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practical Wireless

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BY G8JVE &
'MODDING' THE ROBIN BY G4SGF

- BEN NOCK G4BXD SAYS..."PASS THE BLACK COUNTRY SCREWDRIVER"
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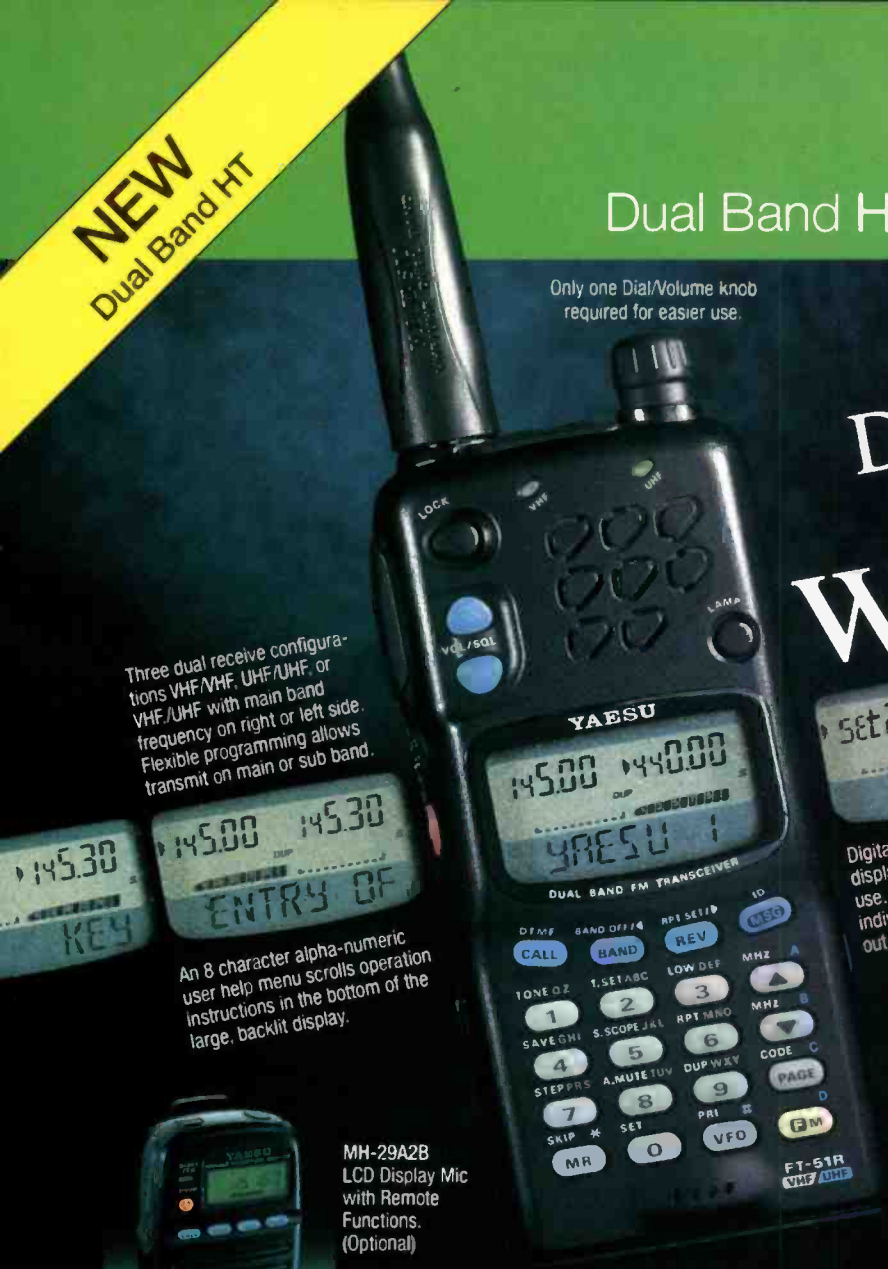
NEW
Dual Band HT

Dual Band Handheld FT-51R

Only one Dial/Volume knob required for easier use.

The First Dual Band HT with WINDOWS!



Three dual receive configurations VHF/VHF, UHF/UHF, or VHF/UHF with main band frequency on right or left side. Flexible programming allows transmit on main or sub band.

An 8 character alpha-numeric user help menu scrolls operation instructions in the bottom of the large, backlit display.

Digital battery voltage readout displays condition of battery in use. Scan skip function allows individual memory channel lockout during scanning mode.

Spectrascope™ displays active adjacent frequencies in real time with relative signal strength.

MH-29A2B
LCD Display Mic with Remote Functions. (Optional)

FT-51R
2¼"W x 4¾"H x 1⅛"D
(2 Watt version shown.)

The new FT-51R Dual Band HT is state-of-the-art, and easy to use! So easy, you won't need an operating manual. Its exclusive, scrolling instruction menu located in the large, backlit display "window", guides you through total operation while simultaneously viewing the main display window.

You'll like some of the other new, exclusive features, too. Like Spectrascope.™ This unique feature displays real time, continuous scanning of activity on adjacent frequencies in VFO mode or 8 of your favourite memories. A cloning feature duplicates favourite channels to another FT-51R.

A digital battery voltage display, five power output levels, the largest backlit dual band HT keypad made, Smart Mute,™ two VFOs on both VHF and UHF, as well as available 2 Watt and 5 Watt versions, round out the exciting FT-51R. Plus, the optional MH-29A2B Display Microphone allows you to control volume and also access Memory, VFO, Call Channel, Band Selection and scanning functions. All of this in world's smallest dual band HT radio!

See the FT-51R with "windows" at your Yaesu dealer today!

"I can see two frequencies and alpha-numeric all at the same time."

"Scrolling instructions tell me what to do next!"

"I use the Spectrascope to find new contacts faster."

