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practical Wireless

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ISSN 0141-0857



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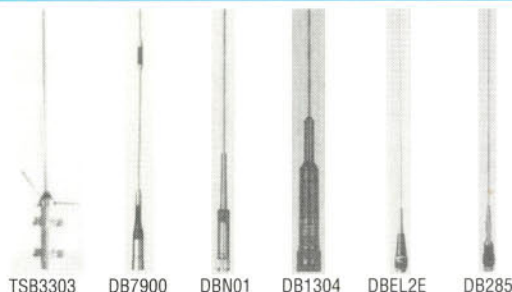
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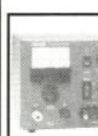


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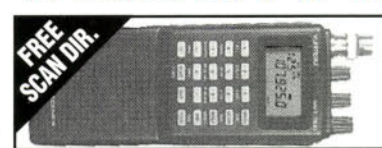
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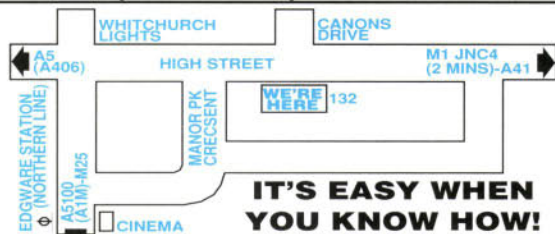
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IT'S EASY WHEN
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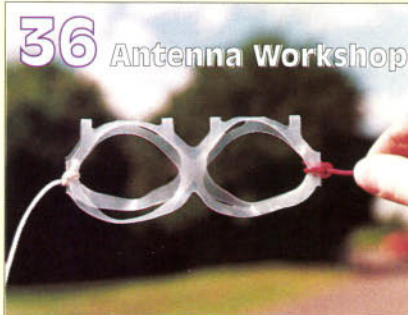
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Our thanks go to Colin Redwood G6MXL for the main front cover shot and to Waters & Stanton Electronics for supplying the inset shot of the Cushcraft A3S antenna.

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 Quotations on request



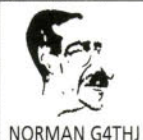
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C558 As reviewed in July HRT

£429 will cell case

£449 with NiCads and wall charger

Performance specifications are nominal, unless otherwise indicated, and are subject to change without notice.

Receiver:		VHF section	UHF section
Circuitry		Double Conversion	Superheterodyne
Intermediate Frequency	1st IF	21.80MHz	23.05MHz
	2nd IF	450kHz	450kHz
Sensitivity (12dB SINAD)		0.158µV	
Threshold Squelch Sensitivity		0.112µV	
Selectivity (2-signal method)		55dB	50dB
Audio Power Output		200mW at 10% distortion	
S/N Ratio at 0.5µV input		25dB	

Transmitter:		VHF			UHF		
RF Power Output	Battery type	Hi	Mid	Lo	Hi	Mid	Lo
	CBT151GY	2.0W	2.0W	0.35W	1.5W	1.5W	0.35W
	CBT150	2.5W	2.5W	0.35W	2.0W	2.0W	0.35W
	CNB151GY	2.5W	2.5W	0.35W	2.0W	2.0W	0.35W
	CNB153	2.5W	2.5W	0.35W	2.0W	2.0W	0.35W
	CNB152	5.0W	2.5W	0.35W	5.0W	2.5W	0.35W
Modulation Method		Reactance Modulation					
Spurious Emission		60dB					
Maximum Deviation		±5.0kHz					
Harmonic Distortion (at 1kHz)		Less than 5%					
Frequency Stability (-10°C to +60°C)		0.001%					
Frequency Setting Accuracy		±1.0kHz			±1.5kHz		
Battery Life		CNB150	CNB151GY	CNB152	CNB153		
(depends on operating & environmental conditions.)		2.5hrs	4.5hrs	3hrs	6.5hrs		
		TX:RX:Standby=1:1.8:Hi-power mode					

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	4.8/7.2dB 1.3mtrs long	82.50	70.00
X200	2m/70cms vertical 6/8dB		
	2.5mtrs long	109.95	92.50
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NR77	2m/70cms 2.15/5.3dB		
	84cms long	32.95	27.50
NR770	2m/70cms 3/5.5dB 99cms long	41.95	35.00
NR790	2m/70cms 4.5/7.2dB		
	1.45cms long	69.95	59.50
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RH702B	UHF metal 5.5dB 5/8th wave	29.95	25.50
RH2B	VHF flexible 51cms whip	12.95	11.00
RH900	2m/70cms flexible 49.5cms	39.95	33.00
HF			
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	rigid radials	275.00	230.00
CP6	As CP5 with 6mtrs	299.00	250.00



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- Auto repeater shift

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with Nicads & Charger



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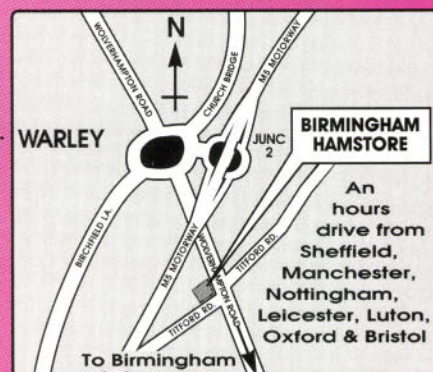


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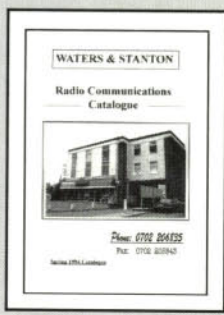
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DR-599E Dual Bander

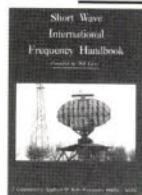


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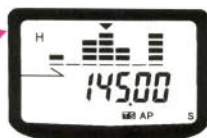
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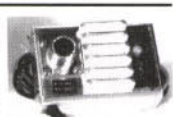
£109.95 Carr. £4.50

PW June Review says "Performed extremely well" - "good value for money."

This keyboard and interface plug straight into your transceiver. Send perfect CW 5 - 100 wpm. Ideal if you have finger trouble. 200 character type ahead, 100 character message memory, serial numbers, tone adjust etc.

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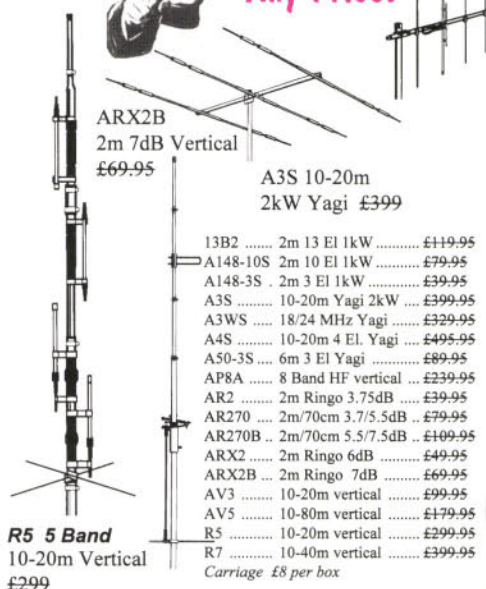
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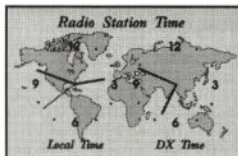
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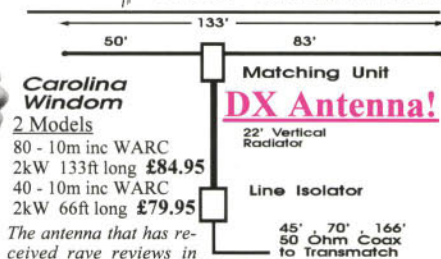
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ALPHANUMERIC comments stored along with frequency, mode & attenuator status simplifying the job of recalling and identifying memory channels, password protection etc. **Computer control** and clone of data between two AR8000UK receivers (optional interface required).

IBM-PC software available for the AR3000A with software for the AR3030 & AR8000UK to follow soon. Please phone or forward a large SAE for full details.

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EDITOR'S keylines

The 'Club News' section of *PW* is very popular with readers...even if they don't often attend a club themselves (so I've found out from my many club talks and visits during the year!).

Some club secretaries and events organisers scan the 'Club News' to get ideas on what other clubs are doing. That's no bad thing really when you consider that their job can be very difficult!

To help make the magazine reflect further the results from our reader survey last year, the *PW*

Editorial team are planning to change the format of the 'Club News' pages from the September issue. This change will mean that the list of club events will cease to be printed in the magazine in its present form.

However, the club events list will be still be available as a reader service on publication day each month from the *PW* Editorial offices. There'll be no charge for the list, but we will require readers to send in a large stamped addressed envelope marked 'Club News Sheet'.

Our intention is to use the 'Club News' pages to 'Spotlight' clubs and provide them with the opportunity to tell others more of what they do, who they are and to

spread the word about Amateur Radio and help them to attract new members. To do this we require from you, together with the diary of events you already send in, a copy of your club Newsletter, and we would appreciate it if we could be put on your mailing list.

If you don't publish a newsletter, we're still interested in your club's events, especially if you have an unusual story to tell or other items which you feel would be of interest to other radio enthusiasts.

By having Club News structured in this way it will enable us to publish the information so you can tell others about events such as Special Event Stations,

Honourary Membership Awards, Club Competitions and Field Days, etc. We will of course, when featuring your club still mention brief details of meeting dates, places and contact details to accompany the story. And, don't forget that when you're sending stories in for possible use in Club News...photographs are always welcomed.

The reasons for the changes to Club News are to make the pages more informative and as interesting to as many readers as possible. And, as I've already mentioned, we intend to introduce the new look pages in the September issue.

So, the Editorial team would very much appreciate your co-operation. If you have any further queries please don't hesitate to contact Donna Vincent (News & Production) or Zoë Shortland (Editorial Assistant) who will be producing the new-look pages between them, with **your** help of course!

Rob Mannion G3XFD

COMPETITION CORNER Wordsearch

Words To Find

Haydon
Communications
Cushcraft
Antenna
Dual
Band
Mobile
Hustler
Focal
Point
Novice
Natter

Send your entry (photocopies acceptable with corner flash) to: Wordsearch Competition Corner, August 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.

Entries to reach us by Friday 26 August 1994.

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

In keeping with our Antenna theme this month *PW* has **five DB-7900 dual-band antennas** to give away as prizes for this month's competition. These antennas have been kindly donated by **Haydon Communications, 132 High Street, Edgware, London and have a UK retail value of £99 each.** So why not have a go and see if you can win a DB-7900.

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 August 1994.

Name.....

Address.....

.....

.....

.....

.....



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.

Kits And EMC Regulations

Dear Sir

For a number of years now, members of the European Community have been working on regulations which could be applied to electrical and electronic products in respect of electromagnetic interference.

Some regulations have been in place to differing standards in each member state, but the proliferation of electronic equipment in recent years and associated EMC problems have led to the establishment of laws to be applied throughout the EC. The intention is that, once a product has achieved certain recognised standards, it will bear the 'CE' (declaration of conformity) mark and may be sold anywhere within the Community (part of the Single Market concept).

To cut a long story short:..... 'Statutory Instruments 1992 No. 2372 Electromagnetic Compatibility Regulations' came into force in the UK on 28 October 1992. The wide-ranging effects of this law caused a 'stay of execution' to be agreed, so that it will not fully apply until 1 January 1996. This should enable manufacturers and importers of equipment time to ensure that their products come up to scratch.

According to the UK Document, the Regulations apply to all electrical and electronic appliances and systems, with just a few exceptions. Such devices shall not cause excessive interference and shall not be unduly affected by interference (to agreed standards). The Regulations do not apply to components or spare parts, second-hand apparatus (unless modified), or to amateur radio apparatus which is not available commercially (i.e. home constructed).

As far as the manufacturer or importer is concerned, there are three ways to comply with the Regulations:

- 1: EC type-examination by a notified body
- 2: Technical constructions file certified by a competent body
- 3: Standards route by self-certification

Roughly speaking, route 1 requires the product to be submitted to an authorised test house for examination (very expensive); route 2 requires EMC documentation about the product to be scrutinised by an authorised body (less expensive than 1); route 3 relies upon the manufacturer or importer of the product to testify

that it adheres to laid down EMC standards. The same standards, however, apply no matter which route is taken. In the UK, route 3 can be taken for amateur radio equipment, including kits; but here the plot thickens, for some of the standards have not yet been agreed and not all the Regulations apply to all situations. Manufacturers and importers choosing self-certification must decide which ones apply and give good reasons for any which they consider do not.

So what are these 'Standards'? Basically, they are derived from a set of European generic standards and in the UK are covered by certain British Standards. Without going into great detail, they cover emissions, both radiated and conducted from equipment, the effects of supply voltage variations, transients, strong fields and electrostatic discharge, to name but a few. For amateur radio purposes, the RSGB has proposed some 'watering down' of some of the rather tight standards and did request that kits should be exempted from regulation. The latter was rejected by the DTI, however, since this would then have to be applied to all types of electronic kits.

So, from 1 January 1996, kits will come under regulation along with all other equipment (unless the DTI decides otherwise) and we shall have some strange situations:

You may decide to build a project from a magazine article, purchasing components and hardware from various sources; no regulation. If a kit manufacturer or component supplier were to package the necessary parts as a kit, EMC Regulations apply! Perhaps the author of the magazine article should be held responsible for conformance, or the magazine owners (or the Editor?). Just think of the consequences: suppliers offering projects with essential components missing so that the term 'kit' does not apply, or can you imagine *PW* without any constructions articles?, or how do you decide which standards to apply to a g.d.o. kit for instance?

Who will be responsible for monitoring compliance with the Regulations? Not the DTI, nor the RA, but local Trading Standards Officers, all of whom have degrees in radio and electronic engineering of course! (?)

Many people in recent years have been attracted into home construction by the availability of good quality electronic kits. The educational value is obvious and, coupled with after-sales service and advice from kit manufacturers and suppliers, has served to encourage interest in amateur radio in particular. Construction should go hand in hand with the Novice licence for example. Amateurs returning to the hobby after a break of some years often like to begin again by building kits. Black boxes are all well and good, but they are expensive and complex beasts; kits offer a 'back to basics' (I'm sure I've heard that saying before) approach to learning about electronic systems.

As a kit manufacturer, I am concerned that a low-cost entry into the hobbies of electronic construction and amateur radio will be adversely affected by the increased costs which will be incurred by extra testing required by the EMC Regulations. Many such businesses are very small, one person concerns whose sole purpose is to promote construction. Personally, I have never experienced difficulty in selling kits to anyone in the EC, so the 'free movement of goods' argument holds no water.

My reasons for writing this letter are to inform the readers and to invite comment from them. If you are concerned or can shed any light on the EMC Regulations, please make your own views known (even rules can be changed if enough pressure is brought to bear....). As far as I know the facts are correct. If anyone wants to write to me directly, will they please include an s.a.e. for reply.

Derek Pearson G3ZOM
Jandek, West Midlands

Editor's comment: This letter has been printed because it's of obvious importance to amateur radio and in particular, the 'practical' approach to the hobby. Unfortunately, a reply from the Department of Trade & Industry's Radio Communications Agency was not received in time for this issue. The RA state that they need time for a considered reply. We hope to publish a full reply from the RA in the next issue (September) of *PW*.

Queries To Practical Wireless

Dear Sir

R. Johnstone GM1YGV (May issue) defends the efficiency of the RSGB with which I agree - I only wish I could do the same for *PW*.

If you asked *PW* a query a few years ago, you received an answer within a week or two, as you still do with the RSGB. Today, the accent is purely financial - let's get the subscriptions in and to hell with the service to readers.

You query this? My subscription ends on 1 May 1994

with the June issue, but already I have had two requests for subscription renewal from *PW*. Efficiency rating 100%.

Let us look at service to members. In the beginning of December last year I asked if you could trace an article on Scott-Taggart's ST900, giving approximate dates that it appeared. Two 'phone calls and four months later I still have had no reply, although I did enclose an s.a.e. Efficiency rating 0%. But there again, you

have had my money, so why bother.

Let me pose a further question. If you were me, would you renew your subscription?

If you wish to publish this letter in 'Receiving You', you have my permission to do so. Will you? Of course you won't. 'Publish and be damned' is not one of your maxims.

A. J. Wall
Warwickshire

Editor's reply: Despite searching through our com-

prehensive archives we have not found the details Mr Wall requires. In a telephone conversation with him, I suggested a reader might be able to help by identifying the magazine (it does not seem to be *Practical Wireless*) involved. Nowadays we have a much smaller editorial team compared to years ago, however, we still endeavour to maintain this (free) service and help whenever we can.

The RAE

Dear Sir

I feel that I would like to add my views to the ever increasing topic of the RAE that has been at the forefront of your pages.

As I write, I have just taken my RAE, literally one week ago, and must say that if one takes the proper steps of learning the various topics, then the examination itself is not too hard. Being a single parent, I have neither had the time or the finances to attend a college course and didn't use the Rapid Results College either. Indeed, I can honestly say that I am self-taught, from the various books that are available to everyone, whether they are borrowed from the local library or bought at a book shop. As long as you're prepared to take the trouble to study, then I see no reason why anyone should be unprepared for the exam, thus finding it unnecessarily hard.

I must however say, that the facilities for sitting the examination could do with some improvement. In January, when I decided to apply for the RAE, I contacted the City & Guilds institute for a list of local examination centres. Within a week, this information had arrived through the letterbox and I promptly contacted my nearest centre on the list.

I was told by the college that they no longer conducted the RAE and had not done so for two years, so much for the C&G 'up-to-date' list. Undaunted by this fact, I set about contacting the next nearest centre on the list, some 20 miles away, twice the distance of the first, preferential, centre. I was in luck, the college would indeed hold the exam.

On the evening of the exam I arrived at the centre, found the examination room and met the other candidates taking the exam at the time. There were four of us in the examination, I wonder, is this because of a lack of interest or, perhaps, other prospective candidates in the area were being put off by the incorrect information supplied by the C&G institute?

R. Brown, Essex

Yeovil Transceiver

Dear Sir

Congratulations to Clive Hardy G4SLU for his detailed and well balanced article on the building of Tim Walford's 'Yeovil' transceiver. Having successfully built the 'Yeovil' myself, and also added Tim's frequency counter and 7MHz kits to the rig without much difficulty, I would like to offer the following comments for any of your readers who may be considering building these kits. Some of these points are, of course, basic to all 'home-brewing'.

I consider that the 'Yeovil's' construction manual is very well planned with most helpful and practical guidance, especially for those constructors who are working without help from fellow club members, (as in the Yeovil Club Project), but the manual must be read and re-read many times - it's so full of good advice for building the kits.

I agree that the p.c.b.s have to be examined carefully before starting and that some holes have to be cleaned out a bit. I find it worthwhile, time-wise, to push in a few of the larger components, like i.c.

holders and relays, to establish a few markers on the boards. I also fixed a dozen or so components onto a polystyrene off-cut, labelled with values and the order of fitting to the board. I also check and re-check against the circuit diagram and p.c.b. plan. Mistakes in the building can take ages to discover at a later stage.

I like Clive's early preparation of the case and front panel. I decided on a 'Cirkut' E2, metal case with independent top and bottom covers for easier testing and servicing.

I note his neat lacing cords on the wiring. I used a looser approach with short wires where possible, and some screened leads. Not so attractive, but I did not have any instability at all and therefore extra capacitors were not used. The frequency counter kit is a worthwhile addition and like the 7MHz kit, worked straight away with no problem of insta-

No Frills Hand-Helds

Dear Sir

Having just returned to amateur radio after a six year lapse, I have been looking for new equipment. It seems that although the technology has improved, you can no longer go out and buy a simple no frills hand-held anywhere.

I wish to purchase an f.m. only hand-held that will operate on the 144MHz band. I don't need keypads, memories (what is wrong with the one between my ears?) or extended coverage on receive. If I wanted all that I would buy a scanner.

Don't manufacturers cater for us simple folk anymore? I know it can be done, just look at the Marine and Airbands - units can be basic or high tech so why not the Amateur bands?

**Mick Sharp G1GTV
Surrey**

The RSGB President's Editorial

Dear Sir

Ian Stuart GM4AUP's plea for support for the RSGB reads very well in the June 'Keylines', but...

Compulsory Morse kept me off the h.f. bands for the better part of half a century. The RSGB today almost completely spoils radio for me in my retirement with its continuing atavistic and tedious attitude to this matter. The RSGB publication will not publish any letter of mine on the subject.

Many h.f. enthusiasts, doubtless including 'B' licensees and s.w.l.s will agree there is a strong case against Morse compulsion in an age when it is not required, for example, at sea. The problem is that all effective argument and representation come indeed from the RSGB.

For myself, until the RSGB has a change of heart, I shall no longer be subscribing, even at the cost of some personal inconvenience.

A. L. Dick GM0IRZ, Tayside

Written To RSGB

Dear Sir

I read with great interest Duncan Cadd's article. I have written on three, yes, three occasions but never a reply or acknowledgement from the RSGB. Times are very hard, jobs going, redundancy rife. I suggested to them to consider perhaps member - no *RadCom* £15, member no voting rights or *RadCom* £10, etc., but alas, no reply.

Before some smart alec says it's only 58 pence per week, there is my mortgage, insurance policies, car tax and petrol etc. Times are very hard for very many. So why can't the RSGB bend like the willow and be more flexible. I know of very many amateurs who would join or re-join in a flash (myself included) if it were less expensive. I do not need *RadCom*, have been an avid reader of *PW* for 30 years. Use of the bureau would be super, but I do not need any other services, my needs are simple and few.

**David Arnold G0BID
Avon**

bility. Perhaps a mixture of care and some luck?

I also found that the audio level was a bit low until I found a small speaker in my spares box that seemed to match the rig and produce a better output. I believe that a simple modification to the i.f. stage is now possible and raises the overall gain, (information: G3PCJ's *Construction Club Journal*, Spring 1994).

Like many other 'Yeovil' users, I have had good results on s.s.b. across Europe and into Africa with only a 20m end-fed wire antenna on 14MHz and further afield into the USA on c.w., with the power wound to 5W, QRP level.

The 'Yeovil' is not a simple rig to build, but with careful

planning and frequent reference to the manual, it's quite a straightforward project as Clive's efforts have proved.

Tim Walford has designed an excellent little rig that has given me great satisfaction both in the building and in operating. Clive's review should encourage others to accept the challenge.
**Keith Edwards G3XUO
Southampton**

Editor's comment: While on the subject of the 'Yeovil', Tim Walford G3PCJ has kindly donated the transceiver built and reviewed by Clive Hardy G4SLU as first prize in a special competition which we plan to run in the near future.

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

NEWS 1994

Oak Hills Research

Adur Communications have informed *PW* that they are now importing the range of Oak Hills Research QRP transceivers and accessories from the USA. The kit range includes dual and single band superhet c.w. transceivers as well as the SCAF audio filter, QRP wattmeter and the Curtis electronic keyer.

Adur Communications are also importing a range of spares for the Heathkit SB220 amplifier that are produced by Harbach Electronics. These spares include a filter capacitor block, rectifier metering board module, parasitic suppressor kits, soft start module and meter replacements which can be supplied and fitted as required. A repair service on amateur radio equipment especially on older Ten-Tec transceivers is also on offer.

For more information contact **Phil Godbold G4UDU, Adur Communications, 13 Dawn Crescent, Upper Beading, Steyning, West Sussex BN44 3WH. Tel: (0903) 879526.**

Haydon Antenna Range

Mike Haydon of Haydon Communications has recently advised the *PW* newsdesk of a new range of v.h.f./u.h.f. mobile and base station antennas he has added to his range of stock.

Mike points out that the increase in the price of antennas over the past few years, is not (as was originally thought) a result of them being of Japanese origin. Many of the antennas that are sold on the UK market are in fact made in Taiwan and then branded by Japanese companies.

Mike has now gone direct to the manu-

facturers and has managed to get a range of antennas made with the Haydon Communications name on. This has resulted in a reduction in price and it is claimed that potential customers can see that the antennas are identical to their Japanese competitors but at a more reasonable price.

More details on Haydon's new range of antennas can be obtained by contacting **Haydon Communications, 132 High Street, Edgware, London HA8 7EL. Tel/FAX: 081-951 5782.**

Identity Crisis

South Wales amateur radio shop, Securicor PMR Ltd. have been experiencing problems from potential customers, who are confused by their name. In an attempt to put a stop to all the telephone calls from people enquiring about having money delivered or wanting to buy business radios, Securicor PMR are looking for a new name.

Securicor PMR would like help in choosing a new name that reflects their business, which is catering for the amateur, Novice, listener, CBER and marine radio user. Readers are encouraged to send in suggestions for a new name. The best one in the judges opinion will be used and the entrant will win a ADI AT18 144MHz hand-held transceiver worth £179.

If you'd like to enter all you have to do is send your suggestion to **Securicor PMR Ltd., Industrial Estate, Gwaelod-y-Garth, Cardiff, South Wales CF4 8JN before September 7 1994.**

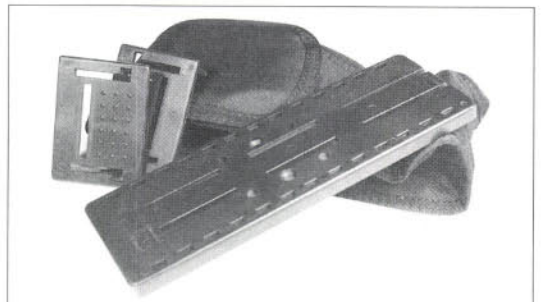
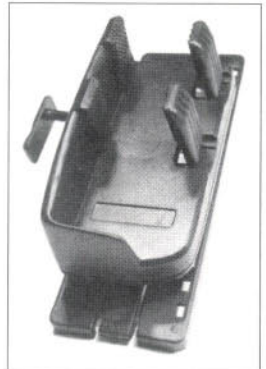
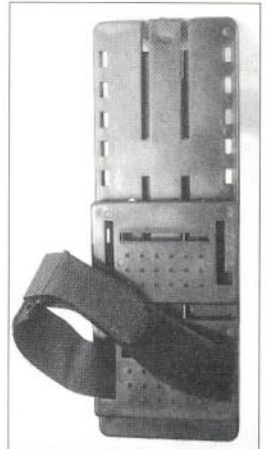
PowerPack Accessories

Additional accessories to the Innova Corporation's PowerPack system (as reviewed in July 1994 issue of *PW*) are now stocked by Forman Productions Ltd. The three latest items are an HT Clip Holder, a Universal Cradle and a Storage Pouch. All share a common frame to clip to the side of any of the PowerPack batteries.

The HT Clip Holder allows a hand-held radio to be clipped to the side of a battery PowerPack. To give added security, a quick release strap holds the bottom half of the rig.

The Universal Cradle has an adjustable clamp to grip a hand-held radio from 32-63mm wide with a quick action release grip.

The third item, a Storage Pouch, allows items up to 65 x 60 x 180mm to be carried and can be attached to a PowerPack battery. The Pouch can also double as a belt pouch when not clipped to the battery pack.



The HT Clip Holder costs £10.34, the Universal Cradle £15.51 and the Storage Pouch £10.93 including VAT. All are available from **Forman Productions Ltd., 62 West Street, Dunstable, Bedfordshire LU6 1TA. Tel: (0582) 665718.**

Review List

The *PW* Editorial Offices frequently receive requests for details of equipment reviews that have been featured in past issues. As a service to you, the reader, we have compiled a summary of such reviews covering the past 15 years. Articles from *PW* and our sister publication *SWM*, are listed. If you require a copy please send a large (minimum of A5, 149 x 210mm) s.a.e. and two first class stamps.

Catalogues

Waters & Stanton Electronics now have two new catalogues available. The first is the new Diamond Antenna Corporation Antenna, Meter and Accessory catalogue. This A4 size 24 page catalogue incorporates the full Diamond range and is available on request from Waters & Stanton. If you mention *PW* when requesting the catalogue you'll also receive a free Diamond window sticker.

The second catalogue is the latest from MFJ and Ameritron that Waters & Stanton can supply together with a price list. As a special promotion, the first 100 readers to request the MFJ/Ameritron catalogue who mention *PW* will also receive a copy of *Packet Radio Beginner - A Handbook for the Advanced Packet Operator* by Buck Rogers K4ABT worth £5.

If you'd like a copy of either catalogue contact **Waters & Stanton Electronics, 22 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835.**

Open Day

The Waters & Stanton Electronics Annual Open Day was held on May 22 1994 at their shop in Hockley, Essex. The main shop was overflowing with the latest in amateur radio and scanning equipment, as well as staff to offer advice and equipment demonstrations.

Practical Wireless and *Short Wave Magazine* were in attendance in the marquee situated behind the shop. Also in the marquee were Dennis Goodwin G4SOT from Icom (UK) Ltd., Jane Hanson from the Radio Society of Great Britain, the bargains and the free food and drink!

There were many bargains to be found, especially on the second floor where there were end of lines, one-off samples and service department failures all at special prices. Also on display was Waters & Stanton's own museum.

The day proved very successful and the next date that Waters & Stanton Electronics would like you to put in your diary is their 21st Birthday Party. The celebrations will be held on Saturday 23 July 1994 from 9am to 6pm at their Hockley shop.



Jeff Stanton G6XYU pictured with Dennis Goodwin G4SOT of Icom (UK) Ltd.



These weren't for sale at the Open Day - the Waters & Stanton museum pieces.

New AKD Transceiver

The Stevenage based company AKD have recently launched a new 430MHz f.m. transceiver, model no. 7003. The 7003 covers 432.500 to 435.000MHz, has 100 channels and a power output of 3W, making it ideal for Novice and packet operators.

The AKD 7003 also features p.t.t. repeater tone burst, auto repeater shift and offers an audio output of 2W. This new transceiver is available for £193.74 inc. VAT plus £5 P&P and is supplied with a microphone and a two year guarantee.

For more information on the AKD 7003 or for a copy of the new AKD catalogue contact **AKD, Unit 5, Parson Green Estate, Boulton Road, Stevenage, Herts SG1 4OG. Tel: (0438) 351710.**

Royal Tournament

The 1994 Royal Tournament is being held from July 19 to 30th at Earls Court and the Air Training Corps will again be operating an h.f special event station. The callsigns to listen out for are GB4ATC, G3ATC and G8RT.

The special event station will be on the air from 1100 until 2200 hours local time for the duration of the Tournament. There will be Air Cadets on hand to pass and receive greetings messages, as well as a demonstration station which will be operated by Air Cadets using their own allocated frequencies.

For more information contact **Malcom Wood, 12 Lime Tree Walk, Enfield, Middlesex EN2 0TJ.**

Radio Tunnel Operations

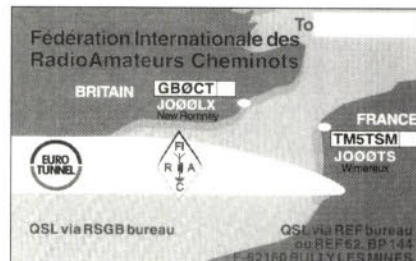
As reported in the News pages in the May issue of *PW* the Federation Internationale de Radio Amateurs Cheminots (FIRAC) operated special event stations from either side of the channel in celebration of the Channel Tunnel opening.

The British Rail Amateur Radio Society operated GB0CT from New Romney, near Folkestone on the Romney, Hythe & Dymchurch miniature railway. At the French end Groupe des Radio Amateurs SNCF (GRAC) activated

TM5TSM from Wimereux, near Boulogne from a site where Marconi carried out experimental transmissions at the turn of the century.

The two special stations operated on Friday 6 May through to Sunday 8 May and had a two-way ATV link cross channel. Dick Pascoe G0BPS, Chairman of Shepway District Council visited GB0CT and made contact with the Mayor of Wimereux.

A combined TM5TSM/GB0CT QSL card has been printed to commemorate this railway connected, historic event.



At the English end of the Channel Tunnel GB0CT, Dick Pascoe G0BPS operates GB0CT watched by (left to right) Tony SWL, Brian G8ZYZ, Geoff G3FIB, Daphne and Alf G4VEF.



New Receiver Concept

The ComFocus Corporation of San Diego, California have just launched a new product which brings together radio and state of the art computer technology. The new product is called SoftWave and the manufacturers claim has been designed to bring the world of radio to the computer user in a understandable and flexible form.

SoftWave is a receiver unit with no controls on it, which is controlled totally by a PC running a Windows application. It is actually several receivers in one as it can be a communications, short wave broadcast, v.h.f. receiver or a wide-band spectrum analyser to name a few.

Features include a

continuous frequency coverage of between 0.5 to 30 and 108 to 174MHz, 1Hz tuning resolution, tuneable notch filter with 60dB attenuation and seven digital demodulators. The method for selecting frequencies is done by typing the frequency, clicking the slide bar, choosing from the database or clicking directly on the signal shown on the spectrum analyser display.

Lowe Electronics Ltd., Chesterfield Road, Matlock, Derbyshire DE4 5LE. Tel: (0629) 580800 have been appointed as sole UK distributors for SoftWave and more details on this new concept are available direct from them.



NOVICE *natter*

As my last technical teaser proved to be so popular, I thought I'd look out for another challenge to sharpen up your understanding. I didn't have long to wait thanks to a letter from **Joe Riggs** of Swindon.

Joe has been rebuilding the first stages of an old transistor radio and is having problems tuning the antenna circuit. I've shown a simplified circuit diagram of the offending part in Fig. 1.

The problem Joe is facing is how to make the tuning of the antenna circuit line-up with the markings on the dial. If he just connects the 500pF tuning capacitor across the tuned circuit it resonates at 500kHz when fully meshed and 1.6MHz when wide open.

However, Joe needs this to change to 550kHz to 1.5MHz. He hasn't altered the antenna inductor yet, but it's wound on a cardboard tube, so can be slid off the ferrite rod if necessary.

What does Joe need to do to the circuit to correct the coverage and how can he get the best alignment throughout the band? If you think you know the answer drop me a line, the prize this month is a copy of JVFAX and HAMCOMM complete with interface from **Pervisell Ltd.** If I'm swamped with answers I might be able to stretch to two prizes! (**Nevada Communications** have kindly offered one of their **Eartalker** microphones as the second prize. Ed.)

Prize Winners

In the June issue of *PW* I set the task of identifying a mystery Language. Well, I was surprised at the number of replies - I thought that when *PW* offered two prizes they were being optimistic!

The first two names out of the competition bin were **Richard Smith** from Bishop's Stortford and **David Robinson** from Middlesex. Again, I've grovelled to the Editor and he's kindly agreed to a couple of runner's up prizes of six month subscriptions

This time Elaine Richards G4LFM has another technical teaser for you, details of prize winners and an antenna update.

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

to *PW*.

The runners-up prizes are going to **Mr Royle** from Manchester and **Mr Driscoll** of Stratford-on-Avon. Many thanks to all of you who entered, if you didn't win don't worry perhaps you'll have better luck with the quiz this month.

Porta 'J' Update

I've heard from a couple of people who have built the Porta 'J' antenna that was featured in the May '94 Novice Natter. **Jeff McKernan G1JDM** bought all the items at the Dunstable Downs Radio Club Car Boot Sale in the middle of May.

Jeff's 450Ω ladder line was slightly different as the spacing on the conductors was 21mm and he used 14s.w.g. enamelled copper wire for the stiff wire conductor. By holding one end in the jaws of a metal bench vice and the other in the jaws of a large pair of pliers, Jeff slowly, but firmly pulled the wire straight until he felt it stretch.

The result was a nice straight length to work with. Jeff then bent it to the shape shown in the drawing, removed the enamel coating and filed the BNC end to fit into the centre pin for soldering.

