high side, you can reduce it by one or both of the following methods:

a) install one or more additional earthing rods in parallel with the existing arrangement.
b) use heavier gauge wire and possibly shorten the conductor run from the earthing point of our equipment.

Multimeter

Virtually all amateurs own, or have access to a multimeter, so I will proceed on that basic assumption. The measuring technique is to generate three simultaneous equations using values derived from an ohm-meter.

Normally an (analogue) ohm-meter may have a very non-linear scale. Because of this we expect our readings to be low, say below 500Ω. With the advent of digital meters this statement is no longer true.

But if you only have an older meter, then select a scale with 500Ω reading about mid-scale. This will ensure maximum accuracy of reading by using the most open end of the scale.

Now you come to the only real bit of work in the whole exercise. Look at **Fig. 1**, the original earth (the one we are aiming to measure) is designated 'A'.

To complete the equations you need two other temporary earth connections. These connections I shall call 'B' and 'C', respectively.

The new earth connections don't need to have especially low resistance. They should be of the same material as the earth contact we are trying to measure. This action minimises e.m.f. errors due to dissimilar metals in an acidic soil environment.

A couple of temporary earths are readily made by using two pieces of 12.5mm copper water piping, each about 18in long (assuming you've used copper for the original earth). Hammer these rods into the ground far enough to produce a steady resistance value.

If the ground has loose topsoil, either remove the loose surface soil, or use longer lengths of tubing. Also make sure the tubes are free of surface oxidation by cleaning with wire wool or wet-and-dry paper.

The two temporary earths can be sited anywhere convenient, say one to two

Table 1.

Take readings	First reading	Reverse reading	Add readings	Average reading
'A' to 'B'	95Ω	100Ω	195Ω	97.5Ω
'B' to 'C'	85Ω	32Ω	117Ω	58.5Ω
'C' to 'A'	90Ω	'34Ω	124Ω	62.0Ω

metres away from the earth to be measured, creating an approximate equilateral triangle. The rough layout is shown in **Fig. 1**.

Temporarily disconnect your existing earth lead from its ground connection (to avoid any errors arising from its possible earthing via alternative routes in the shack).

Three Earth Points

So you now have three earth points, all conveniently placed and readily reached using the test leads supplied with the meter. Make sure you have good, strong crocodile clips on the leads so that reliable connection can be made to your three earths.

To avoid confusion, it's a good idea to label your earths A, B and C. Earth point 'A' being the one you aim to measure, as I said earlier.

Make a little table as shown in **Table 1** and then proceed to take measurements to fill it in, (don't forget to zero your meter accurately). As you will have zeroed your meter at the clip end of the leads, their resistance will have been cancelled out, but in any event, this would be negligible in comparison to your earth readings.

A brief explanation of **Table 1** is necessary here. The ohms reading capability of your meter, of course, derives its power from an internal battery, and therefore the leads are polarised. Non-linearities, or small inter-ground potentials may exist which can be additive or subtractive to the meter battery.

To minimise this possible source of error, make each reading twice, reversing the leads for the second readings, so enter them both on your Table, subsequently add them and divide by two to find the average. This should be entered in the last column.

Results

As an example, I've filled in **Table 1** using the results I obtained from my own system. Doubtless most of you can take it from here, and derive your own answers, but as a reminder for those who left school many moons ago, I'll spell out the basic algebra line by line.

Now, I need to use a mathematical symbol for the actual calculations. Where (in the table) I've put 'A' to 'B', I'm going to write 'A+B' and similarly with the other two rows.

From the right hand column labelled 'Average reading'

1) A+B = 97.5
2) B+C = 58.5
3) C+A = 62.0

From the three statements above, take 2) from 1) in this manner:

A+B = 97.5
-(C+B = 58.5)

Therefore A-C = 39

Rewrite as A-39 = C

Substitute for C in 3) above

(A-39) + A = 62

Doing a little more manipulation you arrive at:

A+A-39 = 62
2A = 62+39

So you can write A = 50.5Ω, which is the effective impedance of the main station earth rod.

Improving Accuracy

Using a d.c. ohm-meter you may find there is a significant difference in the readings obtained when comparing the 'First' reading and the 'Reverse' readings. The average of the two readings, in the right hand column, is the only way to proceed if only an ohm-meter is available. Should you have access to an a.c. bridge, you will obtain your averaged readings directly.

A simple form of a.c. bridge can be put together using an audio oscillator output of around 800Hz at approximately 1 volt, as shown in **Fig. 2**. The resistor value chosen should be big enough to encompass the highest reading you are likely to obtain. I suggest 220Ω.

Use your ohm-meter to select close matching values, or purchase 5% or better resistors. Resistors need not be very large or expensive, and 0.25W rated components are adequate.

The balancing potentiometer should have a similar value to those of the fixed resistors. It should preferably be a wire wound, linear component. A linear variable means that the scale is not cramped at one end.

Mount the potentiometer on a suitable sheet of metal together with a paper scale. This you can mark off resistor values on, using your ohm-meter, when you initially calibrate your potentiometer. (If you have a wire wound pot it will probably have a linearity better than 2%).

A pair of headphones is the simplest method of balancing the bridge. To

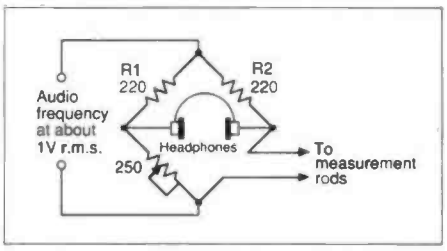

Fig. 2: The circuit of a simple a.c. resistance bridge. All fixed resistors can be 0.25W devices, the variable should ideally be wirewound and have a linear track.

confirm that your bridge is working properly, connect a resistor of known value (about 100Ω) and apply a signal from the audio oscillator applied.

Plug in the 'phones and adjust the variable resistor for a null, or minimum tone heard in the 'phones. The value read off on your self calibrated scale should be very close to the known value of your test resistor.

At last, you should be ready to go! Disconnect your test resistor and apply your new a.c. bridge to the three earth points as described earlier. The three readings directly obtained are: A+B, B+C and C+A (the right hand column in **Table 1**). Proceed with the mathematics as outlined above.

Earth Impedance

If your calculated figure for earth resistance is on the high side (i.e. somewhat higher than my example) you should try to lower the earth impedance to improve your system earth. An easy way of doing this is by putting another rod in parallel with the original one.

Alternatively, you might consider 'watering' your earth occasionally with a cup of common salt to a bucket of water. Though you should keep any of your favourite plants well out of the area.

Whilst you've got your earth lead still disconnected, arrange to measure its resistance back to the shack by looping back with some heavy gauge mains cable or other of low resistance. If you find it's more than an ohm, replace it with heavier gauge wire, or, if possible, reduce the length. Remember that a long earth lead may have a low resistance or d.c. or low audio frequencies, but can present a considerable impedance to r.f.

Don't forget that a low earth impedance/resistance can only improve your station. So, don't forget, install one or more additional earthing rods and/or use heavier gauge wire for the earthing point. **PW**

Plug on Regardless

John Worthington GW3COI shares his thoughts on fitting plugs as standard?

The news that we shall soon be seeing all new gear compulsory fitted with a mains plug by the manufacturer seems to have been greeted by amateurs everywhere with a stunned silence.

The implications will sink in slowly, but I have been muttering into my portable tape recorder at odd times, day and night, in an attempt to assess a ruling which will shake the foundations of our dedication for many years. It may even attract large numbers of enthusiasts to the hobby who have been put off by the thought of having to fit their own plugs!

Thought Provoking

Manufacturers fitting plugs to new equipment is one of the most thought provoking measures ever to come out of Parliament. It has certainly stirred up a 'hornet's nest' on the benches that I provide in my shack for visiting short wave listeners. I am sure that this sort of inspired law will act as a perfect kick-start to the economy.

Apart from the high number of new plugs that will be required, just think of the pairs of side cutters that we will need for the chaps who will be employed to fit the plugs!

Then there will be all the 'extras' which accompany such new employment, like brassards for their badges of rank plus tea-break facilities. But hold it! I have just had a weasel thought.

What about if I get a new rig and the mains lead won't reach to my one remaining a.c. socket? I don't suppose they've got an answer for that one - they never think these things through properly!

Real Users

Why on earth don't the manufacturers recruit a few **real** users like myself to thrash the problems out? Myself and a group of like-minded bigots from the 3.5MHz nets could form a sort of think tank and we wouldn't want paying or anything as long as we received expenses.

Come to think about it, that bit about the lead not being long enough is a real stopper. I think that that alone would stimulate demand for telephone time and other correspondence expenses.

Then of course, there is the type of person who will operate a 3kW fire from a lampholder - what's he going to do under the new regime? (make a note to buy socket adapter shares?!).

As I said earlier, preliminary projections of the likely impact of the new move are being made here. Until then, I am not quite ready to inform the press and media. In the meantime, it seems very clear to me that to a lot of people, it will represent a blow to their self esteem.

I have of course referred to those who have always been home-brewers. And, when the law is finally passed, I assume that we shall see the 'President of the Home-Brew Society' on TV.

The President will be symbolically cutting the plug off a piece of new equipment and then rapidly and skilfully fitting his own with the use of his official Swiss Army knife. This will attract the sneers of those rushing to buy their first two-way radio equipment - but you can't please everyone!

PW

'What about if I get a new rig and the mains lead won't reach to my one remaining a.c. socket?'

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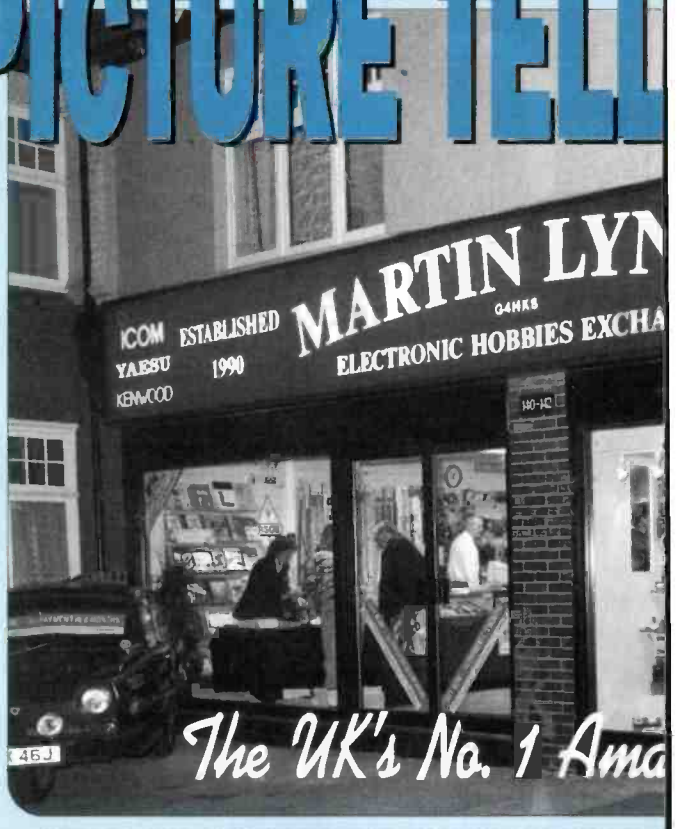

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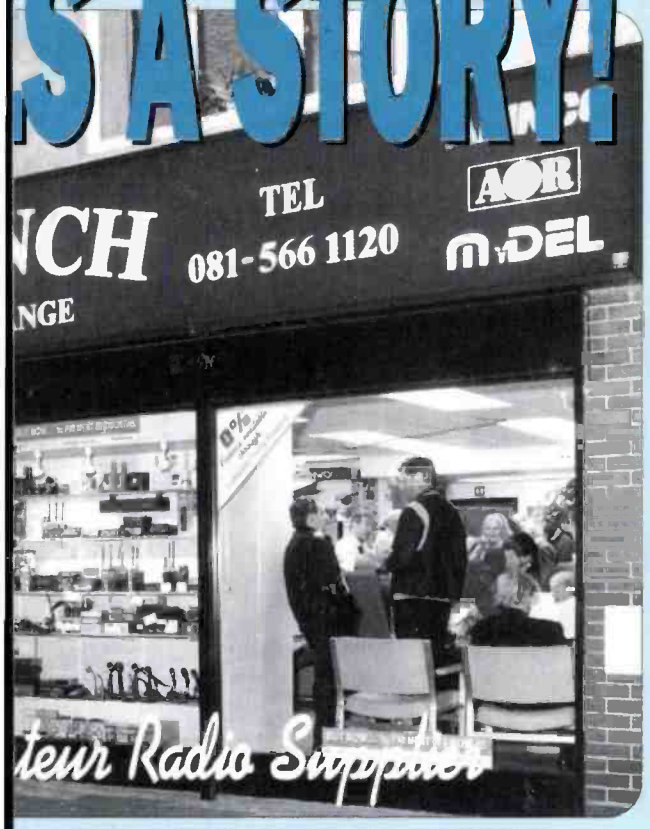

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ALINCO'S FIRST

The Alinco DR-M06SX FM Mobile Transceiver

Taking a short break from writing the PW 'VHF Report' David Butler G4ASR has been busy trying out a newly introduced 50MHz f.m. mobile transceiver from Alinco.

There are very few transceivers available for use on the 50MHz band at the present time. So, I was pleased when *PW* asked me to review the Alinco DR-M06SX f.m. mobile transceiver.

This is Alinco's first venture into the 50MHz band market. Because of this I was eager to check its facilities and confirm its adaptability for use within various European IARU Region 1 countries.

When I first removed the radio from its packaging I was surprised how little it weighed. In fact it only moves the scales to a mere 860gm!

Neatly Packaged

The transceiver is neatly packaged in a plastics covered mild steel case measuring only 140mm wide and 40mm high. A loudspeaker is fitted on the upper side of the case.

Personally, I would have preferred the speaker to face downwards. However, I recall a recent review where the loudspeaker faced down and the reviewer favoured it pointing up!

A 3.5mm jack socket on the rear of the rig also allows an external speaker to be connected. Also on the rear panel can be found two short flying leads.

One flying lead is terminated in an SO239 u.h.f. socket. I didn't need the booklet to guess what this was for!

The other lead terminates in a snap-on d.c. power connector. This lead includes a 4A fuse.

The d.c. power cord which is included as a standard accessory is 2.9m long. It's supplied with two in-line 15A fuses. This is a good safety feature.

Supplied Accessories

Also included in the set of supplied accessories is an electret condenser type hand microphone. It supports the standard up/down buttons, function lock switch and p.t.t. control.

The supplied microphone is fine for fixed station operation. But only the foolhardy would use a hand-held microphone whilst driving a car. I really can't understand why manufacturers produce mobile radios without a hands-free microphone as standard.

The transceiver also comes with a mobile mounting bracket and associated nuts, bolts, screws and washers. There's even a spanner included. That's a nice touch!

The mounting bracket seems very versatile. And because of the small size of the radio it's fairly easy to find a suitable location for it in a motor vehicle.

Business End

Moving to the business end of the rig now and my first impressions was that the front panel was fairly busy. It contains controls for tuning, volume and squelch.

There's a total of eight keys controlling the standard user-selectable facilities. These are the same as can be found on many similar rigs nowadays.

The options are displayed on a large l.c.d. display. The display, of course, also shows the selected v.f.o. or memory channel.

Then it was time to take a peek inside. (There's nothing better I like than opening up a new rig for the first time!).

Inside, I found a robust die-cast chassis. This supports the front panel assembly, the main p.c.b. and a large heat sink for the p.a. stage.

Surface Mounted

The circuit board on the Alinco DR-MO6SX makes extensive use of surface mounted devices (s.m.d.). The only discrete components I spotted were associated with the r.f. front end and some electrolytic capacitors sprinkled around the p.c.b.

The quality of the board is excellent. I couldn't fault it.

One thing I did spot though was that the built-in speaker is only rated at 1.5W. As the audio output is 2.5W I didn't think it would last long in a mobile environment. I recommend that an extension speaker is used.

Broadband Module

A broadband p.a. module (Mitsubishi M57735) is bolted to the large heat-sink. This module is capable of over 20W output but the drive is restricted to limit the output to 10W.

The reduction in output is very sensible. This is because the 3dB increase in power would make no significant difference in readability.

Reducing the output power does of course increase the reliability of the unit. The set also provides a facility of dropping the output power down to the 1W level.

Alinco claim that the DR-M06SX represents some of the most advanced innovative usable features available anywhere. Now that's a challenge I like! So let's take an in-depth look at some of them.

The set comes equipped with 50 CTCSS encoder tone. These are accessed from the front panel by pushing the **T.SQ** button.

The main tuning knob or the microphone up/down button can then be used to select the required sub-audible frequency. This type of facility is normally used with repeater operation.

However, the use of CTCSS is not widespread and is only used on a few 144/430MHz units at the present time. To my knowledge there is only one licensed 50MHz repeater in the whole of Europe and that doesn't use CTCSS tones.

An optional EJ-20U tone squelch decoder unit is available. This must be used so that CTCSS tones can be decoded for selective receiving when in simplex mode.

Memory Channels

The set has a memory capacity of 100 channels. If that isn't enough you can buy an optional memory expansion unit.

Programming the memory channels is very easy. It only requires a few key strokes.

The desired frequency, repeater shift direction (+ or -), repeater off-set and CTCSS tone can all be stored and recalled. I used channels 41-59 to store the IARU Region 1 f.m. simplex frequencies, 51.410 to 51.590MHz.

One feature I liked was the **Call** function. A special pre-programmed memory channel can be accessed at the push of a button.

I programmed 51.510MHz, the f.m. calling frequency, into the Call memory. It should have been simple but the booklet didn't actually say where this Call channel was hidden amongst all the other memory channels.

I actually found it between channel 99 and 00. This is fine if you just happen to turn the knob anti-clockwise. Of course I went looking for it in what **I thought** was the logical direction!

Scanning Modes

The set has two basic scanning modes. In the first, the v.f.o. mode it will scan over the entire range of the receiver.

If the receiver 'hears' a signal it will stop for five seconds and then resumes scanning. Unfortunately the receiver covers the range 50.0-54.0MHz. In the UK and most of IARU Region 1 the allocated band is 50.0-52.0MHz.