"Yaesu did it again!"

Specifications

- Frequency Coverage
  VHF RX: 110-180 MHz
  TX: 144-146 MHz
  UHF RX: 420-470 MHz
  TX: 430-440 MHz
- Spectrascope™ Display
- Scrolling User Help Menu
- Alpha-Numeric 8 Character Display
- Up/Down Volume/Squelch Controls & Display
- Selectable Sub-Band TX Mute
- Automatic Tone Search (ATS)
- Digital Battery Voltage Display
- AM Aircraft Receive
- Scanning Light System (SLS)
- 120 Memory Channels (80 w/Alpha-Numeric)
- Large Backlit Keypad & Display
- Automatic Repeater Shift (ARS)
- Multiple Scanning Modes
- 3 Selectable Scan Stop Modes with Scan Skip
- User selectable lock function w/15 combinations
- Automatic Power Off (APO)
- TX/RX Battery Savers Built-in
- Handy Cloning Feature
- 5 Selectable Power Output Levels
- Message system with CW ID
- Selectable RX Smart Mute™
- Cross-Band & One-Way Repeat Functions
- DTMF Paging/Coded Squelch Built-in

Accessories
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YAESU
Performance without compromise.™

YAESU UK LTD. Unit 2, Maple Grove Business Centre, Lawrence Rd., Hounslow, Middlesex, TW4 6DR

Specifications subject to change without notice. Specifications guaranteed only within amateur bands.
Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.

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COMET ANTENNA

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CA-14HR	14MHZ Mobile Whip	£49.95
CA-21HR	21MHZ Mobile Whip	£46.00
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HR-50	6M MOBILE Whip	£49.95
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B-10	2M/70CM Mobile Whip	£21.50
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TELEX HY-GAIN HF ANTENNA

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DX88	10-80m vertical	£315	C
DX77	10-40m vertical	£369	C

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HAM"IV	Antenna rotator, medium duty, meter controller	£449	D
HAMV	Antenna rotator, medium duty, digital controller	£749	D
T2X	Antenna rotator, heavy duty, meter controller	£525	D
T2XD	Antenna rotator, heavy duty, digital controller	£795	D

USED EQUIPMENT

HF TRANSCEIVERS & AMPLIFIERS

AX	IC-720A	Icom	Good	HF transceiver £400
AX	FT-902DM	Yaesu	Fair	HF trasceiver valve PA £450
AX	La-120	Ham	V. Good	HF 100w amp £125
AX	FT-102	Yaesu	Fair	HF transceiver PA-3 x 6418's £475
AX	FT-747GX	Yaesu	Good	HF 12v transceiver £499
AX	TS-830S	Kenwood	V. Good	HF transceiver £575
AX	IC-725	Icom	V. Good	HF transceiver, boxed £624
AX	IC-726	Icom	V. Good	HF & 6m transceiver, boxed £699
AX	TS-430S	Kenwood	Mint	HF Tx/Rx FM, CW filter £650
AX	FT-890T	Yaesu	Mint	HF transceiver with ATU £1,199
BX	FT-901DE	Yaesu	Good	HF transceiver £449
LX	FT-1010B	Yaesu	Good	HF transceiver £275
LX	FT-7B	Yaesu	Good	HF transceiver £275
LX	FT-101E	Yaesu	Good	HF transceiver 6 band £325
LX	FL-700	Yaesu	As new	HF linear, boxed £1,650
LX	FT-890T	Yaesu	As new	HF transceiver, boxed £1,250
LX	FT-757GX	Yaesu	Good	HF transceiver £575
LX	IC-726	Icom	V. Good	HF + 6m transceiver £665
LX	FT-747	Yaesu	Good	HF transceiver £475
LX	TS-820S	Kenw	Good	HF trans, no WARC bands £400
LX	TS-140S	Kenwood	Good	HF transceiver £595
LX	FT-767GX	Yaesu	V. Good	HF transceiver £1,450
LX	TS-850SAT	Kenwood	Excellent	HF Tx/Rx with internal ATU £1,350
LX	FT-757GX	Yaesu	Good	HF transceiver Gen Cov Rx £575
PX	TS-440S	Kenwood	Good	HF Tx/Rx Gen Cov 100W £649
PX	AT-50S	Kenwood	Excellent	Auto ATU matching TS-50 £225
PX	IC-728	Icom	Unused	HF 100W Gen Cov Rx £899
PX	IC-735	Icom	Excellent	HF 100W Gen Cov Rx & PSU £675
PX	FT-1000	Yaesu	Unused	HF trans + additional Sub Rx £2,595
PX	FT-757GX11	Yaesu	Good	HF Tx/Rx Gen Cov Rx £675
PX	TS-130S	Kenwood	Fair	HF 100W with Ext VFO £395
PX	FTONE	Yaesu	Good	HF transceiver Gen Cov Rx £750
PX	FT-980	Yaesu	Good cond	HF 100W gen Rx/Tx ham s/h £925
PX	HT-180	Tokyo	Good	HF 10W 80mtr mobile SSB/CW s/h £289
RX	IC-720A	Icom	Poor	HF transceiver £350
RX	FT-990	Yaesu	Good	HF Tx/Rx £1,495
RX	IC-768	Icom	Fair	HF transceiver £1,778
RX	FT-7B	Yaesu	Good	Mobile HF transceiver 50W £225
RX	TS-530	Kenwood	Good	HF transceiver £395
RX	FT-1000	Yaesu	Fair	HF transceiver 200W dual Rx £1,950
RX	TS-450SAT	Kenwood	Good	HF transceiver with auto ATU £1,025
RX	30L-1	Collin	good	HF lin amp £425
RX	IC-735	Icom	V. good	HF Tx/Rx £695
RX	FT-101Z	Yaesu		HF transceiver £425
RX	FT-277	Yaesu	Fair	HF transceiver £250
RX	SB-104			Transceiver £225
RX	JST-100	JRC	Good	HF Tx/Rx £595