Initial tests using a low power transmitter and a v.h.f. Reflectometer (a gadget similar to an s.w.r. meter) showed a preference for the high end of the 144MHz band. Jeff thought that the reason could be that 144-148MHz is the American allocation and the antenna was probably designed with this in mind. After a little experimentation, he managed to tame the antenna to a more acceptable s.w.r.

Jeff hopes to take the antenna tucked away in his suitcase on a holiday in France and Spain. I'd be very interested to hear how it performs with the Icom IC-02E and TR-45E whilst you're away Jeff. Hope you and your wife enjoy the break.

Welsh Touring Antenna

Writing from Paignton, **Bernard Jones G3GCW**, says he has also built the Porta 'J' antenna in readiness for his Welsh touring holiday. To start with he did not like the idea of soldering to the outside of the BNC plug, as it would take a lot of heat, be ugly and unreliable as the wire in 450Ω twin is very stiff. So he made a bracket from tin-plate as you can see from Fig. 3).

Bernard usually makes up two antennas, if they're cheap to make, so that he has an experimental one. On trimming for best s.w.r., he found that one was better than the other. When he investigated he found that he had connected one to the wrong side of the 450Ω twin and it was that one that gave a perfect match at 145MHz.

Find The Amateurs

Ann Bradbury has written asking where can she find radio amateurs on her radio. Unfortunately you don't say what your radio is Ann, so let's go through all the bands. I'll give the basic frequencies where you may find amateurs, but if you want a detailed band plan you would contact the **RSGB at Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE. Tel: (0707) 659015** for a copy of the latest list.

The basic frequencies are 1.810-2MHz also known as 160metres (m); 3.5 to 3.8MHz also known as 80m; 7-7.1MHz also known as 40m; 10.1 to 10.15MHz this is a 'newish' band and so you may not hear much here very often; 14 to 14.35MHz also known as 20m; 18.068 to 18.168 this is another 'newish' band and so can be quieter than other more established bands; 21 to 21.45MHz also known as 15m; 24.89 to 24.99MHz yet another

'newish' band; 28 to 29.7MHz also known as 10m 50 to 52MHz also known as 6m; 70 to 70.5MHz also known as 4m; 144 to 146MHz also known as 2m and 430 to 440MHz also known as 70centimetres (cm).

I'll stop there, not because there are no more amateur frequencies but because these are the ones you are most likely to be able to use with your receiver.

Unfortunately, for most of these frequencies you'll need to be able to receive single sideband (s.s.b.) on your radio. If you haven't got the s.s.b. facility, all is not lost. You can build, or possibly buy, a beat frequency oscillator (b.f.o.) *Practical Wireless* did a project for one back in September 1992 in 'Getting Started The Practical Way' (back issues available for £2, photocopies for £1.50).

Once you've got your b.f.o. all you do is place it next to your receiver and switch on. If you first tune into a reasonably strong broadcast station you should find that altering the tuning of the b.f.o. causes a loud whistle that varies in pitch as you tune the b.f.o. You are now ready to try receiving your first s.s.b. signal.

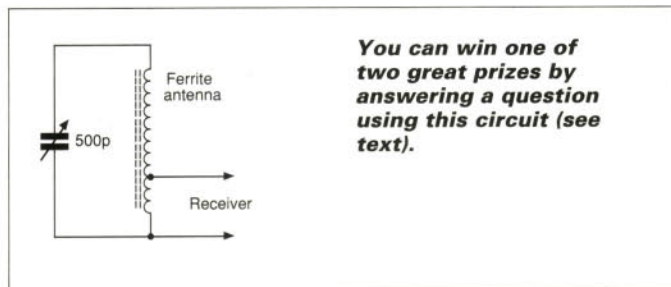
For day time listening tune around 3.6-3.8MHz or in the evening use 7.04-7.1 or 14.1-14.3MHz. When you find something that sounds like a very distorted speech signal (something like Donald Duck speaking) turn on the b.f.o. and slowly alter the b.f.o. tuning. With a little patience you should find that the signal becomes quite clear.

If your receiver has an r.f. gain control, it's a good idea to turn the volume up to maximum and use the r.f. gain control to adjust the volume.

Beginners Book

I've been loaned a really good book for the beginner in amateur radio and the best thing about it that it is written in English without the use of unnecessary jargon. It's called *Amateur Radio for Beginners Book 3 The Novice Licence Students Notebook* by John Case GW4HWR.

The book says that the notebook is intended to be used in conjunction with the Novice Licence training scheme, but don't let that stop you reading the book as it will provide useful information for many people. My favourite section is Part 1 that answers many of the most frequently asked questions about amateur radio, such as - who can hold a licence, what's a full licence as well as lots of other how, where, and why questions.



You can win one of two great prizes by answering a question using this circuit (see text).

The other five parts (or chapters) deal with making a medium wave radio, hints to help you through the exam, the Morse test, how to apply for your licence and worksheets. The worksheets cover too many subjects to mention them all here but I noticed things like fitting a 13A plug, fitting a BNC plug, propagation, transmitter and receiver block diagrams, etc. Each section is explained clearly and simply without using too much jargon.

I really enjoyed reading the *Amateur Radio for Beginners* (I haven't read it all yet). Hopefully I won't have to give it back until I get a chance to read it all though carefully! If you would like a copy, then it can be obtained from the PW Book Service priced £5.10 plus £1 P&P (UK), £1.75 P&P (overseas).

That's all I've room for this month, so cheerio for now and keep those letters coming in.

Elaine G4LFM

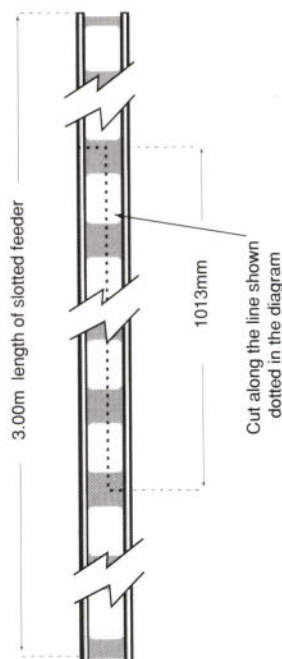


Fig. 2: Jeff McKernan G1JDM's modified version of the Porta 'J' antenna showing cutting instructions for ladder line (see text).

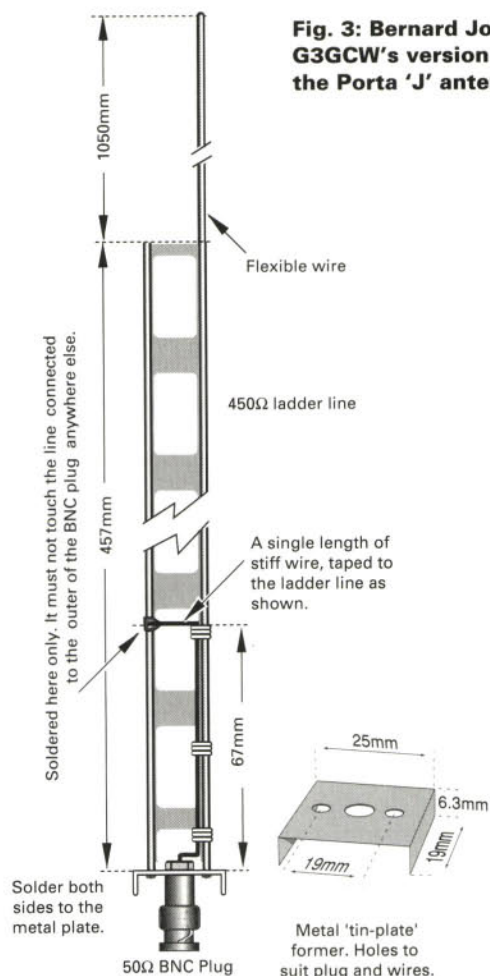


Fig. 3: Bernard Jones G3GCW's version of the Porta 'J' antenna.

July 17: The 11th McMichael Rally and car boot Sale will be held at the Haymill Youth and Community Centre, Burnham Lane, Slough (near Burnham railway station). The event starts at 10.30am, admission is £1.50. There will be free parking on the site and a talk-in is available on S22. Neil G0SVN or Roy G4XYN on (0628) 25952.

July 24: Colchester Radio Amateurs will be holding their 26th Radio & Computer Rally (including car boot sale) at St Helena School, Colchester. G3FIJ on (0206) 851189.

July 24: The 1st Humber Bridge Amateur Radio Rally is being held at the Freightliner Exhibition Centre. Easy access off the M62, one mile from the Bridge on the Clive Sullivan Way, 2nd exit. Doors open at 11am (10.30am for disabled visitors). There will be a Bring & Buy, refreshments and a talk-in on GB1HBR. There is parking for over 700 cars. R. Towler, Secretary on (0482) 837042.

July 31: The Rugby Amateur Transmitting Society are holding their 6th Annual Amateur Radio Rally at the BP Truckstop on the A5, 3 miles east of Rugby and approximately 3 miles north-west from Junction 18 of the M1 motorway. Doors open at 10am, admission is £1 per car and facilities include a good cafeteria and toilets. Talk-in on S22 by GB6CBS. Peter on (0455) 552449.

***August 7:** The Woburn Rally will be held at the Woburn Abbey, Woburn, Bedfordshire. The rally is open from 10am to 5pm.

***August 14:** Flight Refuelling ARS Hamfest will take place at the Flight Refuelling Sports Ground, Merley, Wimborne. The event will run from 10am to 5pm and will include the usual mix of traders, Bring & Buy, car boot sale and field events. Richard Hogan G4VCQ on (0202) 691021.

August 14: The Derby and District Amateur Radio Society will be holding its annual radio rally at the usual venue, Littleover Community School, Pastures Hill, Littleover, Derby. The venue for the Rally is on the A5250, just north of its junction with the A38, on the southern outskirts of Derby. There will be the usual attractions, including the famous monster junk sale. Martin Shardlow G3S2J, QTHR on (0332) 556875 or packet G3S2J @ GB7LNN

August 21: The Southend and District Radio Society are holding their Rally at the Rocheway Centre, Rochford, Essex. Doors open at 10am with ample parking for all. Weather permitting, there will be a boot sale for computer, radio and electronic equipment will also be on the site on the sports ground to the rear of the centre. Further details from **The Rally Organiser, PO Box 88, Rayleigh, Essex SS6 8NZ.**

August 21: The West Manchester Radio Clubs 'Red Rose 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 visitors. Refreshments available all day plus bar. Doors open 10.30am for disabled visitors, 11.00am for general public. Admission £1, children free. Dave G1100 on (0204) 24104 evenings only.

August 21: King's Lynn Amateur Radio Club are holding their 5th Great Eastern Rally at the Cattle Market, Hardwick Narrows, King's Lynn (off A10/A47 roundabout). Doors open at 10am (9.45am for disabled visitors). Attractions include a spacious indoor area with major international exhibitors, outdoor car boot area, Bring & Buy, Talk-in on S22, easy access for disabled, all one level, free parking, refreshments available. Entry £1. G0BMS on (0553) 765614.

August 27, 28 & 29: A Computer Fair including a Radio Rally and Electronics Fair is being held on the site of what used to be Walsall Airport, and is situated off the main A434 Aldridge to Walsall Road and is approx four miles from the A5, or five miles for Junction 7 of the M6 motorway. Mr A. Wood on (0543) 372807 after 5pm or anytime weekends.

August 28: The Galashiels Club are holding their Open Day at the Focus Centre, Livingstone Place, Galashiels, Scotland. Doors open at 11am till 4.30pm. There will be a Bring & Buy, traders, club stalls, a raffle and refreshments. J. G. Campbell on (0835) 822686.

August 28: The East Coast Amateur Radio & Computer Rally will be held at the Clacton Leisure Centre, Vista Road, Clacton-on-Sea, Essex. Doors open at 10am to 4pm. There will be a Bring & Buy, bar and cafeteria available from 11am. Free car park and talk-in on S22 and SU22 (GB0CR). Further information on (0473) 272002.

August 28: The 30th Torbay Rally will be held at Clenon Valley Leisure Centre, Paignton, Devon. Doors open at 10am. There will be trade stands, Bring & Buy, special interest displays, use of leisure facilities, restaurant and bar. Only four minutes walk away there is a beach, boating lake, steam railway and a flume water park. John G3YCH, QTHR on (0803) 842178.

August 29: The Huntingdonshire Amateur Radio Society are holding their Rally at St. Germain Street, Huntingdonshire. Admission is £1 per person and the car parking is free. There will be hot and cold refreshments available, and a talk-in on S22. Doors open at 10am. Further details from David Leech G7DIU on (0480) 431333.

***August 29:** Scarborough Amateur Radio Society will hold their radio electronics and computer rally at the Spa, South Foreshore, Scarborough. Doors open at 11am. Many traders, Bring & Buy, refreshments and bar. Ross Neilson on (0723) 514767.

***September 4:** The 9th Bristol Radio Rally and Bristol Computer and Electronics Market will be held at the Brunel Centre, Temple Meads Railway Station, Bristol. 10.30am to 5pm (disabled visitors 10.15am). £1 admission, accompanied children under 14 free, 40 plus traders, large Bring & Buy, raffle, refreshments, ample under cover parking at £1. Talk-in on S22. Muriel Baker G4YZR on (0275) 834282.

If you have any queries about a particular event, please contact the organisers direct.

Editor

* 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.

Editor

CLUB news

Avon

City Of Bristol Group. Last Tuesdays, 7pm. New Friends Hall, Purdown, Bell Hill, Stapleton, Bristol BS16 1BG. July 26 - RAF Bombers Ops. **Dave Bailey G4NKT** on (0272) 672124.

Shirehampton ARC. Fridays. July 15 - DF Briefing. **Ron Ford** on (0272) 770504.

South Bristol ARC. Wednesdays, 7.30pm. Whitchurch Folkhouse Association, Bridge Farm House, East Dundry Road, Whitchurch, Avon BS14 0LN. July 27 - Magazine Exchange Or For SBARC Rally Table, Aug 3 - 430MHz Activity Evening & Committee Meeting, 10th - Computer Shareware - Please Bring Some. (0275) 834282.

Bedfordshire

Shefford & DARS. Thursdays, 8pm. Church Hall, Amphill Road, Shefford, Bedfordshire. July 14 - BBQ. **Paul G1GSN** on (0462) 700618.

Berkshire

Maidenhead & DARC. The Red Cross Hall, The Crescent, Maidenhead, 7.45pm. July 17 - McMichael Rally. **Neil G8XYN** on (0628) 25952.

Newbury & DARS. 4th Wednesdays, 7.30pm. Bucklebury Memorial Hall. July 27 - Club Meeting. **Norman** on (0635) 863310.

Reading & West Berkshire RAYNET: is urgently seeking new members. Net every Monday evening on 144.775MHz at 7.30pm - all welcome. July 24 - Berkshire Emergency Services Tournament. **Dennis G4KWT.** (0734) 698526.

Buckinghamshire

Aylesbury Vale RS. 1st & 3rd Wednesdays, 8pm. Village Hall at Hardwick. July 20 - Social Evening. **Martyn G4XZJ** on (0296) 81097.

Cheshire

North Cheshire RC: Morley Green Club, Morley Green, Nr. Wilmslow, Cheshire. Sunday evenings, we will once again be running an RAE exam course. Registration will be at 8pm on Sunday 11 September, each Sunday thereafter the course will start at 7pm. **Jill.** 061-485 5036.

Stockport RS. 2nd & 4th Wednesdays, 7.45pm. Room 14, Dialstone Centre, Lisburne Lane, Offerton, Stockport, Cheshire. July 27 - Mechanics Of Radiation & Propagation - Part 2 by G3LX, Aug 10 - Lecture by The RNLI. **Jim France G3KAF** on 061-439 4952.

Clwyd

Rhyl & DARC. 2nd Mondays, 8pm. Wellington Community Centre, Wellington Road, Rhyl. **A. Antley GW3UTG.**

Wrexham ARS. Maesgwyn Community Centre, Maesgwyn Road, Wrexham. July 19 - Field Night, Aug 2 - Equipment Testing Evening. **Ian Wright GW1MVL** on (0978) 845858.

Derbyshire

Buxton Radio Amateurs. Lee Wood Hotel, Buxton, 8pm. July 26 - Power Supplies, Aug 9 - Printed Circuit Boards by G0JND. **Derek Carson G4IHO** on (0298) 25506.

Derby & DARS. Wednesdays, 7.30pm. 119 Green Lane, Derby. July 20 - BBQ at Drum Hill, Little Eaton, 27th - Shareware Swap Evening, Aug 3 - Junk Sale, 10th - Rally Preparation Evening. **Hayley Winfield G7PXA** on (0773) 856904.

Devon

Appledore & DARC (Devon). 3rd Mondays, 7.30pm. Appledore Football

Clubroom. July 18 - Treasure Hunt. **Reg Lyddon G4ETJ, QTHR** on (0237) 477301.

Exeter ARS. 2nd Mondays, 8pm. The Moose International Centre, Blackboy Road, Exeter. Aug 8 - Haldon BBQ. **Ray Donno** on (0392) 78710.

Torbay ARS. Fridays, 7.30pm. ECC Social Club, Highweek, Newton Abbot. July 22 - Monthly Meeting, BBQ Or DTI, 30th - Apple Pie Fair at Marldon by GB2APF. **W. Hipwell G3HTX** on (0803) 526762.

Dorset

Blackmore Vale ARS. 2nd & 4th Tuesdays, 8pm. Shaftesbury School, Dorset. July 26 - Project/On Air Night, Aug 9 - 144MHz DF Hunt. **Stuart G7JIF.** (0963) 362766.

Dorset Police ARS. The Dorset Police ARS will now be holding regular monthly meetings, at Force HQ on the first and third Thursdays of every month, at 7.30pm. Membership is open to Police Officers, serving and retired, civilian employees, Special Constables and their immediate family. The club welcomes contact from other local clubs. July 21 - The 1st DPARS Annual Fox Hunt, 23rd - RSGB VHF Low Power Contest, Aug 1 - Introduction To The Winter Construction Project by Clive Hardy, 4th - ATV Talk/Demo at HQ by SDRS Organised by Bob Knight. Further info from **PC915 Richard Newton at Ferndown Police Station** on (0202) 229351 or (0202) 229342.

Dyfed

Aberystwyth & DARS. 2nd Thursdays, 8pm. Scout Hut, Plasrugg Avenue, Aberystwyth. Aug 7 - Amateur Radio Demonstration (11am) - Ceredigion Flying Club 'Open Day' Between Frostrasol And Capel Cynon On The A486 From Synod Inn To Llandysul. **Katy GW0SFO** on (0545) 580675.

East Sussex

Crowborough & DARS. Thursdays, 8pm. Plough & Horses, Crowborough. July 21 - The Biggest Aspidistra In The World, BBC Overseas Broadcasting - Part 2 by Les G3FET. **Michael Smith G6UUU** on (0892) 661807.

Essex

Braintree & DARS. 1st & 3rd Mondays, 8pm. The Clubhouse, Braintree Hockey Club, Church Street, Bocking. July 18 - Junk Sale, 25th - Club Net - S15 - 145.375MHz - 8pm Local Time, Aug 1 - Kite Flying & Operating, 8th - Club Net - S15 - 145.375MHz - 8pm Local Time. **J. F. Button G1WQQ c/o G4JXG, 88 Coldnailhurst Avenue, Braintree, Essex CM7 5PY** or **Publicity Secretary** on (0376) 327431.

Colchester RA. Colchester Institute, Sheepen Road, Colchester. July 14 - Top Band Radio Direction Finding by Philip G0NXH. July 24 - Radio & Computer Rally At St. Helena School, Sheepen Road, Colchester. **Trevor Bradbeer G0URJ** on (0206) 764034.

Vange ARS. Thursdays, 8pm. Barnstaple Community Centre, Long Riding, Basildon, Essex. Aug 4 - Junk Sale, 11th - Natter Night. **Doris** on (0268) 552606.

Grampian Region

Aberdeen ARS. Fridays, 8pm. Queen Mother House, Aberdeen. July 15 - Trades Holiday - Rag Chew, 22nd - Trades Holiday - Rag Chew, 29th - Wet String Listening Competition - Round 5, Aug 5 - Junk Sale. **Gordon Stuart GM7PXW** on (0224) 780591.

Banff & DARC. 2nd Fridays, 7.30pm. Fridays. Banff Castle, Castle Street, Banff, Aberdeenshire AB45 1DL. (0261) 812368 (work) or 861254 (home) or GM3DZB.

Greater London

Cray Valley RS. 1st & 3rd Thursdays, 8pm. Progress Hall, Admiral Seymour Road, Eltham SE9. July 21 - Getting Started On Packet by G6SDO, Aug 4 - Natter Night. **Bob Treacher** on 081-850 1386.

Crystal Palace & DRC. 3rd Saturdays, 7.30pm. All Saints Parish Rooms, Beulah Hill, London SE19 (opposite junction with Grange Road). July 16 - Annual Outing. **Wilf Taylor G3DSC** on 081-699 5732 or **Bob Burns G30OU** on (0737) 552170.

Southgate ARC. 2nd & 4th Thursdays, 8pm. Winchmore Hill Cricket Club Pavilion, Firs Lane, Winchmore Hill, London N21. July 14 - Receiving Weather Satellite Maps At Home by Keith G3NCD, 28th - Managing CW Pile-Ups by Ron G3KTZ, Aug 11 - Annual Club BBQ In The Spinney. **Brian Shelton G0MEE** on 081-360 2453.

Gwynedd

Dragon ARC. 1st & 3rd Mondays, 7.30pm. Four Crosses Hotel, Menai Bridge. July 18 - An Opportunity To Display Home-Brew Equipment, Aug 1 - An Evening Of Amateur Radio Videos. **Tony Rees GW0FMQ** on (0248) 600963.

Porthmadog & DARS. 3rd Thursdays, 8pm. Harbour Cafe, Ffestiniog Railway, Porthmadog. July 21 - Surplus Equipment Sale. **Pat Vernalls** (0766) 770546.

Hampshire

Basingstoke ARC. 1st Mondays, 7.30pm. Forest Ring Community Centre, Sycamore Way, Winklebury, Basingstoke. July 31 - 144MHz Direction Finding Competition: OS175 - Fox Dave G4NIP, Aug 1 - Radio Tracking Of Wildlife (0256) 25517.

Horndean & DARC. 1st Thursdays, 7.30pm. Horndean Community School, Barton Cross (off Catherington Lane), Horndean, Hants. Aug 4 - Digital Signal Processing by Nigel Gerdes G7CAW. **Stuart Swain G0FYX** on (0705) 472846.

Itchen Valley RC. 2nd & 4th Fridays, 7.30pm. Scout Hut, Brickfield Lane, Chandlers Ford. July 22 - Open Meeting & Natter Night. **Les Kennard G3ABA** on (0703) 732997.

Winchester ARC. 3rd Fridays, 7.30pm. Red Cross Centre, Durngate House. July 15 - Transmitting Video - Continuing Amateur Television by Steve Harding G4JGS. **Peter Simpkins G3MCL** on (0962) 865814.

Hereford & Worcester

Bromsgrove ARS. 2nd & 4th Tuesdays, 8pm. Lickey End Social Club, Alcester Road, Burcot, Bromsgrove. July 26 - Technical Topics/Talk, Aug 9 - EMC Discussion/Problems. **Mr B. Taylor G0TPG** on (0527) 542266.

Hertfordshire

Dacorum AR & TS. 1st (informal) & 3rd (formal) Tuesdays, 7.30pm. Girl Guide Meeting Rooms (Next To British Legion), Queensway, Hemel Hempstead, Herts. July 19 - 144MHz Fox Hunt. **Nicholas Camp G7KFQ.** (0582) 766973.

Hoddesdon RC. Alternate Thursdays, 8pm. Conservative Club, Rye Road, Hoddesdon, Herts. July 23 - Operating From Tolmers Scout Camp, Cuffley from 1400, Using GB2, RST, Followed by STAR BBQ With Talk On Astronomy by Brian Bond, Together With A Running BBQ From 1930, Aug 4 - Club Natter Night. **John G7OCI** on (0920) 466639.

Humberside

Goole R & ES. Fridays, 7.30pm. West Park Pavilion, West Park, Goole, last Fridays at the 'Old George Inn', Market Place, Goole. July 15 - Video, 22nd - ATV by G8VHL, 29th - Social Evening (Old George Inn). **Steve Price G8VHL** on (0405) 769130.

Kent

Bromley & DARS. 3rd Tuesdays, 7.30pm. The Victory Social Club, Kechill Gardens, Hayes, Kent. July 19 - BBQ And Operating Evening. **Alan Messenger G0TLK** on 081-777 0420

Sevenoaks & DARS. July 18 - Shack And Natter Evening. **The Secretary, c/o Sevenoaks District Council, Council Offices, Argyle Road, Sevenoaks, Kent TN13 1HG.**

Lancashire

Fylde ARS. 2nd & 4th Tuesdays, 7.45pm. Blackpool South Shore Lawn Tennis Club, Midgeland Road, South Shore, Blackpool. July 26 - Informal, Aug 9 - DF Fox Hunt. **Eric Fielding G4IHF** on (0253) 726865.

Merseyside

Liverpool & DARS. Tuesdays, 8pm. Churchill Club, Church Road, Wavertree, Liverpool. July 19 - Coach Trips Planning, 26th - Surplus Sale, Aug 2 - Home-Brew Night, 9th - GX3AHD On The Air. **Ian Mant G4WWX** on 051-722 1178.

Sefton ARC. 1st & 3rd Tuesdays, Liverpool Prison Officers Social Club, Walton. **Phil Taylor G4KIN** on 051-531 0991.

Norfolk

Dereham ARC. 2nd Thursdays, 8pm. St. Johns Ambulance Hall, Yaxham Road, Dereham. July 14 - BBQ at Joes G7MPQ's, Aug 11 - VHF Field Day Exploits. **Mark Taylor G0LGJ** on (0362) 691099.

Norfolk ARC. Wednesdays, 7.30pm. Formal And Informal Meetings Held At The Norman Centre, Bignold Road, off Drayton Road between Asda and the Mile Cross Roundabout, Norwich. July 20 - Satellite DXing by Gordon Higgins G3PXT, 27th - Night On The Air/Construction QRP/Morse Practice, Aug 3 - Foxhunt, 7th - RSGB Woburn Rally, 10th - Night On The Air/Construction QRP/Morse Practice. **Mike G4EOL.** (0603) 789792.

Nottinghamshire

Mansfield ARS. 2nd Mondays, 7.30pm. Polish Catholic Club, off Windmill Lane, Woodhouse Road, Mansfield. Aug 8 - Amateur Television by Barry G6LIC. **Howard G1JGY, QTHR.** (0623) 423697.

Nottingham ARC. Thursdays, 7.30pm. Sherwood Community Centre, Mansfield Road, Nottingham. July 14 - Surplus Equipment Sale, 21st - Fox Hunt No. 4, 28th - Construction/Activity Night, Aug 4 - Forum & Night On The Air, 11th - Frequency Conversion by Mike G2SP. **Simon G0IEG on (0602) 501733.**

South Notts ARC. Highbank Community Centre, Farnborough Road, Clifton Estate, Nottingham, or Fairham Community College, Farnborough Road, Clifton Estate. July 15 - Open Forum. July 15 - Talk-in On S22/Open Forum - Members Only, 22nd - Construction & On Air HF & VHF, 29th - Breedon Hill Site Servicing, 30th - BBQ At Breedon & Radio On Air Activity, 31st - On Air Activity Until Close At 12:00 Noon. **Julie Brown G0SOC, PO Box 4, Nottingham NG11 9DE.**

Shropshire Salop ARC. Thursdays, 8pm. Oak Hotel, Shrewsbury. July 14 - A Visit to Whittington House, British Telecom Oswestry, Shropshire, (members must be at Whittington House for 7pm), 21st - Foxhunt - Chase 4, 28th - Antenna Construction by Charlie GW3JPT, Aug 4 - Natter Night, 11th - Notice To Members Of The AGM (Nominations, Information & Agenda). **Sheila Blumfield G0SST on (0743) 361935.**

Somerset Yeovil ARC. Thursdays. Red Cross HQ, Grove Avenue, Yeovil, Somerset. July 14 - Club Visit To The Stockland Hill Television Transmitter, 21st - The PC, Your Best Friend In The Shack by G4JBH, 28th - Club Station On Air & Committee Meeting, 31st - A Social Gathering Of All Radio Clubs In The Surrounding Area, Aug 4 - Choosing Passive Components by G3MYM, 11th - A Home-Brew QRP Station by G0FUW.

Cedric White G4JBL on (0258) 473845.

South Yorkshire Sheffield ARC. Mondays 7.30pm. Firth Park Pavilion, Firth Park Road, Sheffield. July 18 - 3rd Round Of The Inter Club Contest Eliminator, Including Questions From The NRAE & RAE Exam Requirements, 19th - Ten Pin Bowling, 25th - Organisation Of Future Club Events, Aug 1 - Crime Prevention by PC Robinson, 2nd - RAYNET Meeting, 8th - Committee Meeting. **(0742) 446282.**

Strathclyde Mid Lanark ARS: Fridays, 7.30pm. RAE & Morse classes, lecture and chat nights. Newarthill Community & Education Centre, High Street, Newarthill, Motherwell. John GM7FXK. (0698) 822860.

Suffolk Haverhill & DRC: 2nd Mondays. 7.30pm. Samuel Ward Upper School, Chalkstone Way, Haverhill, Suffolk. 6-7 Aug - Club Portable Weekend. **Rob Proctor G4PZW on (0440) 704637.**

Ipswich RC. Wednesdays, 7.30pm. Rose & Crown. July 18-22 - Summer Activity Week At Otley, 20th - Making And Using Kite Antennas, 23rd - VHF Low Power Contest At Otley, Aug 3 - Artificially Intelligent Machines by Johnathan G0DVJ. **Mrs S. Elden G8HYE, 124 Larchcroft Road, Ipswich IP1 6PQ. (0473) 742072.**

Sudbury & DRA. 1st Tuesdays, 8pm. Wells Hall Old School, Great Conrad, Sudbury, Suffolk. 3rd Tuesdays, 8pm. Five Bells Public House, Bures Road, Great Conrad, Sudbury. July 14 - Special Event Station At Woodhall School. July 14 - Special Event Station At Woodhall School, 19th - Natter & Noggins Night, Aug 2 - Aerials by Mike G4GGC. **Tony**

Harman G8LTY on (0787) 313212 or G8LTY @ GB7NNA.

Surrey Dorking & DRS. The Friends Meeting House, South Street, Dorking, 7.45pm. July 26 - Activity Evening At The Devils Dyke, Brighton. Meet In Car Park 7pm, Talk-in 2m, S20/S18. Operation Will Be On 144, 70, 50 & 430MHz. BYO Food & Drink, Aug 9 - Informal Meeting At The Fox Revived PH, Norwood. **John Greenwell G3AEZ on (0306) 631236.**

Sutton & Cheam RS. 3rd Thursdays, 7.30pm. Sutton United Football Club, The Borough Sports Ground, Gander Green Lane, Sutton, Surrey. Natter Nights - 1st Thursdays. July 21 - Operation From Tristan da Cunha by Roger Western G3SXW, 26th - Committee Meeting, Aug 4 - Informal Meeting (Natter Night). **John Puttock G0BWW, 53 Alexandra Avenue, Sutton SM1 2PA.**

Wimbledon & DARS. 2nd & last Fridays. St. Andrews Church Hall, Herbert Road, Wimbledon SW19. July 29 - Camp Briefing. **George Cripps G3DWW on 081-540 2120.**

Warwickshire Stratford-Upon-Avon & DRS. 2nd & 4th Mondays, 7.30pm. Home Guard Club, Main Road, Tiddington, Stratford-Upon-Avon, Warwickshire. July 25 - Annual Construction Competition. **Martin Rhodes G3XZO. (0789) 740073.**

West Midlands

Stourbridge & District ARS. 1st & 3rd Mondays, 8pm. Robin Woods Community Centre, Scotts Road, Stourbridge. July 18 - Final Main Meeting. **James French, 2 Pepper Hill, Stourbridge, or via packet G7HEZ @ GB7PZT.**

West Sussex

Worthing & DARC. Wednesdays 7.30pm. Parish Hall, South Street, Lancing, Worthing, West Sussex. July 20 - Nostalgia by G8MSQ, 24th - HF Portable Competition, 27th - Map Making Past & Present - Ordnance Survey Talk & Slide Show, Aug 3 - Discussion Evening, 10th - Antennas by G3GRO. **G4GPX on (0903) 753893.**

West Yorkshire

Keighley ARS. The Ingrow Cricket Club, Ingrow, Keighley, 8pm. July 14 - Treasure Hunt, 21st - Natter Night, 28th - The History Of Radio by G0BZH, Aug 4 - Natter Night, 11th - Fox Hunt. **Kathy Conlon G0RLO on (0274) 496222.**

Wiltshire

Chippenham & DARC. Tuesdays, 7.45pm. Sea Cadets HQ, Long Close, Chippenham. **John Ainge G4LGZ on (0225) 743352.**

Trowbridge & DARC. 1st & 3rd Wednesdays, 8pm. Southwick Village Hall, 8pm. July 20 - Natter Night, Aug 3 - Yagi Antennas by G3ZXX. **I. L. Carter G0GRI on (0225) 864698.**

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Review

The Cushcraft A3S HF Beam Antenna

Working together, Clive Hardy G4SLU and Rob Mannion G3XFD have tried out a beam antenna from Cushcraft in the USA. Clive did the mechanical assembly work while Rob went on the bands and apparently thoroughly enjoyed himself!

As we've planned this 'Antenna Special' issue for a long time, I had arranged to review the A3S over a year ago. Unfortunately, it did not arrive until a few weeks before we started on this issue.

So, instead of having the antenna to try over several months, I've only had it for a few weeks. However, in that short time I've come to realise why operators using beam antennas always beat me to it in h.f. QSOs!

Fortunately, Clive Hardy G4SLU was 'on hand' (forgive the deliberate play on words) to help assemble the antenna. As the assembly was part of the review I thought it better to get some help...after all, three hands are better than one!

I've also got to bear in mind that

although I could assemble it myself, it would take longer. It seemed fairer to the manufacturers that Clive did the assembling and I watched him and got on with the photography. So, it's over to you on the tools Clive!

The Assembly

Thanks Rob! Fortunately it was a very sunny day when we started assembling the antenna. We both caught the sun, despite our hats the only casualty was Rob's nose which wasn't protected fully by the rim of his hat!

The Cushcraft A3S had been delivered to G3XFD's home and I found all the components for the antenna were in one

long box. The elements and traps were loose packed and there were two polythene bags of bits and pieces.

There was one bag containing all the Jubilee Clips for fixing the elements together. Some of the supplied Jubilee Clips were 22mm and some 25mm. When I started the job, the size difference is not obviously apparent but it's marked in small digits on the clips.

The other bag contains the U-bolts, nuts, bolts, etc. These

are used to fix the elements to the boom, and plastics end caps.

Cushcraft provide the instructions on a couple of sheets of paper. The only tools required are an adjustable spanner, a flat bladed screwdriver, and a tape measure.

The written part of the instructions gives general advice on assembling Cushcraft antennas. There's particular reference to the dangers from overhead electricity cables when erecting the antenna.

One interesting point that's made is, if you enlist help to assemble the antenna, make sure the helpers know that you are in charge! It didn't apply to assembling this antenna as I was on my own.

(Thank you Clive...but I did help by making the tea and offering advice! G3XFD).

There are no specific written assembly instructions for that particular antenna, but several schematic diagrams are provided. Combined with the list giving a description of each part these are clear and easy to follow.

Traps Labelled

The traps on the A3S are labelled for identification. Some of the element sections are very similar to each other and it's necessary to measure them to make sure the right one is being fitted in the right place.