Therefore, 50% of the time is spent scanning non-amateur frequencies. Unfortunately there is no facility to program frequency limits.

In the second scanning mode, memory mode, the set scans all programmed memory channels. If you hear a wanted signal the scanning can be stopped by pressing the p.t.t. switch or v.f.o./memory button.

Again there is no facility to de-select unwanted channels when in memory scan mode. It's all or nothing.

A priority feature allows monitoring of a primary channel for five seconds and then cycle automatically to a secondary channel for half a second. It's almost like having two radios on the same band.

I set it up to monitor 51.51MHz (f.m. calling) and 51.250MHz (a semi-local chat channel). I found this feature quite useful.

Channel Steps

The transceiver has a total of six selectable channels steps for the v.f.o. These are 5, 10, 12.5, 15, 20 and 25kHz. All known channel spacings within IARU Region 1 are therefore accommodated.

Some facilities have been included to enable it to be used for repeater working. Apart from being able to select the repeater shift direction (+ or -) the amount of frequency off-set can also be selected.

It was then that I discovered that it was possible to select up to 16MHz of frequency off-set. This is rather strange, because if you go outside the band 52-54MHz an error message is displayed and the set ceases to work!

Obviously the built-in firmware belies its original commercial usage. However, it did make me wonder whether the set could be made to work **on the 70MHz band**. (But *PW* did say they wanted the set back in one piece!).

One other point worth mentioning is that at the present time there are no UK repeaters authorised for use on the 50MHz band. In any case, the Alinco DR-M06SX does not have a tone burst fitted.

On Air

On air I was able to make some comparisons with the Alinco and my Kenwood TS-690S transceiver. Every station I contacted, some nearly 200km away, commented on the good transmitted audio quality from the DR-M06SX.

The reports were very pleasing. The DR-M06SX seemed to be quite sensitive.

Using a 6-element Yagi I was able to consistently hear the GB3NHQ beacon, at 193km. This was received with the same amount of quietening as on my TS-690S.

By altering the working frequency of the set I was able to find out the effects of different v.s.w.r. values. (My Yagi is tuned to give best match at 50.100MHz).

A 1:1 match produced a full 10W out of the set. At a v.s.w.r. of 1.5:1 the output had dropped to 8W.

At the top end of the band, with a v.s.w.r. of 2:1, the power had dropped 3dB to give an output of 5W. This means that the p.a. is protected if your antenna connection should accidentally be removed.

Packet Radio

I wanted to test the rig's suitability on packet radio. But there's no circuit diagram or details of the microphone connections in the supplied documentation.

I thought that the booklet was only barely adequate. It lacks the quality provided by other manufacturers.

Fortunately, I discovered that the microphone worked with my TS-690S. I was then able to look in the comprehensive Kenwood manual for the connections! Once the transceiver was connected to my TNC. I had no problems making a few packet radio contacts.

In Car

Personally I wouldn't buy this transceiver to use in a car. One of the drawbacks of using an 50MHz f.m. mobile transceiver at the present time is that there's very little activity on this mode.

Using it as a base station however is another matter. The repeater shift and channel steps conform to IARU Region 1 recommendations. It can therefore be used throughout Europe without any operational difficulties.

Working from the shack I managed to contact a number of stations. They told me that activity is slowly increasing. So, if you're the pioneering type the DR-M06SX could well be the rig for you.

My thanks for the loan of the review transceiver go to Waters & Stanton Electronics, 22 Main Road, Hockley, Essex SS5 4QS. The Alinco DR-MO6SX is available for £299.

PW

Manufacturer's Specifications

General	
Frequency coverage:	50.000 - 54.000MHz
Frequency resolution:	5, 10, 12.5, 15, 20, 25kHz steps
Antenna impedance:	50Ω unbalanced
Power supply	13.8V d.c.
Current drain (at 13.8V):	Receiving (squelched) less than 700mA Transmitting (high) 3A
Dimensions:	140mm (W) x 40mm (H) x 154mm (D)
Weight: Approx.	860gm
Transmitter	
Output power:	High 10W / Low 1W
Mode:	F3E (f.m.)
Modulation system:	Variable reactance frequency modulation
Max. frequency deviation:	±5kHz
Spurious emission:	-60dBc or better
Microphone:	Electret condenser
Operation mode:	Simplex or semi-duplex (repeater)
Receiver	
Receiver type:	Superheterodyne dual conversion
Intermediate frequency:	1st i.f. 10.7MHz 2nd i.f. 455kHz
Sensitivity:	12dB SINAD -16dBμ
Selectivity:	> ± 6kHz at -6dB < ±12kHz at -60dB
Audio power output:	> 2.5W at 10% distortion
Speaker impedance:	8Ω

After seeing a copy of the G4ASR review, Jeff Stanton G6XYU of Waters & Stanton sent us the following comments:

Thanks for giving me the chance to see the review of the new Alinco DR-MO6SX transceiver. I was pleased to read that there are many features which David Butler likes about the rig but there are one or two comments I would like to make in addition.

The reviewer comments about hand-held mics supplied with mobile radios and of course this would apply to every mobile rig on the market. One of the reasons of course is cost and also many mobiles tend to be used as base rigs these days. The first three of these radios sold were sent out with power supplies which seems to confirm this.

Regarding the use of CTCSS tones for repeater use, my information on the grapevine is that three 50MHz repeaters are planned for the UK, all on the same frequency, requiring access by sub audio tones to 50MHz repeaters and the first one is on trial in the Amersham area.

I take David's point about finding the **'call'** function and also microphone wiring connections. The supplied instruction booklet at the moment is provisional and a fuller manual will soon be provided. Early customers will be sent the revised instruction booklet. The revised manual will carry the above information. Comments from early purchasers of the DR-MO6 have been very good indeed.

Finally we are checking with the manufacturers whether it is possible to limit the frequency scanning range for UK use.

Jeff Stanton G6XYU

Reviving An Old Friend

Ben Knock G4BXD shares the experience he gained in modifying and reviving an old valved friend - an old Trio 9R59DS receiver, often found for bargain prices on 'Bring & Buy' stands at rallies.

The Trio 9R59DS communications receiver.

The idea of the exercise in reviving an old 'friend' was to reduce the heat generated by a typical valved receiver in the hope of improving stability. The modifications were undertaken on an old Trio 9R59DS, commonly available at rallies and shows for reasonable prices.

The method used replaced the valve stages with semiconductor equivalents. This is very much easier than you may think!

To keep the conversation as simple as possible only the v.f.o., the b.f.o. and the audio stages were replaced. Although the work was carried out on a 9R59DS, similar savings could be obtained from other valved radios.

Low Voltage

A source of low voltage was needed to power my modifications. Fortunately, the mains transformer on the Trio 9R59DS has two heater windings, **Fig. 1**, which, after modification, provides the required 12V supply.

By isolating one of the windings from ground, the two heater windings can be placed in series. This provides approximately 12.6V a.c., with valves V6, V7 and V8 running from one winding.

By cutting the valve heater return on the detector/b.f.o./audio board, I was able to take it to the live side of the other winding. This makes the live side of this p.c.b. now 12.6V a.c. above ground.

The 12.6V a.c. is rectified to obtain the d.c., see **Fig. 2**. (Other receivers not having such windings, will of course need a separate 12V transformer installed).

Audio Amplifier

The first step in my modifications to the Trio 9R59DS replaces the audio valve with an i.c. amplifier. An LM380 audio i.c. was chosen, and it provided more than enough volume with the supplied voltage.

The diagram, **Fig. 3**, shows the circuit for the LM380 i.c. A small p.c.b. or Veroboard can be used and this is mounted at the back of the coil pack wall close to the base of the V8.

The layout is not critical, but screened leads are used for the connections. The existing screened lead from the volume control goes directly to the audio board.

A screened lead goes from the audio board to the screw terminals on the rear wall of the chassis. The connections to the old output transformer were taped up to prevent short circuits and the existing wire from the headphone jack was used to complete the conversion.

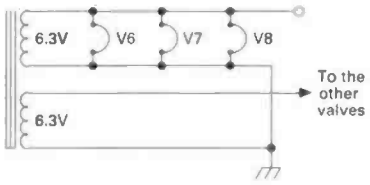


Fig. 1: The original valve heater wiring diagram on the Trio 9R59DS receiver (see text).

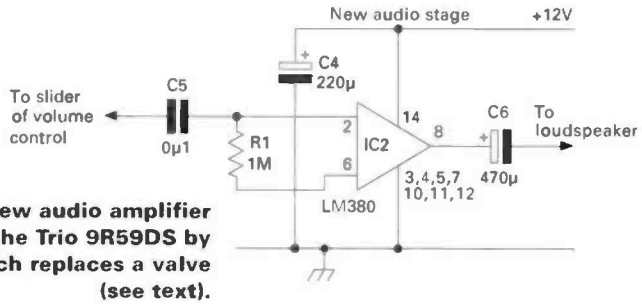


Fig. 3: The new audio amplifier circuit for the Trio 9R59DS by G4BXD, which replaces a valve (see text).

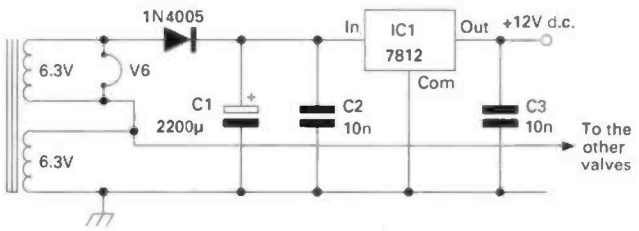


Fig. 2: The G4BXD modifications to the Trio receiver 6.3V circuitry, to enable the existing valve heater windings to provide a rectified and regulated 12V d.c. supply (see text).

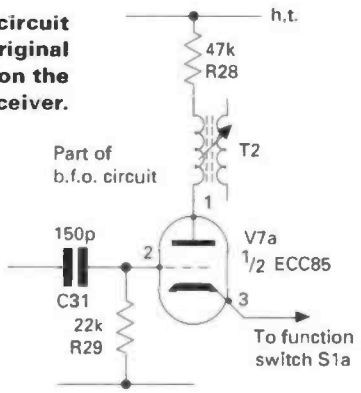


Fig. 4: Part circuit of the original valved b.f.o. on the Trio receiver.

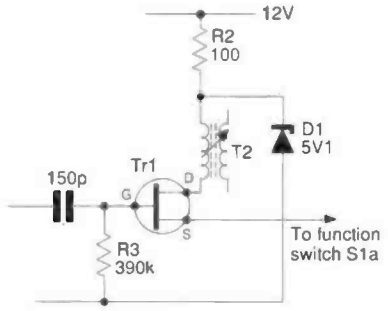


Fig. 5: The transistorised b.f.o. modification using a f.e.t. The modification is mounted directly onto the existing p.c.b. (see text).

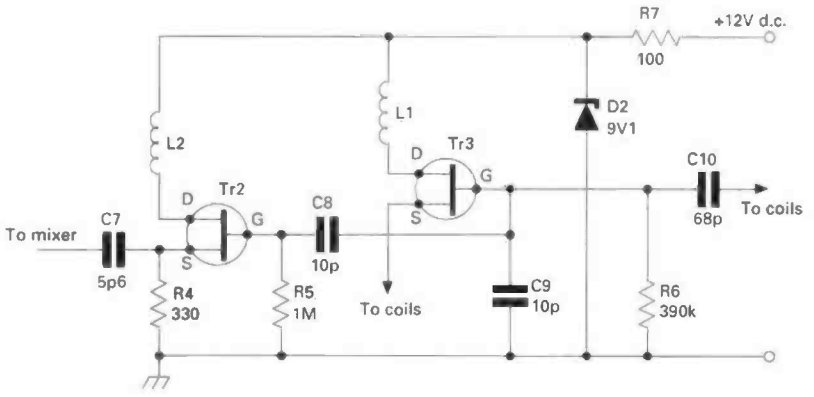


Fig. 7: New v.f.o. employing f.e.t.s, which can be mounted on the existing p.c.b. (see text).

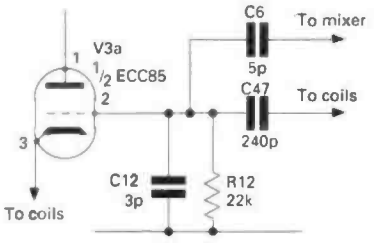


Fig. 6; Part circuit of the original valved b.f.o./buffer (see text).

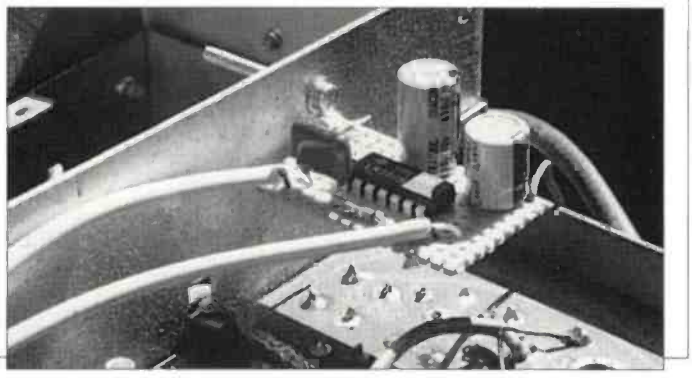


Fig. 8: The new audio amplifier board (in this case built on Veroboard) mounted in the Trio 9R59DS receiver.

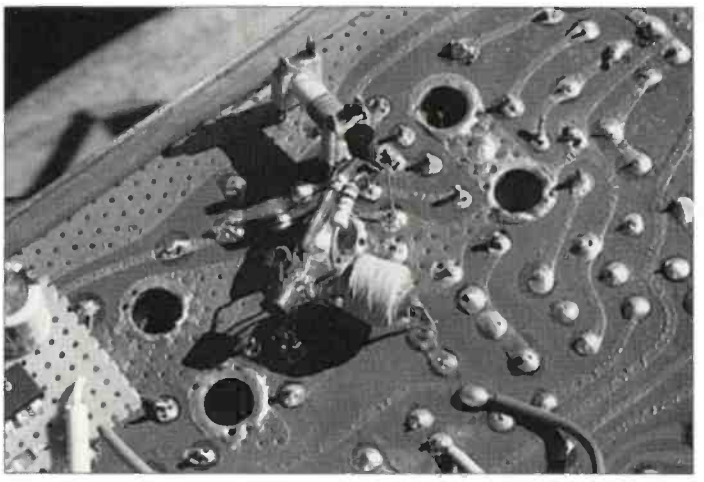


Fig. 9: The new transistorised v.f.o., using f.e.t.s, soldered onto the existing p.c.b. (see text).

Beat Frequency Oscillator

In the un-modified receiver, the audio preamplifier used half of V7 and the other half of the double valve (two valves in one glass envelope) acted as the beat frequency oscillator. Removing this valve, **Fig. 4**, meant using a semiconductor to do the job as the b.f.o., and I chose a J310 f.e.t. as being suitable.

With the valve removed, I soldered the f.e.t. directly across the valve base pins. Then the 47kΩ h.t. feed resistor situated behind the b.f.o. coil was removed, and a wire connected to a external low voltage supply.

The newly transistorised b.f.o. was found to work with only 3V applied. But I used a 5V1 zener stabilised supply as this was handy. I wired it with a 100Ω feed from the new 12V supply and fed it to the new f.e.t. stage (see **Fig. 5.**).

The new b.f.o. needed re-tuning and adjusting. I did this by tuning to a medium wave broadcast station (b.f.o. control at mid position) and adjusting the coil to obtain zero beat.

Double Triode

In the Trio receiver as bought, a double triode is used, one half as the v.f.o. and the other half, the manual suggested, could be used as a buffer. With the valve removed, two J310 f.e.t.s were soldered across the base, one for the v.f.o. and the other as the buffer, see **Fig. 6** and **7**.

The h.t. was fed from the stabiliser valve, now removed, by a resistor. A 9V1 zener (D2) was wired across the old stabiliser socket and 12V fed to it from the new supply.

The h.t. feed resistor to the v.f.o. valve base was removed and a choke fitted. Several were tried until stable operation was achieved. A second choke, not identical to the first, was used for the buffer feed.

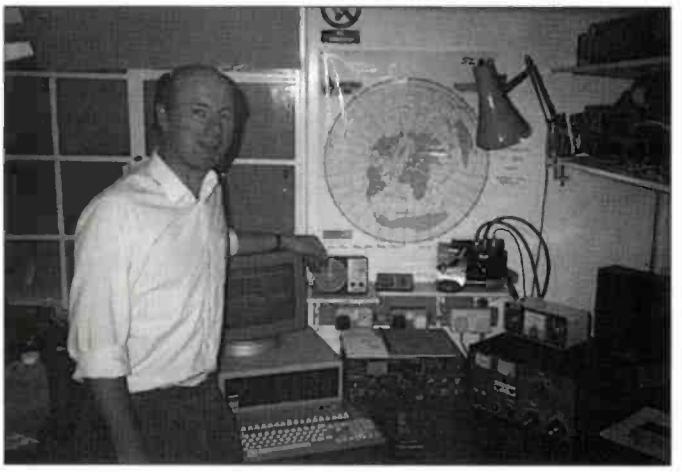
The grid coupling capacitor and resistor were replaced with 68pF and 390kΩ values. Some stray oscillations around 8MHz were removed using a 10pF capacitor from the v.f.o. f.e.t. gate to ground. These alterations required a re-tune of the oscillator coils for each band.

Worthwhile Saving

Three valves were removed, providing a worthwhile saving of some 10 watts of heat. Further alterations could be undertaken to the r.f., i.f. and product detector stages making the set totally semi-conductor.

The finished receiver is no more sensitive than before, but the stability has improved. The same conversion could be employed to any valve set and provides a good exercise in home construction...perhaps you too could revive an 'old friend'? ***PW***

Getting Started with Contests



Keen contester Ed Taylor G3SQX passes on some useful tips and ideas so you can enjoy contest working as much as he does!

Contests are a friendly way for radio amateurs to compete with each other. You can take part at any level of seriousness.

At one end of the scale you can have a few QSOs just to help things along, and at the other you enter a big international event, requiring much preparation, a major contest effort, and extensive paperwork.