VHF/UHF TRANSCEIVERS

AX	EDR-90E	Alinco	Fair	Dual band £375
AX	FT-5200	Yaesu	V. Good	Dual band mobile £499
AX	FT-530	Yaesu	V. Good	Dual band hand-held £369
AX	DJ-180	Alinco	Good	2m hand-held £169
AX	C-500	Standard	Good	Dual band hand-held £225
AX	IC-22E	Icom	Good	2m hand-held £179
AX	IC-W21ET	Icom	V. Good	Dual band hand-held £299
AX	IC-2GE	Icom	Fair	2m hand-held £165
AX	FT-530	Yaesu	Good	Dual band hand-held £399
AX	FT-470	Yaesu	V. Good	2m/70cm handie + charger + mic £285
AX	C844	Stand	Fair	Hand-held £50
AX	IC-02E	Icom	V. Good	2m hand-held + bits £150
AX	FT-726	Yaesu	V. Good	Transceiver £299
AX	M40FM	HRC	Good	Transceiver £45
AX	TEMPO		Good	2m hand-held £88.99
BX	FT-270RH	Yaesu	Good	2m FM mobile £199
BX	TS-700	Trio	Good	2m all mode base Tx/Rx £289
LX	DJ-580	Alinco	Mint	VHF/UHF h/held + mic, DC, mount £380
LX	TH-21	Kenwood	Fair	2m hand-held £145

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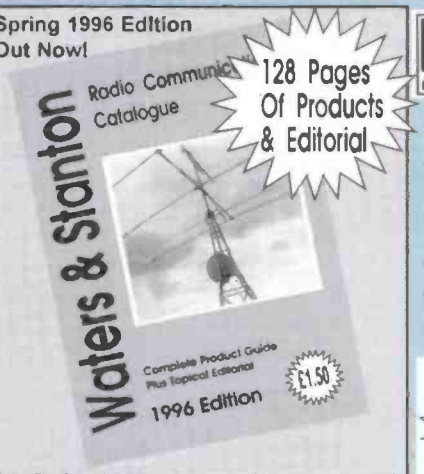

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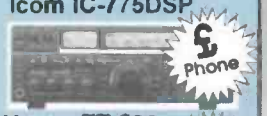

Yaesu FT-990

Kenwood TS-450

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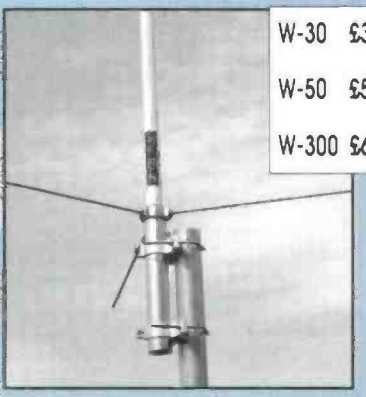

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THE BANDIT

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For the benefit of new readers who may not know us, it would be appropriate in these days of superlative advertising claims to give you a little of our background. Lowe Electronics was founded by Bill Lowe in the 1960's. He acquired the nickname of "The Bandit" as a result of his no nonsense straightforward advertising. In our time, we have been sole UK distributors for Icom, Yaesu and Kenwood amongst many other brands. We have built our reputation on solid support and backup and an honest hype free sales policy. We will never knowingly sell you something inappropriate for your needs, neither will we make exaggerated claims for products we sell. We will not always be the cheapest, or even offer to match the cheapest, but when you buy from Lowe you can have complete confidence in the knowledge that we will not let you down.

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EDITOR'S Keylines

In the last few weeks I've met many really frustrated people. Why are they frustrated? They're trying to find somewhere to take a Radio Amateur's Examination course and finding it very difficult to do so!

And if they eventually do find somewhere that's running an RAE course, they've then got to clear the final hurdle and find an examination centre! Obviously, since Colleges and Further Education Centres have gone 'fully commercial'...a real problem has appeared on the horizon for our hobby.

So, if you are finding it difficult (or have found difficulties recently) I would be pleased to hear from you. However, there's someone else who is specifically aiming to help frustrated RAE candidates and he needs to hear from **you** directly.

Paul Essery GW3KFE is 'Zone E' Member of the Radio Society of Great Britain, and he would like to hear from anyone having problems in finding an RAE course or in sitting the examination. You can write to Paul at **287 Heol-y-Coleg, Vaynor, Newtown, Powys, Wales SY16 1RA** or **telephone** him on **(01686) 628958**. Your letter or 'phone call could help Paul to help you and many others!

Subscription Services

Finally for this month, I should perhaps mention that I've been invited to the Bristol headquarters of Subscription Services Ltd. And if you hold an amateur radio licence or CB radio licence, you'll realise they are the contractors who run the licensing operations on behalf of the Department of Trade & Industry.

I'm looking forward to the visit (on Wednesday October 25) and learning a lot more about SSL (a subsidiary of the Post Office) and how they work. And of course, I intend to keep *PW* readers fully informed on what I learn from the visit.

And, as I write this, the service from SSL seems to have improved. We certainly don't get the number of complaints we used to, or is it that frustrated readers have given up? However, I've no doubt that if you have a problem...you'll write and let me know! Cheerio for now.

Rob Mannion G3XFD

COMPETITION Corner

Spot The Difference

It seems as though everyone in the *PW* office has entered into the spirit of the 'workshop and test equipment' mood. 'Tex' Swann G1TEX is trying to resuscitate his Reliant Three-wheeler again, there's Zoë mending her typewriter while the Editor and Donna 'Toad' Vincent are trying to repair one of G3XFD's artificial arms (while he's wearing his new electronic right hand!). It's left to our guest (Worthington GW3COI himself) to do electronics! See if you can 'Spot The Differences' in the two cartoons and win a prize!