Labels, such as those on the traps would have helped. So, having checked that all the parts appeared to be there, assembly began.

My only minor gripe with the instructions was that the diagram with the part identifiers was on one side of the sheet of paper, and the measurements were on the other. As I was constantly turning it back and forth I kept forgetting to anchor it down and the breeze took it away now and then.

In theory you should assemble the antenna and then adjust it, but you don't, do you? Fortunately, measurements are given to tune the antenna for resonance at either ends or in the centre of the bands. We decided to centre the frequency on the 'phone sections of the bands for the review tests.

Brief Panic

All the parts fitted well and everything was going together like clockwork until there was a brief moment of panic, **Fig. 1**, from Rob and I. Where was the essential glass fibre dipole centre piece?

The answer? It was hiding inside one of the elements I had just assembled! The moral is, make sure you locate everything before you start, and look in every possible location for missing items.

My confidence that all was well was boosted by finding that all the elements were mechanically balanced about their mid points, **Fig. 2**. The only fault I encountered was with the boom, which is in two sections joined together with a sleeve.

Holes for the bolts which stop the two sections rotating in the sleeve didn't line up with those in the sleeve. Apart from that everything else went together perfectly.

Assembly is completely straightforward

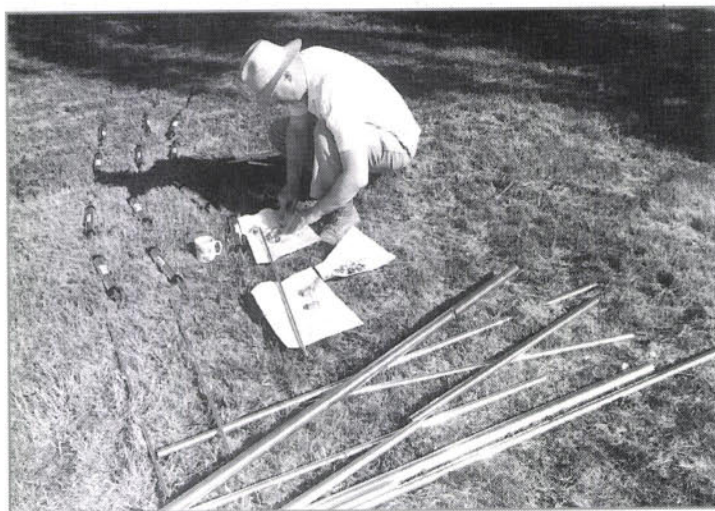


Fig. 1: A pause for tea, and a brief moment of panic as Clive Hardy G4SLU (i/c assembly) tries to locate an essential component which seemed to have got lost. The component - the dipole insulating centre-piece - was eventually discovered inside one of the element tubes, where it had slid during transit!



and the end product is a good looking piece of kit. Working at a fairly relaxed pace and pausing regularly for tea, it took ????? (See separate panel for competition question) from opening the box to the antenna being erected in the Editor's front garden.

Rob's contribution was to dig a hole for the pole ('Allo, Allo'), walk the pole up, and hold it while I tied guy ropes to trees and bushes. Oh yes, and he did make the tea!

On The Air

Once Clive had finished the assembly work on the antenna, I made haste to get on the air. I was looking forward to trying the A3S out, as it seems to be a very popular beam antenna.

I've never regularly used directional antennas for extended periods at my own QTH, with one exception. The exception was the Nelson Electronics 21 and 28MHz cubical-quad antenna I reviewed in the September 1992 issue of *PW*.

However, the cubical-quad comparison (I'm using my experience with this antenna to compare it with the Cushcraft) starts off with a disadvantage as it didn't cover 14MHz. Despite this, I can compare the antennas on 21 and 28MHz in setting up and operation.

Unfortunately, 21MHz wasn't in good shape during the period of the review. The 28MHz band was not up to much either, but I did manage some QSOs on both bands.

So, most of my operation for the review period was on 14MHz and what a revelation it was to use a beam antenna on that band! Having used it on the bands...I now realise why beam users do much better than those without directional antennas!

Once on 14MHz I found that my Trio TS-120V, running at the 20W level, did extremely well. I normally operate almost exclusively on c.w., but for this review I ventured onto 'phone and competed successfully with other, higher power stations.

The Results

I was exceptionally pleased with the results I got from my on air tests. On paper, the manufacturer's claimed gain (they don't state at which frequency the measurement is taken on) seems to be close to the mark.

However, on most occasions when I was in QSO with American, South American and those on the African continent, it was impossible to compare my transmissions with my other antennas. The reason? - I simply disappeared when I went on to my long wire antenna!

It must be obvious to any reader that I can only give an operational and purely subjective review of the Cushcraft A3S. To give fair comparisons between this antenna and a similar model would require a good antenna range and calibrated equipment.

Despite the fact that I can't provide a good radiation pattern plot, with the various lobes discussed, I can let you know how it performed on air. And surely, that's the important information you require?

Clive and I decided to mount the Cushcraft A3S at the same height that I'd erected the Nelson Electronics two-band cubical-quad antenna. At about six metres a.g.l. I was able to rotate it to beam wherever I needed to, using the 'armstrong' method (no rotator!).

On 14MHz, I immediately found there was a great advantage using the beam. The considerable QRM from the near-European station dropped dramatically, as the 25dB front-to-back ratio reduced the signal levels. This fact alone would be of great help to a DX hunter.

In practice I found that my low power Trio TS-120V was often getting me 5 and 9 reports from mid and west coast USA, Japan and Africa. And, I also found that if I could hear them, I could work them (not often the case with my usual dipole or long wire).

With c.w. I found that the beam provided me with an excellent combination. Not only did the forward gain work very much to my advantage, but the c.w. breakthrough on our telephone was removed at one stroke. Beaming west and south for most of the time, I was radiating most of the power away from our (very prone to breakthrough) telephone.



Fig. 2: Clive G4SLU was pleased to find out how well the antenna balanced after he had completed the assembly. The relative size of the completed A3S can be gauged by the 'standard sized' G4SLU.

Summing Up

In summing up, I must honestly say that I was most impressed with the Cushcraft A3S. It worked exceptionally well and loaded up with no bother at all. In fact, I found I could run my TS-120V straight into the antenna without using the a.t.u. (although, to get the best out of the rig I used the a.t.u. most of the time).

Personally, if you've got the space for an h.f. beam of some sort, I'd recommend using one. In my area, there are several amateurs with h.f. beams mounted low in relatively small gardens. They've obviously discovered all the advantages of using beam antennas. Now that I've had a go, I hope to join them soon - I wonder if my family would let me get a 7MHz beam to go with a Cushcraft A3S?

PW

Manufacturer's Specifications

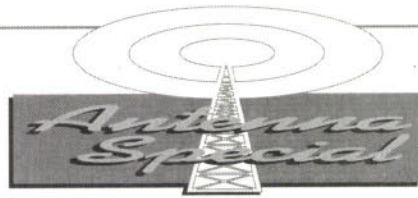
Frequency coverage	14, 21 and 28MHz bands
Number of elements	3
Forward gain	8dBd
Front to back ratio	25dB
Typical v.s.w.r.	1.2:1
Bandwidth at 2:1	>500kHz
Power rating	2kW p.e.p.
Beam width (3dB point) E-plane	60°
Boom length	4.27m
Boom diameter	38.1mm
Longest element	8.45m
Turning radius	4.72m
Mast size range	31.8 to 50.8mm
Weight	12.9kg

My thanks go to Waters & Stanton of 22 Main Road, Hockley, Essex S55 4QS. Tel: (0702) 206835 or 204965, FAX: (0702) 205843, for the opportunity of trying the Cushcraft A3S which they can supply for £349.95 plus £6 carriage.

Win The Cushcraft A3S HQ Beam Antenna

You could win the Cushcraft A3S 14, 21 and 28MHz beam antenna reviewed by Clive Hardy G4SLU and Rob Mannion G3XFD. Waters & Stanton have kindly donated the antenna which can be yours if you can accurately estimate how long it took Clive Hardy to assemble the antenna. The five runners up will receive Waters & Stanton 20% Discount Vouchers redeemable against Cushcraft Antennas. To help, we can provide a clue by telling you it took more than one hour and less than five to assemble. Send your entry on a postcard with the corner flash (no photocopies) to: Cushcraft Antenna Competition, Practical Wireless, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW, to reach us no later than Friday 9 September 1994. The winners will be notified by post and the Editor's decision will be final and no correspondence will be entered into.

**CUSHCRAFT COMPETITION
AUGUST 1994**



A Simple Reflectometer

Stephen Harding G4JGS has already shared his ideas for making cases from plastics materials in previous issues of PW. This time, he's come up with a simple antenna reflectometer which he housed in a case made from square section plastics drain pipe. Could it be Watts down the drain?

This article describes a design for a simple reflectometer that works well up to around 10MHz. So it's ideally suited to QRP use on 1.8, 3.5 and 7MHz. It will continue to work, but with much reduced sensitivity, up to around 30MHz.

One of the beauties of this design is the chances are that you already have most of the bits needed. Before you start...just have a look round the shack and in the junk box.

As far as construction goes, the design has the virtue that the values don't have to be exactly the same, so long as they are near. In use you adjust to the conditions and power of your station anyway.

The construction is finished by fitting inside a length of plastics drainpipe! It makes an effective instrument that will grace any amateur's shack.

Basic Design

The basic design is very simple. It's based on the concept known as 'the coupled line directional coupler' principle.

In practice the project uses the transformer principle to sample a little of the r.f. (radio frequency) energy going to and from the antenna. The main feed from the transmitter goes straight through the centre of the device in a straight line, and if made as described, will impose negligible insertion loss to the transmitted

signal.

Very close to, and on each side of the main transmission line is a secondary line. In this circuit the secondary line is very loosely coupled to the main transmission line.

The rapidly rising and decaying magnetic field in the transmission line induces a voltage in the coupled lines. This voltage is proportional to the square root of the power in the transmission line.

If the voltage is rectified and displayed on a meter, we have a visual indication of what is going on. All that needs to be done is to arrange for one coupled line to measure the forward voltage, and the other, reverse.

Putting it very simply one measures what is going up to the antenna, and the other measures how much is being reflected back. What we are looking for is the maximum going up and the minimum coming back.

Early Designs

Early designs for home-built reflectometers had the pick up conductor threaded between the centre core and the screen of a length of coaxial cable. This had to be done twice, once for forward power, and once for reflected.

As can be imagined, it was not an easy task to construct the sensing cable. In this design a printed circuit board is used to achieve the same effect.

The r.f. passes along the wide centre conductor to which the input and output sockets are directly soldered. Close to and on each side is a smaller conductor into which a current is induced from the main conductor.

The distance from the main r.f. path to the pick up line determines the power that can be handled. The closer the pick up line, the lower the maximum power that can be passed without danger of flash-over.

As designed, the printed circuit board is suited to powers up to 10W. For higher powers the separation between the r.f. line and pick up line will need to be increased, but if this is contemplated, it must be done with care so as not to overload the current carrying capacity of the copper tracks.

Practical Circuit

It's a practical circuit and if you look at the circuit diagram, **Fig. 1**, you will see the principle very clearly. The main transmission line passes straight through the middle with the coupled lines on each side.

Each coupled line has a small signal diode rectifying the voltage to produce a very rough d.c. As the diodes are mounted at opposite ends of the coupled lines, they measure opposing voltages.

The other end of the coupled line is terminated in a resistor. To accommodate a range of line impedance (50 or 75Ω, etc.) and enable accurate matching of the two arms of the bridge, small presets have been chosen so that line balance can be adjusted.

It is important that any r.f. component left after rectifying the voltage is dumped. This is the purpose of the two capacitors.

Switching between forward and reflected power is by a single pole, double throw switch and to allow adjustment for different power levels with different transmitters, a sensitivity control is included in the meter circuit.

For ease of construction, surface mounting of the components is used and **Fig. 2** shows the component layout.

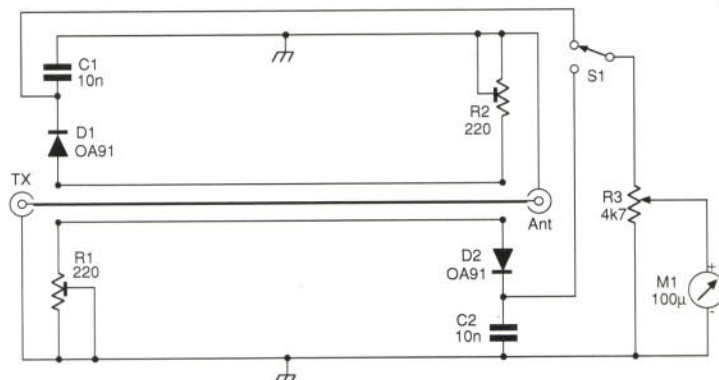
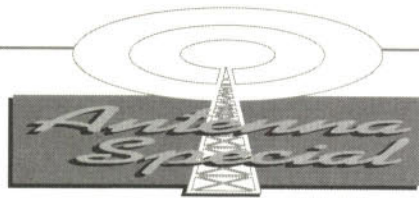


Fig. 1: Circuit diagram of the simple reflectometer designed by G4JGS.

continued over



Surface Mount

Surface mount all the components on the board after cutting the lead lengths to suit. Solder them in place making sure you heat the joint with the soldering iron first and then melt the solder with the heat of the joint.

Don't melt the solder on the iron and then throw it at the joint. At best it will only make a dry joint sticking the components down like glue would. At worst you'll end up with an unsightly mess that does nothing.

After soldering, examine all the joints and look for an even, shiny surface on the solder. Any that are dull or irregular in appearance should be reheated with the soldering iron until the solder melts and flows into the joint.

If necessary, add a little more solder. A small magnifying glass is ideal for this, and many component suppliers sell magnifiers with a built-in battery powered light source which are ideal.

On my prototype, I soldered the BNC sockets directly to the board to ensure good contact. Experience has shown that soldering the two diodes about 10mm from the end of the pick up line increases sensitivity because of the extra capacitance achieved.

You should try to keep the lead lengths to the minimum so that any stray

capacitance is kept within acceptable limits. A hot melt glue gun is useful for fixing the switch wires in place. Alternatively adhesive tape can be used.

Prototype Case

My prototype meter was mounted in a length of square plastics drain piping case. The drain piping was bought very cheaply from a builders' merchant as a damaged section.

The ends were cut nice and square using a hacksaw, two holes drilled in the back to take the BNC sockets, a large hole for the meter and two smaller holes for the sensitivity control and forward reverse switch cut in the front. To work properly the outer edge of the p.c.b. must be connected to the sockets you use. Many BNC and SO239 sockets have four mounting holes in them. Trap a solder tag under each of the mounting bolts. Then connect each tag to the nearest point on the p.c.b. with short lengths of thick copper wire.

Screening to attenuate the switching noise of the diodes can be added with thick domestic aluminium foil. Double-sided adhesive tape is stuck round the inside of the tube about 10mm from the end and around the edge of each hole.

Carefully roll a piece of foil slightly longer than the tube onto a piece of

dowelling, insert the dowelling into the tube, press the foil onto the tape and then carefully unroll. Any excess and the holes can be trimmed away with a sharp knife.

I carefully filled the ends of the tube with two pieces of flat plastics material. These were suitably shaped and fixed in place with the solvent used for plastics plumbing joints.

With four self adhesive feet stuck to the bottom, a pleasant appearance can be achieved. Graphics can be added with rub down lettering and 'go faster' striping kits sold in car accessory shops.

Setting Up

Before installing the meter into its case, it will need setting up. This is so that the terminating resistors are properly adjusted for the load impedance, nominally 50Ω .

To start, connect a dummy load to the output and connect a transmitter on low power to the input. If you're using resistors to make up a dummy load, make sure they are **not** the inductive type (wire wound or helical carbon film).

Set the switch to **Forward** and set the sensitivity control so that the meter is almost at full scale deflection. Now switch to reverse and adjust RX for a minimum reading.

Now reverse the transmitter and load connections and repeat the process, but



Fig. 2: Printed circuit board layout for the simple reflectometer. The few components are soldered into place using 'surface mount' techniques (see text).

adjusting R2. Check in both directions again in case you did not get it quite right.

The meter is now ready for use, and can be sealed off in its container after the copper surface has been sprayed with clear lacquer. You can use the sort sold for protecting metallic car paint finishes to prevent the copper from corroding.

The Meter

I designed the project around the 100 μ A full scale deflection (f.s.d.) meter shown in the circuit. With a meter of this f.s.d., it will be quite safe to use at up to about 7W transmitted power, but it should handle 10W.

If you're intending to use the meter with a higher power transmitter, it must be set to a lower power position. But in practice this is no bad thing because you are radiating a signal all the time you are tuning the antenna.

The lower the level of your tuning signal the better, until you have it perfectly matched. Remember every radiated signal can cause interference to someone somewhere.

Once the antenna is properly tuned, the reflectometer can be taken out of the antenna circuit. You only need to reconnect it if the transmitter is retuned.

If you want to work higher powers it will be necessary to shunt the meter movement with a suitable resistor and/or increase the value of the sensitivity control. You'll also have to increase the separation between the through and coupled lines.

Some simple arithmetic using Ohm's Law and a little experimentation will lead you to your own conclusions as to what is best for your meter movement. If you decide to use a shunt, the addition of a second switch, suitably labelled, on the front panel would extend the range of the meter for both low and high power use.

Built Cheaply

A meter such as I've described can be built very cheaply. The most expensive item is likely to be the meter movement, but if you're prepared to shop around, there are some great bargains to be had.

If you don't know the value of the meter, or you want to check an unknown

meter you can use the tester described by George Dobbs in *Practical Wireless* September 1991 pages 41 - 45.

Don't be afraid to use components from your junk box as the circuit and the values are not very critical so **do** use whatever you have. The only proviso on this is that each pair of components, diode, capacitor and preset resistor, need to be the **same** value and type so the characteristics of each circuit are the same.

I have little doubt that best results are obtained with signal diodes although ordinary rectifier diodes will do. Have a go and do a little experimenting; it's very satisfying! It may even work better! Who knows?

Using The Reflectometer

Now it's time to look at using the reflectometer. A quick glance at the illustration in **Fig. 3**, will show how the meter is inserted into the antenna feed.

The links between the transmitter and reflectometer and the reflectometer and antenna tuning/matching unit should be as short as possible and of good quality coaxial cable. The feed from the a.t.u. or matching unit should be chosen to suit the type of antenna in use.

Before transmitting to tune the antenna, it's a good idea to roughly tune for peak received signal. Set the sensitivity control on the reflectometer to approximately midway in its range and select forward power.

Using as low power as possible, key the transmitter and adjust the reflectometer sensitivity control until the meter indicates in the higher third of its range. Now adjust the a.t.u. for maximum deflection of the meter adjusting the sensitivity control if the meter runs out of scale.

The meter can now be 'set' with the

Shopping List

Resistors

Miniature preset p.c.b. mount

220 Ω 2 R1, 2

Linear variable

4.7k Ω 1 R3

Capacitors

Miniature disc ceramic

0.01 μ F 2 C1, 2

Semiconductors

Diodes

OA90 2 D1, 2

Miscellaneous

Suitable 100 μ A meter movement (see text), two BNC or SO-239 sockets, wire, knob for sensitivity control. Double pole throw single pole switch. Approx. 200mm of square section plastics drainpipe Dry transfer lettering, coloured striping, clear varnish plastics solvent cement, four self adhesive rubber feet, p.c.b. (a suitable board will be available from the PW PCB Service).

sensitivity control to the maximum scale reading. To check the antenna is correctly tuned/matched select reverse power

If things are well, the meter should read at the bottom end of the scale (preferably as near to zero as possible). If it's considerably higher than this further tuning is needed.

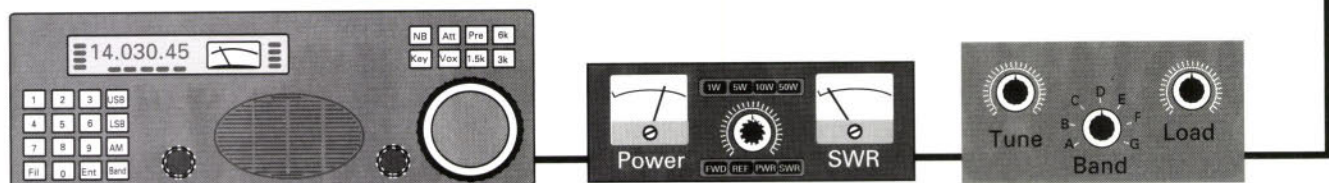
If further tuning is required, it can be done with the meter set to reverse by seeking the lowest deflection of the display. Once the best point is found, flick back to forward and check the meter is at or very near maximum reading.

As a final check the power can be gradually increased up to the desired working level. You should check all the time for a good match to the antenna.

Don't be surprised if you cannot achieve a perfect match. There will always be losses in any system, so you should be aiming to achieve the best match possible. Consequently there may well be some reflected power indicated on the meter, but the aim should be to minimise it.

PW

Fig. 3: Illustration showing how the simple reflectometer described by Stephen Harding G4JGS can be used with a low power station (see text for maximum power levels).



HF VERTICALS

Ground mounted HF base antennas that work!

Hustler has been producing HF vertical antennas of unusual electrical performance and mechanical integrity since 1959. Many of those original verticals are still in service after over 35 years of reliable operation.

This exclusive trap design offers the lowest loss possible. A special extrusion process allows Hustler to produce trap covers to an otherwise unattainable close tolerance, assuring accurate and permanent resonance. The highly accurate traps provide top signal reports and consistent contacts.

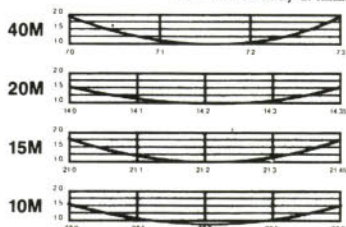
Accurate tuning is made possible by the wide range of tuning flexibility design into the verticals. Not only can you use the normal adjustable tubing to change resonance, but the traps themselves can be field tuned for an additional 2 Mhz shift. This flexibility will enable you to achieve a good vswr even if your installation is not ideal.

All Hustler verticals will easily handle the full legal limit of power and will cover 10-40 meters with a swr of 1.6:1 at band edges 80 meter bandwidth on the 5BTW and 6BTW is 80 KHz under 2 to 1.

A fixed station antenna is only as good as its ability to stay up, mechanical design of Hustler verticals is superior to any. Large diameter 1 1/4 inch corrosion-resistant aluminum tubing is used from top to bottom. The base assembly utilizes a centre tube with a .315 inch wall thickness, unequalled in the industry. The trap coils are wound around solid one inch diameter fibreglass cores and stainless steel clamps permit adjustment without damage to the aluminium tubing.

"I think the quality of the Hustler Antenna speaks for itself!"

Tom Rickward, G4ZZN



"WORKED VK"

Hustler's 6 Band Vertical Antenna assembled very easily and the SWR adjustments were simple and low figures obtained without too many problems. Compared to my previous vertical, it was simplicity itself.

The Antenna is mounted at ground level without any radials and performs well. Have worked mainland VKs and a VK7. Bearing in mind I am still working and the opportunity is not available to pursue more fully, I am more than happy with the results and again the quality, especially bearing in mind the price.

L.C. Duncan, G0OLK

HF MOBILE ANTENNAS

If you are serious about HF mobile operations now that the weather is getting better, the Hustler system is the obvious choice. This system offers a wide variety of components, which enable you to customise your mobile installation to fit your present and future requirements. A choice of four different support masts provides an installation solution for every vehicle. A selection of thirteen interchangeable resonators, in high and moderate power levels and varying bandwidth, are available.

"DXCC ON 20 WITH HUSTLER"

Just 100 watts SSB, no ATU worked 161 prefixes achieved 1978-81 all mobile! Often get better reports than other G's home based beams.

Paul Hurst G3PCT

"The best antenna there is for HF!"

I have tested the Hustler HF Mobile with the rated power and have measured the Q factor and it is the nearest to 300 in any antenna I have seen! I have also fed it with inductive and capacitor matching including both to obtain 50 ohms input on 40/80mtr and have a band width of between 50 and 75 kcs compared with other mobiles which had only 10 to 15 kc band width. The best antenna there is for HF!

73, David Hudson, G4W0E

"RM 20 + TS 50 = PERFECTION!"

Delighted to find Hustler available again. Now I am sure to get the full benefit of my new TS 50 mobile! Congratulations from an old Hustler fan.

Tony Case G4ZVR



HUSTLER PRICES

4BTW HF Base 10-15-20-40 meters	£129.95
5BTW HF Base 10-15-20-40-80 meters	£145.95
6BTW HF Base 10-15-20-30-40-80 meters	£160.95
RM-10 10m Mobile resonator 150-250Khz bandwidth 400W	£15.95
RM-15 15m Mobile resonator 100-150Khz bandwidth 400W	£16.95
RM-20 20m Mobile resonator 80-100Khz bandwidth 400W	£23.95
RM-30 30m Mobile resonator 50-60Khz bandwidth 400W	£24.50
RM-40 40m Mobile resonator 40-50Khz bandwidth 400W	£24.95
RM-80 80m Mobile resonator 25-30Khz bandwidth 400W	£25.95
RM-10S 10m Mobile resonator 250-400Khz bandwidth 1.5KW	£24.95
RM-15S 15m Mobile resonator 150-200Khz bandwidth 1.5KW	£26.95
RM-20S 20m Mobile resonator 100-150Khz bandwidth 1.5KW	£29.95
RM-40S 40m Mobile resonator 50-80Khz bandwidth 1.5KW	£34.95
RM-80S 80m Mobile resonator 50-60Khz bandwidth 1.5KW	£45.95
MO-1 Mobile mast 54 inches long, tilts at 15 inches	£27.95
MO-2 Mobile mast 54 inches long, tilts at 27 inches	£27.95
MO-3 Mobile mast 54 inches long, solid rubbercoated	£22.95
MO-4 Mobile mast 22 inches long, solid rubbercoated	£19.95

(All masts end in a 3/8 thread, for mounting. Ideal for any strong CB style mount and cable.)

NB Postage/delivery extra as required.

"ZS6 THOUGHT I WAS IN JO'BURG!"

Dave Hudson, G4W0E

Since using the Hustler I have contacted stations in "India VU2TTC", "Sri Lanka 457RO", "Trinidad 9Y4TD", Africa 9X5GC, KA1V/T5, 3DA0BM, Australia VK7OH, Barbados 3P9EM and the Falklands VP8CGH with signal reports ranging between 5/5 to 5/9, as for 9Y4TD who was surprised when I told him I was mobile due to my signal strength. A station in Johannesburg called me "ZS6BEW" as he thought I was in one of the Johannesburg suburbs, this was when I was in contact with KC9BI we then had a three way contact, not bad from a car don't you think?

As for the antenna, I have tried inductive coupling and capacity matching as per ARRL handbook mobile section and this was not needed.

The resonators are very well constructed as so the mast which can be used as a 1/4 wave on 6 mtr, the band width is as advertised for each band, "as the instructions state 2.1 swr or better". I obtain 1.5 to 1 and less on 10, 15, 20 mHz but what did surprise me was the band width on 80 mtr as with other antennas. I could only move frequency of about 10 kcs but with this resonator I can move 30 kcs either side of the tuned frequency. Now when I go camping all I take is the required camping equipment and the Hustler antenna which I use with a tri-band adaptor, so I can operate any three frequencies without having to change resonators. The mast is hinged so it can be folded to fit the trunk and apart from that I also use the quick disconnect attachment which I also obtained from Coastal Communications.

To end this letter which sounds like an advert, all I will say to past, present or future mobile operators is, try this antenna and I can tell you that they will not be disappointed with the results and also excellent service from Coastal Communications.

"Out-performs the competition!"

After using my Hustler 20m mobile antenna, I had to let you know the super duper results on the first day. Once set correctly, the SWR stayed below 1.8:1 over the whole of the voice section of the band. With the added advantage that the antenna does not sway at any speed, the performance didn't vary during my journey to work.

With 100W input, six different countries were worked, even with conditions being on the low side the first evening. After many years of trying different mobile HF antennas, the Hustler far out-performs the competition. With the low cost and versatility of changing bands, this is the HF mobile antenna of the future.

Tony, G0MBA

COASTAL COMMUNICATIONS

AMATEUR RADIO FOR
THE RADIO AMATEUR



19 Cambridge Road, Clacton-on-Sea, Essex CO15 3QJ Tel: 0255 474292





The Hustler Mobile HF Antenna System

Practical Wireless asked keen h.f. operator John Goodall G0SKR if he'd like the chance to try out the Hustler h.f. mobile antenna system from the USA. In reply, John immediately borrowed a Kenwood TS-50S and got on with the job!

It all started with a telephone call from the PW Editor asking me "Would you like to review the Hustler"? However, my first thoughts were "What on earth has Paul Newman and pool (The game not the place) got to do with Amateur Radio" Anyway I found to my pleasure the Hustler was not the film but a system of h.f. mobile antennas.

The Hustler HF Mobile System is a unique arrangement of masts and resonators, manufactured in the USA.

Four masts are available, two can be tilted to save removal and two are rigid types.

The two rigid Hustler masts are white rubber coated, one being 1370mm long and the other 560mm long. The 560mm mast is supplied complete with three extra tips of 660mm in length.

The two other tilting versions are not coated,

both being 1370mm in length. One version can be tilted at 380mm, and the other at 560mm.

The resonators available for the Hustler system include 3.5, 7, 10, 14, 21 and 28MHz. With the exception of the 10MHz (the 30m WARC band) resonator, all are available in two sizes, 400W and 1.5kW. The 10MHz version is only available for 400W.

Review Package

The review package consisted of one rigid rubber coated 1370mm MO-3 mast. There was also one 1370mm non-covered MO-1 mast with tilt facility at 380 and one 560mm MO-4 rubber coated mast.

Resonators supplied for the review included the Standard version RM-15 21MHz 400W; Super versions RM-20S 14MHz 1.5kW and RM-40S 7MHz 1.5kW version. I would have liked to review the 3.5MHz 400W version but this was not supplied.

The 21MHz Standard Resonator RM-15 has a loading coil 110mm in length and 15mm diameter with its base threaded internally to allow fixing to the top of the mast.

Fixed to the coil is a hollow tube

160mm long, with a Conex type clutch grip for the rod tip of 320mm length. The protruding length of this tip is adjustable to facilitate moving the resonant frequency.

The 14MHz Super Resonator RM-20S has a loading coil 143mm in length and 60mm diameter. The tip holding tube is 160mm long with the rod tip being 473mm long. The base is threaded.

The 7MHz Super Resonator RM-40S has a coil of 170mm in length and 60mm diameter. The tip holding tube is 240mm in length and rod tip of 825mm long. The tips for the Super Resonators are terminated in a 19mm diameter spherical tip for high power use. The base is threaded.

The Resonators

The Resonators all fix to the top of any of the masts. Several mount types including: mirror, tow ball, gutter, hatch back and magnetic were supplied.

All the mounts except the magnetic, which was not tested, proved adequate when on the move, even with the heavier Super resonators. The instructions supplied with each component was a single A4 sheet, which was concise but informative.

Perhaps I'd better mention at this point that the review on the Hustler system would have been greatly improved had the bands been in better shape. Even the weather also had its best attempts at preventing the review.

Being disabled, it's impossible for me to dodge the raindrops - Hi! Two attempts had to be called off as both myself and the car became waterlogged.

Why was the car waterlogged? You may well ask but all will be revealed later.

But summer is forecast for a Friday this year, although they didn't specify which Friday. Well, Friday arrived with a strange orange sphere in the sky, so it was now time to play Radio!

With the car suitably loaded with all things that may prove useful: Hustler antenna system, cables, screwdrivers, microphone; pencils; Allen keys. I also took spanners, my Kenwood SW200 s.w.r. and power meter, portable barbeque; kitchen sink and not forgetting

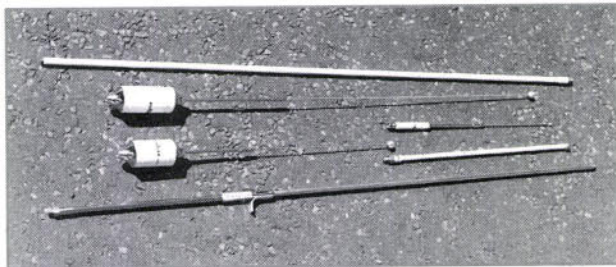
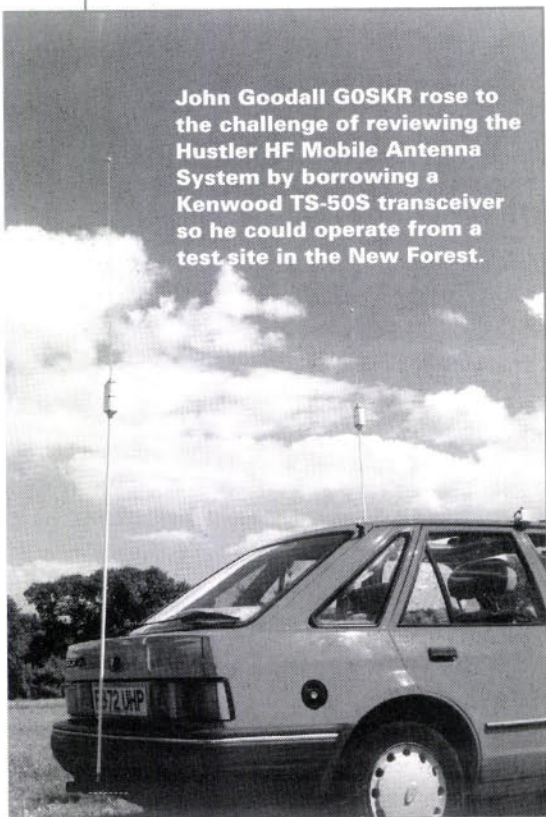
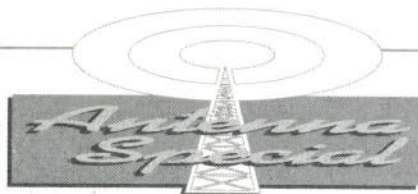


Fig. 1: The Hustler HF Mobile Antenna System components laid out prior to testing. (Individual items reviewed in text).

John Goodall G0SKR rose to the challenge of reviewing the Hustler HF Mobile Antenna System by borrowing a Kenwood TS-50S transceiver so he could operate from a test site in the New Forest.





the rig - Off I drove to a suitable spot in the next door county of Hampshire from my home in Bournemouth.

Kenwood TS-50

For the duration of the review I was loaned a Kenwood TS-50 by John Bashford G0TZW. I must give my special thanks at this point to him for his overwhelming generosity.

I told John that the review would take 12 months to complete! But I also had my trusty Kenwood TH-78E should my battery change its shape and go flat during the review.

A suitable spot for the occasion turned out to be a remote picnic area in the New Forest, not too far from Brockenhurst. Once parked I then performed a series of acrobatic moves on my elbow crutches, moves suitable I think for an Olympic Gold athlete!

Even the ponies were laughing! All the mounts were previously attached to the car so it was simply a matter of fixing the mast and resonator to the mount in use.

Gutter Mount

The first mount to be used was the gutter mount. I started with the RM-20S and with reaching through the open sun roof (Hence the waterlogged car when it rained) I was able to attach the mast and resonator, to the mount. Retrieving, adjusting tip and replacing the mast and resonator I soon had down to perfection.

Before long, I had the RM-20S resonant on 14.160MHz, with the s.w.r. reading just above 1.1:1. This was with 360mm of tip protruding from the adjuster.

At 14.058MHz, the FISTS frequency, I found the s.w.r. was acceptable at 1.6:1. The dial reached 14.300MHz before the s.w.r. reached on 2:1. This proved an even greater bandwidth than that published by the manufacturers.