Contests are open to anyone, with s.w.l.s and Novices being particularly welcome. You will find that entering contests means your station is pushed to limits not achieved during normal operation.

Shortcomings in equipment and antennas will be highlighted, and your understanding of propagation and operating procedures will increase. Above all, your technique will improve, whether on Morse or 'phone, so that you use time as efficiently as possible.

Different people look at contesting in different ways. You might find that you can have contacts that would be difficult in normal circumstances.

Towards The End

Towards the end of a world-wide 48 hour contest, even a rare station will be glad of your call. Most active amateurs come on the bands for a few hours in these events, to see what DX is around, and to give a point or two to the weary contestants.

On the other hand, many have their favourite contests, which they enter annually, trying to do better each time. You might want to concentrate on a single band, a specific mode, or on working a particular part of the world.

If you have a Novice Licence, you may think that your limited power and frequency allocation will make it impossible to have contest QSOs. It's true that you could not win an international multiband contest, but there are other events which are extremely suitable.

On 1.8MHz there are several contests that include the novice sub-band, and on 3.5MHz the c.w. cumulatives are designed with Novices in mind. The 10MHz band is contest-free, but on 21 and 28MHz there are plenty of stations throughout the world who will be happy to work a British '2' callsign.

In fact, the American 21MHz c.w. and 28MHz Novice sub-bands are identical to the UK allocation. **And** you will have a good audience for your unusual prefix!

As far as power is concerned, you only have to look at the list of stations contacted in the low power section of Field Day to see what can be achieved.

Dipping Your Toe

The contest equivalent of dipping your toe in the water is simply to call stations and give them points. No need to enter - just find out what information the contestants want, and join in.

You might try one of the Radio Society of Great Britain's (RSGB) shorter contests. This is where everyone can work everyone, and the information exchanged is fairly obvious.

For Novices, suitable contests are ROtating POst COdes (RoPoCo), QRS CW, LF Cumulatives, Club Calls and AFS CW. You can find out from the RSGB's *Radio Communications* the date and times, and the frequency limits, if any.

Listen for a while to understand what people are doing, and how they exchange information. Note that there are good and not-so-good operators.

A strong signal is important to win, but this is only half the story. Operating ability is equally important.

In most contests, particularly those organised by the RSGB, you are required to send a signal report, followed by a serial number. This number starts at 001, and goes on to 999.

In longer events, stations contact over 1000 stations, and then the serial number gets into four figures. But you are unlikely to achieve these rarified regions as a beginner!

Sometimes there's additional information to be exchanged, for example, the county code. This is a three letter group which indicates your county or region, so for example, Surrey is SRY and Fermanagh is FMH.

Other contests ask for your zone, your age, or the power you are using. The idea of this is to enable the adjudicators, who examine your log afterwards, to see if you are able to copy other stations' details correctly.

Points are deducted if you are not accurate; the most difficult contest in this respect is ROPOCO. This is where there's a trophy for the highest placed 'perfect' log, which can be a long way down the list of the high point scorers.

Try A Contact

When you've decided to try a contact, write down in advance what you will send to the first station worked - '59 001 Sierra X-ray Echo', for example. Now you'll have something to rely on in the heat of the moment.

Be aware that people do not always send realistic signal reports. So 59 or 599 is often sent when signals are extremely weak!

Find someone who is calling 'CQ Contest' or 'QRZ'? And if they're working another station, wait until the end of that QSO.

Once they've finished, then transmit just your own call, once. On c.w., send at a speed you can receive comfortably. This may be quite a bit slower than the speed of the other station.

On s.s.b., use phonetics. You may not succeed at the first try - there might be QRM or other stations calling.

But, be ready for the reply, which is likely to be considerably more snappy than you are used to! It will be something like '2E0QPO 59 123 Golf Delta Delta'. Don't expect frivolities such as 'Good Morning', or 'Over to you for your information, Old Man (OM)'.

Try to respond with your exchange as concisely as you can. There's no need to add greetings or extraneous procedure.

Exchange Clearly

Unless conditions are poor, send your exchange clearly just once, with phonetics on 'phone. You may not receive all the information, because of QRM, QSB or nervousness.

It's usually best to get a repeat first, before sending any of your exchange. Simply ask for what you need, or for confirmation of anything doubtful.

For example, 'Your county again please, over', 'CTY? BK' on c.w., or 'Is that Golf Whiskey Tango? Over'. When you are sure of the other station's information, send your own.

You'll get a simple acknowledgment. Then your contact will be off looking for someone else.

Many people are put off by high speed c.w. in contests. Contestants **are supposed** to reply at approximately the speed they are called at, but some are not very conscientious at this!

To get practice, try the RSGB QRS CW cumulatives. These are designed for Novices

or anyone who has never entered before.

The RSGB QRS Cumulatives and c.w. contests are held in the Autumn, and the maximum speed is 12w.p.m. These will enable you to get the feel of c.w. contest operation, without the pressure of trying to copy faster than you can manage.

There are also 'QRS Corrals' in the AFS CW and LF Cumulative contests. These are very helpful for beginners.

So, you've had your first contest contact and you can look for the next! But don't forget to update your log and the QSO counter. Start searching - you've got the contest bug!

Source Of Experience

Very often a good source of experience is your local radio society. Many of the contests in the calendar are designed for multi-operator entries, and you'll probably find that the group already enters one or two events.

Joining in and helping with a club contest entry is a good way to learn more. And not just about good operating, but also about many other aspects of contesting.

You might persuade the group to enter an event, pooling knowledge to work out a strategy, and analysing how to do better next time. For many clubs, the highlights of the year are the Field Days - c.w. in June and s.s.b. in September.

Field Day Idea

The idea of a 'Field Day' is to put a station on the air for 24 hours, without using mains power or permanent buildings. You have just one day to get everything ready, starting from a bare field!

A simple entry might use just one doublet antenna with battery-operated equipment in a tent. At the other end of the scale, there are stations who have six or seven antennas at over 20m high!

Some field day stations include enormous beams. They use caravans for operating, sleeping and eating, the whole station being powered by a large diesel generator.

Planning and running even a modest field day entry is a big job, and most groups appreciate extra help. You quickly learn about many topics: camping, antenna rigging, propagation, band useage, logging, computers, transport and cooking.

In some groups, operating is regarded as a skilled activity, carried out by experts. However, most clubs are set up so that everyone does everything, and you will find yourself at the business end of a key or microphone some time during the weekend.

Novices are allowed to operate under supervision, as are Class B licensees on the h.f. bands. This baptism of fire is the way that many amateurs got their first taste of contests, and it's highly recommended.

Affiliated Society Contests

Along with Field Days, the most popular RSGB contests for UK stations are the two Affiliated Society Contests (AFS), one c.w., the other s.s.b. These are held on 3.5MHz in January, each lasting four hours.

Any group can enter one or more teams in the AFS contests. A team usually consists of several stations operating independently, with scores pooled for the overall entry.

In the AFS there's tremendous competition for both the individual table, and for the team results. It can be very instructive to help a station entering AFS, either by logging for an hour or two, or by taking a share of the operating.

The best scorers in a club become the **A** team, and the rest form the **B** or even **C** teams. The competition between club members is an incentive to get better results each year!

Club Calls Contest

Another event specifically intended for groups is the Club Calls Contest, which is a mixed mode event on 1.8MHz held in November. This is a good training ground for anyone who needs practice in contest operating, and it's more relaxed than many others.

Apart from contests specifically intended for clubs, there are many others having multi-operator sections, appropriate for groups to enter. For example, the 21/28MHz contests, the RSGB Islands on the Air Contest in July and the CQ World-wide contests in October and November.

Take The Plunge

So, you've decided to take the plunge and enter a contest. Choose your contest to fit in with band allocations and availability of time.

Then decide whether you will operate on your own, with others, or as part of a club effort. You'll also decide which mode you prefer.

You may already have a contest in mind which meets your objectives. There are, for example, the ARRL 28MHz contest in December or the RSGB 1.8MHz contest in February.

Pre-contest planning requires consideration of three areas. These are equipment, tactics and logging.

On equipment, you may consider rearranging the layout of your station to make it more efficient. For example, do you need to do anything with antennas? You may be able to erect a structure for a few days that would be unacceptable on a permanent basis.

As far as tactics are concerned, look at questions such as propagation and band-changing. There's also rest periods, food and drink to be considered, together with (if a multi-operator entry) the division of responsibilities.

The question of what can be regarded as pre-planned depends on the contest, and will change with experience. Short contests are easier to organise, although you may find contesters who consider anything less than 24 hours to be a little frivolous!

Careful Logging

Logging needs to be carefully organised, so that it helps your operating rather than slowing

Fig. 1: Teamwork is the name of the game when it comes to club entries. Even if you are not an established contest operator you gain valuable experience in logging contacts - a vital job requiring essential accuracy for maximum points.

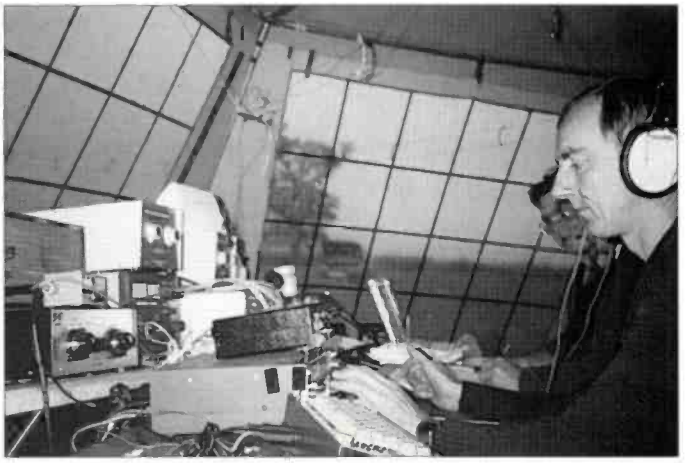


Fig. 2: Huge contest antennas like this example can help you do well. However, Ed Taylor G3SQX says that everyone can still join in and have a go. British Novice callsign stations seem especially sought after by foreign DX hunters!

Time	Callsign Sent	S9(9) if not stated Received

Fig. 3: A sample log sheet.

2nd 1.8MHz c.w. 1993

A	OK1ACF G0ADH
B	G3BGM G4BUO G4BWP G3BPM G4BJQ F6BWO F6BKP G3BFP
C	G4CZB GM3CFS F6CEL
D	G4DDX EI5DI DL0DA F6DW G3DIC OE3DSA G4DBN
E	G4ERW DL0EKD
F	ON4FP G3FVW OK1FPS
G	F6GED G3GMS G3GMM OK3GI EI6GF F6GNP
H	G4HYU EI4HM F6HSV G2HLM G3HKD G3HEJ G3HQX
I	G0IVZ G4IFB GW4IDI
J	G0JZE G3JKB G0JNZ G4JSN 13JSS
K	G3KZR GM3KHH G3KKQ G3KDP OE5KE G4KGG GW0KZW SP9KRT G3KNU G3KDB
L	G0LZL G0LKX G3LVP
M	G2MJ HB0MX G3MXJ LA6MP
N	GM3NCS G3NKS
O	GM4OSS G0OPB G3OAG G3OZF G4OFR
P	GM3PFQ G3PDL G4PIQ
Q	DK7QJ
R	G3RSD G4RCG G3RXP GM0RHP
S	F5SEY G3SJJ G3SWH
T	F6TM G4TLS
U	GM3UA G3UFY G3UNG GM3UM
V	G3VOD G3VRY G3VYI
W	G3WRR/P G3WKL G3WQV DL6WT
X	G3XTT
Y	F5YG G3YLC G3YAJ GW3YDX DL4YD
Z	G3ZGC G3ZDD G3ZBU G3ZEM G3ZWH

Fig. 4: A sample duplicate log sheet suitable for contest working.

you down. You can do everything on paper, or use a computer.

It's probably advisable to use paper logs to start with. But computerisation is becoming the norm nowadays for serious contesters.

Logging programs such as Super-Duper (from EI5DI) or CT (from K1EA) are quite easy to use. They cover all contests likely to be encountered.

If you have an IBM-compatible PC, it's worth getting one of these programs and practising. You will then find that on-line logging becomes so straightforward that you wonder why you struggled with paper logs for so long!

Let's assume that you want to use paper logging to start with. You'll need prepared logsheets, a duplicate log, and scrap paper.

As regards logsheets, most people prepare their own. It's not practicable to enter contacts directly into the station log, so you need to make up sheets which contain (say) 20 QSOs per page, with serial numbers written in to the appropriate space.

The log information should be entered in the same order in which it is received or sent. The exact layout will depend on the contest, but be sure to leave enough space in the 'Station worked' column, as this is the one which usually contains the most corrections and deletions.

The log illustration, **Fig. 3**, shows the sort of layout suitable. The duplicate log, also exists in a variety of designs.

For a contest where up to 150 QSOs are likely, you can prepare a ruled sheet by writing the letters of the alphabet down the left-hand side. As you work stations, enter the callsign on the appropriate line according to the first letter of the suffix.

So, G0AAA is entered under 'A', G4BUO under 'B', IQ3CBG under 'C', and so on. Then it's simple to check and find out whether a station has already been contacted. See the illustration, **Fig. 4**, for the format.

Heavy Penalty

Duplicate logging sheets are important because there's a heavy penalty for claiming points on duplicate contacts. Of course, apart from the waste of valuable QSO time, stations will not thank you for calling several times without good reason!

However, when the boot is on the other foot, and you are called by someone you have already worked, it may be easier to have another QSO. This is rather better than taking too much time to explain. When you get to this stage, you can regard yourself as an old hand!

More elaborate duplicate sheets are available for longer events. But, remember that you'll need to keep a separate one for each band (and mode) in the contest.

The Contest

In the contest itself, you can be doing two main things. Calling CQ, or responding to others who are calling CQ.

Generally speaking, winning stations spend more time calling CQ than hunting for others. But there are big variations from contest to contest.

Of course, if you are limited to 3W as a Novice, you'll need to call others for most of your QSOs. But don't neglect calling CQ. And remember that even the strongest stations **do not** get a call from every CQ!

To do well, you must be transmitting most of the time so do not do too much aimless tuning. Have an objective in mind, and call CQ if you don't hear anyone you want to work.

Your CQ calls need only contain two pieces of information. You need your callsign, plus the fact that you are looking for contest QSOs.

So, 'Two Mike zero Quebec Papa Oscar, Two Mike zero Quebec Papa Oscar, Contest' is both concise and informative. On c.w., 'TEST' replaces 'Contest'.

Paradoxically, the best contesters rarely use the letters CQ in their CQ calls! You'll also find that they rarely send 'Over' or 'K' because this is obvious and wastes time.

Short Calls

Short calls repeated after a second or so are better than long calls. There's no need to be concerned that you are not getting replies - it's quite normal to call 20 or 30 times between QSOs.

To begin with, you could write down the sequence of events that's likely in each contact. Make up two cards - one for each side of the exchange.

If you are lost for words, refer to the appropriate card. This will guide you through the QSO.

People new to contests have been known to forget the phonetic alphabet because of nerves. But at least you can send your own callsign if you have it written out phonetically in front of you!

On c.w., my advice is that you **do not** use the contest to test out your new keyer. It's better to be a bit slower but completely comprehensible.

It's also important to fill in the duplicate sheet immediately after a contact. This must not be at the expense of making QSOs, so you have to develop the knack of writing down the information at the same time as dealing with the next contact!

A memory keyer or voice loop can help with the 'Tnx, QRZ'? message and provide a second or two for the paperwork. If you have mastered computer logging, you only have to enter the callsign once which is a big advantage.

Eat And Drink

Don't forget to eat and drink in the excitement of the 'hunt'. Exhaustion can be caused by dehydration or by not getting food. And remember that sleep is also essential, particularly in a 24 or 48 hour contest.

You should have already planned your sleep periods. But remember that it's usually better to take a nap if you are tired, coming back refreshed after an hour or two. At this point, the advantages of entering a short contest become apparent!

Completing Paperwork

Completing the paperwork for a contest entry can become a chore. Fortunately this has been relieved in recent times by the increasing use of computers.

The major job is writing up the log itself. In the RSGB h.f. contests, the logsheets have 40 QSOs per page, which means that a contest such as RoPoCo needs no more than two sheets.

Be careful to check the log after you have completed it. Careless mistakes such as writing G7QRX for G3QRX will lose you all the hard-earned points for the contact.

You will also be asked to submit a duplicate sheet. You can use the one that you wrote during the contest with a little cleaning up.

There may also be other requirements for particular contests, which you should be careful to observe. A cover sheet is also needed, containing such things as details of equipment and a score summary.

Make sure you send the entry to the correct address by the given deadline. Volunteer adjudicators are not very sympathetic to late or mis-addressed entries, for obvious reasons.

Next Contest

Before you start planning your next contest, hold a brief post mortem. Could your organisation be better?

Can you improve the antennas or other equipment? Does your shack need modification, and was the paperwork adequate?

Will you try a computer for logging? Were your operating tactics reasonable - did you spend too much time searching, for example?

You may have developed a taste for a particular type of contest, and this will tell you pretty clearly what to enter next time. As a guideline, here are the characteristics of some of the RSGB events. Those suitable for beginners using slower c.w. include the LF Cumulatives and Club Calls.

For 'Top Band' there's the 1.8 MHz CW (fast and furious). And there's the Affiliated Societies (accuracy more important than speed). The ROPOCO for the DX-minded and the 21/28MHz CW and SSB Contest.

There's also the 7MHz CW, The Commonwealth Islands on the Air. For low power there's the LP Field Day, for Club events: CW Field Day SSB Field Day. Finally, I wish you Good luck - let's have a QSO in the next contest!