There are 12 differences to mark on the bottom version of the cartoon this month, good luck.

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Entries to reach us by Friday 21 December 1995.

Send your entry (photocopies acceptable with corner flash) to: **Spot The Difference Competition, December 1995, 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.

COMPETITION CORNER DECEMBER 1995

RECEIVING You

Please send your letters to the Editorial offices in Broadstone. Reader's letters intended for publication in 'Receiving You' must be original and not be duplicated. Letters are accepted on the understanding that they have only been submitted to *Practical Wireless*. Please ensure that your letter is clearly marked 'for publication in Receiving You' and that it has not been submitted to other magazines. We reserve the right to edit or shorten any letter. The views expressed in letters are not necessarily those of *Practical Wireless*.

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.

Tri-Band Beam Antennas

Dear Sir
I note with interest the letter from Z21KIR/G7URW in your October issue, Mr Tucker needs only to buy a copy of the *Beam Antenna Handbook* by W6SAI and W2LX. This excellent book contains all the whys and wherefores of Yagi beam construction and design. There are several multi-band designs included, even a log periodic, which is, of course, trapless.

There was also a letter from G3AHO in the same issue who is wrestling with the problems of a small garden. My garden is only 36 x 23ft. and up to now I have restricted my activities to 20m and upwards. I have used various home-brew antennas including dipoles, delta loops and best of all, a ground plane.

I use the antennas and experiment, dismantling them when not required. All this activity has aroused the curiosity of my neighbours who have been invited in to see the station working.

They all seem to be on my side. One of them got breakthrough on his new TV so I 'loaned' him a TV filter to good effect. This same neighbour has now offered the use of his garden for antenna experiments as well! The secret seems to be to get to know the neighbours well and take down your antenna when not in use.

Finally, to render my antennas 'invisible' I make them out of clothes line from the local supermarket. This stuff is brass-plated, multi-strand steel wire covered in plastic. It solders well, is very strong, will handle up to full legal power and is very cheap. Best of all, the neighbours think the washing line has been left out, if it's configured as a long wire!
P. J. Halls G4CRY
York

★★★★ STAR LETTER ★★★★

Dear Sir
For some time now I have intended to write to *PW* about publication of h.f. antenna designs, particularly with a view to building. After reading the letter by Nigel Tucker Z21KIR/G7URW, I decided to write in.

Firstly I would refer you to your reply to that letter, ie. h.f. Yagi design could make a very practical article! This is very true. However, if you decide to go ahead in a future issue, I feel compelled to ask you to make it a 'good one'.

By good, I mean it would have to posses the properties, or nearly so, of a trade antenna, such as say a Cushcraft or Tet, etc. and show individual components, also specify materials to carry full dimensions as Nigel's letter states, having said that, its height, etc. must be left to the individual circumstances, as the designer would have no influence over these issues.

I have obtained countless drawings and articles over the years, but never once a good, fully dimensioned design. I have seen, for instance, capacitors apparently hanging from sky hooks, etc.

My other hobby is model engineering, and while I recognise the difference between aspects of the two hobbies, I can tell you that the magazine *Model Engineer* would not exist without the projects it publishes being fully dimensioned. So many radio magazines will tell the reader how to produce and assemble a project, however, a simple drawing would save a lot of script and crystal ball gazing!

I also recognise why *PW* exists and for sure it is not mechanical engineering in itself, but it is very closely allied, without mechanical engineering amateur radio would not exist. For a long time now I have asked myself why this particular problem prevails, could it be pressure on Editors by the trade not to make things too easy, or the inability of those who aspire to design and offer for publication the result of their work? I do not believe the former, but the latter could be true, I sincerely hope not.

Finally, my thanks to Nigel and to *PW* (despite the criticism). So, come on all of you and make it more interesting and dare I say more practical.
Don Birch G0ORM
Cumbria

Editor's comment: We try our best Don, that's why whenever possible, *PW* prototypes of projects intended for publication (including antennas) are built and commented on. But you can be sure we'll carry on trying to make our projects even better!

Dear Sir
Home-brew 'Tri-Banders'. I have just read the letter from Nigel R. Tucker which tells us that he cannot find details for the making of tri-band Yagi beams centred on 14MHz. I suppose he means an antenna that will work on 28, 14 and 7MHz. I doubt if he will ever find constructional details of such an antenna.

Tri-band Yagi beams are very difficult to design and even more difficult to fabricate. This is why the antenna 'Bible' the *ARRL Antenna Book* has no tri-band Yagi designs.

There is lots of information on the construction of mono-banders, which after all are more effective than trapped antennas. To have a 7MHz Yagi that will be effective for DX work, an antenna support at least 20m high is needed.

Making any kind of multi-element Yagi beam requires engineering and radio skills. It would be difficult to find the materials and their cost would come to about the price of a commercially available beam antenna.

The problems I have outlined account for the lack of information on home-brew, tri-band Yagis in radio magazines and antenna books. A comprehensive constructional article would take up many pages of a magazine and few readers would have the time or the skills to replicate the design.

Can I suggest Mr Tucker purchases a copy of that excellent publication *Beam Antenna Handbook* by Messrs. Orr and Cowan (see PW Book Service list)? There's also the book *HF Antenna Collection* published by the RSGB, again available from PW Book Service.

My DX work on h.f. has all been done when using wire antennas and I feel sure that Mr Tucker could put up Vee beams or even Rhombic antennas to good effect. If he scans the regular 'Antenna Workshop' articles, Mr Tucker will find something that he can build cheaply and which will certainly work first time.