I worked RA3REM and RK3VWF, both with reports at 5 and 6; YU70GW and 9A1CAH 5 at 9, all on 50W.



Fig. 2: Resonators used in the Hustler mobile antenna system (see text).

Repeated Antics

I removed the RM-20S and replaced it with the RM-40S, and repeated my antics necessary to tune the tip. These antics proved too much for a couple watching from a nearby parked car.

The couple offered me 'First Aid' in the form of hot tea and biscuits! Once I had explained my mission and thanked them for the refreshments they retreated to their car knowing that I was not really insane - just crackers!

Now - where was I - Oh yes - the RM-40S would not tune within the band unless I cut off a hefty chunk of the tip. Not wishing to upset the importers Coastal Communications, I improvised by using one I had made earlier!

With 535mm of the tip protruding I had the resonant frequency at 7.060MHz with an s.w.r. of 1.2:1. The whole of the 7MHz band was now within the bandwidth without further adjustment, with the s.w.r. being no higher than 1.6:1

Contacts Made

Contacts were then made with Chris G0DFN who gave me 5 and 8 with Eric G0DRG giving me 5 and 9 on 10W. My thanks to them for their time in assisting the review.

I also contacted GB2RSS, a RAFARS (Royal Air Force Amateur Radio Society) Special Event Station. Rick G0SJR was at the microphone and I got 5 and 9 again with 10W. When I worked them, Rick and the rest of the station were awaiting the arrival of HRH

The Prince Philip, the Duke of Edinburgh!

The RM-15 was tried both on the 1370 and 560mm masts and loaded extremely easily with a resonant frequency of 21.180MHz and s.w.r. of 1.1:1. Bandwidth from 21.030 - 21.300MHz with an s.w.r. of below 1.8:1. Sadly this band was in a poor condition.

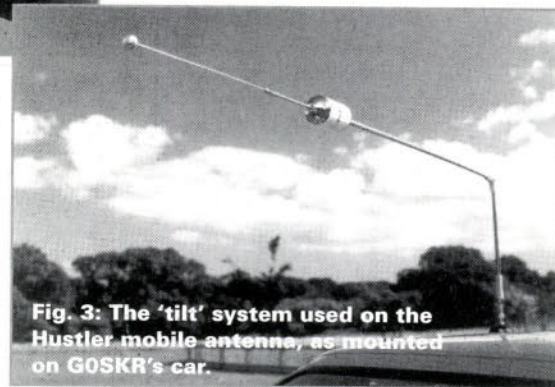


Fig. 3: The 'tilt' system used on the Hustler mobile antenna, as mounted on G0SKR's car.

Summing Up

In summing up, I should mention that throughout the review I used the TS-50 without its matching a.t.u. After the initial hiccups with the tip of the RM-40S, and once the tips had been tuned and locked in place, it was a simple process to change resonators and bands.

I found that using the Hustler HF Mobile Antenna System was indeed a pleasure. I think that the cost of the 'Standard Resonators', which I feel are adequate for this country, is quite reasonable for the excellent quality of the equipment.

However, I feel that the 1.5kW Super Resonators are somewhat over-the-top for mobile operation in this country. PW

My thanks go to Coastal Communications, 19 Cambridge Road, Clacton-on-Sea, Essex CO15 3QJ. Tel: (0255) 474292 for the loan of the excellent review package.

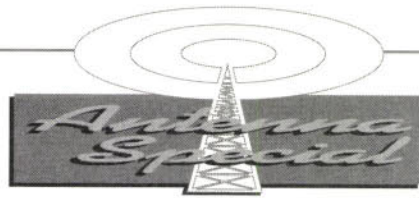
After seeing a copy of the G0SKR review Andy Durrant from Coastal Communications sent us the following comments.

The MO1, MO2 and MO3 masts are 54in long and work ideal as a quarter wave vertical on 50MHz, you do not have to remove the band resonator from the top of the MO mast when working 50MHz. The MO4 mast can be doubled up and co-phased with two matching resonators (e.g. 2 x RM10S). By attaching the feed line braid to one mast and the centre lead to the other. You can use two VP-1 (7.95) adaptors to form a tri-band dipole with the appropriate resonators, ideal for apartments, condominium or field day use.

Andy Durrant

A list of the equipment that made up the review package, together with prices, are as follows:

MO1 foldover mobile mast	£27.95
MO3 mobile mast	£22.95
MO4 mobile mast	£19.95
RM15 21MHz standard M resonator	£16.95
RM20S 14MHz mobile resonator	£29.95
RM40S 7MHz mobile resonator	£34.95
Skiptech mobile gutter mount kit	£12.95
Kestrel mobile mirror mount kit	£9.95
M-MP boot/tailgate mobile mount kit	£19.95
Sirio SO239 to 3/8 adaptor	£5.95
Sirio MAG160 mobile mag mount	£19.95



Antenna Ideas For The Novice

Dick Pascoe G0BPS has some ideas to help the 'novice' antenna constructor. He's aiming to be purely practical and to leave the theory to the textbooks.

Confusion about antennas often starts before you even look at the equipment itself. Pick up any book on amateur radio theory, read it and there's instant confusion, should it be aerials or antenna?

Editorial note: No confusion in PW Dick, our editorial style uses antenna or antennas except in the 'Valve & Vintage' section. **G3XFD.**

Most people in the amateur world tend to use aerial, because an antenna is the type of thing that a snail has on its head. But yet again, most 'technical types' prefer to use antenna!

However, you cannot win. Suffice it to say, that whatever you use, we're still referring to that piece of equipment which is used to capture or send out our radio signals.

Differing Terms

Not only are we assailed by differing terms for the antenna. There's also the profusion of types of antennas and the various names by which they are known.

To see what I mean, just try to sort out which antenna is best for you from this lot: ground plane, vertical, collinear, cubical-quad, Yagi, 'quagi', beam, Zepp, Windom, dipole, doublet, loop, Marconi, etc. And I mustn't forget those antennas with their inventors' names attached such as the G5RV and the HB9CV.

For all our practical purposes antennas can be divided into two very distinct types. There are those you can make at home and those you cannot! This may seem a very simplistic method but for the beginner, with very little cash available perhaps, it is the fairest way to start.

The Long Wire

Let's take a look at the simplest of all antennas, the 'long wire'. It has earned the name simply because it should be more than one wavelength long at the working frequency.

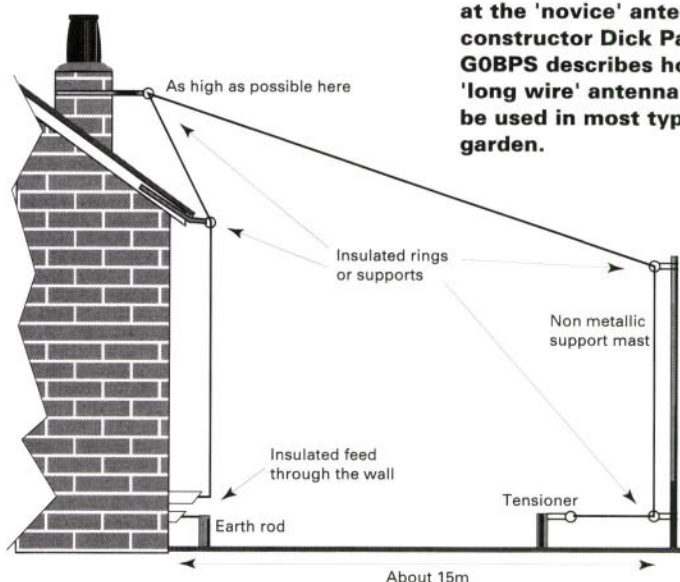
The long wire antenna can be placed over the ridge of the house. Or it can be fed from the gutter to a nearby tree or pole, or as in my case to a nearby telegraph pole (or two).

As long as the length is greater than the one wavelength, the long wire **will** work on h.f., provided that some form of antenna matching system is used (an a.t.u.). Beware though, the far end may be 'hot' with r.f.

With the long wire, it's also essential that a good r.f. earth is available. This may be a copper stake in the ground or a system of tuned wires called a counterpoise.

Continued Over

Fig. 1: In his article aimed at the 'novice' antenna constructor Dick Pascoe G0BPS describes how a 'long wire' antenna can be used in most types of garden.





The Counterpoise

The counterpoise is made from lengths of wire cut to exactly quarter wavelengths on the bands in use. They should then run from the earth point on your a.t.u. or your rig, either around your shack, out into the garden or even under the floorboards.

One easy way of making a counterpoise is to take a length of household mains electrical wire (three cores or more) and cut each length (core) to a particular band. **Do not** be tempted

means that whatever means of getting the signal to the aerial was employed, this is where the connection would be made.

The diagram, **Fig. 2**, refers to a simple dipole (when the measurements are correct) or doublet antenna (no measurements given). The feeder can be 300 or a 600Ω ribbon feeder, coaxial cable of 50 or 75Ω or any type the constructor may prefer. At present it's not important, (heresy, I hear them cry!)

Holiday Problem,

I was on holiday in Malta recently and only had a reel of wire for an antenna....it seemed I had a problem! The apartment was in the centre of a block, a service shaft ran from the bathroom to the roof 12m above. The roof edge was just 8m or so from the service shaft.

If I had run a long wire from the rig to the edge of the roof we would have had 25m running vertically inside

the building and only 8m or so horizontally out in the open.

It wasn't a very good prospect and almost guaranteed to cause TVI. But what else could I do with only wire?

However, all is not lost! If we go back to our 300Ω ribbon feeder you'll see that it's two wires separated by a film of plastics.

What if we now divided our length of wire into two and twisted them together for 12m? They would be separated by plastic and we would have a simple form of balanced feeder.

Tie a knot at the 12m point and separate the two ends to make your doublet antenna. My version was a very simple antenna using only wire. The 'feed' length was 12m which hardly radiated at all and the 'flat top' was only 16m or so across!

The type of antenna I've just described (see **Fig. 3**) will cost only pence to make. It could also be bent to fit into almost any garden.

Oh yes, did it work? Well, the pile up from JAs, Ws VK, etc., plus all the rare

DX worked (V85, TU, FR, etc.) proved that it did! This antenna won't compete with a beam...but how about the cash difference?

Just think, I've looked at two very simple antennas so far that cost pence only to make. **And** I have not touched an ounce of theory at all. The best way to find out about antennas is to get out there and make some!

More Ideas

I have more ideas and another easy antenna to make is the Windom, which has advantages over doublets and dipoles. See *PW*, April 1990 for details on this antenna.

Another lesser known single band antenna that can be made for a few pence is the Bobtail Curtain. This is a very simple antenna that has a lot of gain. A 21MHz version is very small and can hide in most gardens (see **Fig. 4**.)

If you want to try and work some real DX the loop antenna can come into its own. A brief chat with a VK one day gave me a 53 on the Windom, the loop antenna was switched in to reap a: "Wow, what did you do? Your 5 and 9 is plus 20db now!"

A loop antenna is also very easy to make and is exactly as the name suggests - a loop of wire. However, my loop for

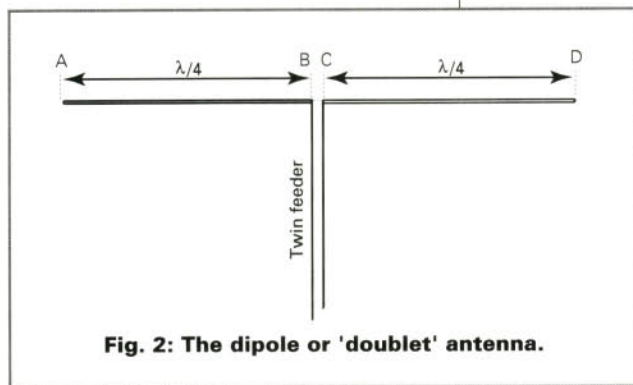


Fig. 2: The dipole or 'doublet' antenna.

to use this household wire for antennas, in use it stretches too much.

The diagram, **Fig. 1**, shows how the long wire antenna may be fitted to a small garden. And, you'll see from the diagram that it bends somewhat!

However, all the books and the pundits tell us that for best operation the long wire should be in a straight line and horizontal for best results! But what most books don't tell you is that they will still work if they're bent (more on this later).

Forms Of Feeder

Many reams of paper have been used to describe the various forms of feeder that should be used, from Helix coaxial cable to wire. What most written pieces fail to describe is how well these various feeders work against others, especially when cost is also taken into account.

I've already referred to the doublet and the dipole. The dipole is usually two lengths of wire cut to be a quarter wave long on the band required. Thus the whole length of the antenna is a half wave long, giving the name 'half wave dipole'.

The doublet however is usually two lengths of wire, of perhaps unknown, but equal length. Both the dipole and doublet would be fed at the middle joint. This

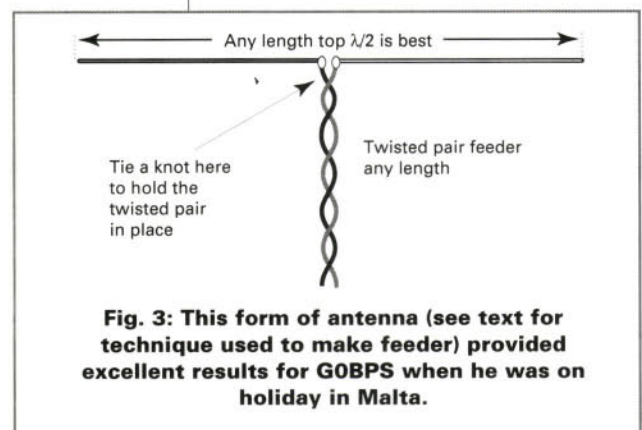


Fig. 3: This form of antenna (see text for technique used to make feeder) provided excellent results for G0BPS when he was on holiday in Malta.

7MHz is actually a triangle!

One corner of my 7MHz loop is on a mast in the garden with the other two at the eaves of the house. This loop is horizontal and is useless for local (European) QSOs but great for DX.

A similar 3.5MHz version of the loop antenna has been squeezed in the garden, this time in the vertical plane. This one is great for more local working, but still good for further afield.

I can hear the shouts now! "An



3.5MHz loop of wire in the garden? Impossible"! So, I suggest you load it, try a 7MHz version first. Don't say: "It won't fit". Try it out and find a way so that it will fit.

The great benefit of course is that these loops are also usable on harmonically related bands. For example, my 3.5MHz loop is great on 14MHz.

Multi-band Antennas

For those who want to spend a little more time at it, a very nice multi-band antenna can be made using the same wire. Again it will only cost a few pence (see Fig. 5).

To make this antenna, a series of quarter wave lengths are cut, two for each band. We then take one of each length and join the ends together as in the diagram.

String may be used to hold the ends in place and the joined ends connected to the feeder. There is no real limitation to the number of bands that may be fed in this way. It all depends on the strength of the wire!

For those who have larger gardens and like to play there is always the rhombic! We know they are huge, but with everything to scale, a 14MHz rhombic antenna **can** fit into a 16m (or thereabouts) garden. I've done it!

Just think positive! My rhombic was omnidirectional of course but it did work.

Antenna Tuning

Finally, having made your wire antenna, be it a loop, a dipole or just a simple end fed, how do you go about tuning it for the band required? To start, let's look at the loop antenna first.

Two people and a pair of hand-holds make life very easy. One in the shack where the v.s.w.r. meter is located, and one in the open with wire cutters and loads of patience.

Measure the loop, ensuring that a

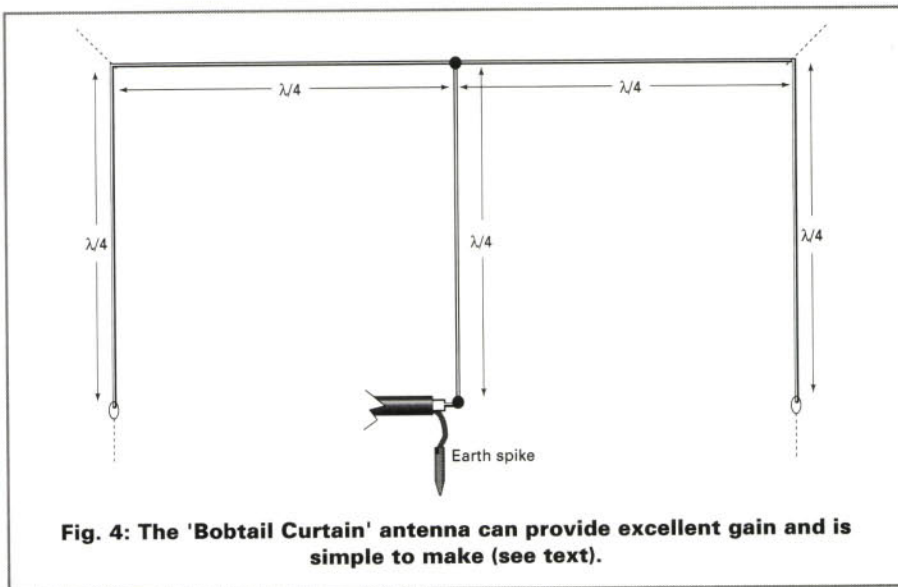


Fig. 4: The 'Bobtail Curtain' antenna can provide excellent gain and is simple to make (see text).

small amount in excess is in place. As there is too much wire, it will resonate on a lower frequency than required, if we trim the length gradually (500mm or less at a time) the v.s.w.r. will slowly come down.

Don't be surprised if you cut off a lot more than you think you need. Take it very slowly as you approach resonance.

No Real Difference

There is no real difference when trimming antennas with two 'legs'. You have to remember though that whatever you take off one side, you must also take off the other.

Multi-band antennas are slightly more difficult to tune. This is because as you change the resonant frequency of one part the other may change slightly.

Height and surrounding materials such as trees may also cause changes in resonance. Cut the shortest wire to resonance first and then down to the longest. In other words, if you're making a tri-band version for 3.5, 7 and 14MHz, cut the 14MHz length first.

Don't worry if the v.s.w.r. doesn't come down to 1:1, 1:1.5 is still acceptable, so is 1:2. So what? It's a trifle high, but it will still radiate!

Without Theory

Well, there it is! An article on antennas for the 'novice', without an ounce of theory.

Each of the antennas here have been in use at my home at some time or other except for the twisted wire version. I used it in Malta and Liechtenstein and also to great advantage at a JOTA station later the same year when someone forgot the coaxial cable!

In summing up, I don't profess to be an expert on antennas, I'm just a gatherer of knowledge!

I thank all those authors who have provided books on the subject of antennas. And I also recommend anyone interested in antennas in all their forms, shapes and sizes to get the biggest library of books that they can. It's a fascinating subject.

PW

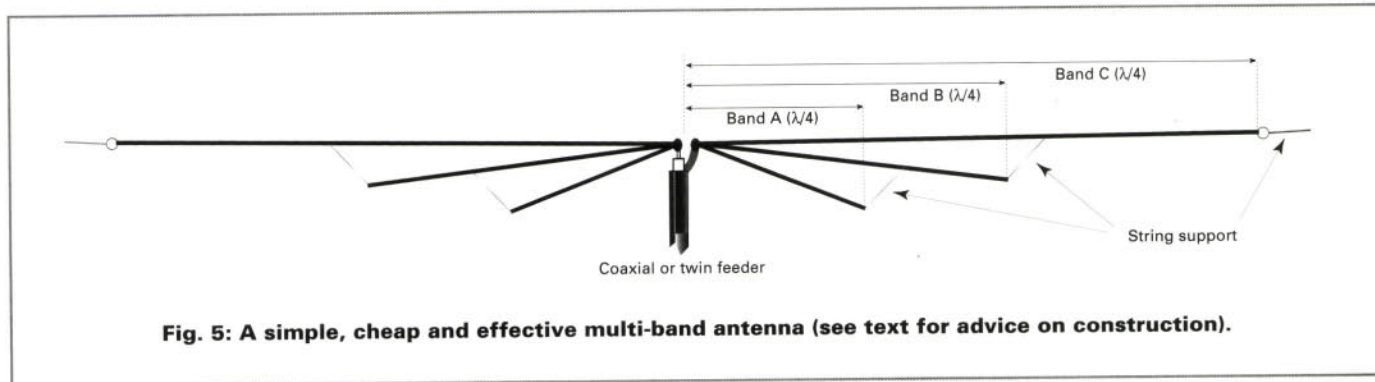


Fig. 5: A simple, cheap and effective multi-band antenna (see text for advice on construction).

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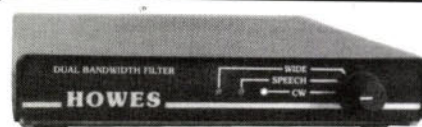
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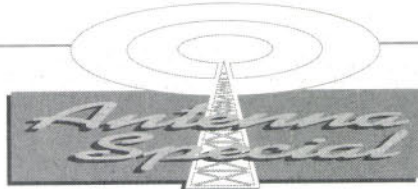
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73 from Dave G4KQH, Technical Manager.



Antenna Wise Buys

Tex Swann isn't tight, he's just a wise-buyer. Here G1TEX shows you some unusual bits that were almost missed because they were different.

In this 'Wise Buys' article I've looked at two previous issues of *PW* with an antenna related theme. In those magazines you'll find pages (pages 37/38 in Sept '92 and pages 34-36 in Aug '93) providing lists of suppliers of equipment involved with the antenna and feeder side of getting your signals out into the world of

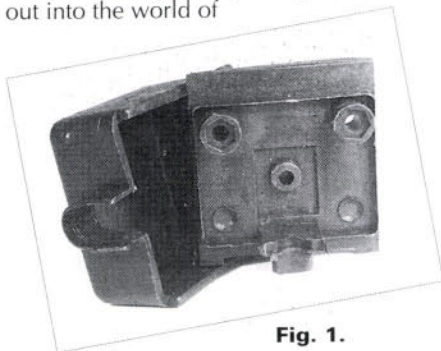


Fig. 1.

amateur radio. The September '92 and the August '93 issues are worth getting hold of, or reprints if you don't already have them, as space will not allow me to give them again.

I decided to approach Wise Buy suggestions from my personal viewpoint, which is adaptation and improvisation. I hope to give you an idea of what may be used to increase the ease of assembly of an antenna system.

On this page I'll mention a few of the items that I have picked up very cheaply at rallies or car boot sales. To start off, take a look at the junction box, **Fig. 1**, that I found at a rally. It was originally with a badly corroded antenna system found in the 50p 'Bargain' box at one small stand. But cleaned up it makes a very good junction box once again.

The clamp shown in **Fig. 2** was originally on a junk-box type of stall. I must assume that it was part of a clamp to attach a square section boom to a 25-37mm diameter vertical pole. I'll end up paying more for a new U-bolt than I did for that piece!

While on the subject of U-bolts. They are about the only things I do try to get,

either new or as clean as possible. When the mild steel, of which most bolts seem to be made, is exposed to the elements, it soon becomes corroded.

Rusting And Corrosion

The rusting and corrosion problem seems to apply to some clamps that are to be found, so do look closely at them first. It's all very well getting them cheaply, but they must also be sound, otherwise your hard earned money is just thrown away.

The clamp shown in **Fig. 3**, is however, made of aluminium and doesn't rust (though it can corrode in salty atmospheres). It's an interesting item, made of two interlocking parts and when correctly adjusted will grip, or release, two poles at the same time.

The nut and bolt on the right hand side of the clamp grips a 25mm pole. At the same time it will pull back slightly on the lower nut of the main U-bolt, clamping the larger of the poles in the left hand side.

Turning now to clamps for antenna elements. At v.h.f. and u.h.f. frequencies distances are critical. The angles that elements have to the boom also need to be accurate.

Whenever possible I use square section boom, as it's normally easier to get an element square. I'm no longer sure where I got the specimen shown in **Fig. 4**, but it's ideal for the job.

The clamp is made for 19mm square section, and will grip and hold tight an element up to 12mm diameter. A series of these and I'll be able to make a Yagi antenna that may be quickly put together for portable use, but that remains predictable in gain and directivity.

Small Antenna

I made a useful small v.h.f. antenna from bits and pieces found at several rallies. The 144MHz antenna shown in **Fig. 5** was made up from scrap bits of old antennas. The base, top and bottom sections came from an old CB antenna, and the loading coil in the centre was in a box of bits I got from an old friend (junk swapping).

The screws on the upturned sections were to mount earth plane legs if they were needed (they weren't most of the time).

The bandwidth was miserably narrow but it did work on a packet radio system where narrow bandwidth is not normally a problem. It saved using the main station antenna for packet operation.

What I'm trying to say in this short article is, use a little imagination when you look at those items jumbled together in the box under the tables at rallies. You never know what fun you can have for very little money.

Isn't the essence of mucking about with antennas, the fact that you can have a little fun without it costing a great deal? And who knows, you may just improve your station at the same time. What have you got to lose?

G1TEX

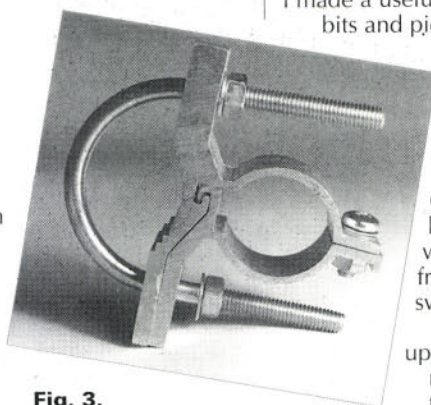


Fig. 3.

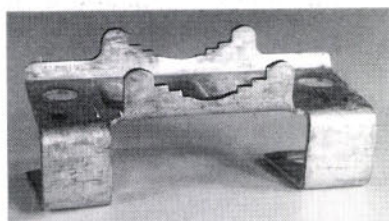


Fig. 2.

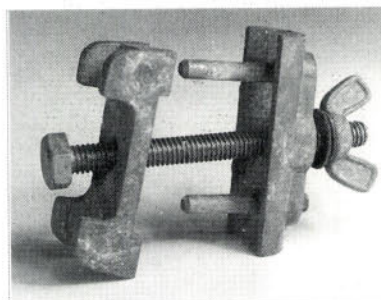


Fig. 4.

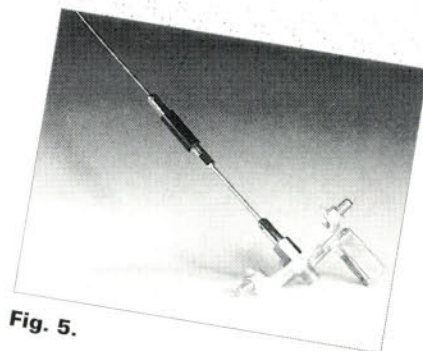
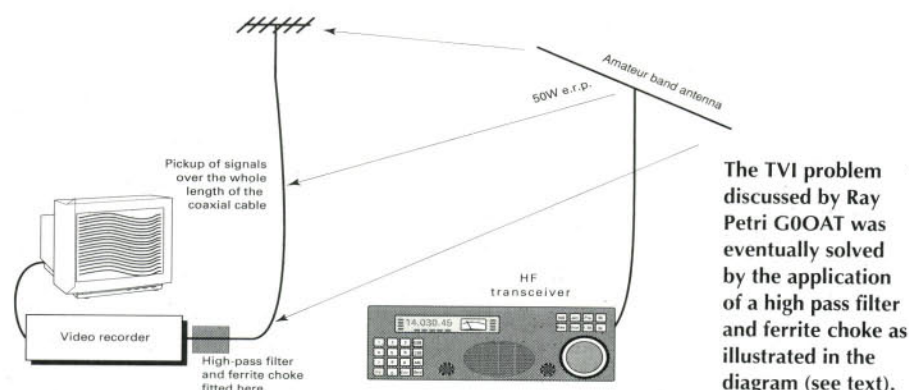


Fig. 5.



A Case Of TVI

Ray Petri G0OAT tells the story of a case of TVI which (for once) was very close to home - his own home!



It was an early October evening, about 7pm to be more precise. The sun had sunk slowly in the west some time ago and its penetrating rays no longer illuminated the D Layer or, for that matter, the E Layer. The F1 layer was beginning to combine with the F2 and the m.u.f.s were dropping.

I stood back and admired my four band horizontal trapped dipole in the available light. It's a perfect antenna I thought to myself as I watched it swinging lazily in the evening breeze.

My new antenna had taken me the best part of two weeks to manufacture. And this textbook example of excellence was now ready for on-air tests.

Switched On

I entered the shack and switched on the h.f. transceiver. I then connected the s.w.r. meter to the new antenna and listened across the bands.

The noise levels were generally increasing across the lower frequency end of the h.f. band due to TV timebases. The noise from their switched mode power supplies could also be heard.

I checked the v.s.w.r. meter of the new antenna. I was ably assisted by Shaun G0NMX as we checked on all of the four bands for which it had been designed. But now for the real test!

The First C2

I'd only just called my first "CQ DX CQ DX CQ DX" when the doorbell rang, ominously and menacingly. Even the dog sensed trouble!

Every amateur comes to dread hearing the doorbell ring! My heart rate and adrenaline flow increased and I braced myself for the onslaught. Anyway, I

composed myself and answered the door.

It was my hitherto friendly neighbour. "Hello Jack!" said I, falsely, trying to show my pleasure at his visit. But hardly had I got the greeting out when he blustered - "I'm getting interference on my television, and it's happened since you put that thing up in the garden!"

I tried to mask my annoyance at his seemingly aggressive attitude. I couldn't really understand the aggression, because both he and his wife had always been friendly.

I replied "Perhaps it's an EMC problem. I'm sure we can overcome it".

"Yes, you can" my neighbour replied, folding his arms in an attitude of indignant defiance. "Stop transmitting, everything's been okay until you put that aerial up!"

This, I thought I to myself, is all I need. Especially as I have spent many years investigating TV and radio interference problems for other people, and spoken to many clubs on the subject and written articles about it. I was at the sharp end and very much on my own.

Tact And Diplomacy

Tact and diplomacy had to be the order of the day. I was faced with one of those typical training school scenarios! However, I realised of course I've got to live here. So I didn't quote the party line and tell him to get his installation checked and to complain to the DTI's Radio Investigation Service (well, not at that stage anyway).

"Perhaps" I enquired apprehensively "you would like to try a filter in your aerial lead?"

"No, I'll not try a filter! Why should I" he said, folding his arms even tighter.

"It'll impair my picture"! He paused for thought - "anyway, my television's been okay for the last four years until you started transmitting"!

"Yes, that may be so, but are all your TVs affected"? I enquired.

"No, only the one on the outside aerial, the two sets working on indoor aerials are okay. So, it must be you causing it"! he blustered in reply.

"No" I answered. "It suggests to me that your affected TV has an EMC problem and is susceptible to nearby transmissions".

I went on to try and explain that all transmissions have their own slot in the r.f. spectrum, etc., and that if other receivers weren't affected he must have a problem. But he didn't want to be convinced.

"Could you let me see the problem for myself"? I asked. "Then I'll know how to treat it".

Reluctantly he agreed. I grabbed a couple of filters and the v.h.f. hand-held, left Shaun behind to operate and followed my neighbour to his sitting room.

Practical Exercise

The situation was by now rapidly turning into a practical exercise. It was ideal for Part 1 of the RAE, under the syllabus heading EMC.

I observed a good clear picture on the TV. This was just as I would have expected, because we live in an area of reasonably high signal strength.

I then called to Shaun on the 144MHz hand-held and requested him to key through the h.f. bands, full power and on 1.8, through to 28MHz. I stood back and waited, with the tension mounting.

The picture leapt up and down on the screen. It split up into big black and white chunks that seemed to roll from right to left and a crashing noise emanated from the speaker.

I hid my horror stricken look. I could now understand the reason for my neighbours unreasoning attitude in the matter. It was as if he'd been advised by a bunch of mates in the pub, rather than someone who understood the problem.

"Oh dear! There does seem to be a small problem, doesn't there"? I said, expressing casual concern. I knew that I would be judged the villain even when I'd demonstrated beyond all shadow of doubt, that the TV lacked immunity.

"Yes" retorted my neighbour, with just a discernible, but none the less predictable hint of sarcasm. "There is a problem... I can't watch my picture"!

"Okay then", I continued, determined to keep control of the situation, "would you care to fit this filter into your feeder cable, as close to the installation as possible?"

I handed him the coaxial choke first. This was partly because it was cheaper



than the high pass filter and easy to construct without the aid of test instruments and partly because I thought most of the offending signals would be entering via the feeder screen.

Video Recorder

It was at this point I noticed my neighbour's video recorder. "Ah! that's the problem I thought", the front end of that is being 'zapped'.

It's a well known fact that video recorder front ends are very prone to blocking. They're also known for generating intermodulation products in the presence of strong transmissions, due to their wide bandwidth and high gain.

The coaxial choke was then fitted close to the input of the video recorder. Next, I called Shaun on 144MHz to ask him to make a test transmission on h.f.

The screen once more went mad, with the picture breaking up and flashing across the screen. I was utterly dismayed, and at the same instant out the corner of my eye detected a sly suppressed smile from my neighbour.

Before he could comment further I offered him the high pass filter and asked him to fit it in front of the coaxial choke. I called for a series of test transmissions and with bated breath waited for Shaun's voice to come back from the other end.

"On ten metres metres; keying; s.s.b.; f.m." came Shaun's voice. The screen didn't give one flicker!

"On 15 metres; keying; s.s.b.; f.m." Now on 20 metres; keying; s.s.b.; f.m." said Shaun as he systematically transmitted through the bands. I breathed a sigh of relief (hopefully inaudible!) as no disturbance to the picture whatsoever was observed.

Job Done

"There you are," I said as I turned to him..." job done, are you happy?"

"What about my other channels?" he enquired. He was obviously not wishing to concede to the fact that he couldn't really see anything wrong.

We duly tested through all the channels and all permutations of channels. The TV was now nearly 'bulletproof' and 'bombproof' as well. I'd provided the immunity that the manufacturer should have thought about providing in the design stages, and at my expense just to keep the peace.

"Will you accept the filters with my compliments?" I asked.

"I don't know" he replied... "what about the other neighbours, are you going to give them all filters?"

I grimly held onto my patience. "It's not my intention to spoil anyone's viewing" I replied. "I'll consider each case on its merits if it's reported to me, but I'll not be interested in complaints of washing machines and toasters that haven't worked since I put up my aerial".

Not A Victory

Although I had been correct in my approach and procedure and won-over the situation, it was not really a victory. There are no points to be scored when it comes to dealing with EMC problems.

Did I go wrong in my approach? It must be remembered that every EMC situation is different. They're played out second by second and with a different cast of actors, or clowns, as the case may be.

I don't think I went wrong. I took care to avoid the use of the word interference as much as possible and substitute the expression EMC wherever it seemed appropriate.

I avoided feeding my neighbour phrases such as 'harmonic radiation' and 'strong interfering signals'. If I had, he may have been able to turn phrases like that against me later.

I should also mention that I did not lay hand on the sacrosanct television set myself. I let him do what was deemed necessary.

There was only one thing (in retrospect) I could have done differently in this particular case (I don't think it's advisable in all cases). It would have been to advise my neighbour that I would be carrying out some test transmissions and ask him to let me know if he had any resulting problems with his TV picture.

The reason that I didn't advise him was that I didn't really think he'd be affected. I should have known better!

PW

Fig. 4: Graph illustrating the attenuation effect of a high pass filter (see text).

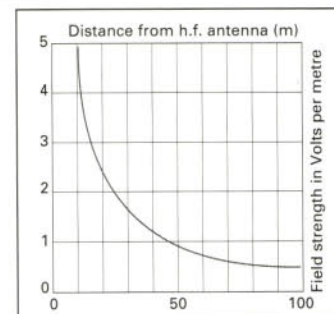


Fig. 1: Graph with a curve illustrating varying field strength in volts per metre from an h.f. antenna at known distance (see text).