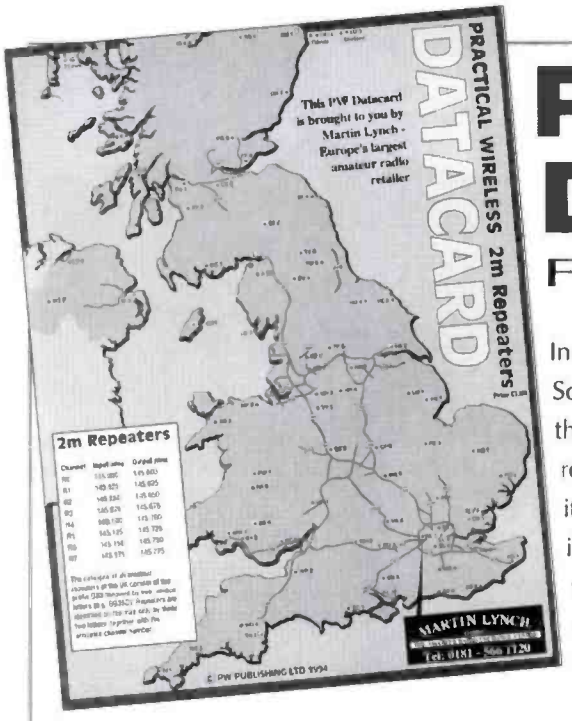
PW

Further reading

RSGB HF Contests Guide (RSGB HQ) This contains plenty of information for contesters, along with a calendar and suitable paperwork.

Ham Radio Contesting By K1XA (Tiare Publications, Wisconsin). Suitable for anyone who has progressed beyond beginner stage - covers international contests, computer logging and more.

'Getting Started in Contesting' - Video (*CQ Magazine*) Hicksville, NY). This is part of *CQ Magazines's* definitive series of videos, available in PAL format. Informative, and of a high standard.



PW 2m DATACARD

FREE WITH THIS ISSUE

Inside this issue you'll find a free gift - an updated 2m repeater datacard. So many readers have been asking if we still have any of the old ones that we decided it must be time to produce a completely new and revised one. We've updated it and made it bigger than before so that it's easier to read but still a convenient size for carrying in the car. Now it's easy to see when pinned up in the shack and sturdy enough to take with you when you're driving and, if you're in an unfamiliar area, a quick glance will show you the nearest 2m repeater, along with its frequency and callsign.

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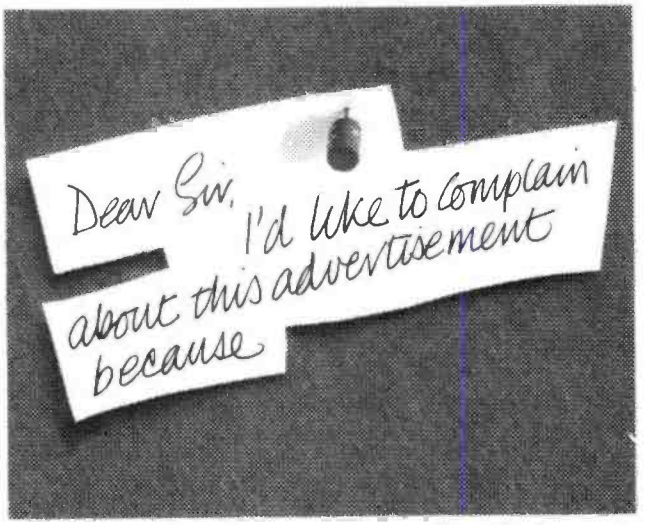

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Specifications – The Mysteries Explained

This month Ian Poole G3YWX unravels the mysteries of frequency modulation.

Frequency modulation (f.m.) is one of the most popular modes in use today. It is not widely used on the h.f. bands except at the top end of 28MHz. However, its use on the v.h.f. and u.h.f. bands more than makes up for this.

On the v.h.f. and u.h.f. bands f.m. has gained great popularity because of its resilience to interference and fading. This lead to its use for portable and mobile applications, and now for most local communications, either simplex or via repeaters.

In addition to its use for voice communications, f.m. is also used for packet. This must be the fastest growing mode nowadays.

To resolve f.m., a receiver must be able to convert the frequency variations of the signal into voltage variations. This conversion is acomplished in the demodulator and there are a wide variety of circuits which can do this. However, all of them have voltage to frequency characteristic which is identical in its form as shown in **Fig. 1**.

To ensure the minimum of distortion in the output the centre section should be as linear as possible. It is most unusual for amateur sets to have distortion figures quoted, but many hi-fi sets will have figures of less than 0.1%.

Capture Effect

Naturally there will be a number of receiver specifications associated with the use of f.m. One of these is associated with a very useful feature of f.m. called the capture effect.

The capture effect occurs when two signals are present on the same frequency. The receiver will pick up both signals, but only the stronger one will be audible at the receiver output. This is in sharp contrast to amplitude modulation (a.m.) where a combination of the two signals will be heard in addition to an annoying heterodyne when the signals are on slightly different frequencies.

Capture effect is very useful because it means that interference levels are reduced when the occupancy of various channels is high. This is particularly true of packet where the usage of the specially designated frequencies is very high. It is also a very important feature on v.h.f. f.m. tuners where the capture effect helps to reduce interference from other signals.

The effect arises because the receiver detector and i.f. strip act as a limiter and remove any amplitude variations on the signal. This has the effect of suppressing the weaker signal, and allowing the strongest one through.

The capture ratio is used to measure the capture effect. The capture ratio is the minimum ratio (expressed in decibels) between two signals on the same frequency for a specified reduction in the unwanted signal at the output. Normally a reduction of 30dB for the unwanted signal is used for this.

Typically you might expect to see a capture ratio of 2dB for a typical broadcast tuner. This means that if the wanted signal is 2dB stronger than the unwanted one, then it will capture the demodulator and suppress the unwanted signal by 30dB.

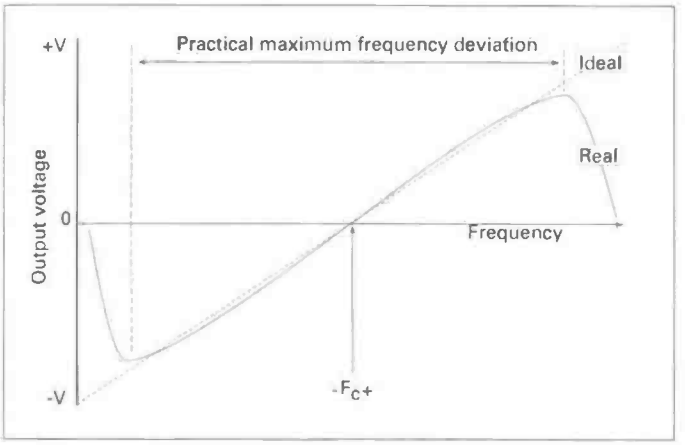


Fig. 1: Response curve for an f.m. demodulator, the closer the 'real' approaches the 'ideal' the lower the distortion.

Noise Output

When there is no r.f. signal present on an f.m. receiver a large noise output is present. As a frequency modulated signal is introduced into the detector the noise level decreases sharply, and almost disappears when a sufficiently strong signal is present.

Owing to the high levels of noise when no signal is present, a squelch control is fitted to most f.m. receivers now. The squelch enables the audio to be switched off when no r.f. signal is present, preventing the high levels of noise reaching the loudspeaker or headphones.

The reduction in noise as a signal is introduced is known as quieting. Often people will be heard saying that a signal into a repeater is 'full quieting'.

When a signal is very weak there will be a large amount of background noise. As it increases in strength the noise level falls until large signal increases yield virtually no improvement. This is known as fully quieting, and on repeaters it's taken to be the level when no noticeable noise can be heard.

Receiver specifications will be quoted a little more exactly. When no signal is present a certain level of audio noise will be present. When an r.f. signal is introduced the noise level will fall. The quieting is the ratio of the two noise levels.

Often a receiver sensitivity will be quoted for a given quieting level. For a narrow band f.m. receiver a typical sensitivity of 0.5 microvolts for 20dB quieting may be expected.

For a wide band f.m. broadcast receiver where background noise levels are more noticeable a much lower level of noise is needed. Typically a level of 1.5 microvolts may be expected to give 30dB quieting.

That's it for this month, cheerio for now. Don't forget to send your letters to me via the *PW* Editorial Offices.

PW

Antenna Wo

For many years the half wave dipole, and its cousin the trap dipole, have been the mainstay antenna at many amateur radio stations. The reason that such a simple antenna holds pride of place is not surprising. It's an antenna that can be effective, cheap, easy to install, and easy to adjust.

The dipole antenna really is easy to adjust. In fact, the only adjustment needed is to ensure that the antenna resonates on the band of interest. This is done by changing the length of the dipole.

Over the years many different ways of resonating a dipole have been described. My article aims to summarise the main methods, their advantages and disadvantages.

Tape measure

For those who merely want to listen to the band, nothing more than a tape measure is needed. You determine the length of the dipole according to the simple formula:

L(metres) = 147/f (in MHz).

The character f represents the centre frequency of the band of interest, and L is the length of the complete $\lambda/2$ antenna. As the dimension L represents the complete dipole length, each side of the dipole has to be exactly half of the distance L.

Providing the dipole is installed in a reasonably straight line it should be close enough to resonance to work reasonably well. In fact, for listening purposes it's doubtful if any real improvement can be made by using more sophisticated techniques.

However, if the dipole has to be bent to get it into the space available, it may need further 'tweaking'. Again for an s.w.l. the 'untweaked' antenna is likely to be quite satisfactory. But the transmitting amateur may find that, 'untweaked', the antenna doesn't load well.

Single Turn Loop

A dip oscillator (still known almost universally as a g.d.o.) is very useful. It may be lightly coupled to the end of the feeder by a single turn loop.

The length of the dipole can be adjusted until the g.d.o. shows a dip at the frequency at which you wish the antenna to resonate. But like all things there's a technique to getting the best results.

To begin with, it may be necessary to tightly couple the coil to the g.d.o. to find the initial dip. But having found this dip, the coupling must then be made 'looser' until only the faintest dip is obtained.

The light loading of very loose coupling gives greatest frequency accuracy. The oscillator frequency of the g.d.o. should be determined by using a digital frequency meter (d.f.m.) or by listening to it on a calibrated receiver.

An alternative to using a d.f.m., is a receiver with a dial calibration of better than 1%. This should be quite good enough.

Unless the g.d.o. has a built-in d.f.m. do not rely on the g.d.o. dial calibration. This is because it may have been 'pulled' by coupling to the dipole.

With the g.d.o. method you are measuring the resonance of the whole system, that is dipole, feeder and loop. However, as the match between the feeder and dipole is usually good I have found it to give satisfactory results provided the coupling loop is small.

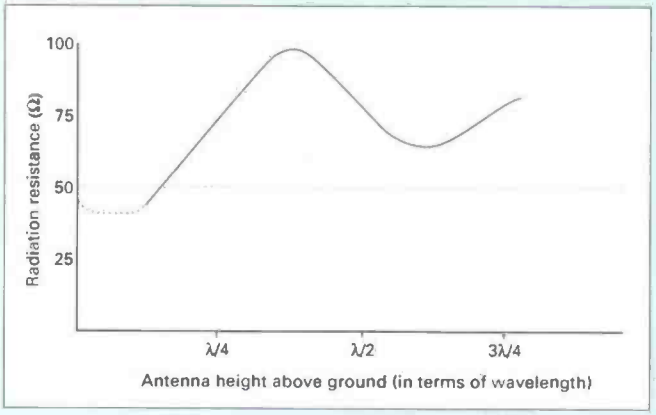


Fig. 1: The radiation resistance of a λ/2 dipole antenna varies with its distance above ground. When less than λ/8 above ground this value is very unpredictable and depends greatly on the resistivity of the ground itself.

The Noise Bridge

Noise bridges are frequently recommended and are an excellent method but the results may need interpreting. If it's possible to match the feeder exactly to the antenna then all that is necessary is to set the noise bridge to say 50Ω and trim the dipole until you get a null at the required frequency.

Whether you get a null at the desired frequency or not, depends on the height of the antenna above the ground, and the feeder impedance and length. The chart **Fig. 1**, shows how typical feed point impedances vary with the antenna height above ground.

However, in the real world it is very likely that the feeder is not going to be matched to the dipole. For example, consider a dipole for the 7MHz band at a height of some 10.5m and fed with 50Ω coaxial cable.

In this case the feed impedance will be about 75Ω and you will never get a purely resistive impedance of 50Ω at any point on the coaxial cable.

If you possess a receiver noise bridge, you know the length of the feeder and you know how to use a Smith Chart, the problem can be solved. But this method is rather complicated, and to be honest it's somewhat of an 'overkill' for our purposes.

Fortunately some of these complications can be avoided by making the feeder a whole number of quarter wave lengths long. But remember to allow for the velocity factor of the coaxial cable.

For example at 7.05MHz, one quarter wave length of RG-58/U will be:

Velocity Factor

The velocity factor is a term you may have seen used from time to time. Put simply, the velocity factor is the speed that the r.f. energy travels along the cable. This simple change means that some calculations have to be modified to take this figure into account.

Because the energy travels at only slightly more than two thirds of the speed of light in 'free space' (300 000km/s) value, the wavelength in the coaxial cable is so much shorter. The velocity factor is given as 0.659, the r.f. energy travels at 300 000 * 0.659 m/s, or 197 700 metres per second.

In spite of the change of the distance travelled in a specific time, there are still the same number of oscillations in that time. So the wavelength is shorter when the wave travels slower.

rkshop

We all know that to work effectively an antenna has to work efficiently on the band of interest. And in the first of his antenna workshops Gerald Stancey G3MCK tells you how to do just that.

$$\frac{300 \times 0.659}{4 \times 7.05(\text{MHz})} = 7.01\text{m}$$

Where 0.659 is the velocity factor of the coaxial cable (see the separate panel for more information).

The calculated length of coaxial cable will give a resistive termination at the shack end of the line when the dipole is at resonance. The value of resistive termination will only be 50Ω when the dipole feed impedance is also 50Ω.

In other words, resonance will be achieved when the bridge balances at a resistive setting. The value of this setting can only be found by trial and error.

In the example given it would be either about 75 or 34Ω. Dividing this impedance by the impedance of the coaxial cable will give you either the s.w.r. or its reciprocal, in this case 1.5.

Simplest Method

The simplest and probably the most effective method I have saved to last. And that is to use a normal reflectometer, or s.w.r. bridge, and adjust the dipole for minimum s.w.r.

Again, to get best results certain precautions have to be taken. You may find that *measured* s.w.r. increases with power.

Don't worry if you find the s.w.r. changes with power. You should use the lowest r.f. power possible for your initial adjustments. Then when you've adjusted the antenna to bring the s.w.r. to a minimum, increase the power to determine the true voltage standing wave ratio (v.s.w.r. or just s.w.r. normally).

You may have to retrim the dipole but it will give you a more realistic s.w.r. figure. As a guide I use about 3W for initial adjustment and 20W or more for the final adjustment.

There's more good news! The cheapest s.w.r. meter is quite adequate for the task. But don't be surprised if you obtain different minimum s.w.r.s and dipole bandwidths with different s.w.r. meters.

However, you should remember that once you have trimmed your dipole for minimum s.w.r. there is nothing you can do to improve the situation. In this context, provided all s.w.r. meters show minimum s.w.r. at about the same frequency their actual readings are largely unimportant.

Unexpected SWR Readings

Funny s.w.r. readings can sometimes occur due to r.f. on the feeder or harmonics giving higher than true reverse readings. The former can often be minimised by winding the coaxial cable into a coil, say six turns 9 inches in diameter, just before the s.w.r. meter or by using a balun at the feed point.

Harmonics can be reduced by inserting a low pass filter which cuts off just above the fundamental frequency, between the s.w.r. meter and the dipole. I have included these for completeness as others have reported problems in this area, although they have never happened to me.

Techniques Work

The above techniques all work. Which one you use will depend on your circumstances but for the transmitting amateur it is hard to see why anything other than a reflectometer s.w.r. meter being used. For the s.w.l. a tape measure is all that is needed.

All these methods are all equally applicable whether or not you use a balun with your dipole. Although views on the necessity of using baluns differ. Perhaps, if I feel brave, I may try to give a balanced view on this emotive subject in another article!

PW

Practical Tip

Now for a practical tip for adjusting lengths of dipoles. I usually make my dipoles from insulated stranded wire. I cut a little more wire than I need then erect the dipole so that it is too short (that it resonates higher in frequency than where I want it to resonate).

I then steadily increase the length until I get it resonance at the desired frequency. Instead of using knots I use 'chocolate block' connectors as I've shown in **Fig 2**. They are easy to slide on the wire and enable me to make easily small changes in length.

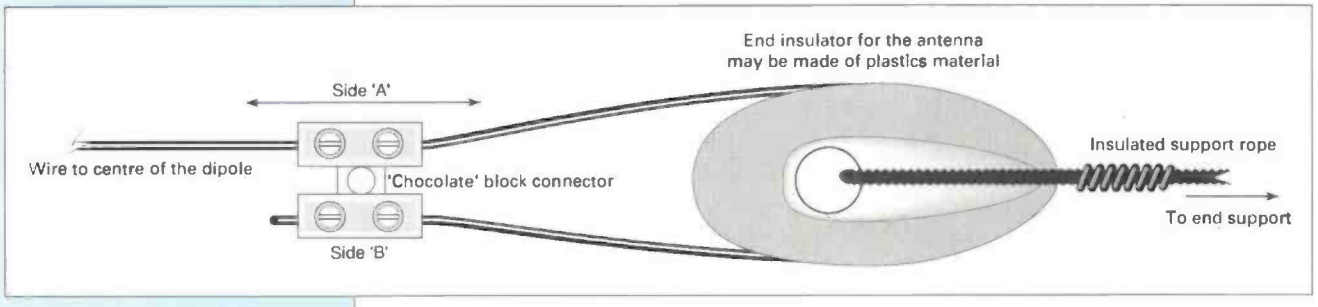
While you can quite easily adjust the antenna by steadily increasing the length. The process can be speeded up by a bit of simple maths. This is best explained by means of an example.

Assume I have put up a dipole that I wish to resonate at 3560kHz. It's resonating at 3700kHz. Let us assume it's 19.5m long. Then we can say that it should be:

$$\frac{19.5 \times 3700}{3560} = 20.26\text{m}$$

Hence the dipole needs increasing in length by 0.76m so increase the length of each leg by 0.38m. Find the frequency of minimum s.w.r. again, if it's not 3560kHz adjust by repeating the procedure again.