By the way, I can walk up masts that are 40ft high which have their bases secured to one of my apple trees!
John Heys G3BDQ
Guestling

Editor's comment: John G3BDQ is of course one of our team of 'Antenna Workshop' authors. And don't forget, if you have an interesting antenna idea, you can share it with other readers!

Transceiver Conversions

Dear Sir
Further to your 'Keylines' comments in the October edition of *PW*, I wholeheartedly agree with your sentiments as to the purchasing (by amateurs) of 27MHz multi-mode radios for conversion to 28MHz operation. For many years now, we, as amateurs, have been restricted by the powers that be from purchasing, possessing (dreaming of!) any form of radio that could conceivably be utilised by 27MHz operators.

As you stated, these multi-modes CB sets are readily available, not only as second-hand units on Bring & Buy stalls at rallies, but also openly available from various retail outlets here in the UK. Therefore, if CB sets of this nature are filtering into Britain and are not being stopped in their tracks, then why can't we as legal operators purchase 28MHz radios?

I believe the time has come for the Radiocommunications Agency (RA) to change their attitude to this subject. They (the RA) have already endorsed ETS 300-433 as a European a.m./s.s.b. CB standard, so surely now this new broad-minded attitude should apply to amending the legislation appertaining to 10m equipment (be it CB conversions or proper rigs, i.e. Uniden 2830, etc.). Please keep this subject in the news, it's a good cause.

John Wheeler G0IUE
Wiltshire

'High Flyer' Antenna

Dear Sir
Ref 'High Flyer' antenna, November *PW*. On reading Clive G4SLU's report on the *PW* version of my 'High Flyer' design, I am left wondering why it did not work properly, giving an s.w.r. of 2:1 instead of 1.2 to 1.0. If you reduce the length of the antenna to raise the frequency and pull out the tuning rods to lower it back to 18MHz you now have the the 'IndoCap' further into the current section, which would induce more capacitance and raise the 'Q'.

Ruling out any bad connections it is possible that the antenna was tuned to a shallow secondary resonance, which this type of antenna seems to have. Another probability to that the tuning rods are going back through the coils. It's twelve months since I worked on this antenna, but I believe this can upset things. I hope these few points may help any constructors who have problems.

Victor Goom G4AMW
Dorset

Scanners

Dear Sir
Re - Letter from Mr Page, Tyne & Wear. Mr Page's letter in your September 1995 magazine raised some interesting points I would like to explore.

Firstly, he mentions the fact of unauthorised 'eavesdropping' on telephone conversations and the Emergency Services communications. He quite rightly points out that the police, in certain parts of the country, have started to scramble their radio traffic.

I however, totally disagree with his remarks that possession of scanners should be illegal. There **are** people who do actually use them **legally**. I myself used one a few years ago to monitor the local 144 and 430MHz amateur bands locally and listened to nothing else. For him to suggest that **everybody** uses them illegally is total 'hogwash'!

Other countries have a good system of prohibiting unauthorised monitoring by 'Joe Public'. It is called encryption - the 'good old US of A' has been doing it for years! Only in the last few years have our police forces cottoned on to this notion!

My second point is regarding his comments on CB radio, specifically power amplifiers (p.a.s). Again I agree with most of his comments with regard to these illegal items, but I feel that his argument is still lacking in details somewhat. I have seen these things and the diagrams that go with them, the filtering, if any is **very rudimentary** to say the least!

If you want to stop illegal p.a.s being used, then outlaw their importation into this country. They are no use for a.m. or s.s.b. as Mr Page points out, they are designed for constant amplitude, i.e. f.m. (even then that's debatable!).

My last point is, there still seems to be, after 14 years of legal CB, a 'them and us' attitude between CBers and 'Hams'. Surely this can't continue, if we want to progress beyond this ideology that holds us back. After all, they are just different faces of the same hobby - **radio!**

Mr Page implies that many CBers use p.a.s, this is probably true, but on the other hand, there are many stations out there who run just the legal 4W and are quite decent to talk to. I live in the east end of Glasgow and yes, there is a problem of people using illegal p.a.s, and 50W is not uncommon!

Hopefully, the amateur radio fraternity will remember before they criticise CBers, that there are lot of decent stations out there to talk to (you should give CB a try sometime). I see things 'from both sides of the coin' so to speak. How about a CB Radio Club and Amateur Radio Society?

Ian McCallum
Glasgow

Dear Sir
The factual inaccuracy in Adam Page's letter regarding scanners in the September issue of *PW* went un-challenged - or even commented upon by the Editor. The writer asserts that it is 'illegal to use' scanners and that 'nobody uses them legally'. This is completely factitious and I am surprised that the Editor didn't bother to point this out.

Scanners are bought and used - with perfect legitimacy - by many people including radio amateurs. They provide a relatively cheap way of monitoring a number of v.h.f./u.h.f. (amateur) bands, looking for band openings or just to monitor local activity. All quite legal!

His (Mr Page's) comment that "it should be illegal to possess radio scanners" seems to be pandering to a further increase in bureaucratic dictatorship. Perhaps it would make sense to sweep away much of the ludicrous *Thou shalt not listen* laws and adopt the more liberal regime of North America, where it is quite legal to listen to anything you like, even the police.

Gareth Jones GW4KJW
Gwent

Dear Sir
Re - correspondence from Adam Page of Tyne & Wear where he states that it is illegal to use a scanner. This statement is not entirely accurate.

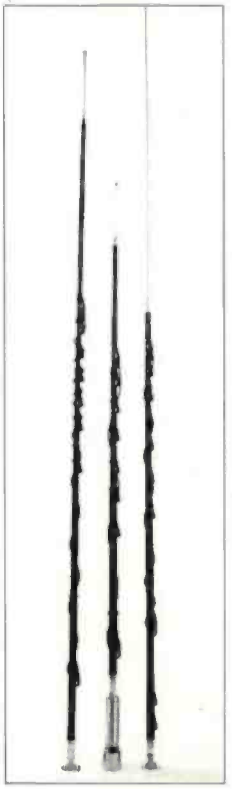
I use my scanner legally whilst monitoring the amateur bands from 28 to 430MHz. The activity outside of the amateur bands does not interest me and this is the only area where the use of a scanner would be illegal so far as the radio amateur or short wave listener is concerned.