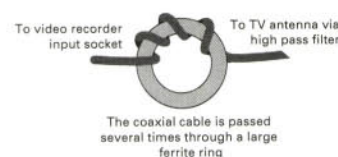


Fig. 2: A ferrite ring filter (see text).

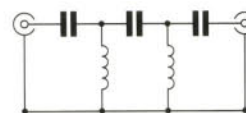
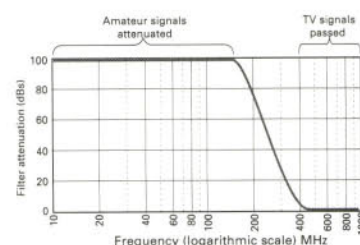


Fig. 3: High pass filter circuit (see text).



Technical Facts

Now, let's have a few of the technical facts. The field strength at my neighbour's installation, due to the signal radiated from my antenna, (his antenna was incidentally in the direction of my maximum radiation, ie, it was broadside on) can only be calculated approximately by using the formula:-

$$E \text{ (V/m)} = \frac{\sqrt{E.R.P.}}{d}$$

d = distance in metres, in this case about 25m.
e.r.p. = effective radiated power, 50W.

Therefore, by using the above formula we can see that the field strength of the electromagnetic wave in the vicinity of the television is approximately 2volts/metre.

The graph, **Fig. 1**, provides a curve and table relating to field strength to distance. This curve is for 50W e.r.p. only. Levels of field strength for given immunity will probably be mandatory eventually. It is likely that the level for immunity will be set at somewhere between 1.5 and 3V for domestic TV receivers. So be prepared.

The purpose of the coaxial choke, **Fig. 2**, (sometimes referred to as a 'braid breaker') is to provide high impedance to r.f. currents flowing on the outside of the braid or screen of the TV feeder cable, thereby stopping them entering and causing trouble inside the receiver. A simple solution is to pass about five to seven turns of the TV feeder through two ferrite rings as close to the TV as possible.

The 'high pass filter', **Fig. 3**, passes with very little attenuation all frequencies above its turnover point and attenuates all frequencies below the turnover point. In this case the turnover point is about 500MHz as can be seen from the filter frequency/attenuation characteristic in **Fig. 4**.

BEFORE YOU ARRIVE AT THE RIGHT DECISION, YOU HAVE TO CONTACT THE RIGHT SHOP

Although the summer sale has finished, I'm still offering very competitive prices across the range. I won't sell to you at a loss as the back up service is worth more to you (and me), in the long term. All prices quoted are **RECOMMENDED MAXIMUM RETAIL**. That's the starting point. If you want to haggle, call 081-566 1120 then the Lynch Mob will talk turkey. I've used that term before, haven't I?

Super low finance is available on all products, new or used. If you spot the item required, give the Sales Desk a ring for an instant quotation.

Yaesu FT990

More and more customers are realising the high quality offered by Yaesu and the "Nineties" series of H.F. communications transceivers. The FT990 is probably the most "commercial grade" transceiver available to the Amateur. For example, no other has plug in boards interfacing to a mother board, giving you low servicing times in the unlikely event of a break down. No other has digital filters fitted as standard, giving you razor sharp selectivity. No other has a front panel layout that allows the operator to take full advantage of all the features available - without referring to the handbook every time. The list goes on. Visitors to the store always comment on how solid the FT990 feels to the hand. The performance has been underlined by Peter Hart and Rob Manion. Test drive one today!

The FT990 is available with built in PSU or as a DC version. Maximum retail price of £1899 (DC) or £2199 (AC).

Yaesu FT736R

Still the only Base Station that can take all four VHF/UHF bands at once, the FT736 for 6/2/70 & 23CM is out on its own. No other offers you a built in PSU. No other offers satellite operation at the press of a button and is so convenient for packet operation. It's SSB facility allows true DX when the local FM chat becomes a bore. A Turbo front end, courtesy of messers muTek has been available for almost two years enhancing the receiver performance even more on 2 & 70. **The FT736 retails at a maximum price of £1699, with 2 & 70 fitted.**

Yaesu FT747GX

Now in its final stages of production, the FT747GX allowed thousands of operators to get on the H.F. bands for the cost of a dual bander mobile rig! Its simple in operation and Yaesu's brief was to give the user 100 watts on all Amateur Bands, include a General Coverage Receiver and the option of all modes. The biggest crunch was the price. I've managed to secure the very last production from Yaesu Japan and I'm offering them to you at cost. Last chance - there are no more! **Maximum retail price £849. Last few at only £649 and a microphone thrown in.**

Yaesu FT840

With the FT747 now finished, the FT840 takes over. The reports from the "big boys" on H.F. constantly remind me how good the FT840 is. [see our newsletter, FT840 - First Impressions by Henry Lewis G3GJQ]. I'm so confident that you'll agree, the FT840 really has performance to match the big rigs, I'm offering a TEN DAY money back guarantee. Buy an FT840 during August and if you don't like it, return it direct as in new condition and I'll refund your money in full, (less original shipping costs). How's that for money where my mouth is! **Maximum retail price of the FT840 is only £875.00**

Yaesu FT530

Hands up all those who thought they had bought the right dual band handle, only to find their mates bought the correct one first - the FT530. The new FT530 from Yaesu is in our opinion the easiest to use, most feature packed, only one to offer CTCSS as standard, super-wide extended coverage Handle available. Like other Yaesu products, once you've read the manual, we doubt you'll need to read it again. **Maximum retail price is only £499.00**



Kenwood TS-50S

I've been using one mobile for nearly a year. For all those skeptics, it hasn't gone wrong, even running 100 watts output. I remember other manufacturers scoffing at the fact "I wonder how long it takes to burst into flames?" Well let me tell you, they don't. The TS-50S is the most reliable HF transceiver we probably sell. It only begs the question why are the other H.F. transceivers so large?

The TS-50S retails for a maximum of £999.

Icom IC-820H

This one's so new that we still get asked what is it? It's the latest Dual Band Multimode Base Station from Icom. 35/45 watts on two & seventy, it's the neatest package around for the VHF operator. Once again, the men at Icom have priced this very sensibly.

IC-820H from Icom. Maximum retail price of £1699.

Icom IC-736

It's funny that only a year ago you were all asking me when a manufacturer was going to bring out an HF rig with six, that offered 100 watts across the whole range. Icom's ears must of been wagging, presto! the new IC-736. It didn't stop there however. Whilst they were busy giving you a world first, somehow they've squeezed in a mains PSU and an auto tuner in the smallest space possible! Don't forget what Peter Hart said about its brother, the IC-737 (without 6m), "amongst the best receive performance of any rig I've tested". **The maximum retail price is only £1849, complete with PSU & auto ATU.**

NEW! AOR AR-8000

It's not often I advertise a scanner in PW or RADCOM, but this masterpiece from AOR is a true portable DC to Blue Light communications receiver! The same size as an average Handie, the AR-8000 covers 150KHZ to 1.8 GHZ, all mode including AM/SSB/CW/WBFM & NBFM, has proper 2KHZ ssb filters fitted and even sports an internal ferrite rod antenna for lower frequency reception! It works well enough for me to recommend it without hesitation. I only wish I could keep up with demand!

Maximum retail selling price £449.

MARKET DUMPING OF TH-78E CAUSES MASSIVE FLOODING AROUND WATFORD

Over ordering of this fantastic dual band handle, has forced me to sell off at a "never knowingly made a profit price", (to quote Mr T. Smith, G4ZZZ of Cornwall, as featured on BBC Points of View, May, '94), are available on a first come first served basis.

List £499

Lynch PRICE ONLY £399



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AA&A 'CAPCO LOOPS'

Whether you're using a FT747 or a top flight FT1000, if the space is limited, try the new range of CAPCO LOOPS for yourself.

Magnetic Loops

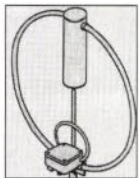
AMA-3 200W 13.9 - 30 Mhz	£249.95
AMA-4 100W 1.8 - 4.2Mhz	£399.50
AMA-5 150W 3.5 - 11Mhz	£299.95
AMA-6 150W 6.9 - 24Mhz	£279.95

(E20 Carriage on these items)

Antenna Tuning Units

SPC-300D Roller Coaster, 300W RMS, 1kW pep	£299.95
SPC-3000D Roller Coaster 1kW RMS, 3kW pep	£399.95
CFA. Variable frequency antenna	£99.95

And don't forget the high power range of baluns, all ratios.



DIGITAL FILTERS

The full range of Digital Filters including JPS, J-ComW9GR, TimeWave and others are now available. They all fit in line with your A.F. output and are fitted in seconds.

W9GR DSP Multimode filter	£299.00
TimeWave DSP-9 Noise filter	£169.00
TimeWave DSP-59 filter variations	£299.00
JPS NTR-1 Wide band noise & tone remover	£199.00
JPS NFR-7. As above with selectable centre frequency	£279.00
JPS NIR-10. As above with notch filter, removing multiple hets	£169.00

PACKET & DECODERS

Moving to a larger premises has also enabled us to show off our massive range of new & used datacomms equipment. Here is just some of the range stocked:

AEA PK-900	£549.95	Universal M400	£399.95
AEA PK-232MBX	£385.00	M900	£529.00
AEA PK-88	£169.95	M1200	£399.95
Tiny 2 TNC	£139.00	M8000	£1299.00
KAM	PHONE!!	Momentum MCL 1200	£229.00
KPC-3	£139.00	ERA Microreader	£189.00
MFJ 1278	£339.95		

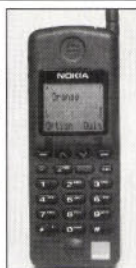
CUSHCRAFT ANTENNAS

R7 Vertical, 40-10M now in its mk2 state, it really is a winner	£369.00
R5 Vertical 20-10M, as above, no radials required with this one either!	£279.00
A4S 4 ele Beam, for those who take H.F. seriously	£428.00
A3S 3 ele Beam, almost as above!	£349.00
A3WS 18/24MHz 3 ele beam	£275.00
D3W 10/18/24 MHz rotary dipole	£179.00

DON'T FORGET, I'VE GOT A HUGE ARRAY OF ANTENNAS AVAILABLE.
COBWEBB, OUTBACKER, VARGADA, VALOR & SERENE to name but a few!



Since its introduction last month, I've sold this new form of communication to dozens of satisfied customers, including many Radio Amateurs. How about forming a radio amateur Orange directory? Just to remind you, "Orange" is the latest form of personal portable telephone for the individual. Unlike Cellular, it does not cost a fortune to run every month, (A cell phone bought for a bargain price of £50, can cost a staggering £350 to own per year and that's BEFORE you make any calls!), and the digital speech quality and features are amazing. If two of you bought an ORANGE Nokia or Motorola, it could cost you only ten pence per minute to talk, from one end of the country to another!



CALL NOW FOR A DEMONSTRATION

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Orange Nokia only £299 and the Orange Motorola at £249 are available now.

THREE YEAR WARRANTY AVAILABLE!!

In association with the distributors, I am pleased to announce a TWO YEAR WARRANTY on all YAESU, ICOM and KENWOOD equipment. In addition, a further 12 months cover is available for a small charge, giving you a total of THIRTY-SIX MONTHS COVER. How's that for confidence?



Additional Workshop Now Open!

Due to the increase of repairs from customers and the trade, (yes, we do work for other retailers), our new workshop has been sanctioned by the major manufacturers and is now fully operational from the London premises. The original Watford site will continue until that too is relocated at Ealing. This means turn-around is even quicker and repair charges are kept to a minimum. Have you asked that super discount radio shop how long you will have to wait for your rig, if it needs a repair?

To celebrate the opening of the area and making use of the increase in test gear, a FREE RIG CHECK is available to visitors to the store. You will be able to see for yourself the power output, sensitivity, spectrum purity and frequency accuracy of your own equipment. Call in and ask for Brian, G3THQ in Customer Service. He'll make sure you get a cup of coffee whilst you wait!

OPTO 3300 Frequency Counter

More than a 1MHz to 2.8GHz handheld counter, this size of a fag packet unit is ideal for "sniffing" out unlawful transmissions on your local repeater, or employed as a first rate piece of test equipment.

Only £169, including NiCads and Charger.

***** NEW MyDel MiniMag 270 NEW*****

After six months of trials, the new MiniMag 270 is offered as the real alternative for fixing a dual band antenna to your new vehicle, without drilling holes or using ugly trunk clip mounts. Under twenty inches high, the antenna offers dual band operation on 2 & 70, incorporates an extremely powerful magnetic base just over an inch in diameter and comes complete with 4M of miniature coax, terminated with a BNC plug. I've driven at high speeds and it won't fall off unless knocked hard!

Introductory offer of only £29.95 plus £3.00 p&p.
Also available at other retailers - just ask!

NEW ANTENNA ANALYSER MFJ 259

If you've never bought a piece of test gear in your life, then now's the time. This hand held device instantly allows you to view the resonance of any antenna upto 170MHz. Not only ideal for those of you who home brew but checking out that multiband vertical or HF beam, dipole and so on. An ideal birthday present - to yourself!

Only £249 free p&p!

Used Equipment Lists

Don't forget MARTIN LYNCH carries the widest range of good clean USED GUARANTEED Amateur Radio Equipment.

If you have a FAX machine, call us for an up to the minute computer generated print-out. Part exchange against any new or used stock item, a pleasure!

Summer Newsletter now available!

It's been a long time coming, but the Lynch newsletter has arrived. If you like reading my twaddle, (you've read this far!), then phone or write in today. Packed with new products I'm not even allowed to mention here, there's money saving offers and clearance items listed. News reviews and First Impression tests from Henry Lewis are all there. It's totally free so call today.

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Antenna Work

A Cheap 50MHz Vertical Antenna

Due to high winds and an obdurate neighbour, I changed my 28MHz vertical ($\lambda/2$) antenna to a remotely tuned 'magnetic loop' antenna. I also lashed out at the same time and brought a rotator to go with the new antenna. Then, as is the manner of these things, I found myself looking for a suitable vertical antenna for use on 50MHz.

Having just changed my h.f. antenna, I also found myself with a shortage of cash at this time. As need is often the 'mother of invention' I looked at the remains of the 28MHz vertical antenna. It was longer than a $3\lambda/4$ antenna for 50MHz, so it could be pressed into service again.

As the overall length was to be a little shorter, the wind loading shouldn't be such a problem (the neighbour was another problem not dealt with here). I set about stripping the antenna and checking it over to see what needed overhauling.

Construction

The first thing I had to do was to remove the loading coil in the base of the antenna and firmly fix, using four blind ('pop') rivets the bottom section back on again. I measured 1.22m along this section and cut it off square.

I then made four saw cuts of about 50mm vertically in the section. This was to become the tuning joint, and would be fastened with a 'Jubilee' fastener.

Using the drawing, **Fig. 1**, mark and fix the various sections together by riveting the joint with blind rivets. The lengths shown are guides only, any section could be of different length as long as the overall length remains the same.

My original antenna had ground plane elements bolted to the top of the support section. I only had to shorten these to be some 1.44m long to make them resonant on the section of the 50MHz band I was using.

Setting Up

Now it's time to start the setting up of the antenna, to provide a 50Ω match for the system. Begin by tuning your 50MHz rig to the centre part of the band you will be using, and put a suitable v.s.w.r. meter in line.

With the rig on low power check the v.s.w.r. at the band centre. If the v.s.w.r. is below 1.5:1, then check it again at the upper and lower limits of the band you will be using. If the readings are the same then little needs to be done to the antenna for use.

If the two v.s.w.r. readings are different, then try to adjust the length of the antenna to make the two readings equal. Remember if the reading is higher at the upper end of the band, then **shorten** the antenna slightly.

If, however, the reading is higher at the lower end of the band then **lengthen** the antenna. When you've adjusted the antenna, seal all joints and get onto the band and use it!

J. D. Bolton G4XPP
Crook
County Durham

Antenna Joiner

I was looking for an antenna system to take to Barbados, and the J-Beam trap dipole I'd used before was not available. It had also been a bit of a fiddle getting it onto the aircraft, the poles had been pushed under three rows of seats and the traps had been in the luggage.

This time to keep weight down I wanted to use a resonant $\lambda/2$ wire antenna for each band. To further reduce equipment I decided to leave the a.t.u. at home. So I needed to come up with some form of joiner.

I ended up with two similar ideas, both of which are shown in the drawings of **Fig. 1** and **Fig. 2**. Both of them worked well, so I can recommend either one for you to try.

Ray Baldwin G3WZ
Salisbury
Wiltshire

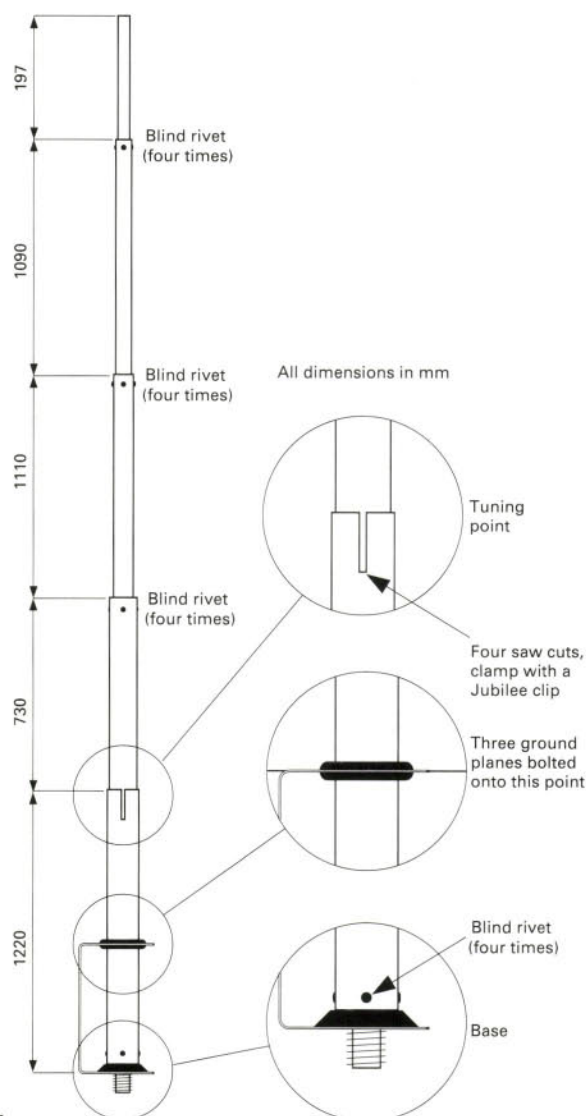


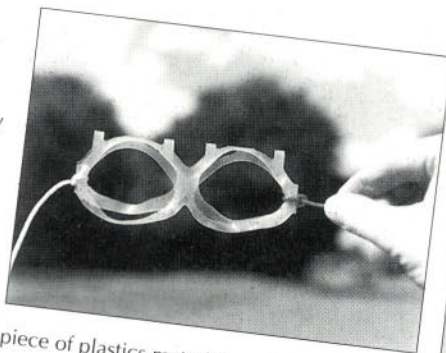
Fig. 1

Workshop

This month's Antenna Workshop is thrown open to five authors bringing you some of their good ideas.

Drink Up An Antenna

Having just finished a four-pack of -er- refreshment, I was looking idly at the bit that held the cans together before I started on another one. It was then that I noticed that I couldn't break the piece of plastics material, no matter how hard I tried.



An insulator, strong as well as cheap (well it's a pleasant cost), what a wonderful thing for an end support of a dipole antenna. Fold it double as shown in the photograph and it's strong enough for the end insulator of a half wave 3.5MHz antenna.

The retainer from a 'six-pack' can be used for the centre part of the antenna. Each leg of the antenna is tied to an outside ring and the coaxial feed point is tied to the middle section and held in place firmly.

If the system is to be made permanent then the junctions, made from individual sections from 'chocolate block' connectors, should have bathroom sealant spread around them. However, at 14 cans per antenna I may want to change the band tomorrow if my head will allow it.

Michael Stott G0NEE
Ovington on Tyne

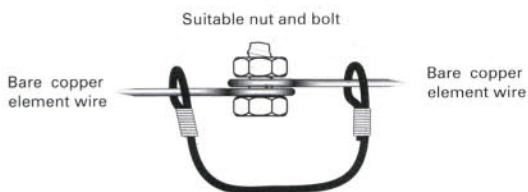


Fig. 1

Thin Nylon or polypropylene rope with a loop bound at each end.



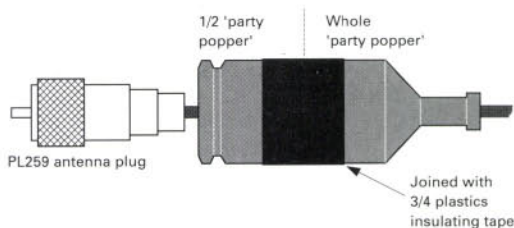
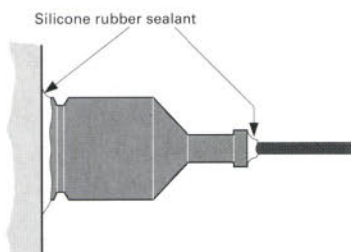
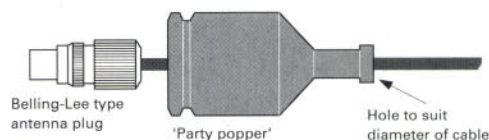
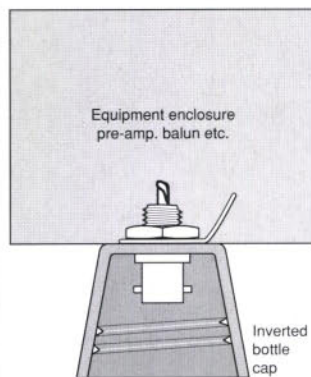
Fig. 2

Cap-It-All

In these days of recycling, every item that is about to be thrown out is looked at with a view to finding some other use for it. Doing my bit for ecological correctness, I've found another use for those large caps to be found on many bottles of fabric softener.

I use these large caps to add a weatherproof shroud around sockets on external equipment. I have to admit the idea isn't new, I've seen it on ex-p.m.r. sets designed for mounting on motorcycles. So have I motor cycle recycled two ideas with this one 'What A Good Idea'?

K. Wallace G2LQW
W. Knighton
Leicester



Popper Cover

Amateur radio is about keeping costs down by making items do more than one job, or finding other uses for an item that has outlived its original use. This can also extend to items such as fired off 'party poppers'.

The remains of these explosive little cannons that fire off a spider's web of coloured paper streamers (recycling these is another idea I haven't considered yet), can be used to make a reasonably weatherproof cover for external connections.

I think that the illustrations, Fig. 1, should be adequate to show you a few ideas of how to use them. They are particularly easy to use for antenna wire sealing after running a suitably sized twist drill through the rear of the body. I find that self-amalgamating tape makes the best weatherproof seal, even if it is more expensive.

Duncan Walters G4DFV
Mansfield
Notts



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The CROSSED FIELD ANTENNA stimulates an RF magnetic field with HALF the transmitter power, alongside an RF electric field with the other HALF power. Suitably crossed and phased in the cycle, the two fields combine and the power in total flies away to space in all directions as a radio wave. The process is called POYNTING VECTOR SYNTHESIS; ref. EW+WW, Mar 1989 and Dec 1990. Such an antenna is efficient, broadband, low voltage, safe and operates both in transmit and receive.

HAT makes these for Medium Wave Broadcasting and for commercial stations with city area restricted sites. If you are licenced on HF and wish to transmit from a centre-city site with almost no room, consider one of our new nine-band Electromagnetic Delay-Line Radiators. They consist of a three wire feeder with a small termination which can be laid over a house roof, or taped to the balcony of an apartment block, or concealed inside a loft space or attic and will radiate from 1.8 to 30MHz. The EMDR 1 is 8.5 metres long & costs £189 inc VAT & post and the EMDR 2 is 16 metres long and costs £199.

Send TWO First Class Stamps and ask for details of these, or our other conventional wire antennas.

CABLES & CONNECTORS

Westflex 103, low loss air spaced 50 ohm	95p/m	Two core screened cable, 5mm	30p/m
RG213U, (UR67), Mil spec, 50 ohm low loss	70p/m	3 core mains, 5 amp, cable	25p/m
UR43, 5mm dia, 50 ohm, single centre	30p/m	6 core rotator cable, heavy duty	45p/m
RG58CU, 5mm dia, 50 ohm, stranded centre	30p/m	8 core rotator cable, heavy duty	65p/m
RG174U, 2.3mm, 50 ohm, miniature coax	30p/m	14 SWG HD copper	25p/m
UR95, 2.3mm, 50 ohm, mini nylon coax	30p/m	16 SWG HD copper	20p/m
UR111, 2.3mm, 75 ohm PTFE mini coax	40p/m	PVC coated AE wire, light duty	8p/m
UR57, 10.3mm, 75 ohm low loss coax	70p/m	Red/black DC power cable, 8 amp	30p/m
UR70, 6mm dia, 75 ohm transmitting coax	30p/m	Red/black DC power cable, 15 amp	45p/m
Double screened, 75 ohm coax, 8mm dia	40p/m	PVC coated AE wire, heavy duty	12p/m
UHF low loss TV downlead, 75 ohm	25p/m	NEW UR67 50 ohm HD with robust outer sheath	90p/m
75 ohm twin balanced feeder, 400 w PEP	20p/m	NEW 75 ohm HEAVY DUTY TWIN Balanced feeder	60p/m
300 ohm standard ribbon	20p/m	NEW 300 ohm HEAVY DUTY SLOTTED Feeder	60p/m
RG62AU, 6mm dia, 95 ohm coax	50p/m	NEW 16swg stranded copper aerial wire	30p/m
Single core screened cable, 2.3mm dia	12p/m	NEW 450 ohm ladder ribbon feeder	65p/m

Postage on cables up to 20m \$3.00, over 20m \$5.00

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(Trade enquiries welcome)



WIN A NEW ADI AT 18 2M HAND HELD TRANSCEIVER! BY CHOOSING OUR NEW COMPANY NAME

Yes that's right - all you need to do to WIN this fabulous prize is to come up with a snappy name for our company that lets people know what we do and where we are. You will then be in with a chance to take home this **BRAND NEW HANDHELD**.

Why? - because we've been trading for many years as **Securicor PMR Ltd** and during this time we've found that readers of our advertisements have been confused by what we do. They seem to think we want to sell them a radio for their minicab or to take their money away in a big van. In fact we are the **LEADING** radio dealer in South Wales catering for the radio amateur, novice, listener, CBer and marine radio user.

We've recently been joined by **Mike GW4XLE** who now manages our shop and, along with **Brian GW80KR**, he'll choose the new name on September 7th.

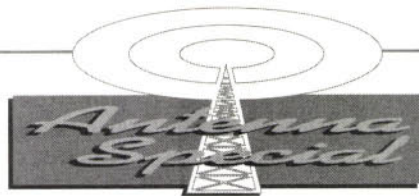
JUST DROP US A LINE WITH YOUR SUGGESTION OR CALL IN TO SEE US.

Part exchanges and mail order are welcome and we can offer a wide range of second hand equipment from stock.

No correspondence will be entered into and the judge's decision will be final. CLOSING DATE SEPTEMBER 6TH 1994

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144MHz Pocket Antenna

Kevin James G6VNT shows you how to build a highly portable antenna. It may be used for hand-helds or base stations, and just rolls up and slips into your pocket!

The antenna I'm going to describe is ideal for use with hand-held radios when you're away on holiday, or when that distant repeater is just out of reach. It may also be used with a lower power base station.

Portable Capabilities

I wanted a small portable antenna for use with portable capability. I ended up going for an end-fed half wave antenna with matcher. The matching circuit matches the coaxial cable direct to the high impedance end of the half wave antenna.

Using the half wave format eliminates the need for ground plane elements, so making the antenna simpler and easier to construct. I tried hand winding, with various measures of success. But all

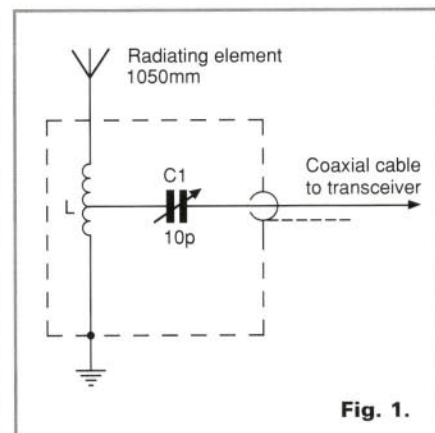


Fig. 1.

suffered from the necessity of being accurately constructed, with considerable differences between similar models.

Coil Design

I decided to design a printed circuit coil to eliminate possible variations with winding coils. This method also gave greater precision in the placement of any components that's so necessary in v.h.f. work.

Another by-product of the printed circuit coil is repeatability of the design. As the antenna is intended for low power, losses in the printed coil were minimal, but losses rise sharply if high power is used.

Circuit Details

Refer to the circuit of Fig. 1 for details. As you can see, the coil is used simply as a step-up transformer. Capacitor C1 allows the high end impedance of the dipole to be connected to the 50Ω impedance of the coaxial cable.

Made Simply

The p.c.b. can be made by simply making a good quality 1:1 photocopy of the track pattern shown in Fig. 2. Photocopy directly onto some thin tracing, or relatively transparent paper.

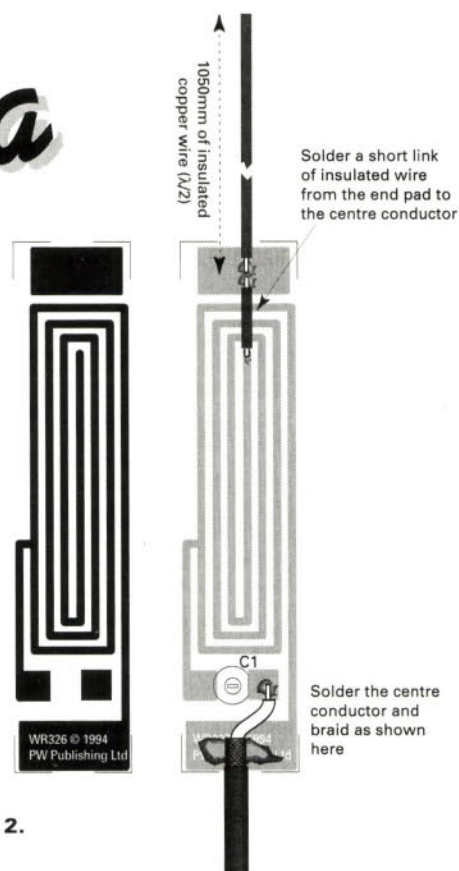


Fig. 2.

The p.c.b. illustrated will be available from the PW PCB Service.

This photo mask, is placed face down, (image in contact with board) and held tightly in place with a glass plate on single sided sensitised p.c.b. material.

The p.c.b. photosensitive material is now exposed, through the mask, to a strong ultra-violet (u.v.) light source, (I used a cheap light box from Maplin) for about eight minutes. To develop the photoresist, the exposed board is put into a solution (5g per litre) of sodium hydroxide in water.

The photoresist in the non-track areas dissolves away leaving an etch resist on the track pattern. Don't leave the p.c.b. in the developer too long, or the track area may become dissolved as well. If this happens you are left with a blank piece of copper, stripped of all the resist.

Now wash the board in running water, and immerse it in a bath of ferric chloride (15 minutes at 30°C). This acidic bath etches away the unwanted copper. The hotter the etchant, the faster it etches away the copper.



Chloride Stains

Please take care when using Ferric Chloride etchant, it stains everything it touches and it is **poisonous**. It pays to wear rubber gloves when handling it and to wash your hands at all opportunities.

Assembling The Antenna

After trimming the p.c.b. to size, you can start assembling the antenna, referring again to **Fig. 2** for details. A short insulated wire bridge is soldered from the coil centre conductor to the smaller pad on the board end.

Care must be exercised when soldering, so as not to bridge or lift the fine tracks on the board. Use a 15W iron and the minimum possible time, or the copper will lift away from the board.

The only capacitor, C1 a 10pF sub-miniature trimmer, is soldered across the two smaller pads, low centre, on the p.c.b. The coaxial cable screen is

soldered to the large pad. The centre connection of the cable goes to the open end of the C1.

To make up the $\lambda/2$ radiating element of the antenna, take a 1050mm length of insulated wire and solder to the top pad on the p.c.b. To the end of this, a 200mm piece of Nylon monofilament or string is attached with a crocodile clip or clothes peg on the very end.

I actually used a large battery charger clip, as it can be attached to all sorts of things to suspend the antenna from. Typically branches of trees, lampshades in hotel rooms etc., may be pressed into use. The string serves as an insulator and distances the antenna from items that might detune the antenna.

Setting-Up

To do the setting-up clip the antenna to a lampshade in the centre of the room, allowing it to hang down. With an s.w.r. meter in line, key up on low power, adjust the trimmer for lowest v.s.w.r.

value with a plastics trimming tool.

I achieved 1-to-1 on the prototype. Readers may want to adjust the length of the wire as well, this will give more range, in case slightly different materials are used in construction.

Performance

To judge the performance, let me quote what I found. A nearby repeater gave one bar on the S meter of my 'Micro 2 E' when using the supplied helical wound antenna. After attaching the new antenna the signal had climbed to a full (end stopping signal) reading. I had some four metres of RG58 coaxial cable fitted at the time. That result was good enough for me!

I hope you enjoy building and using this wire pocket antenna as much as I have.

PW

NEWS *Extra*

Military Yaesu

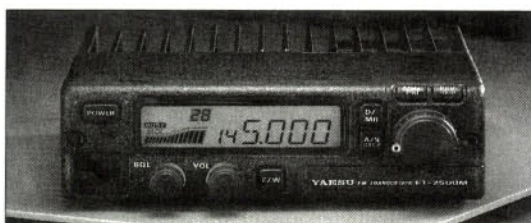
The FT-2500M 144MHz 50W mobile transceiver is the latest rig to come from the Yaesu stables and is the successor to the FT-2400H. Yaesu's FT-2500M is the first amateur transceiver designed to meet with US military specifications for shock and vibration.

Features of the FT-2500M include an upgraded front panel and control knob layout, as well as selectable power output of 5, 25 or 50W without the need for forced air cooling. There are 31 tuneable memories that can be programmed with a four character channel name and then displayed instead of the frequency if required. Channel steps range from 5 to 50kHz and a 39-tone programmable CTCSS encoder is

built-in as standard.

It's also possible to manually adjust the backlighting on the l.c.d. and knobs or to let them be automatically controlled by a photosensor. The function buttons that are less used have flip down protective covers.

The FT-2500M is supplied with a hand-held microphone and mobile bracket and is available from any Yaesu approved dealer for £359. *Practical Wireless* hopes to review an FT-2500M as soon as possible.



Six-In-One Sensation

Trio-Kenwood (UK) Ltd., have recently added to their range the TM-733E, a replacement for the popular TM-732E. This new rig is described as a six-in-one sensation because for each of the six channels it is possible to memorise the entire operating profile.

Kenwood's TM-733E is a v.h.f./u.h.f. dual-band mobile transceiver with 72 memory channels, built-in DTSS and pager functions. There is also a Theft Deterrent Faceplate (TDF), which when used with the



optional snap-release cable kit allows instant removal of the front panel. Other features include automatic band change, selectable frequency steps, incremental MHz key, repeater reverse and offset switch and dimmer control.

The TM-733E costs £729 and is supplied with a MC-45E microphone, mobile mounting bracket and power connection lead and can be obtained from any Kenwood approved dealer.

Specifications

– The Mysteries Explained

This month Ian Poole G3YWX delves into the mysteries of receiver stability and how designers try to reduce frequency drift.