Fig. 2: My quick-adjust method of clamping antenna wires, using a two way piece of electrical 'chocolate' block connector. Side B is held clamped, all changes are made by sliding the block along the wire before clamping side A again.



MIKE RICHARDS G4WNC

Mike Richards G4WNC asks if you've ever fancied RTTY contesting and has an update on JVFAX.

Have you ever fancied having a go at RTTY contesting? If so, why not enter the Swedish Amateur Radio Teledata Group's (SARTG) New Year RTTY contest next year. This well established contest takes place on January 1 1995 on the 3.5, 7.0 and 144MHz bands.

The contest is split into two sections with the h.f. running between 0800 and 1100UTC and v.h.f. in the afternoon between 1300 and 1500UTC. It's the combination of seasonal atmosphere and short operating times that make this an ideal contest for beginners.

The entry classes are: single operator, multi-operator or short wave listener (s.w.l.). To complete a contact each station must exchange RST, QSO number, name and Happy New Year in your own language!

The scoring system for h.f. awards one point for each QSO on each band, plus a multiplier of one for each DXCC country (outside Scandinavia) and for each LA-OH-OZ-SM-TF prefix number (0-9). The final score being the number of QSO points multiplied by the sum of the multipliers. For v.h.f. the scoring system awards one point for each kilometre or part thereof.

You need to record your contacts on a contest log which must contain band, time (UTC), message sent and received, points and multipliers. You will need to use a separate sheet for each band and enclose a summary sheet showing the scoring, entry class and your own callsign, name and address.

All entries need to be sent to: **Bo Ohlsson SM4CMG, Skulsta 1258, S-71041 FELLINGSBRO, Sweden.** The closing date for entries is January 21 1995.

JVFAX Update

As promised last month, here's a run down on the new JVFAX 7.0 FAX program from Eberhard Backeshoff. This impressive package has become something of a standard among amateurs and short wave listeners. The secret of its success is a combination of its easy availability combined with years of development by the author.

Unlike many amateur programs, JVFAX is neither shareware nor public domain. It's supplied on condition that the only charge made when copying is the cost of the transfer media.

I've been distributing this program for Eberhard for around a year now and can offer the latest version to *PW* readers. The details are at the end of the column. If you like the program please send Eberhard a donation to encourage further development.

The first point to note about the new JVFAX program is the improved installation system. Eberhard has now packed all the files into a self extracting archive which contains all the sub-directory information.

To install the program you just copy the file INSJV70.EXE to the root directory of the required drive and run INSJV70. The archive will then unpack itself creating the necessary directories as it goes. This is a much neater installation process and will be particularly helpful for the new computer user.

Most of the changes to this latest version of JVFAX are aimed at making the program easier to use. A typical example of this is to be found in the zoom control which now uses shifted cursor keys to size the zoomed area.

The display capabilities have also been enhanced and it now has a VESA 1.2 driver so that 32k and 64k colours can be used. This is supplemented by the ability to store and load colour pictures as uncompressed TIFs.

If you're into both FAX and SSTV you'll find the fast mode switching particularly good. Not only can you switch directly from FAX to SSTV reception, but you can also use the Quick-TX option. This lets you go straight into transmit and choose the picture to be sent from a handy thumbnail display.

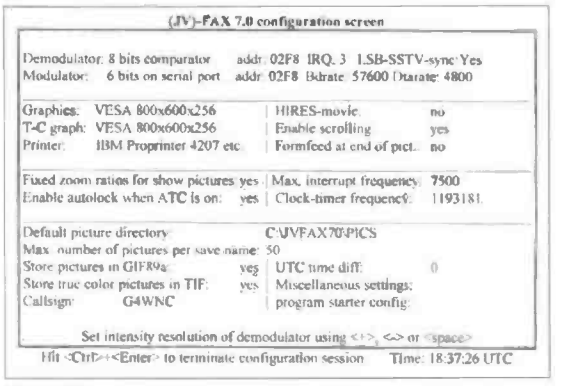


Fig. 1: The JVFAX version 7 configuration screen.

Another useful extra is the addition of a spectrum analyser display when receiving SSTV. This makes SSTV tuning much simpler.

The FAX mode has also been enhanced with a menu system for mode selection. In the old version 6 you had to toggle through all the options until you found the one you wanted. The menu driven system is very much quicker to use.

For those of you into FAX transmission, there's a neat test tone generator that can be very handy for setting up your transmit levels. It can also be used as a tuning aid.

Electronic Shareware

Having recently been given a shareware CD-ROM filled with around 600Mb of electronic shareware it's clear that shareware software is getting out of hand. The particular package contained numerous versions of all the common requirements like filter designers, antenna systems, grey line predictors, etc.

The problem was that with so many different versions of the same basic function how do you decide which one to download to your computer? This is where you come in!

If you would like to contact me with your views on the best shareware packages I'll compile this into a list and make it available to *PW* readers. You never know, it might even be worth putting together a special disk containing the top programs.

Remember you only get out as much as you put in. So please make the effort to contact me with some data.

Special Offers

The following special offers are available to 'Bits & Bytes' readers. Although I try to turn the orders round in a day or two, you should allow up to two weeks for delivery.

1 JVFAX 7.0 - FAX and SSTV transmission and reception for IBM compatible computers.

2 HAMCOMM 3.0 - RTTY and c.w. transceive facilities for IBM compatibles.

3 FactPack 1 Interference - Help for solving interference problems.

To receive any of these offers just send a self-addressed sticky label plus 50p per item to the address at the end of the column. If you're ordering JVFAX or Hamcomm, you'll also need to send a blank, formatted, 720K disk for each program or just one 1.44M formatted disk.

Keep sending your letters to me, Mike Richards G4WNC, PO BOX 1863, Ringwood BH24 3XD. Compuserve 100411,3444

E N D

Ron Ham welcomes you into the warmth of the PW vintage 'wireless shop' while he dips into a very interesting postbag.

Valve &

Fig. 1: Photograph of Henk Merrman's Second World War clandestine communications receiver (see text).

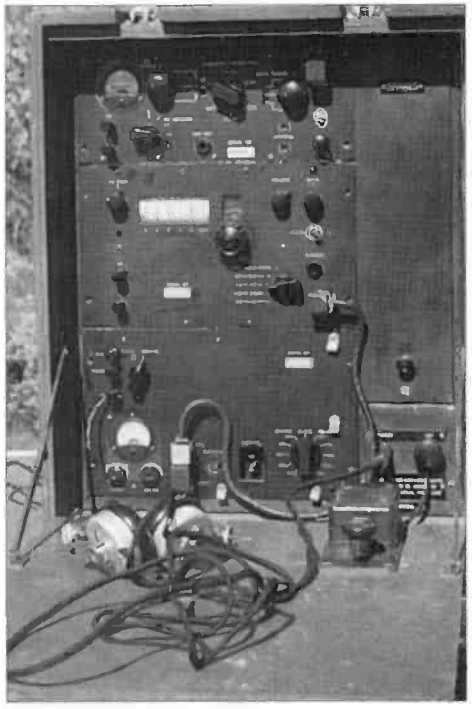


Fig. 2: The complete transmitter/ receiver assembly, complete with fold-down operator's 'table'.

Fig. 3: Close-up view of the assembled clandestine set which was assembled on a 'mini rack' system for ease of maintenance.

Welcome to the world of 'valve and vintage' equipment. And, it's straight to the postbag this time, for some interesting letters.

Firstly, we travel back over 50 years. As he'd seen service with the Guards Armoured Division during the Second World War, **Robert English** (Seaton Delaval, Northumbria) has written and told me about the sets they used in action.

Robert says that the WS11, "had heavy aerial rods in sections of four feet - about thirty feet could be erected by the use of stay wires". He added that "they could transmit about 2 to 4 miles on speech in open country but were quite good on Morse".

Later, Robert did a spell on the WS19 at the PYE factory in Cambridge where it was born. "This set was very adaptable indeed and by the use of control boxes could be used by other sets and telephones coupled to it".

Robert explained that when assisting the artillery a WS38 was carried outside the tank. The observations were then sent direct to the guns.

As a signaller, Robert remembers the 'flick' frequency settings on the WS19 which enabled the operator to contact two parties if needed. They had a problem of 'static' interference when the tank was running on hard road.

Otherwise, said Robert, "they were great sets, very good on speech transmission". Around the time of D-Day his section was equipped with Bedford wireless trucks and WS22 sets.

The WS22 used a vibrator power-pack instead of a rotary transformer. Because of this they were lighter on batteries than the WS19.

Roller Coaster

Earlier this year in 'V&V' I showed the 'roller coaster' antenna tuner used in the 22 set. Robert described this as "a moving coil of aluminium wire which moved a wheel along a rod". This gave trouble, he added, due to condensation causing black tarnish which broke the contact.

While in action they could follow the fighting by listening on the R109 receiver in their 'wagon'. Robert also told me that the 235MHz 'B' set on the WS19 could transmit about 400 yards and was used by tank groups netting on their h.f. transmitter before battle, also and acting as a go-between for external sets.

Another letter on the 11 set came from **Reg Rickets** (Milford Haven). "I started work in 1940 at McMichael Radio in Slough", he told me.

Reg was in what they called the WT11 building at the factory. He remembers that the dial cursor on the WS11, which rose and fell in a spiral slot, was a "real headache"!

Henk Meerman

In our October '93 issue of 'V&V', I used the photograph, **Fig. 1**, of a communications receiver. The photograph had been kindly sent by Henk Meerman from Holland.

Originally the equipment in Henk's photograph was one of four units, transmitter, receiver, power supply and spare parts. Each unit, housed in a metal case, had a tight fitting lid secured by four or six screws.

Since the photograph was published, **Ian Haggart** (Durham) has produced some photographs showing the units in Henk's photograph combined in one framework. This shows a lid-come-table for the operator, **Fig. 2**.

The station in the photograph is built on a mini-rack, **Fig. 3**, so that each chassis can be unbolted for service. Close-ups of the receiver, transmitter and power-pack front panels are seen in **Figs. 4**, **5** and **6** respectively. Additionally, **Figs. 7** and **8** show the upper chassis layout of the transmitter and receiver.

Five Bands

The receiver section of the equipment illustrated covers from 500kHz to 20MHz in five bands. The ranges are selected by the pointed knob at the lower right of the tuning dial in **Fig. 4**.

The controls are simple and clearly marked. Along the top of **Fig. 4** are the adjusters for the antenna, volume and the beat frequency oscillator (b.f.o.).

The phone/c.w. switch and

Vintage

By Ron Ham

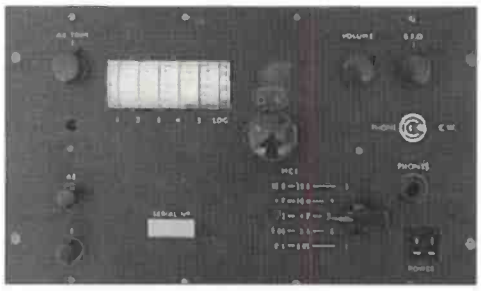


Fig. 4: Tuning scale and front panel controls.

headphone jack-socket is on the right. Note the difference between the power input connectors at the bottom right of **Figs. 1** and **4**. The former, in **Fig. 1**, is a modification.

For mechanical stability and precision tuning the receiver uses a gear train. This is in the centre of **Fig. 8** and it's employed to link the tuning control, dial drum and 3-gang variable capacitor together.

A round screening can, with a large spring under the top rim, is used to hold all of the B7G based valves in position. Two can be seen in **Fig. 7** and five are visible in **Fig 8**.

Be careful when removing or refitting the valve screening 'cans'. If that spring slips, it can 'chop' off the 'pip' at the top of the valve and you'll no longer have a 'vacuum tube'!

Valve Types

Valve types used in the receiver are CV131 (EF92) as r.f. and i.f. amplifiers. Type CV138 (EF91) are used in the mixer, local oscillator, beat frequency oscillator and audio stages.

An EA50 (VR92) thermionic diode acts as the signal detector and a miniature neon lamp, on the right in **Fig. 8**, acts as the h.t. voltage stabiliser. The lamp is installed horizontally so that its glow can be seen through a hole in the front panel, below antenna trimmer **Fig. 4**, providing indication that h.t. is present.

Morse Key

The operator can use the built-in Morse key, lower right **Fig. 5**, or an external key. The external key is plugged into the jack at bottom centre of **Fig. 5**.

The transmitter is a three-valved, crystal controlled type. It's installed at the top of the rack, **Figs. 2** and **3**.

Antennas for the receiver and transmitter are coupled to a pair of terminals. These are mounted on the lower left of each front panel.

The transmit frequency is determined by a quartz crystal between 1.5 and 20MHz. The crystal oscillator is tuned via a turret, top centre **Fig. 5**, and the antenna and driver controls on the left and right respectively of the range knob. A six-way switch, lower left **Fig. 5**, helps match the antenna to the transmitter.

The turret coils are prominent at the bottom centre of **Fig. 7**. To their left is the antenna tuner with the p.a. valve, a CV3990, mounted horizontally above it.

The two CV138 (EF91) valves on the right of **Fig. 7** are used in two ways. They perform as oscillator or oscillator-doubler depending upon the transmit frequency.

The send/receive switch is at the top left of the power pack. This unit, shown in **Fig. 6**, is mounted at the bottom of the rack, in **Figs. 2** and **3**, has a meter measuring a.c. voltage above the fuses on the lower left and an input voltage selector switch on the opposite side.

(Make doubly sure that this switch is set correctly before use and be very careful of the mains and high tension voltages present).

Separate leads with four and six-pin connectors are used to transfer the power from the output sockets, next to the meter **Fig. 6**, to the receiver and transmitter respectively.

The a.c. mains input is connected via a special plug, bottom centre **Fig. 6**. There's also a socket for a 6V battery, to drive a vibrator which is situated to the left of the voltage selector.

Spares and accessories aren't forgotten either. These are kept in the oblong box on the right of **Figs. 2** and **3**.

Navy Heavyweights

Throughout the Second World War the main communications receiver used by the Royal Navy was the CR100. However, it was replaced afterwards with another 'heavyweight' the B40, **Fig. 9**.

The B40 photograph was kindly sent by **David Robb** (Kilwinning, Scotland) who has used the set for many years. He also has a Codar CR45 preselector and an ex-RAF R1155 receiver in his collection.

Well, that's the lot for this month. Time to shut up the 'shop' again. But, don't forget I'm always 'open' for your letters which can be sent to me at **'Faraday', Greyfriars, Storrington, West Sussex RH20 4HE.**

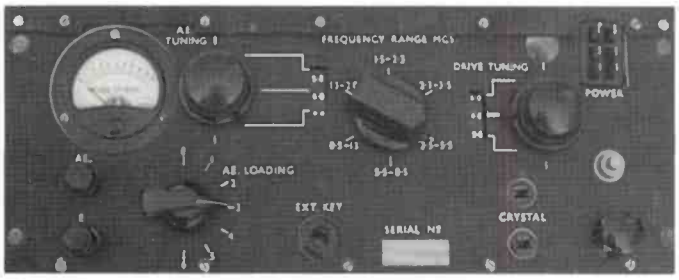


Fig. 5: Transmitter unit of the clandestine transmitter/receiver showing tuning arrangements for the power amplifier (p.a.) stages and provision for crystal control (see text).

Fig. 6: The versatile power supply unit which allowed the transmitter/ receiver to be used from a variety of voltages and an accumulator supply.

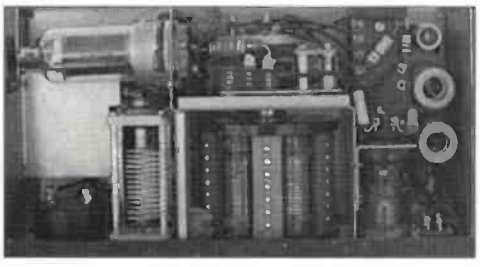


Fig. 7: The tuning coil arrangement using turret mounted inductors (see text).

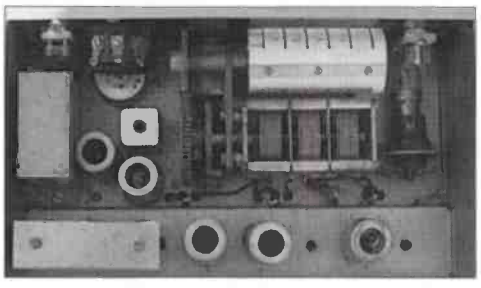


Fig. 8: The receiver tuning capacitor, associated fine tuning gearing and drum type of tuning scale.

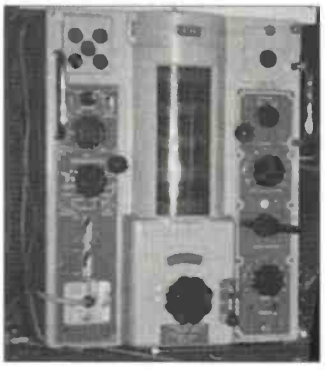


Fig. 9: A Royal Navy 'heavyweight', the B40 receiver, one of the successors to the famous Marconi CR100/B28.

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ECL86 Mull	3.50	OD3	2.50	3B28	20.00	6FQ7	7.50
ECLL800	25.00	PCF80	2.00	4CX250B STC	55.00	6GK6	4.00
EF37A	3.50	PCF82	1.50	5R4GY	6.00	6H6	3.00
EF39	2.75	PCF86	2.50	5U4G	5.75	6HS6	4.95
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						6SJ7	3.00
						6SK7	3.00
						6SL7GT	4.50
						6SN7GT	4.50
						6SS7	3.00
						6U8A	1.50
						6V6GT	4.25
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						12AT7	3.00
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PAUL ESSERY GW3KFE

In his monthly look at what's happening on the h.f. bands, Paul Essery GW3KFE brings news of intruders on 'Top Band'.

HF BANDS Report

Welcome to the world of h.f. where there seems to be a couple of serious problems on 1.8MHz. Firstly there's the Global Positioning System (GPS).

The GPS is mainly satellite-based, but they're now adding terrestrial transmitters. These are high powered and too many of them could be a disaster. One, on 1.819.3MHz, is a good indicator of propagation between G and ZL!