Jack Cunningham GM3JCC
Scotland

Editor's comment: I thank the (very) many scanner users who have written to defend their use. As the point has been well made by the letters selected for publication, the correspondence on scanners is now closed.

NEWS '95

Mobile Outbackers



Nevada Communications of Portsmouth have recently announced two new Outbacker mobile antennas designed for use with the Icom 706 and the Alinco DX-70.

Firstly there's The Outbacker Perth Plus which is 1.8m in length, can be used to operate on the 3.5, 7, 10, 14, 18, 21, 24, 28, 50 and 144MHz bands and is rated to 100W. This antenna also has a 1.8MHz option available. The Outbacker Perth Plus costs £249 including VAT.

The second new Outbacker is known as the Junior Plus and covers the 3.5, 7, 10, 14, 18, 21, 24, 28, 50 and 144MHz bands. This antenna is described as being easy to use, low profile and does not require a tuner. The Junior Plus costs £225 including VAT.

Both the Perth Plus and the Junior Plus allow you to change the antenna tip to use the antenna on 50MHz.

For more details on the full Outabcker range of antennas contact **Nevada Communications, 189 London Road, North End, Portsmouth PO2 9AE. Tel: (01705) 698113.**

Pascoe's Penny Pinchers

Dick Pasoce G0BPS has written various antenna articles over the years for *PW*, and is well known in the world of amateur radio for running Kanga Products and more recently has produced a book entitled *Pascoe's Penny Pinchers - A collection of Wire Antenna's that can be built for pence, not pounds.* (The title incidentallly has been 'stolen', with permission from Rob Mannion G3XFD, from one of G0BPS's articles which appeared in *PW!*)

Pascoe's Penny Pinchers is an A5 sized book comprising of 36 comprehensive pages which cover everything from the simple ground plane antenna through directional arrays and feeders to hints on trimming and cutting for resonance. Dick G0BPS is hoping that this publication will be the first of three, the others will follow in the near future.

A copy of *Pascoe's Penny Pinchers* will cost you **£4.95** plus **£1 P&P** and is available direct from **Dick Pascoe** at **Kanga Products, Seaview House, Crete Road, Folkestone, Kent CT18 7EG.**

Send in your news, photographs and product information to Donna Vincent G7TZB at the editorial offices in Broadstone.

Datong Electronics

Datong Electronics of Leeds would like to point out their full postal address is **Clayton Wood Close, West Park, Leeds LS16 5QE** and that their telephone number is **0113-274 4822** and **FAX** number is **0113-274 2872**. If you have recently tried to contact Datong by FAX without success this is because an error crept into the FAX number details given in their recent adverts. *We apologise for any inconvenience caused by this error.* **PW**

QRP Is Alive in Dublin

The Rev. George Dobbs G3RJV reports on the first International QRP week that was held in Dublin at the end of August.

Donal Leader EI8EIB, Director of the Marino Institute, presents a time and weather station to G3RJV.

The promise of QRP and a visit to Ireland was too much to turn down, so I gratefully accepted an invitation to be a speaker at the first International QRP Week in Dublin at the end of August. The event was held at the Marino Institute of Education on the north side of Dublin.

The Marino institute is an impressive building set in its own grounds and run by the Order of Christian Brothers. **Donal Leader EI8EIB**, the Director, is a keen radio amateur and member of the G QRP Club.

The QRP week included a series of lectures, practical amateur radio construction, under tuition, in an electronics laboratory and metal work in a fully equipped workshop. The event also included a fully working QRP Station with the special event callsign **EI3RJV**.

A programme was arranged which allowed plenty of time for sightseelng and exploration of Dublin. The week was a great success for all who attended and the good news is that further events of a similar nature are planned for the future.

On the final evening members were treated to a reception for the formation of the QRP Club Of Ireland. I was honoured by being invited to give the inaugural speech to launch the club.

The Chairman designate, **Bill Ryan EI8BC**, then presented me with a fine laminated certificate as the first member of the new club. There seemed no end to my good fortune as the Director presented me with a time and weather panel. After a fine buffet and a lesson in choosing Irish Whiskey, all of my fine opinions of the Irish were confirmed!

George G3RJV and Dick G0BPS at the gate of the Marino Institute of Education which was the venue for the International QRP Week.

The visit to Dublin gave me a fine excuse to explore a little of Ireland. The event itself allowed time to visit Dublin with my wife, **Jo-Anna G0OWH** and my fellow speaker **Dick Pascoe G0BPS**. The combination of QRP and my interest in Celtic culture is certainly a heady mix. When future events are planned by the QRP Club of Ireland, I will be itching to return. I can well advise others to join me.

The QRP Club of Ireland is open to anyone. For further information write to **Bill Ryan EI8BC, c/o The Marino Institute of Education, Griffith Avenue, Dublin 9, Ireland.**

Poole Novices

The **Poole Radio Society** have sent the 'newsdesk' a copy of their recently produced *Novice Booklet*. This is aimed at B Class Novices and concentrates on providing practical advice and help to those who have recently obtained their Novice Licences.

The *Novice Booklet* is split into three main sections. The first section offers guidance on topics of relevance to both Class A and B Novices which will, it is hoped, be of considerable interest to all newly licensed radio amateurs. The second section covers topics of interest to A Class Novices whilst the third section covers topics of specific interest to B Class Novices.