The stability of a receiver is a very important factor in its operation. On some older receivers there can be appreciable amounts of frequency drift, which can be annoying because this means that s.s.b. and c.w. signals need to be retuned in every few minutes.

On today's modern receivers the short term stability is normally exceedingly good, especially after the set has warmed up. This is because the use of frequency synthesisers has almost made drift a problem of the past. Even so, the crystal oscillator used as a reference for the synthesiser still needs to be carefully designed as it has an effect on the short term drift as well as the long term accuracy or calibration of the set.

The ways in which short term drift and long term accuracy are specified are different. First I'll take a look at short term drift because this is particularly important for anyone buying an older receiver, and let's face it there are plenty on the market, with some very good bargains to be picked up.

Frequency accuracy is also important on modern receivers as well. Next time I'll investigate long term accuracy and how this is specified.

Oscillator Drift

Any oscillator, whether it is a free running variable frequency oscillator, or a crystal oscillator, will be subject to some degree of drift. As is well known, the amount of drift in a crystal oscillator is very low and may not be noticeable for many applications. However, on a variable frequency oscillator like those used in the days before synthesisers it is much

more noticeable.

Drift is caused by small changes in capacitance or inductance in a circuit that can be the result of a number of factors. A change in temperature is one of the most common.

After a circuit is turned on, heat will start to be dissipated causing its temperature to rise. The basic laws of physics show that this will result in some expansion. Even very small amounts of expansion will give a sufficient change in the value of components to alter the resonant frequency of a circuit by a few Hertz or more. Not only does the heat from the set cause a change in temperature, changes in room temperature can also be noticed.

Another major factor to cause drift is the supply voltage. This voltage particularly affects semiconductor circuits. Any voltage changes here will alter the values of capacitances in the device giving a fairly major change in the operating conditions of the circuit. Valves are also affected but not to the same degree.

Drift Reduced

It is fairly easy to say that the circuit must be designed carefully to reduce drift. In practice this is not so easy, and it may take many hours to optimise the design of a particular circuit.

Many factors have to be taken into account, from the basic design to the actual construction. So, here I'll take a look at a few which will be of interest to anyone likely to perform repairs or undertake some construction.

To reduce the effects of temperature, capacitors with negative temperature coefficients can be used to counteract the effects of the changes in the other

components. However, choosing the right value can be a bit of a balancing act. The value of this component has to be chosen to exactly counteract the drift of the rest of the circuit.

Drift from voltage variations can be largely reduced by the use of voltage regulators. Virtually all oscillators these days will be run from stabilised supplies.

Today there are a wide selection of voltage regulators. But care has to be taken to choose one which is not affected by temperature too much, otherwise this can introduce drift!

The construction of the oscillator and its enclosure also affect the performance. The circuit should be built in a robust fashion. In this way many of the effects associated with expansion and contraction can be minimised. In addition to this, the enclosure should allow some ventilation so that the temperature does not rise too far.

Drift Specifications

Drift specifications normally quote the drift over a measured period (normally an hour) after an adequate time. For valve receivers this may be more than an hour. For most modern semiconductor sets a warm-up time of half an hour is normally adequate.

Today's equipment may boast drift rates of less than 30Hz per hour after warm-up. Older valve receivers with free running variable frequency oscillators are unlikely to beat the old Eddystone EA12 which quoted a drift not exceeding 100Hz in any one hour. In some sets it was so bad that it was not quoted!

Sometimes figures for drift caused by voltage

fluctuations are quoted. These tend to vary in format from one manufacturer to the next, but typically they will quote the drift for a given mains or supply voltage variation.

Older Receiver Problem

When buying an older receiver, drift can be more of a problem than when the set was new. This is because as the components become older they may change their characteristics slightly.

A repair may have also been carried out in the life of the set, an item being replaced with a component having a different temperature characteristic. To check this it is worth zero-beating the set with a broadcast station (there are plenty just above the top end of 7MHz) and waiting a few minutes.

Band-switches can also introduce problems. As the switches become older the contact made by the wipers deteriorates. This can lead to the frequency wandering or jumping from time to time as the band-switch is touched. Although this is not drift in its strictest sense, it is a point well worth checking when buying a set.

That's all I've got room for this month, so cheerio until next time and I hope I've helped to unravel some more specification mysteries.

PW

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The Dayton Experience



Donna Vincent, who looks after News & Production on Practical Wireless, shares her first experience of the Dayton HamVention.

(R to L) Donna Vincent with Kathy Moore (Subscriptions & Book Service Manager) on the PW 'booth' at Dayton.

When I was asked to be part of the *Practical Wireless* team on the PW Publishing Ltd. annual trip to the Dayton HamVention and tour of

Dayton I wasn't entirely sure what to expect. I had been told that the HamVention is claimed to be the largest amateur radio show in the world and that you need to see it to believe it! So here's my account of what turned out to be an amazing experience.

The PW party consisted on 37 people including myself, Rob Mannion G3XFD and Kathy Moore as representatives of the magazine. Rob was leading the party and was on hand during the eight days of the trip to suggest places of interest and generally answer any queries that arose.

We flew from Gatwick, London to Cincinnati, USA on a Delta Airlines flight on Monday 25 April. I was a little apprehensive about the flight as it was my first trip abroad so I wasn't sure quite what to expect. However, I needn't have worried as the airline cabin staff were very friendly and helpful. The flight was a wonderful experience and I even sneaked a look out of the window, once I'd plucked up the courage!

Upon landing at Cincinnati airport and once through customs we were transferred by coach to our hotel, The Holiday Inn, situated on the outskirts of Dayton, Ohio. It was a relief to find out that the hotel had its own swimming pool, as with temperatures in the 80s many of the party were glad of the chance to cool down.

See The Sights

As the three day Dayton HamVention didn't start until the Friday there was plenty of time to see the sights and adjust to the climate. On the Tuesday we took an excursion to the United States Air Force Museum at the Wright-Patterson Air Force Base in Ohio.

The Air Force Museum is the oldest and biggest aviation museum in the world and admission is free. I found the exhibits interesting and was often left wondering how some of them ever got airborne. There was plenty to see in and out of the museum, and even those of us in the party without a great passion for aircraft found something of interest.

The highlight of the day for me was the chance to watch two 3D films in the museum's

IMAX cinema. One of the films was entitled 'How To Fly' and it really did give you a sensation of flying.

The Wednesday was classed as a 'free' day and so many of us took advantage of the fact the hotel was situated just a short bus or taxi ride from the Dayton and Salem shopping malls. If you like shopping, America is the place to do it! Even if you don't have a love for hours of endless wandering through shops, the sheer size of the malls, variety and cheapness of the goods should be enough to attract you.

One shop that did fascinate me was Meijers, a huge 24 hour department store situated a 10 minute walk away from our hotel. Meijers sell just about everything from clothes and food to gardening equipment and newspapers. How many people can say they have been browsing around a store at almost midnight!

The XYLs on the trip and the non amateurs found the Wednesday particularly enjoyable as it provided an ideal opportunity to see some of Dayton. However, some of them did find themselves being dragged along to Mendelhsons - one of the world's biggest surplus stores, in Downtown Dayton.

The HamVention

The Friday brought with it rain (a tradition, or so I'm told) and the first day of the Dayton Hamvention 1994 held at the Hara Arena. The show itself didn't start until midday but the famous 'flea market' started at 6am. A few early risers braved the weather to catch the first of the bargains at the flea market which is almost as big as the show itself.

I'd already got a rough idea of the size of the exhibition, on the Thursday when I was involved in the setting up of the PW stand. However, I don't think I was totally prepared for the sight that greeted me as I approached the hall. There was already a queue of eager amateurs waiting for the doors to open at midday.

The exhibitors inside the Hara Arena were situated in the arena itself and three massive halls, and the linking corridor. To give you an idea of the size I was only able to wander around only about a quarter of the exhibition prior to the show opening and having to take up my post on the *Practical Wireless* booth.

The range of exhibitors was vast with all the 'big' names associated with Amateur radio

in attendance. These included Kenwood, Icom, Yaesu, Cushcraft, MFJ, Optoelectronics and the American Radio Relay League to name just a few. As well as the larger companies there was no shortage of less well known companies dealing in everything from vintage equipment to computer software.

If you're wondering what the non-amateurs on the trip found to look at the show - don't, there was plenty. There were a lot of what I would call typical American gimmicks at show, such as the 'Flashing Light Man', who was decked out like a Christmas tree in strobe and flashing lights. The lights are widely used in the USA by cyclists. There was also no shortage in the supply of baseball caps, I was hard pushed to spot anyone that wasn't wearing one - just wait, the trend for wearing them at radio rallies will take off here in Britain.

I was amazed at the number of people attending the show and at one point it was impossible to see across the gangway between the PW and G-QRP Club stands. I'd thought that the annual London and Leicester shows were big, but they've got nothing on the Dayton HamVention.

It's not difficult to see why so many people attend all three days of the show. I'm sure that even if you were to look around continuously you still wouldn't see everything on display. The show is so vast in every way it's virtually impossible to describe it, you really do have to see it to believe it. The Americans certainly know how to put on an event, British amateurs could learn a lot.

Reflections

On the flight home I had plenty of time to reflect on my Dayton experience. The trip was certainly an experience, one I would like to repeat, and I would say to anyone thinking about making the trip to do it.

The HamVention is like no other show. The Americans really made me feel welcome, even if they did keep mistaking my accent for an Australian's! They also seem to appreciate the fact that the British make the effort to go all that way just to go to a radio show.

I'm hoping that once I've passed my RAE and am on the air I'll be able to return to the Dayton HamVention and stock my shack to overflowing.

Wayne Dillon G0JJQ tells the story of his involvement with the operation of The London Science Museum Amateur radio station GB2SM and gives a potted history of the station.

My association with GB2SM, the permanent Amateur Radio Station at The Science Museum in London as a volunteer operator and demonstrator, began with my first stint at the controls of the station in January 1988. It also provided for me the circumstances of my 'baptism of fire' into the world of h.f. pile-ups and how to handle them! (and on c.w.), but that's a tale for another time.

Suffice to say that ever since I'd visited the station as a schoolboy, I'd always hoped that one day I'd operate the station and there I was, doing just what I'd dreamed about. How many of us can get that lucky in our lives?

My first demonstration stint finished at about 4.30pm. As my fellow operator and I made our way out to the car and thus home to a well earned supper, I must've been yakking on at nineteen to the dozen about the day's events, the vast array of equipment and the contacts we'd made. He turned to me with a knowing smile and said, 'it wasn't always like this you know, ask Geoff next time you see him'.

As we crept through the early evening traffic, my eyes began to close and my mind started to wander back down the years, back to the time when GB2SM was borne into the Science Museum. So, as I began to doze, I made a mental note to discover more....

Show The Public

By the mid 1950s the general public had developed a thirst for knowledge about the technological marvels that seemed to be constantly invading their world, both in the workplace and in the home. Therefore, the idea of showing off amateur radio to the public, in conducive surroundings, seemed to be a good idea.

In 1955, as a result of discussions between the council of the Radio Society of Great Britain and **G. R. M. Garratt G5CS**, the then Deputy Keeper of the Department of Electrical Engineering and Communications, a formal proposal was made to the Museum, from the Society. The proposal stated that a demonstration amateur radio station be set up within the Museum.

The proposal was welcomed as it was in keeping with the Museum's policy of providing working demonstrations of technological

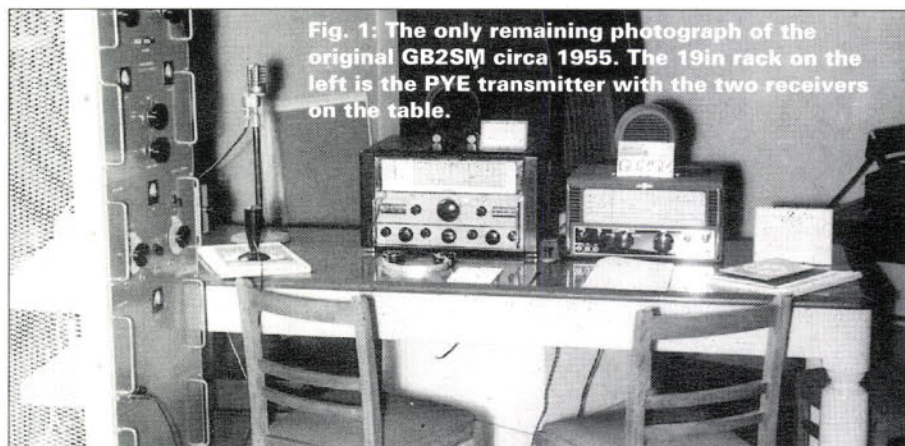


Fig. 1: The only remaining photograph of the original GB2SM circa 1955. The 19in rack on the left is the PYE transmitter with the two receivers on the table.

This Is GB2SM

processes and applications. Mr Garratt took up the project in August 1955, with enthusiasm and with the generosity of various companies that presented or loaned equipment. So began the business of demonstrating the amateur radio station, with its special callsign GB2SM (issued by the GPO). The station was set-up in a room on the first floor opposite the main staircase.

Original Equipment

The original equipment (**Fig. 1**) comprised of a transmitter presented by PYE, a 640X receiver loaned by Eddystone and a trap dipole antenna bought from KW Electronics. Demonstrations started on the September 7 1955, daily for half an hour in the morning and half an hour in the afternoon on weekdays.

On the first day of operation, the very first

Insulated Callender Cables Ltd., mounted on the Museum roof.

In 1957 a new console (**Fig. 2**) was built and installed by the Ministry of Works to improve the original 'table top' layout.

During the operation of the GB2SM station up to 1962, some 12 000 contacts were made. These were mainly speech, using double sideband amplitude modulation (a.m.), although many contacts were (and still are!) made on c.w. The station took part in many of the contests, world-wide, with great success.

The principle operators/demonstrators, **G. C. Voller** and **G. R. M. Garratt** were helped out by invited operators from outside the Museum. These were usually from the Civil Service Radio Society. During this time, many awards were achieved, a selection of which can still be seen on the station walls.

By 1962, the evolution of a different mode of speech transmission had taken hold in the amateur world. This was known as single sideband suppressed carrier (s.s.b.) and with its reduced bandwidth and increased efficiency was beginning to hold sway with the majority of amateur operators going over to this mode.

Collins radio (of the USA) loaned GB2SM a line up of s.s.b. equipment. This comprised of a KWM2 transceiver, a 30L-1 linear amplifier and a 312B-5 control unit, later supplemented by a 7553-B receiver.

It was also around this time that Mosley Electronics presented the Museum with a TA36-40 beam antenna which did sterling service until late 1979. The early 1960s also saw the acquisition of a Creed 7b teleprinter thus adding yet another mode of operation to GB2SM's repertoire.

Around the same time as the teleprinter's arrival, another member of the staff, **L. E. Profaze G3KAB** began some tests with the aim of demonstrating radio teletype (RTTY) from the Museum.

Demonstrations began with reception only. Then on August 7 1967, the first two-way RTTY contact was made with W1AOH in the USA, on 14MHz. Since that time all continents have been worked with many new countries being added to the list all the time.

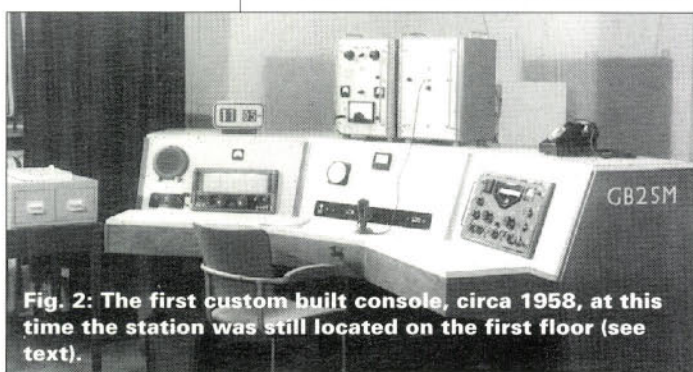


Fig. 2: The first custom built console, circa 1958, at this time the station was still located on the first floor (see text).

contact was with ZC4RX in Cyprus, on the 14MHz band. The operator was **G. C. Voller G3JUL** who went on to become the station's principle operator and later, station manager.

In November 1955, Labgear loaned GB2SM an LG300 transmitter (No. 3 off their production line) and Eddystone replaced their originally loaned receiver for their new model 888. The original trap dipole antenna was replaced by three 3-element rotatable tri-banders. The tri-banders were stacked above each other on the newly built tower, which was presented to the Museum by British

All Change

The year 1968 saw Mr Garratt's promotion out of the department to keeper. The care of the radio collection, including GB2SM was taken over by **W. K. E. Geddes**, appointed to the staff as assistant keeper in January of 1968 from the BBC. It was at Mr Geddes instigation that Sunday afternoon demonstrations were started, and have continued unchanged to this day (only ceasing when there are no volunteers available).

The new telecommunications gallery (gallery 66) was opened in 1971. The radio station was moved up from the first floor to the corresponding room on the third floor, adjoining gallery 66, which had been especially fitted out to the station's requirements.

In 1972, another licensed amateur joined the staff as an assistant, **C. J. Watson G4ABF** who also assisted with demonstrations. Mr Watson left the Museum in 1975 and unfortunately the number of demonstrations had to be reduced.

New Acquisitions

As any amateur knows, the acquisition of new equipment can mean the existing accommodation for the equipment can be rapidly outgrown and this was precisely what was happening at GB2SM. So, yet another new console was required.

The new console was constructed to the Science Museum's specification, by Imhof Bedco Ltd. and was installed in 1974. The new console allowed for a completely revised layout of the station equipment, facilitating two h.f. operating positions so that dual band and/or dual mode operation could take place during the demonstration of the station. It was also possible to install a 144MHz f.m. transceiver in the console and the first

and a 14-element J Beam was erected for 144MHz operation. Racal also changed their receiver for a model R1776 incorporating a built-in RTTY terminal.

The 1970s were not only a time of change for GB2SM but also for amateur radio as a whole, new technology was making possible great advances in communication with things only dreamed about in the 1950s. Another major contribution to amateur radio made by GB2SM was during the launch of the amateur satellite, OSCAR 7 in 1974.

The Museum station assisted in the passing of telemetry information direct to Washington. The signals from OSCAR 7 were received and translated by **G3WPO** in Sussex who passed the information onto GB2SM on 3.5MHz. The GB2SM station then re-transmitted the information to the USA on the 14MHz band. These were the first reports to be received from the UK and Europe.

Anniversary And Beyond

The 25th anniversary of the station in 1980, saw a gathering of the many people and companies without whose generous support and assistance GB2SM would not have been possible. As another recognition of this special milestone in GB2SM's history, the authorities allocated the special callsign GB8SM, which was used throughout October of 1980. About 1600 contacts were made throughout the world using this 'special' call.

Since 1979, many other changes have taken place and indeed will continue to take place. For instance the old Creed 7B teleprinter has been superseded by a Telereader electronic RTTY terminal.

The station now has the antennas and equipment for 50 and 430MHz operation as well as slow scan TV decoding and display and a dedicated v.h.f./u.h.f. scanner/monitor receiver. A short time ago a new linear amplifier was added to the second h.f. operator's line-up along with a 2kW power/s.w.r. meter.

Racal Communications have once again demonstrated their commitment to the Museum by presenting one of their newer communication receivers, the 3701, to replace their existing receiver in the station console. I was privileged to be invited to the handover ceremony at the



Fig. 4: Geoff Voller at the controls of GB2SM in 1988.

Museum on the July 7 1992.

Other companies have also been very helpful and generous to the station. These include Siskin Electronics for the gift of a Tiny-2 TNC to enable GB2SM to demonstrate packet radio, Dave Howes of C. M. Howes Communications for the offer of an 3.5MHz QRP transceiver for our up and coming 'Novice Corner', Robert Kent at R.A. Kent Engineers for the offer of one of his superb Morse keys to go with the QRP station and Martin Lynch for the offer of an f.m. transceiver so that we can leave a dedicated packet station on the air without interfering with the other demonstrations.

To all of these companies I must say a very big thank you for your generosity, time and tolerance of my scrounging 'phone calls!

Continued To Evolve

As can be judged from my potted history, the Science Museum amateur radio station GB2SM has continued to evolve along with technology. It has moved with the times which has made it one of the most enduring and popular exhibits at the Museum.

Although Geoff Voller retired from full-time work at the Museum in 1990, he is still very much involved with the smooth running of the station. Because of Geoff's and the other volunteer's sheer professionalism and enthusiasm, the station has become one of the most famous and well known amateur radio stations throughout the world.

And the future? Well, since late 1992 GB2SM has run a 'schools net', whereby schools and the youth groups can hold regular contacts with the Museum. Exciting things are still happening so watch this space!

Look out for GB2SM on the air and if you hear us, give us a call. VY 73 fer NW de Wayne G0JJQ.

PW

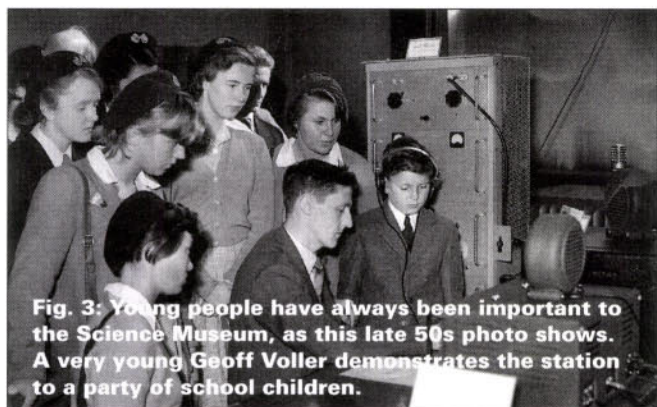


Fig. 3: Young people have always been important to the Science Museum, as this late 50s photo shows. A very young Geoff Voller demonstrates the station to a party of school children.

144MHz f.m. contact was made with G8EUW in Twickenham in November of 1974.

The changes continued with Transtell Ltd. presenting the Museum with a dot matrix printer to enhance the RTTY capability of the station. Muirhead Supplies Ltd. supplied a complete facsimile terminal, which together with a Racal 1218 receiver, facilitated the reception of weather maps and pictures, commencing in 1976.

In 1979 there was a change of antennas. The main antenna was changed for a TA6DXX

Acknowledgements

My thanks to the Science Museum for permission to use the archive photographs for this article. Thanks also to the people who, over the years, have kept notes on the station, without which I would not have been able to prepare this article. And also to all the sponsors and supporters of the Museum without who GB2SM would never have existed. Last but certainly not least, thanks to all the volunteer operators and Mr GB2SM himself, Geoff Voller, who kept the station operating smoothly whilst providing much interest for the visitors to the gallery.

Basic QSOs In Italian

Part 1

Gareth Roberts GW4JXN and Paolo Pellegrineschi I5IJP bring you the first part of Basic QSOs in Italian.

It is almost impossible to scan certain areas of the h.f. bands without meeting a friendly Italian station, as Italians seem to be a very active nation in the radio field. They are usually recognised by their high powered transmitters and their cheerful 'cao' (tshaw) i.e. 'hello' or 'goodbye'. For those who cannot differentiate between Spanish and Italian on the air, most Italian verbs and nouns end in vowels, whereas in Spanish they end in 's'.

Italian is spoken not only in Italy but also in parts of Switzerland and known by others in former Italian colonies e.g. Tunisia and in neighbouring countries e.g. Yugoslavia. There are also a large number of Americans and Argentinians of Italian origin, some of whom still speak Italian, and most Italian amateurs seem to be very interested in beaming over the UK to the United States.

Many Italian amateurs, like my Italian co-author I5IJP, have a good knowledge of English and revel in using it in transatlantic conversations. On the other hand others have a very minimal knowledge of English.

It is claimed that Italian is particularly easy to learn a little of, and easy to pronounce. So we the authors hope that British and other English-speaking amateurs will start to try out their Italian on the air, albeit the very basic radio Italian taught in this article.

The Italian language (like French and Spanish) developed from the spoken Latin of 2000 years ago and seems to have kept many of its features. Its grammar is very

much like that of French, the pronunciation is fairly easy and the writing system is consistent. The pronunciation guide is a useful indication.

The type of Italian spoken here is standard spoken Italian and based on 'Tuscan', this is the Italian spoken by the Italians with foreigners and formally amongst themselves. The Italian custom of saying 'tu' - thou to each other on the air is the one followed in this article.

There is a great deal of dialectal variation in Italy so that there is no guarantee that if you heard two Italians speaking with each other that you would be able to follow their conversation. Aim to listen for Italians speaking Italian to non Italians or to strangers rather than ragchewing with their friends.

The Italian QTH system consists of fairly lengthy regional prefixes with either a letter or a number or sometimes a combination of both after the initial 'I' for Italy. This means that you can place your contact fairly precisely in Italy, e.g. 'I5' (the regional prefix of the co-author) is that of Tuscany - the area around Florence where reputedly the best Italian is spoken. 'I3' is the area around Venice, 'I0' is the area around Rome.

For more detailed information please consult the excellent *Amateur Radio Operating Manual*. If you are quick the QTH can be checked as it is spelt out over the air by looking at the index of a good European road map, e.g. the AA/Marks & Spencer's *Road Atlas of Europe*.

Final Comments

As this is the last in the 'Basic QSOs' series may we again remind the reader that all people appreciate being addressed in their native language, it has a good psychological effect. Furthermore foreigners' mistakes are freely forgiven and there is no need to be self-conscious when you speak a foreign language.

Deal with short phrases first and then build up as you gain confidence. As no-one can see you on the radio you can read from a script. It is easier to read something than to recall it from memory. To beat the QRM you can give your report, name and location in the foreign language.

Do not be put off by an Italian coming back at break-neck speed, repeat 'parla piu lentamente, non dimentica che non sono Italiano' - 'speak more slowly, don't forget that I am not Italian' This quick reply is because it is almost unknown for British amateurs to speak anything other than English.

After this series, however, there is no excuse for anybody not trying a little French, German, Spanish or Italian! If foreigners were so shy of speaking English there would be very few international phone contacts indeed. We hope that this series has given you the confidence to try and return the courtesy shown us by foreign amateurs.

PW

Pronunciation

Tscheecoo Fetaleea, Sweetsayra, Korseeka, Sardaynia od
oon paeeray dee leengwa eetaleeana. Kwi kiana (own call)
ay resta in attayza.

(Other call) kwaysta ay la statseonay Britaneeca/Inglaysay/
Galaysay/Skotsayzay/Irlandaysay/Awstraleeana/Amayricana/
Canadayzay/Nayo-saylandayzay/Swd Africana (own call)
kay tee keeama/rispoday allah twa keeamata.
La stasionay dee lingwa italiana ay

OW wdeeto rispodayray piw dee wna statseonay vay
avante (XYZ). Prova ancora (XYZ) per favoray attendee.
Kwee ay (own call). Bwon djorno/bwon pomayreedjeeo/
bwona sayra. OM. Gratseey per aver reespoato all meea
keeamata.
Penso kay kwesto seea il nostro preemo kollegamento.
Penso tshee seeamo djeea collagatee.

Italian

CQ Italia, Svizzera, Corsica, Sardegna od un paese di lingua
Italiana. Qui chiama (own callign) e resta in attesa.

(Other callign phonetically) questa é la stazione. Britannica/
Inglese/Gallese/Scozzese/Irlandese/Australiana/Americana/
Canadese/Neo-Zelandese/Sud Africana (own callign) che ti
chiama/risponde alla tua chiamata.
La stazione di lingua italiana é

Ho udito rispondere piu di una stazione. Vai avanti (XYZ).
Prova ancora (XYZ). Per favore attendi. Qui é (own callign).
Buon giorno/buon pomeriggio/buona sera OM. Grazie per
aver rispосто alla mia chiamata.
Penso che questo sia il nostro primo kollegamento.
Penso ci siamo gia collegati.

English

Making A Call

CQ Italy, Switzerland, Corsica, Sardinia or an Italian speaking
country. This is (own callign) calling CQ and standing by.

Replying To A Call

(Other callign phonetically) this is British/English/Welsh
Scottish/Irish/Australian/Canadian/New Zealand/South
African station (own callign) calling you/returning your call.
The Italian speaking station this is

After Someone Has Replied To Your Call

I heard more than one station replying. Go ahead (XYZ). Try
again.(XYZ). Please wait. This is (own callign). Good morning/
afternoon/evening old man. Thank you for returning my call.

I think this is the first time we have worked each other.
I think we have worked before.



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ECC35	7.50	EZ81	3.50	UCH81	2.50	6C6	5.00	12BA6	2.50
ECC81	3.00	GY501	3.00	UCL82	2.00	6C6BA	3.00	12BE6	2.50
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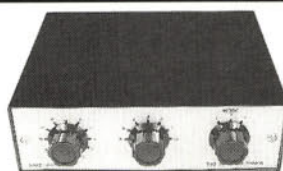
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English		Italian		Pronunciation	
Replying To A Call continued					
The name is I'll spell it for you phonetically. I repeat.		Il nome é Te lo sillabo. Ripeto.		Il nomay ay Tay low sillabow. Reepayto.	
Location					
The location is I'll spell it for you, in the county/state of in North/South/West/East England/Wales/Scotland/Ireland/Canada/USA etc.		La località é Te la sillabo, nella contea/nello stato di nel Nord/Sud/Ovest/ Est della Inghilterra/del Galles/della Scozia/dell'Irlanda/del Canad/degli USA etc.		La lokaleeta ay Tay la sillabow, nela kontaya/nello statow dee nel Nord/Swd/Ovest/Est day/la Inghilterra/del Gales/della Skotsia/del Irlanda/del Canada/daylee WSA.	
The location is in the centre of .../on the island of .../in the small/big town/city of .../in the seaside town of About kilometres from The longitude and the latitude is degrees - minutes North/South, degrees - minutes East West. The QTH locator is		La mia località é situata nel centro di/sulla isola di/nella piccola/grande cittadina/citta di nella cittadina balneare di A circa chilometri da La longitudine e la latitudine sono gradi - minuti Nord/Sud, gradi - minuti Est Ovest. Il mio QTH locator é		La meea localeeta ay sitwata nel tshentro dee sw/la eezola dee nella pikola/granday tshitadeena/tsheta di nella tshitadeena balnayarayay dee. A tshirka kilometree da La longitwdeenay ay la latitwdeenay sono gradi - minwti Nord/Swd gradi - minwti Est/ovest. Il meeo Cw Tay Ha lokayto ay.	
Signal Report					
You are five and nine in Your signal is variable/very weak/weak/strong/very strong/excellent. There is no interference. There is a lot of local interference. Your signals are fading. Your modulation is good/bad. I can understand you very easily. I can understand you only with great difficulty.		Tu sei cinque - nove in Il tuo segnale é variabile/molto debole/debole/forte/molto forte/eccellente. Non esiste alcuna interferenza. Esiste una forte interferenza locale. I tuoi segnali sono evanescenti La tua modulazione é buona/cattiva. Ti capisco molto facilmente. Ti capisco con molta difficoltà.		Tw say tshinqway - novay in Ill two saynialay ay variabilay/molto daybolay/daybolay fortay/molto fortay/tshelentay. Non esistay alkwna interferentsa. Esistay wna fortay interferentsa lokalay. Ee twoi seniali sono evaneshentee. La twa modwlatsionay ay bwona/cateeva. Tee capisco molto fatshilmente. Tee capisco con molta difficolta.	
Asking For Information And Commands					
Please state your name/your location/your callsign. What is your country? Please spell your name/location/callsign phonetically. Please can you give me a report. Please repeat. Please speak more slowly. Is my signal fading? Have we worked each otherbefore - on this band, on 10, 15, 20 metres? I'm sorry, I do not understand you. I do not understand/speak Italian very well. Please stand by. Please go again. Do you copy? Is this frequency free/occupied?		Per favore indicami il tuo nome/la tua località/il tuo nominativo. Quale é il tuo paese? Per favore sillaba il tuo nome/la tua località/il tuo nominativo. Per favore passami il mio rapporto. Per favore ripeti. Per favore parla più lentamente Hai mio segnale é evanescente? Ci siamo collegati prima su questa banda sui dileci, quindi, venti metri? Mi dispiace, non ti capisco. Non capisco/parlo molto bene la lingua italiana. Per favore resta in attesa. Per favore vai ancora avanti. Mi copii? Questa frequenza é libera/occupata?		Per favoray indikamee il two nomay/la twa lokalita/il two nominateevo. Kwalay ay il two payayzay? Per favoray sealaba il two nomay/la two lokalita/il two nominateevo. Per favoray passame il meeo raporto. Per favoray repeatee Per favoray parla piw lentamentay. Il meeo senialay ay evaneshentay? Tshee seemo colegatee preema sw kwesta banda swnee deeytshe, kwindeetshree, ventee metree. Mee dishpeeetshay, non tee capisco. Non capisco/parlo molto benay la lingwa italiana. Per favoray resta in atayza. Per favoray vai ankora avantee. Mee copee-ee? Kwesta frekventsa ay libera/occupata?	

Basic QSOs in Italian

Basic QSOs In Italian Part 2 To Follow...

Kwesta frekventsa ay occupata Old Man, mee dispeeatshay.

Ow key -esto

Posseamow cambearay frekventsa? Proveeamo tshirka deeytshi kiloerts in alto/baso say la frekventsa ay libera.

Proveeamo a tserka Es deetshianovay.

Posseamo andaray in simplex?

Thsee risentiraymo sel repetitoray

Proveeamo in banda lateralay.

Proveeamo in Morse.

Tea darow wn rapporto nel prosimo cambeeo.

Penso kay seea il twrno dee X.

Ow dimenteeakatow a key shpeta il twrno.

Il kambeeo a con il grppo.

Break.

Kambeeo.

Questa frequenza é occupata OM, mi dispiace.

Ho chiesto.

Possiamo cambiare frequenza? Proviamo circa 10kHz in alto/basso se la frequenza é libera.

Proviamo a circa 5 dicianove.

Possiamo andare in simplex?

Ci risentiremo sul ripetitore

Proviamo in banda laterale.

Proviamo in Morse.

Ti darò un rapporto nel prossimo cambio.

Penso che sia il turno di X.

Ho dimenticato a chi spetta il turno.

Il cambio a con il gruppo.

Break.

Cambio.

This frequency is in use old man, I'm sorry.

I have a sked.

Can we change frequency? How about 10kHz up/down if the frequency is free?

How about 519?

Can we go simplex?

I shall see you on the repeater.

Shall we try on sideband.

How about Morse?

I'll give you a report on the next over.

Net Working

I think it is X's turn.

I've forgotten whose turn it is.

Over to with the group.

Break.

Over.

Rig And Antenna

The rig here is

I'm using a transceiver.

I have here a receiver and transmitter with transverter/ with a linear amplifier.

I am putting out 10, 20, 50 100 watts

The rig is home brew with modification.

My antenna is a dipole/is a trap dipole/ a beam with three elements/ a Yagi with 10 elements.

Kwee lekpadjeamento ay

Shto wzando wn reetshetrasmteetowray

Ow kwi wn rishevetowray ed wn trasmetitoray con transverter/con wn amplifikatoray linayaray.

Esho con deeytshree, ventee, tshinkwanta, tshentow watts.

Lekpadjeamento ay statow kostweeto da me con modifeekay.

La meca antenna ay wn deepolo/wn deepole trapolato/wna direteeva di tray elementee/wna yagi dee deeytshree

Qui l' equipaggiamento é

Sto usando un ricetrasmittitore....

Ho qui un ricevitore ed un trasmettitore con transverter con un amplificatore lineare.

Esco con dieci, venti, cinquanta, cento watts.

L'equipaggiamento é stato costruito da me con modifiche.

La mia antenna é un dipolo/un dipolo trappolato/una direttiva di tre elementi/una Yagi di dieci elementi.