Another problem is that of driftnet buoys. A UN resolution made them illegal from December 31st 1992, but the Federal Communications Commission (FCC) in USA is still processing applications!

The FCC says '3W to a whip', but a maker's specification indicates about 6W. They have a range of at least 200 miles over seawater.

The identity signals of these buoy beacons are usually something like SCD1 followed by a long dash, silence, repeated every four minutes. And, for example, SCO1 on 1.827MHz could be heard on the same day in places as far apart as W2 and KH6!

French, Italian, and Spanish driftnet buoys are in use. There are thousands on the other side of the Atlantic. So, I suggest you listen for the buoy beacons between 1.6 to 2.5MHz. **Please** report as accurately as you can on any you come across. Send your reports to me and I'll pass them on.

Prefix Changes

In Canada the licensing authority has issued a large list of possible 'special' prefixes, far too many to reproduce here. Just be aware that an oddball prefix from Canada might well be 'on the level'!

Portugal has made some changes: CT1 and CT4 for the mainland. There's CT3 for Madeira and CU for the Azores.

Mainland Portugal 'specials' may be CT2-5-6-7-8, CQ1-2-4-5-6-7-8. CS1-2-4-5-6-7-8. Azores 'specials' could be CU1-9, and Madeira ones have CT3, CT9, CQ3, CQ9, CS3, CS9 and XX except for XX9. The CR amateur callsigns are not now being issued although some are about.

Tajikistan prefixes are in this form: EY4, ex-UJ-R; EY5, ex-UJ-K, EY6, ex-UJ-X, EY7, ex-UJ-S, EY8 ex-UJ-J, EY9, ex-UJ-J, ex-UJ-X; EY0, EY1, EY2, EY3 are for TARL. Their club calls start with Z in the suffix.

Band Conditions

Band conditions seem to have settled down. But they are well past the glory days!

Each solar rotation now seems to yield at least one spotless day. As a result the maximum useable frequency (m.u.f.) struggle to reach above 21MHz.

Your Letters

Now it's time to turn to your letters. I'll start off with **Ted Trowell G2HKU** from the Isle of Sheppey in Kent.

Ted stuck to c.w. with his Omni V and G5RV on the 21MHz band. He managed to find various ZLs, VK, HH2PK, and VE9AA.

On 10MHz using an HF6 antenna Ted managed a contact with Snow VK3MR, first worked nearly 50 years ago and European stations. The 14MHz activity from G2HKU was with the G5RV, for some W6s, VE6UM/P, W0, UA0, and VQ9TP.

Perhaps the pick of Ted's 18MHz crop included EA8CN, VQ9QM, N5CB, and ZD8OK. Finally 21MHz where the low-power rig made it to TK/W7SW.

When he wrote, Ted was waiting to go in to the Royal Military Hospital for some more treatment. I hope it all works out (*The PW team also send their best wishes Ted. **Editor***).

Keen QRP operator **Eric Masters G0KRT** uses a Lake DTR7 at 2W. And, with an antenna comprising a 26m top at 5m, tuned against a quarter-wave counterpoise Eric has worked all over Europe on 7MHz. But by the time you read this he will be back to his University studies.

In Hastings, **John Heys G3BDQ** is playing with antennas again. On 3.5MHz he worked sideband to VO1FG, C47A, and various Kazakhstan station.

The 21MHz sideband operation from G3BDQ provided 5N0GC, 5U7Y, ZW5B, HH2PK, and ZS9FA (note how the low sunspot numbers made propagation favour N-S paths here).

Next for G3BDQ was 7MHz s.s.b. which provided 9A900PAX (a special for The Pope's visit), plus EX0A, UN8PYL, JH5FXP and some RK9s.

Next John got the key out, for 10MHz contacts with 3A50LZ, VQ9KC, VQ9QM, JT7FAA and J28FD. Up on 18MHz G3BDQ's c.w. accounted for JAs and A71AN, and sideband for C53MW and 5N3ALE.

Finally there was John's 14MHz c.w. activity where B00M was raised (what a lovely call!). He also managed two stations in OX, JAs, VU2BK and 9K2ZC.

Albert Heyes G3ZHE in Warrington was surprised that no-one mentioned the 28MHz opening on July 17-18-19 the band opened to most of Europe. The first intimation was around 0915Z on 17th, when plenty of stations were on, but only a couple of European beacons.

The 28MHz opening finally faded out around lunchtime on July 20. However, by which time G3ZHE's 5W to a doublet antenna had knocked off 21 contacts in 11 countries.

Nothing was heard on 24 or 28MHz, so said the report from **Don G3NOF** in Yeovil. There was the odd South American on 21MHz, and almost daily JA openings by short path around mid-day and North America most days.

Pick of the G3NOF crop, though, was 14MHz, with the best time 1500-1800. The best contacts were: CY9CWI, FS5PL, NU2L/VE8 for IOTA NA 159, VR2IF and WT2O/VE8 on NA-195. On 21MHz there were no contacts, and on 18MHz A71CW, VS6CT, ZD7WRG, ZD8EB, and 3A2LZ/0S0D(!).

Operating Tip

Here's an operating tip (culled from K1AR's Contest Calendar): he says 'get yourself a decent chair. It's daft to spend thousands on the station then operate from a chair that gives you a sore backside in under the hour'!

Finally, Mexican amateur, Bishop Samuel Ruiz XE3AXS, has been nominated for a Nobel Peace Prize. Samuel XE3AXS is Bishop of San Cristobal, and the nomination recognises the work he has done in disputes between the Chiapas Indians and the Mexican Government. The XE3AXS callsign is well-known call on the DX bands.

Well, that's it for this time. Letters please, as usual, to Box 4, Newtown SY16 1ZZ by mid-month.

E N D

D A V I D B U T L E R G 4 A S R

This month David Butler G4ASR has details of various scatter modes that can be used on the v.h.f. and s.h.f. bands. There's also information about some European v.h.f. meetings.

Fig. 1: Nick G3KOX operating the 50MHz station at JY7SIX.

Welcome to the world of amateur radio above 30MHz! And to start off this time I have some news of Sporadic-E.

Ralph Sachs G2CZS (JO01) reckons that conditions on the v.h.f. bands have been very poor of late. He also mentions that he was rather disappointed by this year's Sp-E season.

Ralph only caught one opening, on June 22. He was working CT1WW for a new country on the 144MHz band. Incidentally CT1WW sent his QSL card back very promptly after being provided with an s.a.e. and an IRC.

Regarding this year's Sp-E season, I must agree with the comments by G2CZS. The openings on the 144MHz band were not as good as in previous years.

From reports received and the OX Cluster I recorded 10 events during this summer's Sp-E season. They occurred on May 21 and 22, June 2, 18, 19, 20, 22, 24, 25 and July 2.

Meteor Scatter

In Europe a number of beacons have been specifically designed to be of use for the meteor scatter enthusiast. The beacon PI7PRO situated in locator square JO22 is operational on 144.840MHz.

The beacon identifies itself on c.w. for five minutes at 12w.p.m. After this period it transmits for 30 seconds at a speed of 200w.p.m.

Parts of the message include OX warning alerts such as Aurora or Sp-E openings in progress. The beacon runs 4W into a 10-element Yagi on a beam-heading of 135°.

A new meteor scatter beacon is now operational from Spain. It has been installed by Grup d'Estudis de Telecomunicacions (GET), a telecommunications studies group.

The new beacon is operating on 144.477MHz from a QTH near Barcelona. It transmits the message "Test MS GET JN01 Box 23103 E 08080" at 160w.p.m. This should be easily heard in the UK as it runs 80W into a 16-element Yagi beaming at 20°.

Propagation Mediums

Apart from ionised meteor trails, other propagation mediums can be used to scatter radio signals. One of the more common modes of propagation is tropospheric scatter.

Troposheric scatter (troposcatter, for short) is a mode that relies on atmospheric turbulences. These create small variations in the refractive index of the troposphere. And it's because of these that your v.h.f. signals are refracted beyond the optical horizon.

I should clarify at this point that I am not talking about tropo-ducting. That's the other type of tropo propagation which can create an almost lossless path between two regions. It's almost like having a piece of waveguide between the stations!

The air is always changing within the troposphere thus causing the daily variations in conditions. It also causes the short term enhancements in signal strength.

If the changes in refractive index are suppressed, during periods of heavy rain for example, then tropo conditions will be poor on the v.h.f./u.h.f. bands. (However, rain storms can be useful for the microwave operator, as I will describe later).

The path losses for long-range forward troposcatter are much higher than for duct type contacts. The use of high gain antenna systems and high power are therefore necessary to achieve consistent results.

I'll take (for example) a well equipped station on the 144MHz band running 400W into 4 x 18-element Yagis. That operator will be able to contact similarly equipped stations up to 1000km away at any time.

A four-yagi system (25dBi) on the 1.3GHz band fed with 100W of r.f. should give a range in excess of 700km. You'll need a good low-noise receiver, 100Hz bandwidth and make use of c.w. however!

Heavy Rain

Under most circumstances heavy rain will attenuate signals on a direct path between two stations. This is especially true at microwave frequencies.

It's not untypical for depth-fades in excess of 30-40dB to occur during particularly violent rain storms. The scattering power of an object varies with its size relative to the wavelength.

So, although rain drops are small, large numbers of them can act as a reflector to s.h.f. signals. And that's why you can get 'sparklies' on your 11GHz satellite TV systems when its raining hard!

Recently however, microwave operators have discovered that side-scatter contacts can be made by bouncing signals off intense rain storms. So, instead of both stations beaming at each other they point their antennas towards the rain cloud.

The rain storms can effectively enhance signal levels by 20-30dB. Interestingly, because of the relative motions involved, there is a doppler shift on the signal.

On the 10GHz band c.w. signals can spread out over 1kHz or more. This makes the signals sound auroral.

For short path lengths of 100-200km the use of elevation gives a large increase in signal strength. Path lengths in excess of 700km are not uncommon during particularly violent storms.

Indeed during a 10GHz contest in July of this year G3KEU and G3FYX worked DL3YEE (683km), DF9QX (705km), DK1PZ (776km) and DK3UC (787km) via rain scatter.

Reflecting Off Aircraft

Another way of scattering radio signals is reflecting them off a large aircraft. Aircraft scatter uses the phenomenon called bistatic radar for communication purposes.

Incidentally, bistatic means two radar sites as opposed to monostatic meaning one radar site. You can interpret a radar site as being the antenna system in your back garden!

The radar equation shows that the bistatic radar cross section of an aircraft is much larger than the monostatic radar cross section.

Unlike meteor scatter, where the reflections get weaker with increasing frequency, aircraft scatter favours the u.h.f. or microwave frequencies. Operators with good tropo systems for these bands are therefore encouraged to participate.

Aircraft Path

When an aircraft is in line with, or close to, the communication path of two stations the signals will be scattered or reflected by the metal body of the aircraft.

As the aircraft is at a relatively high altitude it may be visible at both sites. This will give a better signal than that obtained via the direct path.

The most favourable situation is when the aircraft is close to one of the stations. A path length of 500km is a good starting point.

Obtain a timetable of the nearest airport to your sked partner. Look for flights going close to the path you wish to span.

Make a sked between five to 15 minutes after take-off or five to 15 minutes before landing. The timing can alter due to local factors such as site screening, hills, etc.

The available propagation time may in some cases be less than 1 minute. So, it's therefore necessary to adopt 15 or 30 second periods and the use an accurate watch!

Aircraft scatter may also be observed on a signal audible on the direct path. It causes multipath interference and the resulting QSB is very easy to identify as aircraft scatter fading.

Make some tests to listen for this phenomenon before taking schedules. It will enable you to get a good feeling for the flight schedules and propagation effects.

Equipment requirements on the 1.3GHz band are a minimum of 50W and an antenna gain of around 20dB. A low noise receiver is also essential.

The use of c.w. or s.s.b. is preferred. Better equipment will enhance the signal level and increase the possible communication distance.

Ionospheric Scatter

The ionospheric scatter propagation mode rarely gets a mention in the amateur radio press. This is probably due to the fact that for most of the UK, it requires a station with e.m.e. performance and appears to be more prevalent for stations located in Scandinavia or northern Scotland.

John Regnault G4SWX (JO02) has made a number of QSOs this summer via ionospheric forward scatter on the 144MHz band. He reports that signals are continuous but generally weak.

Signals via the ionospheric scatter mode normally exhibit slow fading in the order of 10-20dB. The signals are T9 with very little trace of multi-path distortion. The maximum range seems to be around 2100km.

It's not like Sp-E where you need to beam at a selective E-layer cloud. Propagation seems to be more from a continuous ionospheric layer. It is not a field-aligned mode such as aurora.

Both stations need to point their antennas at a common ionospheric volume, normally at the mid-point. (Tropospheric propagation has been discounted as there is no correlation with weather conditions).

Typical station requirements are 50kW e.r.p. of c.w. Also needed are a low noise receiver and 500Hz bandwidth.

At the station of **G4SWX** ionospheric scatter contacts were made with SM5BSZ (JO89) on June 19 and June 26. Signals were around 25dB above noise in a 500Hz bandwidth. A test was also made with 9A1CCY (JN85) on June 25 but signals were too weak to copy.

On June 26 the station of IW5AVM (JN53) was heard 6dB above noise. The Italian operator was also heard by G4WFR (JO01) using 8 x 9-element Yagis.

Regular Tests

Andy Steven GM4IPK reports that five years ago he used to conduct regular m.s. tests with SM2CEW. During these tests he noticed a weak residual signal that was not being propagated via meteors.

By reducing the c.w. speed to normal they were able to make many QSOs although signals were always weak and fluttery. The summer months, May to August, always produced the best results and signals would remain audible for many hours.

Andy wonders if the increased daylight hours in the north assists with the formation of the scattering process. He also queries whether it could be related to solar activity, especially the geomagnetic K index.

As I've already mentioned, ionospheric scatter is a mode that has received very little attention so far. Perhaps by airing it in this column, a few more reports and explanations of this fascinating mode will be forthcoming.

The 50MHz Band

Conditions on the 50MHz band during September were very poor. The beginning of the month probably saw the best of the propagation.

Most Sp-E openings were brief, some only lasting minutes, and were geographically selective. An opening on September 3 occurred between 1810-2015UTC.

The opening allowed stations in the north of England to work into ES, I, OK, SP, S5, YU and 9A. **Neil Carr G0JHC** (ID83) reported working SP5EFD, S59F and YU1MW. He also heard the SR6SIX, SV1SIX and 4N1SIX beacons.

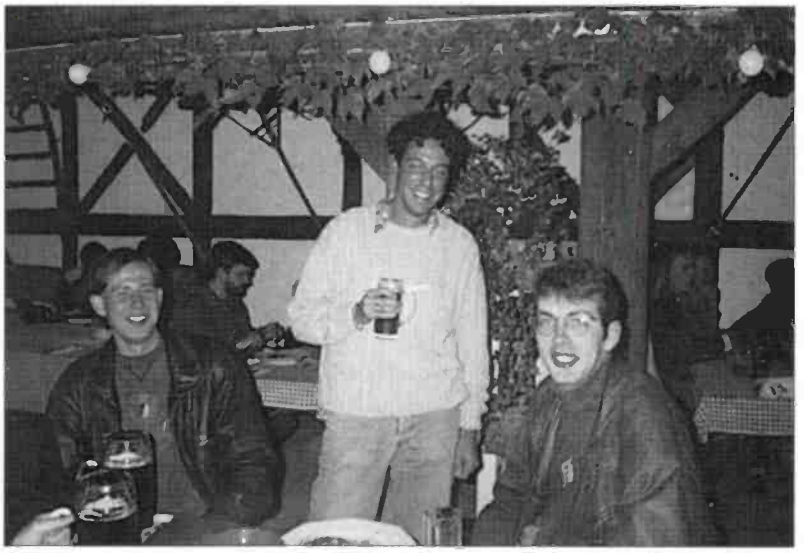

Fig. 2: Some of the DXers at the Dubus Dinner near Weinheim (left to right) Jo DL8HCZ, Gabriel HB9FAP and Allan GJ4ZUK.

On September 8, from 1930-2000UTC, the band was open again. Neil then worked OK1MAC, SP6GZZ, SP6RLA and YL3AG (KO26).

The station of **G3DIL** contacted 9H1AL and 9H5DV on September 10. During this opening, starting around 1530UTC he also worked the special event station 9A900PAX (A special call commemorating the Pope's visit).

Expedition To Jordan

Over 200 UK stations were contacted by JY7SIX, the UK Six Metre Group expedition to Jordan earlier this year. The British Isles stations that made the first contacts were G3HBR, GD3AHV, GI0OTC, GJ8ORH, GM4WJA, GU2JML and GW3LDH.

A total of 2000 QSOs were made world-wide with stations in 49 countries. The photograph, **Fig. 1**, shows one of the operators, Nick Waite G3KOX, at the controls of the station JY7SIX.

Summer Camp

Now for next year's news! This is when The Baltic DX Group are organising another summer camp, in Lithuania, during August 1995. These get-togethers are very friendly and offer the opportunity to operate from an unusual location.

Last year, all bands up to 430MHz (except 24 and 50MHz) were activated. Satellite operation via Oscar 13 was also possible. Aeronautical Mobile (AM) from planes, gliders and balloons was particularly interesting.

An LY-Hamfest encouraged locals and visitors to meet and talk in a common language - Radio! There were also non-radio activities, such as sightseeing trips (Enough to keep other members of the family occupied).

Many participants are returning again and if you would like further details contact: **John Podvoiskis G0NPI** by telephone on **0161-793 5922**. He can also be found on 3.720MHz on Sundays at 2200 hours local time.

An international gathering that I try to get to every year is that organised by the Weinheim Radio Club DL0WH. This year's event was the 39th.

Many v.h.f./u.h.f. and microwave DXers from all over Europe attend the 3-day Weinheim bash. Among the notables I spotted this year were EA3BTZ, EA6VQ, I2FHW, LA8AK, N7ART, OZ7IS, S57C, SM6CMU, UT5AD (ex-RB5AD), UT8AL (ex-RB5AL) and ZB0T.

The photograph, **Fig. 2**, shows some of the happy faces at the Dubus dinner, held not surprisingly in a brewery! The date for the 40th Weinheim v.h.f. meeting is September 15-17 1995.