Copies of the *Novice Booklet* are available from **Colin Redwood G6MXL, 45A Lulworth Avenue, Hamworthy, Poole, Dorset BH15 4DH** for **£5.** Cheques should be made payable to **Poole Radio Society**.

CLUB Spotlight

Send your information to the 'Club Spotlight' newshound Zoë Shortland at the PW Offices.

Your page - your story! The local Amateur Radio Club is seen by many as being the 'backbone' of our hobby. There are some interesting stories to be told, so let's hear about your club history, share the information and you'll probably recruit new members at the same time!
Editor.

Club Logos

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

Hoddesdon Radio Club

The **Hoddesdon Radio Club** is only in it's fourth year, yet is nearly fully equipped. Part of its success is due to the very varied programme, ranging from astronomy through, beer and wine making to visits by the RSGB President.

The membership includes Novices, short wave listeners and CB enthusiasts and also has many wives and girlfriends attending meetings. Members meet at the Conservative Club in Rye Road, Hoddesdon, Hertfordshire, and visitors are always welcome.

The club's quarterly magazine is the envy of many and regularly contains over 30 pages, packed with information. The magazine is produced by the club's Treasurer **John G4VMR**, who owns the Hertfordshire Display Company.

The club is twinned with the Indian Mound Radio Club in Florida and through the magazine, articles are of interest to both clubs. The Hoddesdon RC also take part in local events, like the Hoddesdon carnival and next year members will be fund-raising for a national charity in special event stations and having 'guess the distance' competitions.

An annual dinner is held in March, for the 50 members, and the club is always on show at the Picketts Lock Rally. Further details can be obtained from the Secretary, **Dave G1CAY** on **(01992) 460841**.

Stourbridge's Field Day

Stuart J. McKinnon G0TBI took immense pleasure in taking part in this year's HF SSB Field Day, with the **Stourbridge & District Amateur Radio Society**, of which he has been a member for almost three years now. The site chosen was approx 215m a.s.l. right on the Shropshire/Staffordshire border, and with the height advantage on one hand, and the loan of a 20m tower from Strumech in the other (thanks to Mr David Taylor), the society set about organising the chosen site, something the club had not done for a good many years.

There were various tasks to perform, and Stuart was delegated as site manager some weeks before, everyone else was doing the lifting and putting together, etc. Having arrived on site at 08.45 local time, the society was astonished to see

everything up and running by 12.30hrs!

There were obviously many jobs to be tackled, tents to be erected, antennas to be strung up, the tower to be winched up and safely checked, equipments to be installed and checked and, of course, one vital piece of kit, the trusty generator, which, by the way, was fed with leaded fuel for the first 12 or so hours. However, once the society bought it some unleaded to drink, apparently it purred just like a kitten!

During all of this, it must not be forgotten that an army does not march on an empty stomach! Stuart's XYL Anne and another Ann, XYL of **Frank G0RXO**, Ann, did the society proud by providing excellent catering facilities in the mess tent, loaned and erected by **Eric G7JWJ.** Although the society had several groups of operators and a reasonable shift system in operation, the contacts that were made were by no means as many as some of the stations that the society worked.

Stuart would like to thank all the members of the society who took part in or contributed to the running of the event. The society even had one member, **Julian G7BVV**, who travelled down from Tadcaster to help out. All in all, the society had a 'jolly good time' and feel that the event can only stand them in good stead for any future contests or events.

Open Evening

Back on Tuesday September 12 1995, the **Mid-Warwickshire Amateur Radio Society** held an open evening, which took place at the club meeting rooms. A wide range of displays illustrated the varied interests of the membership.

Home construction and the use of computers in radio circuitry illustrated the technical and practical aspects. The RAYNET display was popular and aroused considerable interest.

Amateur stations were active on air throughout the event and many magazines, leaflets and posters were freely available to those who wished to take them.

The Mayor of Warwick, Councillor Mrs Christine Hodgetts was met by the Chairman, Brian Clulee G0LXG, and was escorted around the exhibits.

John G1WXF demonstrating 144MHz with Chairman Brian G0LXG and Mayor of Warwick, Christine Hodgetts in background. (Spot the *Practical Wireless* magazine!)

Mayor of Warwick Christine Hodgetts being shown a Lake Electronics kit by Chairman Brian G0LXH with Treasurer Peter G0IHH in background.

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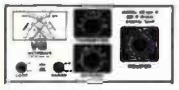

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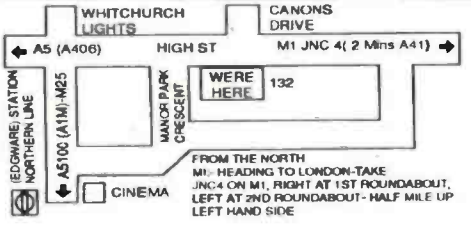

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For Radio Beginners of all Ages.

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

This month Elaine Richards G4LFM has some interesting news on callsign allocations, reciprocal licensing, unusual radio clubs and much more.

Running Out Of 'G' Callsigns

It's finally happened - the Radiocommunications Agency are running out of 'G' callsigns! Don't panic, it doesn't mean that you won't be able to get a licence, just that there will be a new series of callsigns, the 'M' series.

If you have passed your Morse test and want to be one of the first 'M' callsigns on the air, then you can reserve a callsign now and then sit tight and wait for it to be issued. You can still reserve 'G' callsigns until March 31 next year.

If you already have a Class A 'G' callsign, you can't change it for one of the new ones though. It will be interesting to see the pile-ups that the new series of callsigns will cause on the air until everyone gets used to who an 'M' callsign is. If you want more details about the impending changes, then you can talk to the **Radiocommunications Agency Amateur Radio Unit** on **0171-211 0211**.

59(9) DX Report

Last month I passed on some hints sent to me by **Bob Nadolny WB2YQH**, the Publisher of *59(9) DX Report*. Reading through the hints he sent me I found another that answers a question that many newcomers ask. 'How do I become a contester?'