Errors & Updates

The PW Top Band Tourer Transmitter Receiver

Clive Hardy G4SLU reports back on his simple a.m. transmitter receiver design which was published in the July issue of PW and is already proving to be very popular.

I should start off my 'Errors & Updates' by saying that as published, the 'Top Band Tourer' will work and give good results. However, that mischievous little creature, the decimal point, made a couple of unscheduled moves in the Tourer's circuit diagram!

By following my recommendations, anyone who builds the project should get the same excellent results I obtained following the 14 months or so involved with the circuit development and 'on air' tests.

Three Capacitors

Three capacitors suffered from the attention of the dreaded jumping decimal point. These are: C8, 19, and C20. In practice, the changes turned out not to make much difference but.....!

Just to give weight to the conspiracy theory, the editorial word processor's keyboard also made a few changes to the shopping list. To avoid as much confusion as possible, I've outlined the changes below.

Change C8 (Fig. 1) to 47nF

Change C19 (Fig. 2) to 10nF

Change C20 (Fig. 2) to 0.1µF

The text relating to T4 (**Fig. 2**) should read "T4 = RW06A7752EK/YRCS11098 (see text)".

The text relating to T2 and 3 (**Fig. 2**) should read "T2 and 3 = KANK3333R".

The wire sizes for L2 and L3 (omitted from the original shopping list) should be 0.5mm (25/26s.w.g.) enamelled copper wire.

With these modifications I'm sure that anyone who builds the Top Band Tourer will enjoy themselves as much as I did when my original prototypes were completed. I would of course be interested to hear from anyone who builds the rig and especially if I'm able to arrange a sked on 1.960MHz.

G4SLU

Printed Circuit Boards For The PW Top Band Tourer

The p.c.b. for the 'Top Band Tourer' is now available from Badger Boards at 80 Clarence Road, Erdington, Birmingham B23 6AR, Tel. 021-384-2473 @ £7.35 each plus £2 P&P.

Valve &

Once again Ron Ham opens the *PW* vintage 'wireless shop' for business. And, although Ron can't actually sell or supply you with components, valves or batteries, he can share memories of warm cabinets and glowing dials with you in his column.

I know from your letters that many of you are fascinated by the 'accumulator' sets. So, this time we'll take a look at one of the lesser known communications receivers that was still being used by the RAF in the early days of the Second World War.

My decision will please **John Higgins** of Greenock (Strathclyde, Scotland), who tells me, "I was weaned on early 'battery sets' with their accumulators", adding that he now has two British Thomson-Houston (BTH) crystal sets and six mains receivers in his collection.

Now, as you read on, please keep in mind that, although the R1116 was specifically designed for the Royal Air Force, the type of valves and the majority of the components would have been used in domestic sets during the 1930s. This keeps me on the theme of 'wireless is wireless', whoever it's made for.

Air Force Sets

During the late 1930s and early 1940s the Royal Air Force were still using 'battery' operated sets with 2V directly heated valves. One such set is a general purpose communications receiver, with direction finding (d.f.) capability, known as the R1116, **Fig. 1**, which, I believe was used in flying boats.

The focal point of the front panel is the two, slow-motion, tuners, one is marked **HF** (left) and the other **LF** (right). The respective antenna leads, from above the aircraft, are connected to the terminations at the top corners.

Fig. 3: An under-chassis view of the R1116, showing the gearing for the tuning scale drives and other high quality components.

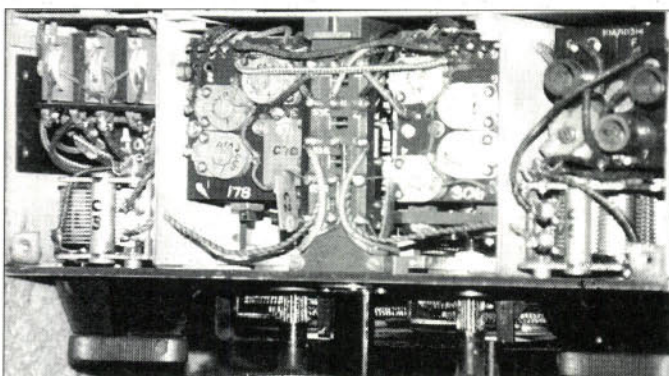


Fig. 1 (Above): The R1116 communications receiver, as used by the Royal Air Force during the late 1930s and early 1940s (see text).



Fig. 2 (Right): The hooded illumination provided for the tuning dials on the R1116 is a distinctive feature on this design (see text).

Also, sockets are provided on the top row for remote control and a d.f. loop antenna. Both main antennas are matched to the receiver by the vernier drives, calibrated 0-100, at the bottom corners.

The large knob in the lower centre switches between **HF** and **LF** while the actual ranges, within these bands, are selected by the switches directly above the antenna trimmers.

The R1116 has seven wave-ranges, three allocated to the low frequency (l.f.) and four to the high frequency (h.f.) bands. The dial for the former is encribed 142-308, 308-690 and 690-1500kHz and the latter reads 2-4, 4-7.5, 7-11 and 11-18MHz. Each dial has a 0-320 logging scale engraved around its outer rim.

The scales are illuminated by a 2.5V torch-bulb under a hood just above the fixed cursor on each dial. There's a better view of the controls, especially the main dials and the lamp hoods, in **Fig. 2**.

The hoods are held in position by a light spring-tension so they are easily lifted to replace the bulb. If the hoods are tight, or perhaps rusted with age, a little 'Three-in-one oil' on each of the springs works wonders and will prolong their life. This advice also applies for all the moving parts inside the set.

Controls

The **LF** band switch, right of dial **Fig. 1**, has six positions, three are marked **Traffic**. This I assume is for normal reception, and the others are headed **DF**. A four way switch immediately above it is for **RT** (AVC), **ICW**, **RT** and **CW**, with the volume control being mounted between the tops of the main tuning dials.

The receiver on/off switch is at the upper left of the **HF** dial. The three position switch above that is marked **Traffic**, **Sense** and **DF**.

On the opposite side is a large knob that switches between **Reciprocal** and **Bearing**. Judging by the controls and their markings, the direction finding was based on navigational beacons and perhaps broadcast stations in the l.f. bands.

Permeability Tuning

Although normal single-gang variable capacitors are used on each antenna control, bottom corners **Figs. 1, 2** and under-chassis view **Figs. 4** and **5**, permeability tuning (like the '58' set) is employed behind the h.f. and l.f. dials.

If you take a look at **Fig. 4** (centre) and **Fig. 5** (right centre) you'll be able to see the larger type ceramic trimmers on the permeability units. Some of the complex gearing for the two units is also visible at the bottom of **Fig. 4**.

Incidentally, great care must be taken when adjusting ceramic trimmers. This is because if they're sealed, the moving part at the top can easily split in two.

All parts of the set are well screened to avoid unwanted signals entering the receiver other than via the main antennas or the d.f. loop. For instance, most of the valves, visible in **Fig. 6**, are not only metalised themselves but are housed inside a screening can.

The photographs, **Figs. 2** show the cans off. The under-chassis sectional screening, around the valve holders, can be seen in **Fig. 4**.

The valves, **Fig. 5**, are fitted in their holders, **Fig. 6**, adjacent to the four 'square' i.f. transformers. The two i.f. cans on the right of **Fig. 6** are encribed **1700 KC/S** and the other two, centre and upper left of **Fig. 6** are marked **100 KC/S**. No doubt these are

Vintage

By Ron Ham

Fig. 4: Looking down on the under-chassis of the R1116, showing the neat screened compartments and high quality components (see text regarding advice on ceramic trimmer capacitors).

for the h.f. and l.f. bands respectively. The frequency of each transformer is set by the two trimmers on the top of each can.

Power Requirements

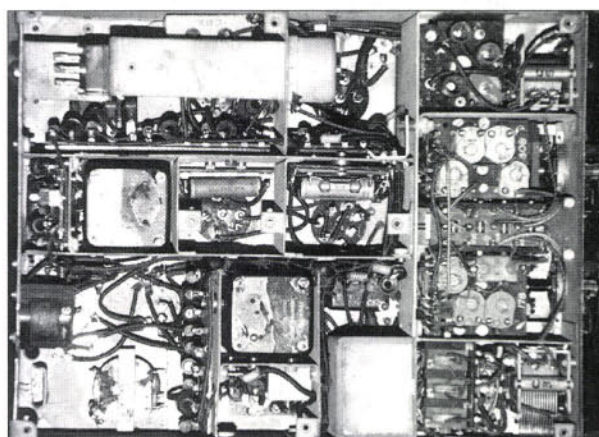
Now let's take a look at the power requirements. According to my calculations, the R1116 requires two volts at about 1.7A for the low tension, possibly 150V high tension and an amount of grid-bias.

The grid bias supply is derived from a 9V battery housed in a slot by the driver and output valves, lower left of Fig. 6. The spring for the battery securing strap is between the bases of these two valves.

A lead from an independent battery box, terminated with a 4-pin socket, carried the h.t. and l.t. supply to a matching plug at the lower rear of the set, visible at the top left Fig. 4.

In addition to the 'known' valve filament current, I've added 400mA for the dial bulbs and 100mA for the 'unknown' valve V1. This valve top right Fig. 6, is missing from the set.

Unfortunately, the components list, Fig. 7, fitted inside the set's upper cover, does not give valve numbers, only the Air Ministry's reference number, '10E/9829'. Incidentally, it's



worth noting here that part numbers preceded by '10E' and '10A' were used by the RAF and the letters 'ZA' by the Army.

The Valves

From left to right, the valves in Fig. 5 are VR35 (CV1035 = MOV QP21), VR21 (CV1021 = Cossor 210LF), VR44 (CV1044 = Cossor 210DDT), the next two displaying their Air Ministry insignias are VR83 (CV1083 = Cossor 210VPT) and the last pair, showing their reference numbers '10E/4' are VR82 (CV1082 = Cossor 220TH).

If you look the valves up in a manual, you'll see that the QP21 is a double pentode, the 210LF is a triode, the 210DDT is a double diode triode, the 210VPT a pentode and the 220TH a triode heptode.

I have not seen the circuit of the R1116 to see how the valves are used. However, a valve manual gives the

maximum anode voltages for the QP21 and the 210VPT as 150V, the 210DDT as 85V, the 210LF as 84V and the 220TH as 120V.

Museum

The R1116 I've looked at this month was kindly donated to the Amberley Chalk Pits museum by Geoff Arnold G3GSR, the editor of *Radio Bygone* magazine. It was loaned to me for this episode of 'V&V' by Dave Rudram the Honorary Curator of the museum's vintage wireless section. My thanks to them both.

German Capacitors

If you plan to replace the metal 'box' type capacitors in one of the German sets from the Second World War, Richard Walker (Uxbridge) offers the following advice.

Richard suggests you first make a pair of shaped wooden vice jaws to

hold the capacitor. Next, carefully bend out the tags which hold in the Paxolin tag board, unsolder the tags and keep this bit to one side.

You should then ease out the contents with a two-speed hand drill and fit a modern, usually much smaller, component inside the can. Then you can connect and refit the tag board.

Try not to damage any identos on the outer case and do make sure that the new part is of the same electrical value and working voltage. Also see that the leads from the new capacitor are well insulated inside and cannot short to the case.

Well, that's it for this month. Time to shut up the 'shop' again. And, although I can't actually sell you any bits and pieces, I'm always 'open' for your letters with memories, advice or requests for help. Write to me at 'Faraday', Greyfriars, Storrington, West Sussex RH20 4HE. Cheerio for now.

Fig. 5: Some of the valve types used in the RAF R1116 receiver. The receiver used 2V and possibly 150V h.t. supplies (see text).

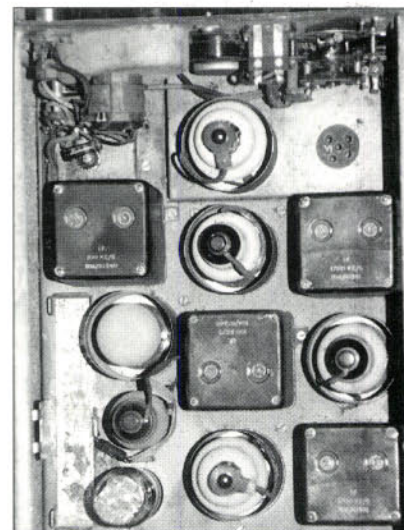


Fig. 6 (Above): A mystery! Ron Ham was left wondering what the missing valve (5-pin base in top right of picture) was. The information chart (in Fig. 7) had no information on the missing valve.

Fig. 7: The component list, fitted under the R1116's upper cover, provides much useful information, but the valve types are only referred to under their service designations (see text).

G.P. RECEIVER R.1116, R.F. No. 4401/10210											
Part No.	Part Name	Part No.	Part Name	Part No.	Part Name	Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	VR35	2	VR21	3	VR44	4	VR83	5	VR82	6	VR83
7	VR82	8	VR83	9	VR82	10	VR83	11	VR82	12	VR83
13	VR82	14	VR83	15	VR82	16	VR83	17	VR82	18	VR83
19	VR82	20	VR83	21	VR82	22	VR83	23	VR82	24	VR83
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31	VR82	32	VR83	33	VR82	34	VR83	35	VR82	36	VR83
37	VR82	38	VR83	39	VR82	40	VR83	41	VR82	42	VR83
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739	VR82	740	VR83	741	VR82	742	VR8				

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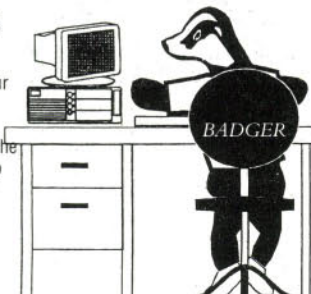
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The Computer in Your Shack

Peter Hunter G0GSZ has news on a new version of Lan-link, two new CD-ROMs but starts off with some advice on registering.

I'm amazed I have found time to write 'Bits & Bytes' this month! You've kept me so busy making copies of Hamcomm my wife thinks I've found a new use for the computer, Hi! I think by now just about every amateur and s.w.l. in UK and beyond must be using Hamcomm.

Remember though, if you do continue using Hamcomm, please play fair. The author has given up an awful lot of his spare time to produce this program, so **please** register.

While on the subject of registering, I have been informed that version 3.0 will be released soon, and will be capable of doing much, much more than 2.2. Obviously, registered users will be the **first** to receive the new release.

Sad Amiga News

Now for a bit of sad news for Amiga users, or those considering the purchase of an Amiga. Many of you will already have heard this, but sometime towards the end of April 1994 Commodore International, and its subsidiary, Commodore Electronics Ltd., went into liquidation.

It's possible that a large corporation such as Samsung or Sony may step in. But it is generally thought that this is the end of future development of the Amiga as we know it, and to future software/hardware upgrades.

Library Software

In the May '94 issue of 'Bits & Bytes' I told you about a PD library for BBC software. Well, this library has now closed.

The PD Library collection of discs have been passed on to another company called **8-Bit Software**, so you can contact them if you need anything. Prices may be slightly higher so please make enquiries first. The contact is **C.J. Richardson** and the address to write to is: **8-Bit Software, 17 Lambert Park Road, Hedon, Hull HU12 8HF. Tel: (0482) 896868.**

Lan-link Update

Joe Kasser G3ZCZ has recently sent me the latest version, 2.30, of Lan-link (see Fig. 1). When I reviewed version 1.59 I said that "I couldn't imagine what else could be added to this program".

Since then of course new modes have been 'invented' which have been added to Lan-link, as well as enhancements to the program itself. Together with this are the improvements made to the actual programming tools that Joe uses, which has allowed him far more flexibility of his skills and knowledge.

Lan-link 2.30 now includes G-TOR and, as far as I can see, all past bugs have been completely exterminated. Lan-link 2.30 is as near to perfect as any program could ever be. The only thing it won't do is make the coffee, but that'll be likely in version 2.40! Congratulations Joe.

I wish I had room to tell you more. If you want a copy just send me a formatted disk (720K minimum space required), and return post and packing (contrary to your beliefs this is **not** supplied by **PM**). Any donations towards the replacement of my disk drives (due to wear and tear) will be gratefully accepted!

New CD-ROMs

My good friend Michael, at The Disk Trader has sent me a couple of CD-ROMs. These are the very latest versions from **Buckmaster Publishing** in Virginia, USA.

The first CD-ROM is the April 1994 edition of **HAMCALL** (see Fig. 2). Hamcall is the US and International call book on one CD-ROM. It is accessible by both IBM PC and Apple Mac computers.

The latest version has many advancements over previous issues, and is 50% faster as well. It also contains a Terminate and Stay Resident (TSR) program which loads into the computer's memory (if you want it to). This allows you to access the call book from within any program that

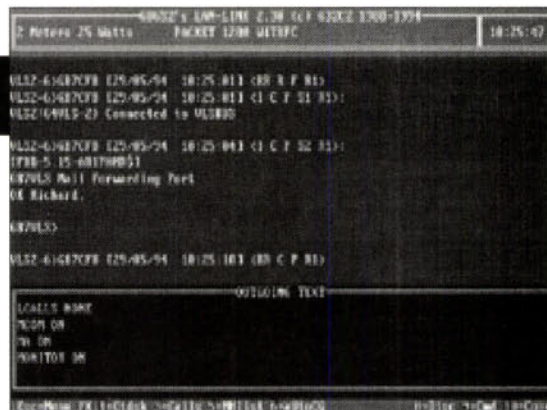


Fig. 1: A sample screen grab from version 2.30 of Lan-link.

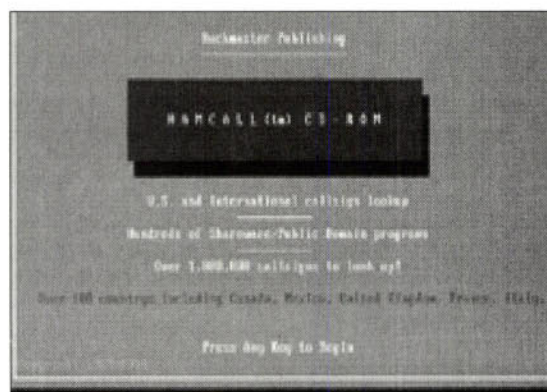


Fig. 2: Hamcall, the US and International call book program.

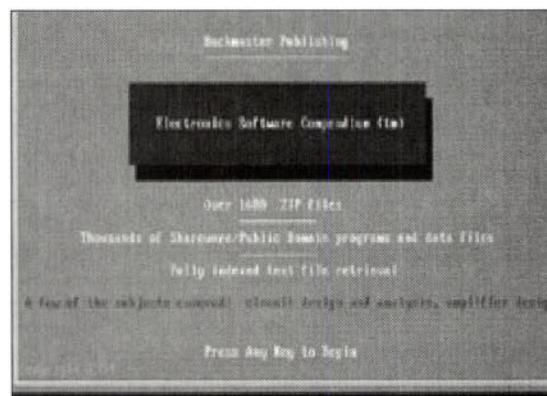


Fig. 3: The Electronics Software Compendium from Buckmaster Publishing.

you may be running at the time.

The Hamcall CD also contains a large collection of other 'ham' programs, all of which can be automatically 'unzipped' and copied to your hard disk. This CD-ROM contains over 1 092 000 call signs. The UK price for Hamcall is **£39.99** inclusive.

The second CD-ROM (see Fig. 3) is another brand new disk, from Buckmaster Publishing and is called **The Electronics Software Compendium (ESC)**. This is a collection of programs and data files pertaining to electronics, broadcasting, amateur radio and s.w.l. activity.

The ESC disk contains programs and files dealing with circuit design/analysis, basic information on electronic formulas, reference

charts, and a whole lot more besides. Over 200Mb of files for the PC and over 20Mb for the Mac. The UK price for the ESC disk is **£21.99** inclusive.

Both CD-ROM disks are available from **The Disk Trader, 85 Curzon Street, Derby DE1 1LN. Tel: (0332) 362770.** Don't forget to ask for a current catalogue whilst you're at it.

Once again space has beaten me. Don't forget to keep my postman busy (he can't afford to be made redundant!) Write to: **Peter Hunter G0GSZ, 2 Mayes Close, Bowthorpe, Norwich NR5 9AR. Tel: (0603) 748338, FAX: (0603) 740800 or packet @ GB7LDI.#35.GBR.EU. 73s until next time.**

E N D

In this month's column David Butler G4ASR provides reports of openings via aurora, Sp-E and tropo on the v.h.f. bands. David also has some news about satellites, both man-made and natural!

I'll start off with aurora this time. I'm not going to give up reporting those auroral openings just yet!

Another month has passed with numerous events being recorded in central England. At my QTH, activity was detected on May 1-2, 6-11 and 28-31. That should be enough to keep everyone happy.

Just for the record I found one opening in January, 14 in February and 12 in March. In April there were 11 events followed by 12 openings in May.

That's 50 auroral openings in the first five months of this year. Now I hear you say, "How come old 'ASR catches all these openings and I haven't heard any"!

I don't know if I can answer all possibilities but if you adopt the following you will certainly increase your chances. Listen to Band II TV frequencies around the 49MHz region, as these occasionally go auroral when magnetic conditions are disturbed.

Ensure you have a good antenna for the 50 and 144MHz bands. The bigger the antenna the more openings you'll detect.

Don't waste signal power with poor quality feeder. Keep a 27-day auroral calendar. Beam in a northerly direction listening on the lower frequencies first.

Use c.w. for that's where the real DX is found. The best times are generally between 1500-1700UTC and 2200-0100UTC. But above all ensure you turn the radio on every time you walk into the shack!

May Openings

Most May openings were fairly weak producing the normal G-GM contacts on the 50 and 144MHz bands. An event on May 1 was much better and a reasonable amount of DX could be worked.

The May opening

started around 1430 and continued through the evening until 2400UTC. Unfortunately, or fortunately depending on your persuasion, the 144MHz band was also open via tropo.

Many operators were happy to work the loud stations in F and DL. They were oblivious to the fact that stations in LA, OZ and SM could be worked by beaming north.

Among the stations worked from central England were LA2EGA, LA2PHA, LA6VBA, LA8SJ, OZ1CLL and SM5BSZ. Some operators also reported working OY9JD (IP62), SP1JVG (JO84) and YL2MB/A (KO38). All these stations were on the key of course!

Low Satellites

With all the solar activity, it's possible that low earth orbiting (l.e.o.) satellites could be affected. And in fact two of them were! The problems were caused by high energy particles effecting memory chips within the LO-19 and IO-26 microsats.

Basically, the on-board computers crashed after having experienced what is known as a single event upset. This can change a bit from a '1' to a '0' or vice-versa in random access memory (RAM) chips.

All microsats have software specifically designed to handle this problem. However, the software is not bullet-proof!

The software can only correct one bit-state change at a time. If two or more state changes occur simultaneously (normally within RAM) the on-board computer crashes.

The problem with Lusat-Oscar-19 was first noticed on May 16 by LU1JBR. The Amsat-LU ground station LU8DYF were able to successfully reset the computer the following evening.

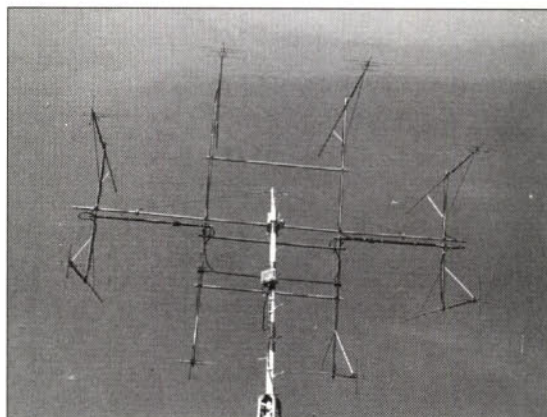


Fig. 1: The antenna system at the QTH of HG1YA (see text).

However, the reloading of software will take several weeks. This is followed by many tests to ensure LU-19 is working correctly.

Alberto Zagni I2KBD reports that the Italian IO-26 microsat failed at the same time as LU-19. The reloading of the integrated housekeeping software was expected to take several days.

Sporadic-E Season Started

The summer Sp-E season has finally started and brought with it a much needed increase in activity. Most openings during May were confined to the 50MHz band. However, on at least two occasions the maximum usable frequency (m.u.f.) rose sufficiently high to allow DX contacts to be made on the 144MHz band.

I'll turn first to reports of activity on the 50MHz band. Most if not all of the intense Sp-E openings during May occurred when the solar magnetic conditions were quiet.

Basically what I'm saying is that if a period of auroral conditions are encountered, then stable Sp-E is less likely to occur. I'm **not** saying it won't, just that it's less likely.

So, now there's another use for your 27-day auroral calendars! Note when the last period of auroras occurred. Wait two or three days for the magnetic activity to quieten down and that's when the band is more likely to be open via Sp-E.

An interesting opening occurred on May 9 from 1730UTC. It followed a small auroral opening with the

band opening up to Spain via Sp-E. This path then extended via trans-equatorial propagation (t.e.p.) to Ascension Island.

Between 1745-1830UTC the beacon ZD8VHF (II22) was audible over the southern half of the UK. The period between May 15-17 was excellent with many lengthy openings.

Wide Open To Europe

The band was wide open to virtually every country in Europe with a 50MHz allocation. In between the more usual stations you could find some quite interesting DX stations.

The DX stations included C31HK, OJ0/OH1VR, SV10H, SV4AFY, SV8CS, SV9ANJ, TK/F5HRY and ZB2EO. Stations from Russia are now active and a number of operators reported working RA3TES, RA3YO and R3VHF.

At times propagation extended to the south-east allowing contacts to be made into Asia. A few fortunate stations managed to log OD5SK, 4X1IF and 5B4JE.

Conditions were also good into the African continent. The notable stations here included CN8NS, CN8ST, 5T5JC and 7Q7RM.

The ZD8VHF beacon was heard again on May 15 between 1545-1550UTC. (It's a pity that there's no permanent station on the island now).

Neil Carr G0JHC (IO83) mentions hearing the FY7THF beacon in French Guiana. He noticed it at 1830UTC on May 17.

First Signals

Philip Lancaster G0ISW (I084) reports hearing his first Sp-E signals this year on May 5. At 0926UTC he heard an SP6 station calling CQ on the 50MHz band.

On May 15 at 1721UTC Philip heard EU1AA located in K033SJ. Conditions were much better on May 16 with many Italian and YU stations being worked.

At 1753UTC a new country in the shape of SV9ANJ (KM25) found its way in the log G0ISW. This was when the expedition station signing EA8/DJ30S (IL18) was worked on May 17. Unfortunately this is an illegal operation and is not valid for DXCC purposes.

A station that is legitimate is RA3TES (LO15). He was worked at 1449UTC also on May 17. Philip mentions that 5T5JC has been heard on a number of occasions. He often appears on 50.110MHz but encounters QRM from many European operators. Please remember that this frequency is designated as intercontinental calling. In theory it should not be used for QSOs.

Particularly Intense

The Sp-E propagation was particularly intense on May 21-22. The 50MHz band was open from early morning through to the evening. It was during these events that openings occurred on the 144MHz band.

The 144MHz opening on May 21 started at 1215UTC and lasted some 45 minutes. The band was open to the EA4 and EA7 regions of southern Spain.

Stations in the UK located from the south coast up to Lancashire got into the action. A number of GW operators from south Wales also got the DX into their log books.

From reports received most EA stations were located in squares IM66, 67, 68 and 69. But there was even better DX around!

The stations of CN8ST (IM64) and EA9AI (IM75) were also worked by many operators. **Jim Smith G00FE** (I090) managed to work EA7GBG (IM67) and heard CN8ST. Unfortunately his poor take-off to the south-west meant that the African station was rather weak.

Tim Kirby G4VXE (I081) was pleased to contact CN8ST especially as his QTH is surrounded by hills. He

also managed to work 5T5JC on the 50MHz band around the same time.

Further to the north **Gerry Schoof G1SWH** (I083) made an excellent QSO with EA9AI at 1259UTC.

On the following day, May 22, there was another Sp-E opening on the 144MHz band. This was a fairly short event between 1515-1530UTC.

A few stations in southern and eastern England reported working into the I7 and I8 regions of Italy. Over in Belgium the station of ON4GG made a contact with SV8YM.

Enhanced Tropospheric

As I've already mentioned, the v.h.f. bands were graced with periods of enhanced tropospheric conditions during May. Because of this, conditions during the period May 1-2 were very good towards Scandinavia. Stations down the eastern side of the UK were heard working into LA, OZ and SM on the 144MHz band.

Ralph Sachs G2CZS (J001) reports working a number of stations in Scandinavia on the 144MHz band. Among the DX he worked on May 2 were LA2PHA, OZ3GW and OZ6ABA. During a contest on May 7-8 he made a number of QSOs with stations in DL, F, ON and PA.

Reg Wooley GW8VHI, operating the RAF club station G6RAF (I092) made a number of s.s.b. contacts on the 430MHz band. These included QSOs with: DB0YI (J042), DL8BDU (J043), OZ1IPU (J057) and OZ9IT. He also heard the LA8UHF beacon on 432.820MHz.

Ekofisk Oil Platform

Andy Cook G4PIQ (J002) has made a contact with one of the operators of LA1EK0, which is located on the Ekofisk oil platform (J016) in the North Sea. The operator said they were putting up an antenna for the 430MHz band and they'll be QRV with about 10W from a transverter.

One of the problems operating on the 430MHz band is interference from the Syledis location system. Therefore, they will have to choose their operating frequency very carefully. In other words don't expect to find them calling CQ on 432.200MHz!

Moonbounce

Let's take a look at moonbounce now. I'll start off with news from **Ralph G2CZS**, who has been attempting to work W5UN via e.m.e. on the 144MHz band.

Although Ralph only uses a single 13-element Cushcraft Yagi he has heard the W5UN with very readable signals. This is because W5UN uses an enormous 48-Yagi array.

The W5UN array has enough gain to enable stations with a good 'tropo' system to hear him. The only thing you have to ensure is that the setting moon is near the horizon and you point your antenna at it.

Ralph asks me if it's possible to give dates of e.m.e. activity weekends. So, to help, I've provided the information in **Table 1**.

The table gives details of moonrise/moonset (UTC) and azimuth angles. Calculations are based on central England and should be reasonably accurate for most of the UK.

Many of the large 144MHz e.m.e. stations are located in North America. Operators such as VE7BQH, K1VHS, W4ZD, W5UN and KB8RQ are commonly heard with a single Yagi.

The best time to hear these stations is at moonset. You can of course listen for stations at moonrise.

European operators such as DL8DAT, HB9CRQ, I2FAK and SM5FRH are regularly heard. Another station that you might hear is that of HG1YA. The photograph, **Fig. 1**, shows his antenna system.

The antenna arrangement of eight 13-element Yagis at HG1YA is unusual. It's conventional to stack and bay antennas with similar spacings. In this configuration the antennas are arranged in an elliptical shape.

Looking Ahead

Looking ahead to later in the year, the ARRL have fixed the dates for this year's international e.m.e. competition. The two legs will be held on October 29-30 and November 26-27. The complete set of rules will appear in the September QST magazine.

If you're keen on working DXpeditions, Per-Einar Dahlen LA7DFA will be active from the island of Jan Mayen (IQ50) from June onwards. Incidentally, Jan Mayen is located in the

Date	Rise	Az	Set	Az
30 Jul	2245	066	1320	294
31 Jul	2320	062	1420	298
03 Sep	0235	072	1725	288
04 Sep	0350	079	1750	280
01 Oct	0125	076	1550	284
02 Oct	0240	083	1615	277
29 Oct	0020	080	1415	280
30 Oct	0130	087	1440	273
26 Nov	0030	084	1240	276
27 Nov	0030	092	1300	268
17 Dec	1555	057	0720	302
18 Dec	1645	058	0810	302

Norwegian Sea between Greenland and Norway. Per plans to use a Yaesu FT-736 running 10W into a dipole. He will use the call sign JX7DFA.

The Roa Island Lifeboat station in WAB square SD26 (Cumbria) will be activated on July 16-17. The call sign GB0RIL will be aired on h.f. and the 144MHz band. The operators will be G4YQW, G7BXA and G7DKX. Further details from **Peter Green G7DKX** on (0532) 563462.

The ES0SM expedition group (ES5MC, SM0KAK) had planned to operate from Latvia on the 50MHz band this summer. **This will now not take place.** It's expected that ES5MC and others will now activate Saaremaa Island (KO07) during the last week of July.

Mike May G4XBF will be operating from The Lizard, Cornwall (IN79JX) in August. The expedition is timed to coincide with the Perseids meteor shower. He will be active on the 70MHz band with 100W and a 4-element Yagi.

Deadlines

That's all I have for you this month, and it's time to mention deadlines. Please send your reports to me at: **Yew Tree Cottage, Lower Maescoed, Herefordshire HR2 0HP.**

Alternatively you can send them via packet radio @ GB7MAD or the DX Cluster system. You can also telephone me on (0873) 87679 especially if there's a Sp-E opening just starting!

E N D

Paul Essery GW3KFE has some tips on DX working, news and information on personalities, QSLs and your letters in his regular look at the world on h.f.

Welcome to the world of h.f. where the coronal holes have continued to rip the bands apart up to the time of writing. However, some people have a knack of choosing to switch on just at the best moments.

For another approach, I can recall the YL operator back in the 1940s, who would sit on the DX frequency with her knitting until something interesting turned up. She rarely missed the DX.

Geoff Watts

Another great name has passed on: Geoff Watts BRS 3129 left us on May 9 from a heart attack at the age of 75. Every DX operator used his various lists. Geoff's induction - the only s.w.l. - in the CQ Hall of Fame in 1977 arose from these, the *DX News Sheet*, and the IOTA programme which he also founded.

On the practical side, Geoff Watts had all countries confirmed, having been the first listener with 40 zones and up to 300 countries. For me, and many others, a friend has been lost.

News of another death came via German newspapers which reported the murder of Horst Henning DK6NN and his XYL Traude at their holiday home in the Bahamas Great Abaco Island. Many readers will have worked the Bahamas by way of C6/DK6NN.

Your Letters

Our first offering from your letters comes from **Angie Sitton G0HGA** in Stevenage. She hasn't been on 1.8MHz much but on 3.5MHz found plenty of signals even if not much could be classified as DX.

Angie used 7MHz for working KA1DWW, in the small hours. And an interesting one was

UA9FGR/MM at Hamburg one evening. The 10MHz band is a favourite for Angie at the moment but 9V1YH was a 'Gotaway', although JA5AUC became a band 'new one', and indeed first JA for over a year on any band with 3A/DF1AN and TA1AN also being new ones.

Venturing up to 18MHz Angie had a chat with EA8CN who is SM5CUN. As for 24MHz, she worked a new country in G3IOI, as far away as Essex!

Next I've heard from **Derek GW3JSV**, not a thousand miles from here. Derek was ribbing me about conditions, and it seems as though he has a crystal ball which switches the rig on and alerts him whenever his chosen band opens up. Perhaps an article for *PW* on how to operate a crystal ball?

Russian Mail

The Russian mail problem: news has come via NT2X and DXNS and I've heard that the five crooks who were opening the mail and nicking the IRCs and dollar bills have been caught. Can we hope that the odd card might now actually get through?

Still in this area of QSLs, the death of Joanie Branson KA6V/7 when her OM AA6BB was himself recovering from heart surgery, must have thrown a spanner in the works. This is because Joanie was so well known for her QSL Manager activity as well as on the bands. Latest news (May 18), however is that the majority of direct requests have been shipped.

Another Slim

There's another 'Slim'. The '5A0/JA2MA0' wasn't: JA2MA0 was in Japan at the particular time. The 'A61AN' was another manifestation of 'Slim'. Don't

waste a card on either of these pseudo stations.