Deadline Time

That's all I have for you this month and it's deadline time. If you make any interesting contacts on whatever mode you use (including repeaters, packet, satellites) let me know about it.

And don't forget that I'm also looking for photographs of your shack, antennas or any v.h.f. activity. Please send your reports to me at: **Yew Tree Cottage, Lower Maescoed, Herefordshire HR2 0HP** or via packet radio @ GB7MAD or the DX Cluster system. Alternatively you can telephone me on **(01873) 87679**.

E N D

ROGER COOKE G3LDI

PACKET Panorama

This month Roger Cooke G3LDI, looks at a versatile packet/Pactor unit, the MFJ-1276 model from the MFJ stables.

Having seen some of the product range from MFJ this year on my visit to Dayton, Ohio, I am particularly pleased to have the opportunity to review one of their TNCs, the MFJ-1276.

The MFJ-1276 is TNC-2 compatible controller that interfaces your radio with the serial port of a computer running a terminal program. Most terminal programs will work, though MFJ recommend their Starter Pack for any IBM compatible, Macintosh, Amiga or Commodore 64/128 computers.

With an IBM compatible, the MFJ Multicom terminal program gives you added features, like VGA packet picture transfer. No standard terminal program offers this mode. The software was not supplied with the TNC, so I'm unable to comment further on this.

The new circuitry in the MFJ-1276 has been optimised for h.f. packet. It can be adjusted to ignore background noise while still able to respond to a valid data carrier.

The new 'packet collision prevention' features - Prioritised Acknowledgements and Slot-time are installed. These help to reduce collisions that seem unavoidable on the crowded packet frequencies, especially in the UK.

The in-built mail-box is very versatile. You can have a separate callsign for a dedicated mailbox. This enables you to keep the mailbox on-line while operating packet.

There are also other features, like auto-forward and reverse-forward. They've not forgotten remote sysop access, sysop paging, mailbox Ctext, chat mode, and a 'mail for' indicator either.

The MFJ-1276 comes with a standard 32k bytes of memory, expandable up to 128k or even 512k by simply replacing a memory chip. The 20-segment 10Hz precision display on the front panel, makes h.f. tuning quite simple. This is much easier than my old TNC-1!

The firmware for the MFJ-1276 comes on a standard 256k-bit EPROM. Expandable to 512k-bit, this provides lots of room for expansion. A speaker jack lets you plug in a speaker and monitor both transmit and receive audio. The speaker also provides a connect signal alarm.

A 20-pin header is used to plug in an optional modem board. This will allow operation at 2400 or 9600baud.

The 'CT' variants of the MFJ-1270 and 1276 TNCs already have a 2400 baud modem installed. When operating at 2400 baud there is an illuminated front panel indicator marked 'TURBO'.

The rear panel houses an array of items, including: a 12V power socket (it comes complete with its mains unit) plus switches for both terminal and radio. There's also a serial port, external speaker socket, a TTL 8-pin serial port, a 5-pin DIN socket for connection to the radio, and finally an h.f./v.h.f. push button switch.

Taking the lid off reveals a circuit board filling the base of the box, and as it's held in by sealed screws, I didn't take it out to inspect the underside. If the topside is a good guide, the construction is of a high standard.

Labelling of the p.c.b. is clear, and all integrated circuits are socketed. The adjustable controls and jumpers are easily accessible and correspond with several layout diagrams in the appendix at the back of the handbook.

The TNC comes well documented, consisting of a very comprehensive bound 300-page A5 sized manual. Though very easy to read and a handy size, to read some of the diagrams you may have to use a magnifying glass. The other minor criticism of this otherwise splendid book, is that it will not lay open on a desk for easy reading.

Full marks for content however, it includes sections on computer and radio interfacing, getting started, operating on v.h.f./h.f. packet and Pactor, plus FAX and a detailed description of all commands used in the unit.

There is also a troubleshooting section and even a detailed description of how the unit works, something not often seen in a manual these days. For those that don't want to wade through this well written manual, included with the TNC, there's a fast start manual with the basic details required to get you on the air.

To get an 'end user' viewpoint, I passed the unit on to **Jim G4BDW**, a sysop of my BBS for his comments. Afterwards he wasn't very keen to hand the unit back again!

Jim's Comments

"This is a neat unit in the unmistakable style of the MFJ stable, with a black case and a silver rack mount style front panel. I prefer the more refined finish of the Paccom and AEA units. No sharp edges! On the front panel there is the usual array of red, green and amber l.e.d.s for DCD, PTT, STA/MAIL, CON, PWR and TURBO!

There's also the bargraph Tuning Indicator with a row of red l.e.d.s calibrated at 10Hz per l.e.d. A feature I also liked was the access to the RESET pins at the side of the unit. This is very handy if you are in and out of terminal programs like I am and have to occasionally reset the TNC before it will accept commands from another program.

On the opposite side of the unit there are a couple of controls for setting the audio levels for Transmit and Monitor. These are very useful in setting up and keeping a watch on the quality of your transmitted tones.

The MFJ-1276 was very easy to set up and operate. The first thing to do was to check out the fast start manual to check the wiring configuration of the supplied Din lead and hook up an adapter to the FT736.

I use TPK as the main Packet program for keeping up-to-date with the BBS. So as soon as I'd changed the TPK CONFIG.TPK file to load the MFJ.SET file on start up, I was on the air.

The MFJ-1276 behaved impeccably throughout the period I had it on trial. It fills the gap nicely for operators who want a bit more than the basic Tiny 2 and don't want the expense of the all singing AEA PK-232 TNC.

At £189 I feel it is good value at almost half the price of the PK-232. And it's only £50 more than the Tiny 2.

The one main criticism is the v.h.f./h.f. switch on the back panel. This I found exasperating, the place for this frequently activated device is surely on the front, not stuck round the back of the unit out of reach!

Final Comments

Apart from a few minor criticisms, I think the MFJ-1276 is good value for money and will provide a means of upgrading to 9600 baud for a standard user speed, a target I think all users should be setting themselves".

My thanks go to **Waters & Stanton Electronics, 22 Main Road, Hockley,. Essex SS5 4QS. Tel: (01702) 206835** for the loan of the MFJ-1276 for review.

Ah well that's it for this month, happy packeting. Roger G3LDI @ GB7LDI

E N D

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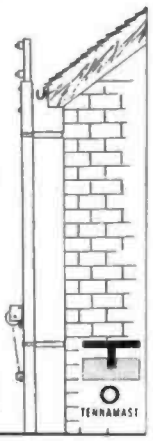

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PETER SHORE

BROADCAST Round-up

This month Peter Shore takes a look at a new radio from the Sony stables, as well as bringing you the latest broadcast station news and schedules.

Fig. 1: It's about the size of a paperback book, the Sony ICF-SW7600G.

I've news this month of another brand new radio from Sony although it has what seems to be an old model number. The latest model is the ICF-SW7600G and follows a long line of similar receivers including the ICF-7600D and the 7600DS.

The ICF-SW7600G is about the size of a paperback book and packs in more features than a copy of *Reader's Digest*. It has a fully digital tuning and frequency display, 22 memory channels, stereo f.m., single sideband and a clock with two alarms and a sleep function.

The most noteworthy feature of the ICF-SW7600G is synchronous detection included for the first time on a set of this size, as far as I know. When the synchronous detection unit is switched on during listening to broadcast stations, the radio will automatically receive the sideband which is the strongest and least interference prone.

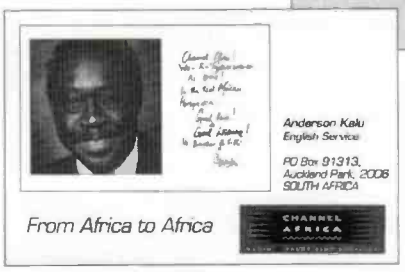
Synchronouse detection improves reception no end. Performance across the short wave bands is good, with selectivity good enough for the most crowded parts of the bands, and ample sensitivity to pick up weak and distant signals. Overall, I think the SW7600G is an excellent product, ideally suited to the jetsetting traveller or to adorn a corner of the sitting room. The UK retail price is around £160.

Broadcast News

Reports have been received of a new English service from Byelorussia, the former Soviet republic. Tune in between 1800 and 1900 on 6.01, 6.02, 7.21 and 11.96MHz, and you might hear English on Tuesdays during the final quarter of an hour. German is heard on Fridays at 1845 and Polish on Mondays at the same time.

Another former Soviet republic, Armenia, has an external service, Radio Yerevan. It broadcasts in English to Europe at 1745 for fifteen minutes on 6.065, 5.93, 4.99 and 4.81MHz. It also beams to the Americas at 2230 on 11.92 and 11.79MHz, and on Sunday there is an extra European transmission at 0830 on 17.77 and 15.17MHz.

Fig. 2: Channel Africa may start beaming its programmes outside its own continent.



Just as this edition of *PW* went to press, Radio Moscow was due to close at least ten of its language services. All Nordic languages - Finnish, Danish, Norwegian and Swedish - as well as Burmese and Thai, four African languages were due to have their final broadcast on September 25.

Radio Vlaanderen International has dropped its transmissions to Southeast Asia, complaining that forecast poor propagation conditions mean that the signals from the Wavre transmitting station - antiquated by just about anyone's standards - would not reach that far. Without relay stations or agreements, the Brussels based station decided it would be a waste of money trying to reach audiences in that part of the world.

Fifty people lost their jobs at Radio Netherlands in September. The French and Portuguese services are the latest to have been stopped, in addition to Arabic which ceased earlier this year. Now the station only broadcasts in Dutch, English, Indonesian and Spanish on shortwave.

Radio Netherlands has started to hire time on the Radio Moscow medium wave transmitter in Kaliningrad on 1386kHz for two hours at 2130UTC.

Deutsche Welle hopes to have its Rwanda relay station back on the air during the late autumn, according to Peter Senger of the HF Section in Cologne. Speaking on Radio Netherlands' *Media Network* programme, Senger reported that the only real obstacle to restarting transmissions was the lack of power in the country. Reports suggested that power would be available in and around the capital Kigali although it would not be sufficient to run all the transmitters at full capacity.

Broadcast Schedules

Radio Norway International (RNI) has returned to medium wave after a gap of some years. The transmitter on 1314kHz, which is audible quite clearly in Britain during winter, now carries English each Sunday at 1900 for 30 minutes, and Norwegian programmes during the rest of the week.

Other English transmissions from RNI are: 0800 on 15.175; 1200 on 11.85, 15.165; 1300 on 9.59; 1800 on 7.12, 11.93; 1900 on 5.96, 7.215, 9.59; 0000 on 6.115, 6.12; 0200 on 9.56 and 0500 on 5.905MHz

Neighbouring Sweden has English daily, despite continuing budget restrictions at the Radiohuset in Stockholm. European programmes are beamed at: 1715 on 6.065MHz and 1179kHz; 1830 on 6.065, 9.655, 13.69MHz and 1179kHz; 2130 on 6.065, 9.655MHz (this may change to 9.50MHz) and 1179kHz; 2230 on 6.065MHz and 1179kHz and 2330 on 1179kHz. The broadcasts at 1715 and 1830UTC are also carried on Astra's Sky Movies Gold transponder, and at 2000 the station is heard on World Radio Network's Astra service on the MTV-Europe TV transponder.

Radio Japan's winter schedule of English to Europe (deciphered from a distinctly confusing schedule!) is: 0000-0100 on 6.055, 6.155; 0600-0700, 0800-0900 on 5.975, 7.23 and 2200-2300 on 11.925MHz.

Radio New Zealand can now be contacted by electronic mail. The e-mail address is adrian@actrix.gn.nz. The station's winter schedule is: 1650-1849 on 9.655 (Monday-Friday); 1850-2050 on 11.735; 2051-0715 on 15.115; 0717-1206 on 9.70 (Monday-Friday; starts 0542 Saturday, 0600 Sunday); 1207-1306 on 9.70 (occasional sports coverage); and 1307-1649 on 9.655MHz (occasional sports coverage). With programmes like *Calling Pitcairn and Norfolk* (Fridays at 0430), Radio New Zealand still offers some of the romance of old-fashioned short wave listening.

Finally this month to Africa and the winter schedule of Channel Africa, which still beams only to its own continent. Things may change within the next twelve months though. Keep an eye on this column for more news as it emerges!

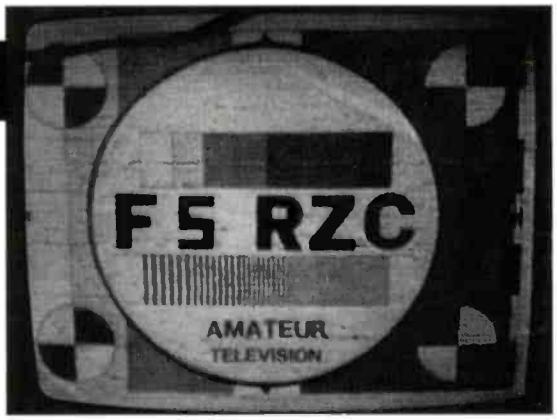
English is heard: 0300-0500 on 5.955, 9.585; 0500-0600 on 7.185, 11.90; 1000-1100 on 17.81; 1100-1200 on 9.73; 1500-1800 on 7.225 and 1600-1700 on 15.24MHz

That's all the room I have this month. If you hear anything interesting, please let me know by dropping a line to the *PW* Editorial Office.

E N D

ANDY EMMERSON G8PTH

In his bi-monthly up-date Andy Emmerson G8PTH says it's all happening with news of a new Amateur TV repeater in Wales, increased repeater activity in Kent and a threat to ATV on 430MHz.



This is a great colour picture - pity you're only seeing it in black and white! French station F5RZC was snapped working through the Lowestoft repeater by Paul Godfrey G8JBO on June 23.

The amateur television repeater GB3TM, which is located near Amlwch on the Isle of Anglesey in North Wales, came on air on Thursday July 14 1994. The allocated Channel is RT1-2 which specifies an input frequency of 1249MHz and an output of 1316MHz. The repeater accepts 625 line fast scan f.m. TV signals with 6MHz inter-carrier f.m. sound and re-radiates these in the same mode.

The GB3TM station is located 154m above sea level and has a clear signal path over the sea in virtually all directions covering the Lancashire and North Wales coast, to Ireland, Isle of Man and possibly Scotland. The transmitter uses the Worthing phase-locked loop transmitter, as a drive unit, followed by a Mitsubishi M57762 broad band integrated module providing a power output of 10W.

The receiver is a modified professional satellite receiver preceded by a GaAsFET pre-amplifier. This is followed by a video amplifier to provide a standard video output signal.

The home-constructed antenna system consists of two Alford slot antennas machined into a common vertical aluminium tube. There are mounted one above the other providing omni-directional horizontal polarisation.

The antenna system is fitted in a plastics tube (drain pipe) for complete weather protection. This is mounted on an existing radio tower about 10m above the ground.

A five element band-pass filter, centred on 1249MHz is connected between the receive antenna and the receiver. It's designed to prevent the repeater transmitter causing breakthrough.

The control logic is based on the BATC I2C Teletron system and contains a caption generator, Z80 processor, video signal detector, video and audio switching, keyboard decoder and PAL coder. The transmitter, receiver and control logic are housed in 19in rack cabinets, fitted in a dedicated cubicle.

The repeater operates continuously, in beacon mode, displaying a variety of captions, news pages with audio Morse code identification. When accessed by a valid signal the repeater provides through transmission of video and sound. The usual 'K' and 'time out' functions are provided and the news pages can be up-dated remotely.

Software for the project has been written mainly by G1FEF. It has additional programming by G8VAT and GW8PBX.

The repeater GB3TM is the only ATV repeater within the Arfon Repeater Group. The group serves Amateur Radio and now Amateur Television, in West Wales. The technical team includes GW3JGA, GW3MEO, GW4KAZ, GW8FEY and the Repeater Keeper GW8PBX. Reports would be most welcome and should be sent to **GW8PBX, QTHR.**

Many thanks to John Lawrence GW3JGA for the detailed GB3TM report. He added that he has had two good P4 to P5 contacts with EI6AS and EI2EM in the Dublin area.

The group is about to present a demonstration of amateur television through the repeater for the Dragon Radio Club in Menai Bridge, Anglesey, in the hope of enticing more stations into the ATV mode.

Kent Repeater Update

The Kent Television Group's newsletter has expanded, with lots of interesting news. From this I note that their committee has been examining a new site on the Isle of Sheppey, which was discovered by **Andy G8SUY.**

The Isle of Sheppey site is very close to a water tower, which they were sadly unable to use due to very high site fees. A provisional site test was held at very short notice with as many stations taking part as could be contacted at short notice.

The results look very promising with many stations able to see the test transmission. The next step will be to repeat the site test, giving all members the chance to try seeing and working the repeater.

No date has yet been set but they will be notified. The site looks to be the best offer of a permanent home for the repeater that the group has had to date. Their present temporary site is at G4JMP's location in Herne Bay.

While **Chris G8GHH** and **Ian G4MLY** were casually chatting on 144MHz and monitoring the repeater they were surprised and excited to see Daniel ON6DV accessing the repeater. Daniel's pictures were P3 with colour and sound (6MHz). A two-way QSO was completed between Daniel (who was running 38W from two Mitsubishi 'bricks').

Unfortunately conditions were extremely variable and at times it was difficult to copy sound on both 1270 and 144MHz, but it wasn't difficult to detect a note of excitement in Daniel's voice! The usefulness of the repeater was realised when they attempted to work direct and were unsuccessful.

Attack On ATV

So called friendly fire does not seem to be confined to military activities. The following letter sent to the BATC's RSGB liaison officer Graham Shirville gives advance warning of a potential, if not yet actual, threat. I would strongly advise all ATV operators to make your opinion known to Peter Burden as requested.

The letter reads...

"At the recent VHFC meeting on June 11 we discussed, jointly with DCC, the possibility of designating more space on 432MHz for packet radio use on 432MHz. The nature of packet radio use of 432MHz is such that they require a number of sub-bands as widely separated as possible. To this end we are looking for comments (both for and against) on the designation of one or more of the following sub-bands for packet radio operation: 430.4 - 430.6, 439.6 - 439.8, 434.4 - 434.6, 438.6 - 438.8 and 433.8 - 433.875MHz.