The DX News Sheet notes that JA8MWU who had been active from Nepal was rumoured to be heading for Thimpu. Later indications are that the trip failed to come off - transport problems - but it may be possible in a year's time.

Ted G2HKU in the Isle of Sheppey is now back on the bands after surgery. Ted mentions ON7BW on 1.8MHz who uses a cubical quad for transmit and a Beverage antenna for the receive side. He also mentions some addresses for direct QSL-ing. Any for 8P9NX goes to W0SA; those for 4K1F go to KF2KT; those for FG5BP go to KA3DSW; and those for Z21HS go PO Box 4110, Harare, Zimbabwe.

Nice to hear from **Geoff Crowley** of Aberdeen, who holds the call TF3XXT. But since his move from Iceland he has been struggling to get the correct paperwork out of SSL so he can apply for a UK licence.

In Aberdeen, Geoff has managed to get a half-size G5RV up and is trying out his ears. An interesting one was RA3SU/R0B on an Arctic expedition on Sredny island, 79N 91E.

By contrast, the 'liddery' apparent when despite his request for full calls only, 9K2XX was drowning in a sea of 'last two letters' shouts. Don't these callers ever listen?

Perhaps a real rare one should announce that anyone giving 'last two' calls will not get a card because he fails to accept what the DX decides. Unenforced rules are pretty useless!

Documentation For DXCC

On the DXCC front, I note that more documentation on the P5RS7 show has been received and is being translated from the Korean. As for the I2RA0/HK0

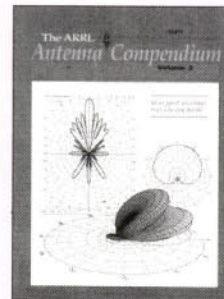
Malpelo activity, the current position is that more documentation, including a landing permit, is awaited.

Applications and cards hitting the DXCC Desk are running at a higher rate - applications up 14% and cards 38% up in the first four months of 1994, following a long term rising trend.

So - there you have it. Letters please to reach me by the middle of the month, to: **PO Box 4, Newtown, Powys SY16 1ZZ.**

Many h.f. bands operators, like regular 'HF Bands' reporter Geoff Crowley of Aberdeen who holds the Icelandic callsign TF3XXT, use the famous G5RV multiband antenna. Those who would like to know more about their G5RV antenna will find the 'The G5RV Antenna Up-to-Date' chapter in the *The ARRL Antenna Compendium Volume 1* of interest. In this section of the book Louis Varney G5RV discusses at length how the antenna works on all the h.f. bands (including the WARC allocations). The book and the other volumes in the series also contain many other h.f. antennas and ideas.

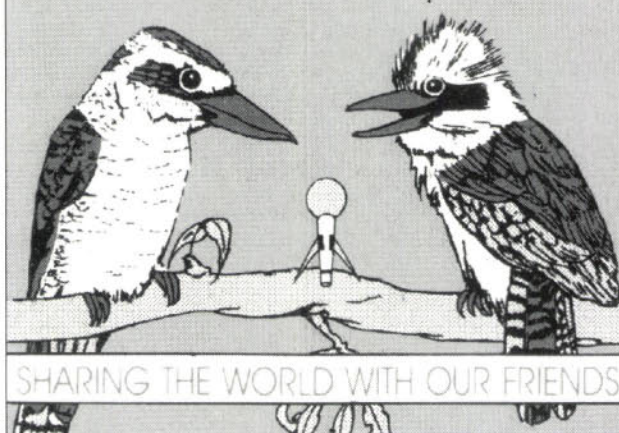
The ARRL Antenna Compendium Volume 1 is available from the *PW* Book Service, cost £9.50 plus £1 P&P (UK) £1.75 (overseas).



E N D

Round-up

RADIO AUSTRALIA



Peter Shore takes his regular look at broadcasting schedules and the activity on the short wave bands.

The Civil war in the Yemen, reunited just a couple of years ago, means that tuning into programmes from Sana'a and Aden could be interesting. The Republic of Yemen Radio in the northern capital of Sana'a is on the air in Arabic from 0255 to 2140 on variable 9.78, 9.069, 5.95 and 4.835MHz. While the Republic's Second programme, in Aden, operates from 0300 to 2300 on 7.19, 6.005 and 5.9MHz.

New transmitters have been inaugurated by Radio Australia at its Darwin site in the Northern Territory. Two 250kW senders have been installed, bringing the total on the site to five, although only three can be on the air simultaneously. The main target areas for the Darwin operation are China, Indonesia, Pakistan and the Philippines.

The British news media seems to have sidelined the continuing conflict in the former Yugoslavia, concentrating in recent weeks on domestic political events and the appalling tragedy of Rwanda. But nonetheless the Balkans remain an area of destruction and mayhem for much of the time.

Radio Yugoslavia in the city of Belgrade continues to operate, with the short wave service emanating from Bijeljina in Bosnia. English is on the air to Europe at: 1830-1920 on 9.72 and 6.10; 2030-2100 on 9.62 and 2100-2130 on 9.595 and 7.265MHz.

International Broadcasters

There is no news yet of a Palestinian international broadcaster following the peace agreement in the Middle East. Kol Israel, the Voice of Israel, in Jerusalem, is on the air with English programmes at: 1300-1325 on 15.65, 15.64 (Sunday to Thursday); 1900-1930 on 17.575, 15.64, 11.675, 11.603, 9.435; 2130-2200 on 17.575, 11.675, 11.603, 9.435,

7.465MHz. There are relays of the domestic Network A programme at: 0400-0415 on 17.545, 11.605, 9.435; 1000-1030 on 17.575, 15.65, 15.64MHz.

Summer Holiday Listening

As the summer holidays approach, many people will be heading towards the Mediterranean, including Greece. If you are lucky enough to be going there, you might want to tune into the Voice of Greece before you fly.

English is on the air to Europe at: 0740-0750 on 15.65, 11.645, 9.425; 1335-1345 on 17.535, 15.63; 1840-1850 on 17.525, 15.65 and 2000-2010 on 9.395MHz.

Perhaps you might be going to neighbouring Turkey. If so try the English service of TRT in Ankara at: 2000-2100 on 9.90 and 2200-2300 on 11.71, 9.445 and 7.185MHz.

Since 6 June, Swiss Radio International has been operating a 24 hour a day English network via the Astra satellite. There is news on the hour, every hour, followed by current affairs programmes, and then at half past the hour there are feature programmes.

Old favourites like the *Swiss Shortwave Merry-Go-Round* have been incorporated into the new feature programme output. You can find the new rolling English service on Astra transponder 9 used by Teleclub. This new service is thought to incorporate the special English breakfast-time service provided by cable to hotels throughout Switzerland.

Bulgaria is hiring out its transmitters to other broadcasters. These include the Voice of America which is on the air on 12.035 at 0600-0700 and on 13.68MHz between 1800 and 1900UTC.

In last month's column I gave the schedule of the Sofia-based station. Since then, an additional frequency has been added which makes the current English to Europe output: 1900-2000 on 11.72 and 9.70 and 2100-2200 on 11.72, 11.645 and 9.70MHz.

Domestic Short Wave

You now have a chance to listen to Albanian domestic radio on short wave. Since the end of May, the First and Second programmes have been audible for much of the day in the 6MHz band.

The First programme is on the air between 0500 and 2400 on 6.10 (a channel used by Radio Yugoslavia). The Second programme is heard between 1100 and 1600 on 6.145MHz.

Radio Prague broadcasts English to Europe from transmitters in both the Czech Republic and Slovakia: 0600-0627 on 9.505, 7.345 and 5.93, 1030-1057 on 11.99, 9.505, 7.345; 1500-1527 on 13.58, 7.345, 5.93; 1700-1727 on 11.64, 7.345, 5.93; 2000-2027 and 2100-2127 on 9.485, 7.345, 5.93MHz.

With many calls on its resources, the Red Cross is perhaps busier today than any time since it was established. The Red Cross Broadcasting Service will be on the air on June 26, July 31 and August 28 with English to Europe at 0700 and 1300 on its regular

channel of 6.165MHz.

Radio Havana Cuba has reduced its European transmission in English to one frequency at 2100 to 2200: 17.76MHz. Spanish is heard at 2100 to 2300 on 17.705, 15.195 and 13.715(u.s.b.). Try for English to North America at 0000-0200 on 13.70(u.s.b.), at 0200-0500 on 9.82 and 9.55 and 2200-2300 on 9.55MHz.

If you have been tuning around the f.m. dial in either Paris or London, you may have come across something rather unusual. Radio France International is on the air via a low power transmitter in London on 105.4MHz, while the BBC is transmitted on 107.1MHz in Paris.

The month long arrangement started on May 31 and may be the first of several similar exchanges now that DTI approval has been given for the scheme.

That's it for another month, don't forget to keep writing to me via the PW Editorial Offices in Broadstone. Until next month 'good listening'.

E N D

The World of ATV

Andy Emmerson
G8PTH takes his bi-monthly look at the ATV scene, starting off with news of an Amateur Television Conference.

Did a mystery amateur jam these aircraft radars atop Clee Hill in Shropshire?

(CAA Photograph)



The BATC's Conference on Amateur Television, CAT94, is being held on September 10 and 11th at Shuttleworth College, Old Warden, between Bedford and Biggleswade. You may know the site better as the home of the Shuttleworth Collection of vintage aircraft and where the Dunstable Downs club used to hold their very successful amateur radio car boot sales.

The main buildings on site are part of Cranfield University and make a very fitting place to hold an event like CAT94. A full programme is being arranged, including lectures, BATC biennial general meeting, repeater users forum, members' trading and a display of outside broadcast vehicles.

The conference should be a fun time for everyone, although it is not a rally as such. There will be a small number of trade stands but the key aim is to provide an unpressurised get-together where members can display equipment they have built, discuss circuit techniques and listen to presentations on television technology.

It is hoped to have speakers on a number of digital television topics, whilst the ever-popular television outside broadcast vans will be on display (possibly augmented by at least one van not previously seen).

Stately Venue

The stately home venue will be more 'homely' than the average rally site and should prove as popular as Harlaxton did when this was open for use by the BATC. The function is being run primarily for members and if you have any interest in ATV but are not yet a member, now is a great time to join! Send me an s.a.e. for the BATC's information brochure and membership form.

The last time the BATC held a conference like this was in 1979 when the club presented CAT70 at Churchill College, Cambridge. A lively demonstration of the then state-of-the-art amateur television technology was

mounted, with several live outside broadcasts from ATV stations in East Anglia.

Fortunately a record of the proceedings was made on video and you can order this from me for £5. The original recording was made on Sony open-reel equipment, in 405 lines, but the optical up-conversion looks quite reasonable.

Future Of ATV

The future of ATV is one of the key discussion topics for the BATC. What is the future of ATV and does ATV as we know it today even have a future?

Certainly the pressure for additional mobile radio frequencies in the u.h.f. spectrum may put an end to the luxury (not my words!) of a 430MHz amateur band stretching from 430 to 440MHz. If this band is reduced, where will ATV go?

Can digital compression techniques be applied to ATV and if so, which standard should we use? Is MPEG2 (Motion Picture Expert Group compression definition version 2, similar to JPEG for still pictures) or a derivative suitable for amateur use and if so, whose equipment and circuits should we use? Is there a common world-wide standard emerging for ATV? All this and more will be on the table for discussion at CAT94.

Allotted Bands

It is easy to forget that our allotted ATV bands are shared with various prime users, even if you never encounter their signals. In many cases, however, their equipment is affected by our amateur transmissions and sometimes we amateurs have to shift these to accommodate the professional users.

When GB3XT, the Bristol ATV repeater and GB3UD, Stoke-on-Trent, requested auxiliary vision inputs on 10.250GHz, these apparently harmless applications were declined by the prime user of the band (don't ask me who this is!). In the event the input

frequency allocated for Bristol is 10.280GHz and for GB3UD is 10.300GHz. In both cases the output is 10.150GHz.

The frequency bands 10.250 to 10.270 and 10.360 to 10.400GHz must not be used for repeater inputs in Britain. It's also worth noting that the frequency 10.300GHz is used for airport surface movement radar and should be avoided for amateur use.

Police equipment also uses the band 10.25 to 10.26GHz apparently, so you should avoid putting your transmissions inside this sub-band.

Public Service Announcement

Here's another word to the wise, coming from the Radiocommunications Agency. This is the message, verbatim.

"ATV stations operating in the 1.3GHz band have been left running unattended on sites remote from the main base station address and have caused severe interference at distances of 30 to 40km away to air traffic control radars, which are the primary users of this band. The amateur licence does not permit unattended operation of TV in this band except where a Notice of Variation has been issued for a repeater and these are subject to careful site clearance procedures).

Operation outside the terms of a licence is unlicensed use, and enforcement action (which could mean prosecution and/or revocation) can be expected in these cases. This is particularly so where a safety of life service, the security of which is the RIS's first priority, is at risk".

This notice has been reproduced from the RSGB's magazine *Radio Communication* and is presumably genuine. No copy was sent direct to the BATC, which at first sight is strange.

But in my usual subversive way, I look for a 'conspiracy theory' meaning to the message because as it stands, it does not really stand

up to scrutiny. Either the true message is other than it appears to be or else the person who wrote the notice was not briefed properly.

I find it highly unlikely that any genuine amateur television enthusiasts would jeopardise their hard-won licences by this kind of misguided operation, although I can see the point of this message as a sabre-rattling exercise to warn off certain G3s testing out their commercial video surveillance systems on amateur frequencies.

The background information is that two stations, in Surrey and Shropshire, transmitted video and caused severe disturbance to aircraft radars but it is not stated whether these stations were (or even purported to be) amateurs nor whether they were operating within the amateur band. I would have expected these points to have been made. If the stations were operating legally in all other respects surely a direct and private approach could have been made, since it is unfair to tar all other amateur stations with the same dirty brush.

But what puzzles me is why the radars were affected so greatly by this operation. Surely any ATV station, attended or unattended, will cause the same degree of trouble and if the sole point of the argument is that unattended stations cannot be contacted in case they need to be closed down, then the same must apply even more so to contest stations.

Indeed, on this basis one might infer that the UK's air warning system goes into apoplexy every time there's an ATV contest on the air, and I don't think that happens. All fascinating stuff, proving once more that there are more questions than answers.

That's all I've room for this time, so enjoy the world of ATV and keep those letters coming to 71 Falcutt Way, Northampton NN2 8PH.

E N D

ARCADE



The PW Shopping Arcade

Welcome to the *Practical Wireless* 'Arcade'. In this section of the magazine, you'll be able to find all those important services 'under one roof' - just like the shopping arcades you see in the High Street.

Let your eyes 'stroll through' the Arcade every month and you'll find all departments open for business including: The Book Service, PCB Service, Binders and details of other *PW* Services. Make a regular habit of 'visiting' the Arcade, because in future, you'll have the chance of seeing special book offers and other bargains. And don't forget, this Arcade is open wherever you're reading *PW*!

Services

Queries:

Practical Wireless,
PW Publishing Ltd., Arrowsmith Court,
Station Approach,
Broadstone, Dorset BH18 8PW.

We will always try to help readers having difficulties with *Practical Wireless* projects, but please note the following simple rules:

- 1: We **cannot** deal with technical queries over the telephone.
- 2: We **cannot** give advice on modifications either to our designs, to commercial radio, TV or electronic equipment.
- 3: All letters asking for advice **must** be accompanied by a stamped self-addressed envelope (or envelope plus IRCs for overseas readers).
- 4: Make sure you describe the problem adequately, with as much detail as you can possibly supply.
- 5: Only one problem per letter please.

Back Numbers

Limited stocks of many issues of *PW* for past years are available at £2.00 each including post and packing. If the issue you want is not available, we can photocopy a specific article at a cost of £1.50 per article or part of article. Over the years, *PW* has reviewed many items of radio related equipment. A list of all the available reviews and their cost can be obtained from the Editorial Offices at Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW for a large stamped self-addressed envelope.

Binders

PW can provide a choice of binders for readers' use. Plain blue binders are available, each holding 12 issues of any A4 format magazine. Alternatively, blue binders embossed with the *PW* logo in silver can be supplied. The price for either type of binder is £5.50 each (£1 P&P for one, £2 for two or more). Send all orders to PW Publishing Ltd., FREEPOST, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW.

Constructional Projects

Components for *PW* projects are usually readily available from component suppliers. For unusual or specialised components, a source or sources will be quoted.

Each constructional project is given a rating to guide readers as to the complexity.

Beginner: A project that can be tackled by a beginner who is able to identify components and handle a soldering iron.

Intermediate: A fair degree of experience of building radio or electronic projects is assumed, but only basic test equipment will be needed to complete any tests and adjustments.

Advanced: A project likely to appeal to the experienced constructor. Access to workshop facilities and test equipment will often be required. Definitely not for the beginner to attempt without assistance.

Mail Order

All items from *PW* are available Mail Order, either by post or using the 24hr Mail Order Hotline (0202) 659930. Payment should be by cheque, postal order, money order or credit card (Mastercard and Visa only). All payments **must** be in sterling and overseas orders **must** be drawn on a London Clearing Bank.

Antenna Book Reviews

As this is the 'Antenna Special' issue of *PW*, Rob Mannion G3XFD has looked at some interesting books for your library, dealing with this fascinating and popular subject.

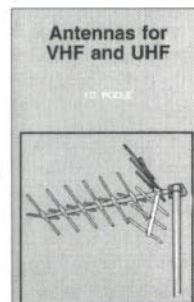
Antennas for VHF and UHF

I. D. Poole

Published by Bernard Babani

I feel that we're privileged here at *PW* in having Ian Poole G3YWX writing for us on a regular basis. Ian is a prolific technical author with an easy to read and informative style which belies his status as a B. Sc (Eng) and Chartered Engineer. His latest offering is an excellent little book dealing with v.h.f. and u.h.f. antennas. The book has chapters covering Basic Concepts, Feeders, The Dipole, The Yagi, The Cubical Quad and so on. Altogether this is a comprehensive book packed with information and practical ideas. Highly recommended for the beginner and experienced enthusiast alike.

104 pages. £4.95 plus £1 P&P (UK), £1.75 P&P (overseas) from the *PW* Book Service.



The ARRL Antenna Book 16th Edition

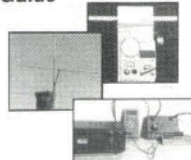
Edited By Jerry Hall K1TD

Published by the ARRL

This book has to be my favourite. I first discovered (a much slimmer volume then!) *The ARRL Antenna Book* over 20 years ago, and it's grown and become even more comprehensive with each edition. Covering everything from masts and safety to microwaves antennas and methods, it's a must for your bookshelf. In particular, I've found the sections on propagation and theory to be very readable. I learn something new every time I read mine. A superb book.

789 pages. £14.50 plus £1 P&P (UK), £1.75 (overseas) from the *PW* Book Service.

The Antenna Experimenter's Guide



Peter Dodd G3LDO

The Antenna Experimenter's Guide

Peter Dodd G3LDO

Published by DD Publications

This is a book for the practical enthusiast who enjoys real 'hands on' antenna work. Regular readers will know that Peter G3LDO has written for *PW* on a regular basis, and with his book you're bound to get more out of your hobby and learn something new with the help of this eminently practical work.

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ARRL Antenna Compendium

Volumes 1, 2 & 3

Edited By Jerry Hall K1TD

Published by the ARRL

Volume 1 contains hitherto unpublished antenna material including articles on cubical-quads and loops, log periodics beams and multi-band antennas, 175 pages. Volume 2 contains antenna material that has not been published in QST, and as such, has much which will be new to the British reader, 208 pages. Volume 3 carries a further selection of antenna projects and related articles to the high standard expected from the ARRL, 236 pages.

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DIAL SEARCH 1992/94

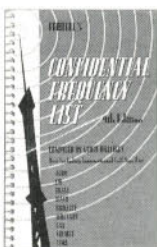
George Wilcox

The listener's check list and guide to European radio broadcasting. Covers m.w., l.w., v.h.f. & s.w., including two special fold-out maps. Also includes a full list of British stations, a select list of European stations, broadcasts in English and 'Making the Most of Your Portable'. 46 pages. £4.25

FLIGHT ROUTINGS 1993

Compiled by T.T. & S.J. Williams

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. 122 pages. £6.00



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9th Edition

Compiled by Geoff Halligey

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listing showing every known frequency against each callsign, who's using what frequency and mode, what's that callsign? These are some of the answers this book will help you find. 544 pages. £17.95

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The new edition of this super reference book covers the world's facsimile stations, their frequencies and methods of working. There is a section covering the equipment needed to receive FAX over the radio. To give you an idea of what is available there are many pages of off-air received FAX pictures. 392 pages. £18.00

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BP255

Peter Shore

As in 'Broadcast Round-up', his column in PW, Peter Shore has laid this book out in world areas, providing the listener with a reference work designed to guide around the ever-more complex radio bands. There are sections covering English language transmissions, programmes for DXers and s.w.l.s. Along with sections on European medium wave and UK f.m. stations. 266 pages. £5.95

INTERNATIONAL VHF FM GUIDE

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Julian Baldwin G3UHK & Kris Partridge G8AUU

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Langley Pierce

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Joe Pritchard G1UQW

A technical guide for all short wave

listeners. Covers construction and use of sets for the s.w.l. who wants to explore the bands up to 30MHz. Also covers the technical side of the hobby from simple electrical principles all the way to simple receivers. 276 pages. £15.95

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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

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Clive Woodyear

This is the third edition of this radio listener's guide. Simple-to-use maps and charts show the frequencies for radio stations in the UK. Organised so that the various station types are listed separately, the maps are useful for the travelling listener. Articles included in the guide discuss v.h.f. aerials, RDS, the Radio Authority and developments from Blaupunkt. 68 pages. £3.45

SHORT WAVE INTERNATIONAL FREQUENCY HANDBOOK

Formerly the Confidential Frequency List and re-published in April 93, this book covers 500kHz-30MHz. It contains duplex and channel lists, callsigns, times and modes, broadcast listing and times. 192 pages. £9.95



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WORLD RADIO TV HANDBOOK 1994

Country-by-country listing of l.w., m.w. & s.w. broadcast and TV stations. Receiver test reports, English language broadcasts. The s.w.l.'s 'bible'. £15.95.

SATELLITES



NEWNES GUIDE TO SATELLITE TV

Derek Stephenson

This book, the 3rd edition, is a hard bound volume, printed on high quality paper. The author is a satellite repair and installation engineer and the book covers all information needed by the installation

engineer, the hobbyist and the service engineer to understand the theoretical and practical aspects of satellite reception with dish installation and to how to trouble-shoot when picture quality is not up to anticipated reception. Mathematics has been kept to a minimum. 371 pages. £18.95

SATELLITE BOOK - A Complete Guide to Satellite TV Theory and Practice

John Breeds

This book deals almost exclusively with television broadcast satellites and is a comprehensive collection of chapters on topics, each written by a expert in that field. It appears to be aimed at the professional satellite system installer, for whom it is invaluable, but it will be appreciated by a much wider audience - anyone interested in satellite technology. 280 pages. £30.00

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Book 3 RSGB

John Case GW4HWR

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Published by RSGB

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ARRL HANDBOOK FOR RADIO AMATEURS 1994

This is the 70th edition of this handbook and contains the best information from previous issues. New for this edition is some information on feedback-loop design for power supplies, a new gel-cell charger project, updates on antenna systems and new coverage of baluns, propagation programs are compared and colour SSTV and telephone FAX machines are also covered. Finally there's a new section on 'for the workbench' with new projects for the reader to build. 1214 pages. £18.95

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Another very useful ARRL book. Although written for the American amateur, this book will also be of use and interest to the UK amateur. Topics covered range from short wave listening through operating awards to repeaters, operating and satellites. 684 pages. £12.95

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The best from the Amateur Satellite News column and articles out of 31 issues of *QST* have been gathered together in this book. The latest information on OSCARs 9 through 13 as well as the RS satellites is included. Operation on Phase 3 satellites (OSCAR 10 and 13) is covered in detail. 97 pages. £9.95

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G. R. Jessop G6JP

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A collection of practical ideas gleaned from the pages of *QST* magazine. Plenty of projects to build, hints and tips on interference, c.w. and

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Clive Smith G4FZH and George Benbow G3HB

The background to multiple choice exams and how to study for them with sample RAE paper for practice plus maths revision and how to study for the exam. The majority of this book is given to sample examination papers so that candidates can familiarise themselves with the examination and assess their ability. 88 pages. £7.99

INTRODUCTION TO AMATEUR COMMUNICATIONS SATELLITES

BP290 - A. Pickard

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I. D. Poole

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BP293

J.G. Lee

How does the sun and sunspots affect the propagation of the radio waves which are the basis of our hobby? They affect the ionosphere, but differing frequencies are treated differently. Find out how to use charts to predict frequencies that will be the most profitable. What effect will noise have on the signal? Find out with this book. 116 pages. £3.95

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I.D. Poole

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LOW PROFILE AMATEUR RADIO - OPERATING A HAM STATION FROM ALMOST ANYWHERE

Jim Kearman KR1S

This book delves into the techniques of being a 'hidden Ham'. There are chapters on specialised equipment, operating techniques and antennas to name but a few. If you have a fascination for spy type radio equipment or like the idea of having a complete h.f. or v.h.f. rig built in a suitcase, then this little American book is for you. 124 pages. £5.95

MICROWAVE HANDBOOK RSGB

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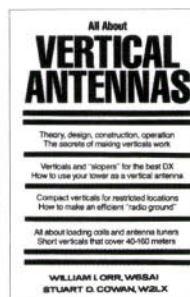
INTERFERENCE HANDBOOK (USA) William R. Nelson WA6FG

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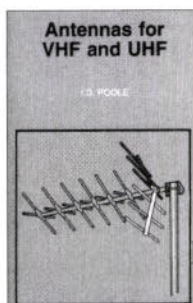
Peter Dodd G3LDO

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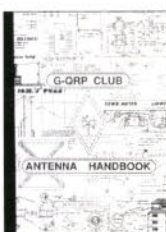
Edited by Jerry Hall K1TD

As the title suggests, this book is the third in the continuing series on practical antennas, theory and accessories produced by the ARRL. The book reflects the tremendous interest and activity in antenna work, and provides a further selection of antennas and related projects you can build. 236 pages. £9.50

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G-QRP CLUB ANTENNA HANDBOOK
Compiled and edited by P. Linsley G3PDL & T. Nicholson KA9WRI/GWOLNQ.

This book is a collection of antenna and related circuits taken from *Spratt*,

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Edited by Erwin David G4LOI

This book contains a collection of useful, and interesting h.f. antenna articles, first published in the RSGB's *Radio Communication* magazine, between 1968 and 1989, along with other useful information on ancillary topics such as feeders, tuners, baluns, testing and mechanics for the antenna builder. 233 pages. £10.99.

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Doug DeMaw W1FB

This book provides lots of designs, in simple and easy to read terms, for simple wire and tubing antennas. All drawings are large and clear making construction much easier. There is no high-level mathematics in this book, just simple equations only when necessary to calculate the length of an antenna element or its matching section. 123 pages. £6.95

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YAGI ANTENNA DESIGN

Dr James L. Lawson W2PV

This book is a polished and expanded version of a series of articles first published in *Ham Radio* following on from a series of lectures by the author, who was well-known as the expert on Yagi design. Chapters include simple Yagi antennas, loop antennas, effect of ground, stacking and practical antenna design. 210 pages. £10.95

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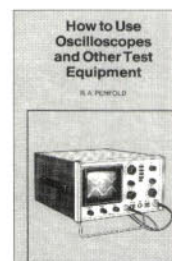
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Canadian 52 set, must be in good condition and working with power unit, etc. Also information on same or service manual or copies. All expenses met, can arrange collection. David Jones, 50 New Dock Street, Llanelli, Dyfed SA15 2MB. Tel: (0554) 775790.

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Ed Turner, Ohio, USA, would you consider selling one of your Hallicrafters please. Mr M. McGeechan, 113 Old Mill Road, Uddingston, Glasgow, Scotland G71 7JB.

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I.C. KB4412 for RX80 amateur band receiver, sold by Cirkit, circa 1980, as a d.b.m. and i.f. amp. T. Wraith, 9 Willow Grove, Thorne, Doncaster, South Yorks DN8 4EH.

Two transistors AU103/02, any info please. T. Plummer, 33 East Street, Sudbury, Suffolk CO10 6TU. Tel: (0787) 311985.

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Please use an order form from a previous issue as there was no room to squeeze it in this month. You must still send the corner flash from this page. Ed.

Bargain Basement
August 1994

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Be sure of your copy of *Practical Wireless* every month and qualify for the Subscribers' Club as well. Special offers and discounts are normally available to members, including those abroad.

In keeping with our antenna theme in *PW* this month, we've come up with a special offer to suit. This time we're offering the **Diamond X-30 144/430MHz dual-band base station antenna** at a special price.

Just look at what's on offer in our combined Reader/Subscriber offer this month: The Diamond X-30 covers 144 and 430MHz, has a quoted (manufacturer's) gain of 3dB on 144MHz and 5.5dB on 430MHz. The maximum power rating is 150W, it matches into 50Ω and has a claimed v.s.w.r. of less than 1.5:1.

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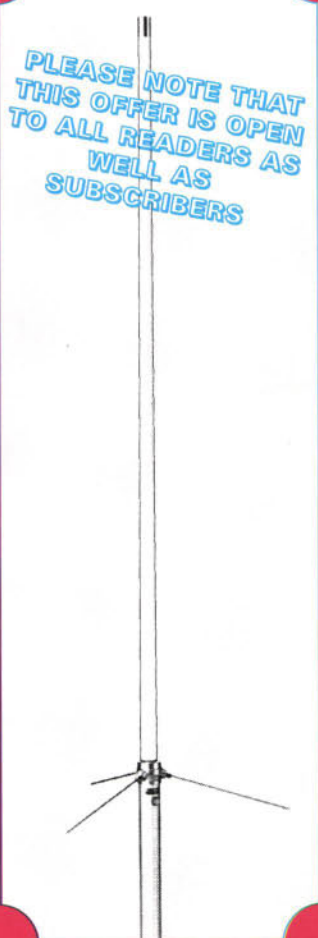
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Board	Article (Project) Title	Issue	Board	Article (Project) Title	Issue
WR315	PW Bourbon 3.5MHz TX	Aug 93	WR288	Morse Master	Jun 91
WR314	UHF Pre-Amplifier	Dec 92	WR286	Meon-4 (RF PA)	Jun 91
WR313	10MHz Transmitter	Nov 92	WR287	Morse (Speedbrush)	May 91
WR312	Receiver/Mixer (Getting Started)	Nov 92	WR255	Meon-4	May 91
WR311	Oscillator BFO (Getting Started)	Sept 92	WR285	Scope Probe PSU	Apr 91
WR310	1.2GHz Pre-scaler	Aug 92	WR284	Scope Probe	Apr 91
WR309	Volt Reg/Divide by 100	Aug 92	WR283	Sudden Receiver	Mar 91
WR308	TTL 1MHz Oscillator (Getting Started)	July 92	WR282	Repeater Toneburst	Feb 91
WR307	Crystal Checker (Getting Started)	June 92	WR281	High Voltage PSU	Jan 91
SET	WR303/304/305/306 Inductance Bridge	Apr 92	SET	WR263/264+WR276-80 Marland Transmitter	Jul 90
WR302	GDO (Getting Started)	Apr 92	WR272	NiCad Recycler	Sep 90
WR301	Challenger Receiver	Feb 92	WR275	Low Voltage Alarm	Jun 90
WR300a	OSCAMPS Oscillator	Mar 92	WR273	Valve PSU	Jun 90
WR300	OSCAMPS Amplifier	Feb 92	WR275	RX Attenuator	May 90
WR299	Multivibrator (Getting Started)	Jan 92	WR271	Product Detector	Apr 90
WR297/298	Additional Beaver boards		WR270	Badger Cub	Apr 90
SET	WR295/296 PW Beaver	Oct 91	WR269	Glymne	Feb 90
SET	WR292/293/294 Chatterbox	Aug 91	WR268	Inwell (RF PA)	Feb 90
SET	WR290/291 Robin Freq. Counter	Aug 91	WR264	Inwell (Relay)	Feb 90
SET	WR292/293/294 Chatterbox	Aug 91	WR263	Inwell (VFO)	Jan 90
WR289	Meon-4 (Control)	Jul 91	WR267	PW 48er	Jan 90
			WR266	Tuned Active Antenna	Jan 90
			WR265	Tuned Active Antenna (PSU)	Jan 90
			WR199	Meon 50MHz Transverter	Oct 85
			WR161	Marchwood 12V 30A PSU	Jul 83

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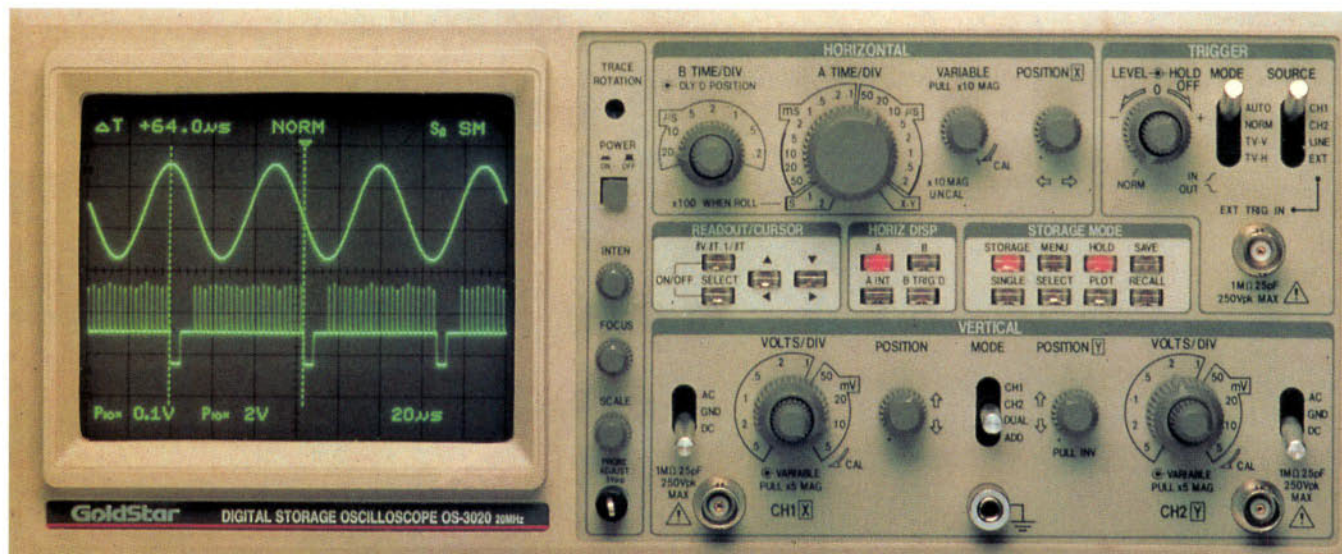
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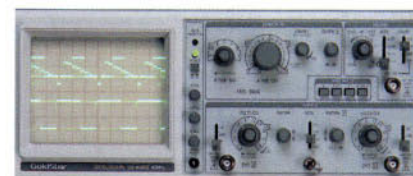
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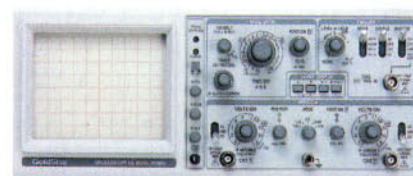
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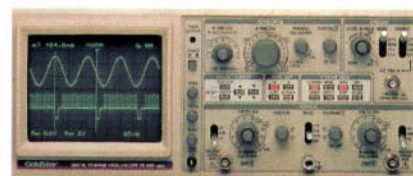
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