I would be grateful if you could make this information widely known amongst the ATV fraternity who, I imagine, may have some fairly strong feelings about some of the suggested frequencies. I'm happy to receive comments via letter mail, packet radio (G3UBX0@GB7MAX) or Internet e-mail (jphb@scitsc.wlv.ac.uk).

Can I emphasise we're only looking for comments at the moment, we won't take any action until October at the earliest and it is likely that the effective date of any changes will be sometime in 1995.

73s **Peter Burden G3UBX, Chairman RSGB VHF Committee, 2 Links Road, Penn, Wolverhampton WV4 5RF.**"

If you are opposed to packet radio taking over even more of the 430MHz band, particularly the sub-bands allocated to amateur television and used by ATVers since some of the racket radio types were even born, please make your feelings known to Mr Burden!

Again space has caught up with me, so until next time cheerio. Letters to me, Andy Emmerson G8PTH at 71 Falcutt Way, Northampton NN2 8PH.

E N D

PW Index Volume 70 January to December 1994

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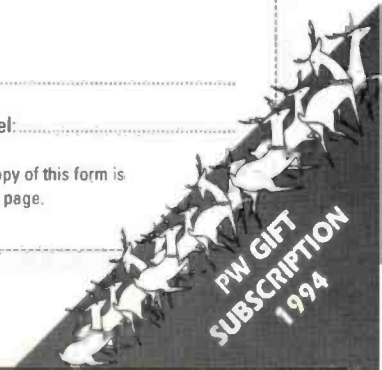

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Closing date for the January issue is November 14th.

Advertisements from traders, or for equipment that is illegal to possess, use or which cannot be licensed in the UK, will not be accepted. No responsibility will be taken for errors.

For Sale

62 set, good condition, original inside, £65. 52 set a.t.u., good condition, £40. Class D No. 1 MkII complete with wood transit case, £20. Czech RM-31 Set, 2-6MHz a.m./c.w., no p.s.u., but have details of requirements, £50. TS-118/AP h.f. power meter to 700MHz at 500W, £40. R1082 anode coil range N, £5. KW Vespa 1.8-28MHz, 100W s.s.b. with original p.s.u., mic., £65. All collect or postage extra. Ben (109), Worcs. Tel: (01562) 743253.

144MHz f.m. mobile/base Navico AMR1000S 13.8V d.c., pristine condition, c/w mic. and manual, guaranteed, £225. FV-102DM immaculate condition, plus five valves for FT-102 c/w manual and cables, £225, no mods. Phil Brouder G3ZJH, 169 North Road, Bristol Avon BS12 6PH.

Alinco DJ-120 hand-held and charger, home made case, speaker mic., plus home made 12V lead with manual, £150 o.n.o. Sandpiper 10-element 144MHz beam, £30 o.n.o. Rotator and controller, £30 o.n.o. Mast head changeover unit (new and unused) N-type connectors (around £70 new,, £50 o.n.o. Power supply 13.8V 2A, £10 o.n.o. Power supply 13.8V 3A, £10 o.n.o. SWR meter 3.5-150MHz, £10 o.n.o. BNOS linear f.m., s.s.b., 144MHz 10W in, 100W out with switchable pre-amp, £95 o.n.o. Set large headphones stereo/mono separate volume controls, £5. Alan, Co. Fermanagh. Tel: (01365) 328687 evenings & weekends.

Alinco DR410 430MHz 5/35W mobile immaculate, £200. Pye MX294/296 144/430MHz mobiles, both with toneburst fitted, 25W o/p, £75 each. Dave G7SQY, Peterborough. Tel: (01733) 574725 after 6pm.

Cobwebb h.f. five-band 14-28MHz antenna, £75, reason for sad sale, moving. Buyer collects. G0IWW, Wigan. Tel: (01942) 36342.

Collectors - special Italian books by Ravalico 1947-1952, *Schemaro Degli Apparechi radio* (600 pre-war continental circuits). *Il radio libo. Strumenti per radiotecnici L'audio libro*, complete, some wear. Sensible offers. K. A. Smith, 6 Lakelands Close, Witheridge, Tiverton EX16 8DD. Tel: (01884) 860864.

Comet dual band antenna, 144/430MHz glass fibre collinear, 6.5/9.0dB gain, £50 o.n.o. Kenpro KP100 all in one lambic and bug electronic keyer, £50 o.n.o. Move forces sale. John, Haslemere. Tel: (01428) 644625 anytime.

Densi Shimuzu SS105 h.f. TX/RX, cover 3.5-28MHz, s.s.b., c.w., 10W, 12V operation, matching speaker, measures 7x6x11in, good condition, recently realigned, £250. Tel: Scotland (01292) 316300.

Eddystone 680X, EC10 MkII, £80 each, plus P&P. Ready for instant despatch! Also unusual Eddystones always wanted, collection possible. Peter Lepino, Surrey. Tel: (01374) 128170 or FAX: (01372) 454381 anytime.

Free matching transmitter with purchase of excellent communication receiver, Yaesu FRDX400, covers 'Top Band' to 28MHz with CB and WWV (10MHz), smart and clean, £150. Buyer collects/pays delivery. Derek, Warks. Tel: (01789) 297158.

FT-101 with f.m. fitted, a bit deaf, but working, £200 or swap for FRG7700 also FR102 receiver (no s.s.b.), swap for 4 x 1meg (70ns) or sell for, £90. Ted, Fife. Tel: (01333) 350993 after 6pm.

FT200 plus FP200, exchange for Trio J310, 9R590 or Eddystone 840, also R210 plus external power supply, exchange for weather satellite equipment. Colin, Dewsbury. Tel: (01924) 464167.

Good working order, audio to u.h.f. a.m./f.m. signal generators, 50MHz dual trace/timebase oscilloscope, 30V/0.5A metered p.s.u., partly working (for spares/repair) CT471C, advance TC9A, VM77D, Fluke 8000A, Marconi TF1041 B/C. Enquiries, anytime to Rodger, North Kent. Tel: (01634) 220747.

Grundig Satellit model 2100, £95. Aiwa world radio model WRD1000, £90. Hitachi 10 band radio, model KH2400, £25. Tel: Notts (0115) 9732608.

HRO valves, 6 of 6D6, 4 of 6C6, 3 of 6B7, 2 of 42. 10 new, £20. Bill, Glasgow. Tel: 0141-649 4345

Icom 761 transceiver, £900. Icom 32E hand-held transceiver, £180. Palomar impedance noise bridge, £25. Bencher Morse key, £40, all excellent condition. Robertson, 14 Solent Drive, Warsash, Hants SO31 9HB. Tel: (01489) 584788 evenings.

Icom IC-737A h.f. transceiver, four months old, still boxed, etc, £900. Also Revex 30A power supply, £70. Icom SM20 base mike, £60. Cash only, no offers please. Nigel, Cheshire. Tel: (01606) 871512 after 7pm.

Icom ICR7000 receiver with remote control and VOX, £700. Marine transceiver, £95. Converter for 45m, as new, £135. Racal Dana 9341 databridge, £300. Kenwood TS820S converted for 45m, £300. Tel: Wiltshire (01249) 653735.

Icom R7000 v.h.f./u.h.f. scanner, excellent condition, £685. Tel: Inverness (01463) 232197 evenings.

Icom R71E short wave receiver with f.m., remote control and SP3 speaker, all as new, boxed with manual, £695 or with Dressler active antenna, £750. Tel: Shropshire (01746) 762031.

Kenwood TM-702E few months old, v.g.c., £400. FT-411 handset including NiCads and charger, £150 v.g.c. or swap the lot for complete Packet set-up or AMTV set-up. Tel: Bucks (01296) 630484 or mobile (0860) 578848.

Kenwood TM-742E 50W tri-band (with 50MHz), Kenwood TM-255E 40W 144MHz multimode, BNOS, 15amp p.s.u., all boxed, exchange for Kenwood TS-790, fitted with 1296MHz, must be perfect, can travel (swap only). Barry G7OFR, W. Yorkshire. Tel: (01274) 880895.

Kenwood TS-530S h.f. transceiver in extremely good condition, new p.a.s last year, narrow s.s.b. filter fitted, MC50 desk mic. included, at £475, buyer MUST collect! Matching AT230 a.t.u., optional extra to buyer. Keith G0OZK, QTHR. Tel: 0161-477 5303.

Linear amplfiers, Pye A100 'M' band will convert to 144/70/50MHz f.b., £12 plus P&P. G3AOS, Cheshire. Tel: (01260) 252287.

Lowe HF225 with all extras, perfect, £375. Daiwa seach f.m. RX, v.f.o./Xtals, £45. CR100/B28 navy RX, fully working for, £30. Trio 9R59 RX, very nice for, £40. All h.f.s, fine 1940s Pilot valve set for, £40. Tel: West Midlands 0121-430 5632 evenings/weekends.

Mizhuo s.s.b./c.w. hand-held, 14MHz QRP, 2W transceiver, 14.000/14.050 and 14.200/14.250, as new, swap for HW9 or similar in same condition. G4KIN, Merseyside. Tel: 0151-531 0991.

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Racal RA17 receiver, 500kHz to 30MHz, v.g.c., £120. Yaesu FT911 1296MHz hand-held with hand mic/speaker, NiCads, boxed as new, £295. Buyer collects. Peter G4OIM, Bromley. Tel: 0181-464 4927 after 6pm.

Repair or spares, HRO rack, 1.0. valves, res, caps missing plus set i.f. trans., two coils, original manual includes power unit, £40. Bill, Glasgow. Tel: 0141-649 4345.

Scanner, PRO2004, 60 channels, scan and search, covers 68-512MHz (with gaps), complete, fully working, good condition, ideal starter, £65 includes postage. Robert, N. Ireland. Tel: (016937) 62166 after 6pm.

Telequipment D75 (D755) 50MHz dual beam oscilloscope complete with service manual and operating instructions, £115 o.n.o. Ian Liston-Smith, Reading. Tel: (01734) 596806.

Tono 7000-E communications receiver, reads Morse, RTTY, etc + prints into words on screen, will swap/PX for hand-held scanner or sell for, £150. Tel: Manchester 0161-335 0915 or (01850) 675234.

Valves, AVO valve data manual, well used, details of over 5000 valves, info on bases abbreviations equivalents, etc, £20 plus P&P. Phil Brouder G3ZJH, Bristol. Tel: (0117) 9691025.

Victor Sirius computer, twin 790k floppies with Iton 7x9 printer, all manuals, masses of software, great word processor, can be seen working. Spare monitor and mother boards, buyer collects, £125. G3WWL, West Midlands. Tel: 0121-353 8874.

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Yaesu 747GX transceiver, £500. Zetagi power supply, 13V 25A, £75, v.s.w.r. bridge, £30. Sadelta desk mic., £25. *Television Engineering Handbook* (Fink), £5. *Radio Engineering* (Terman), £5, both mint condition. Tel: Fareham (01329) 843219.

Yaesu FP-757GX, switching power supply, must sell, v.g.c., £100 o.n.o. Geoff, Devon. Tel: (01404) 44408.

Yaesu FT-747GX with f.m., immaculate condition, £450. PK88 packet controller, £75. 286 PC 20Mb HD, 1Meg RAM, Dos 6.2, Win 3.1, EGA mono, £150. Tel: Lincoln (01522) 693871.

Yaesu FT-890 with auto a.t.u., filters fitted, boxed, £900. Might exchange with Yaesu FT-767 or Icom IC740 and cash either way. Malcom, Middlesex. Tel: (01895) 676919.

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Denco radio communications receiver, or Denco television wanted for sentimental reasons by son of late owner of Denco. R. Allwright, Essex. Tel: (01255) 422213 day or (01255) 424161 night.

Ferrite rod aerials, must be 1/2in in diameter, no more or less, must be six inches long or more. Peter Tankard, Sheffield. Tel: (0114) 2343030 anytime.

Kenpro KT-44, 430MHz u.h.f. transceiver or similar for old timer Novice, good condition and working order essential. Geoff Fowle, Dorset. Tel: (01202) 698142.

Kenwood AT250 auto a.t.u., also Kenwood SP120 or SP430. Good condition only please. Peter G0JWV, Truro. Tel: (01872) 501656.

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Please, please have a look in your drawers and sell me your unwanted old transistor radios, especially small pocket ones made in Japan or USA. Will collect. Enrico Tedeschi, 54 Easthill Drive, Portslade, Brighton BN41 2FD. Tel/FAX: (01273) 410749.

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Trio TR2300, Jim G3XAG, Cleveland. Tel: (01287) 650462.

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The books listed have been selected as being of special interest to our readers. They are supplied direct to your door. Some titles are overseas in origin.

TO ORDER:
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George Wilcox
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46 pages. **£4.25**

FLIGHT ROUTINGS 1994
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This guide was produced with the sole aim of assisting airband listeners to quickly find details of a flight, once they have identified an aircraft's callsign. Identifies the flights of airlines, schedule, charter, cargo and mail, to and from the UK and Eire and overflights between Europe and America.
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BP255
Peter Shore
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266 pages. **£5.95**

INTERNATIONAL VHF FM GUIDE
7th Edition.
Julian Baldwin G3UHK & Kris Partridge G8AUU
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Langley Pierce (third edition)
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Bill Laver
A handy reference book listing RTTY and FAX stations, together with modes and other essential information. The listing is in ascending frequency order, from 1.6 to 26.8MHz. *57 pages.* **£3.95**

RADIO LISTENERS GUIDE 1994
Clive Woodyear
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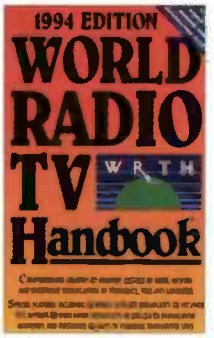
WORLD RADIO TV HANDBOOK 1994



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Derek Stephenson
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371 pages. **£18.95**

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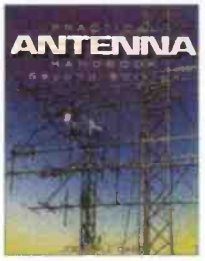

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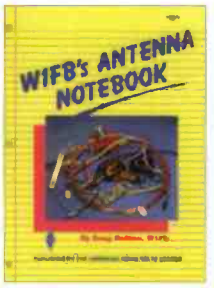

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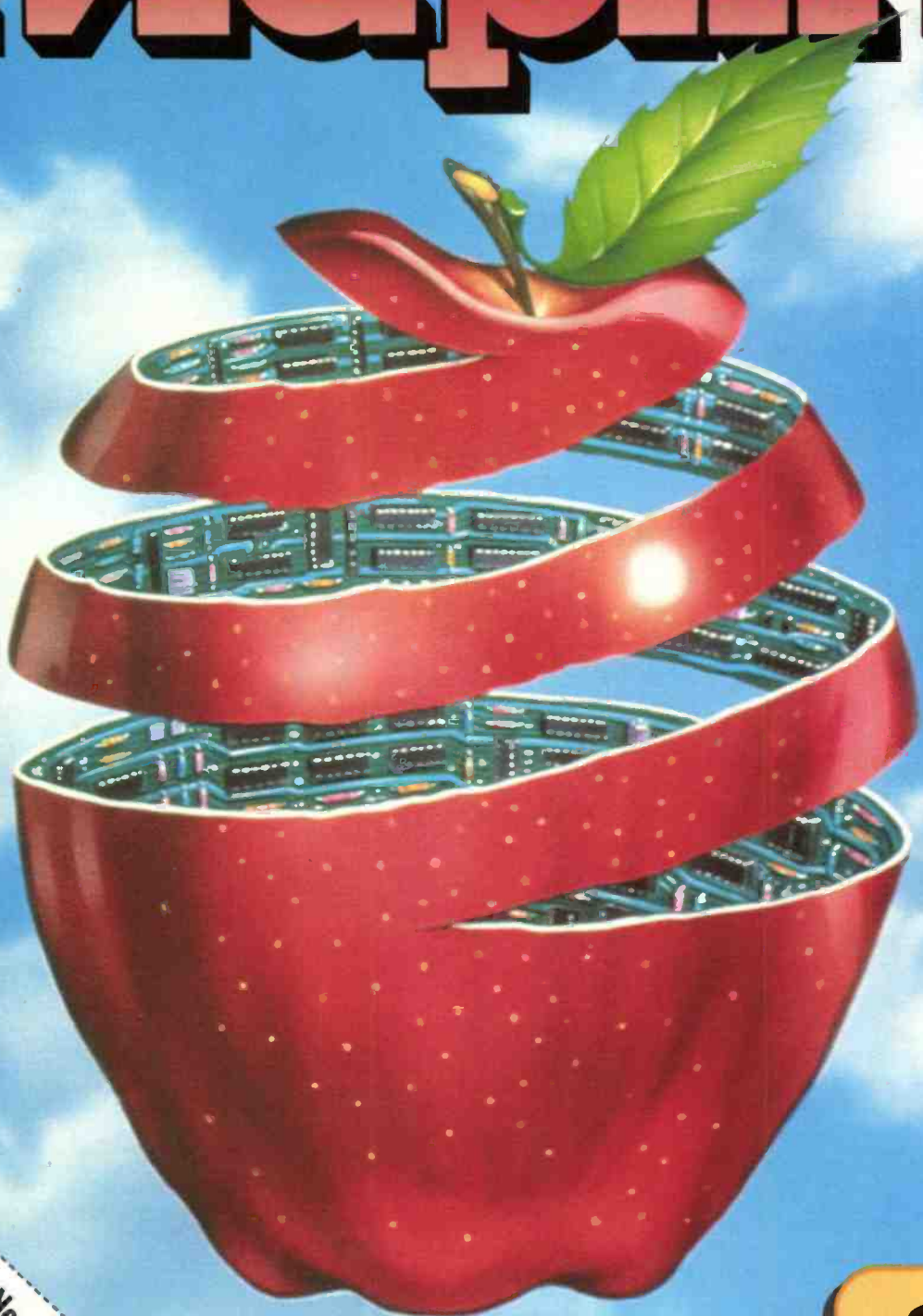

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