No-one is born a contester, although some feel it is in their blood. Like everything else in the radio hobby, repetition and practice bring about proficiency in each area.

Contesting can be fun even for the casual operator. One of the easiest ways to develop contesting skills is to enter a small contest where the competition won't be so great and you won't get scared off from ever entering one again.

Practising your quick exchange of reports in a less crowded band will build you confidence and skill level. The best method to follow for the new contest operator is called 'search and pounce'. This is where you tune the band and call the other contest stations instead of 'running' a pile up of your own.

After a few hours of roaming the bands, you will feel a sense of accomplishment as your log fills up with contest QSOs. Now is a great time to get your feet wet as there are many local contests coming up over the winter months.

So, jump in and join in. Everyone started the same way!

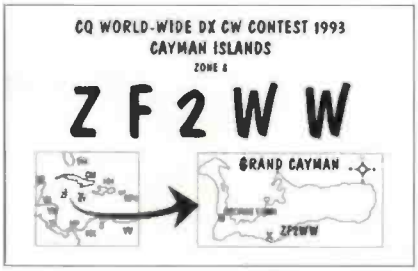
Reciprocal Licensing

Lawrence Selvestian has written to me from Manchester where he is a student at the start of a two year BEd course. He's from Malaysia and has a B licence there with the callsign **9M6AI**.

Lawrence wants to know whether he will be able to operate in the UK. After an enquiry with the Radio Society of Great Britain (RSGB, who are always a useful source of information) I discovered that there is an agreement between the licensing authorities here and in Malaysia.

The agreement means that reciprocal licensing is not usually a problem and once the forms have been filled in and duly processed a reciprocal licence can be issued. Unfortunately, Lawrence only has a B licence and the authorities here only recognise the Malaysian A licence.

All is not lost though. If Lawrence can study and learn the Morse Code, he can take a Morse test here in the UK, which will (hopefully) upgrade his Malaysian licence to the A standard required to get a reciprocal licence.



The RSGB very kindly sent all the necessary paperwork to me and so I've sent this on to Lawrence in Manchester. If you have any queries about licensing, then the RSGB can be contacted on **(01707) 659015**. I must say that they were very helpful (and efficient) when I 'phoned.

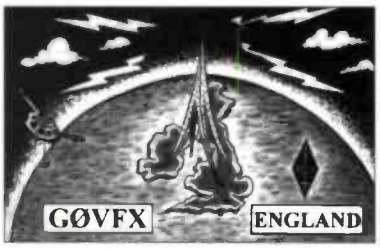
Another thing that will help Lawrence whilst he is studying here is to go along to some of the radio clubs in the Manchester area. Now I don't know where anything is in Manchester, but I do know that the **Manchester & District ARS** are a very busy club. There is always plenty going on there and you should contact **Barrie Langfield G3IOA** on **0161-681 5406** for the latest details.

There are also radio clubs in West Manchester and South Manchester. At least if you get involved with a club Lawrence, you should be able to get help learning the Morse Code.

QSL Cards

I'm not sure whether I've mentioned **Adur Village Press** before, but I've recently seen about 25 sample QSL cards from them. The unusual thing is that they were all different and ranged from simple black ink on coloured card (usually just a simple line drawing on them) through to four colour drawings or photographs.

Each card is individual because it was created by the purchaser. They have sent their sketches and photographs to Adur Village Press and awaited the proof. Adur have designed and printed over 400,000 QSL cards for about 50 DXCC countries.



Prices range from £26.95 for 250 simple cards to £499.95 for 10,000 four colour ones!

If you would like to see some examples, contact **Adur Village Press, 'Alamosa', The Paddocks, Upper Beeding, Steyning, West Sussex BN44 3JW. Tel: (01903) 879750.**

First Steps

Test And Measurement

Daril Partridge has written to me with a very common problem facing newly licensed amateurs. I myself can remember pondering over the pros and cons of the various frequency measurement options.

The basic problem has always been the reluctance to divert money that could be spent on a better station to a regulatory necessity. I'm talking, of course, about the old chestnut of frequency measurement.

The requirements are laid-out in Sub-clause 4(1) of the licence and state that the Licensee must ensure that: a) "the emitted frequency of the apparatus in the Station is as free from Unwanted Emissions as the state of technical development for amateur radio apparatus reasonably permits"; and b) "whatever class of emission is in use, the bandwidth occupied by the emission is such that not more than 1% of the mean power of the transmission (NOT including the power contained in spurious emissions) falls outside the frequency band".

Whilst this is all legally correct it doesn't offer much help to

the new amateur in fact the opposite is probably more likely! Fortunately the Radiocommunications Agency do offer some plain language advice.

The general guidance is that you will need a crystal reference and an absorption wavemeter to check a transmitter that's crystal controlled. Crystal controlled used to imply single channel operation, in modern terms this extends to embrace all modern synthesised transceivers.

This is because synthesised systems have a crystal reference oscillator at their heart to provide a high degree of accuracy and stability. With absorption wavemeters being so easy to build this is certainly the cheapest way to meet the basic licensing conditions.

Another way to meet the basic licensing requirements is to use a simple crystal calibrator in conjunction with a good communications receiver. A 100kHz calibrator will produce harmonic outputs every 100kHz throughout the h.f. bands. These

regular markers can then be used to verify the receiver's calibration and so verify the operating frequency of your transmitter.

If you want to try some home construction a crystal calibrator makes an excellent starter project. Despite the economic advantages of using wavemeters and crystal calibrators, the best way to meet the licensing conditions is to get yourself a digital frequency counter.

Although digital frequency counters are significantly more expensive than an absorption wavemeter, they are far more versatile and much easier to use. To give you some idea of the cost, you can buy a new 8 digit frequency counter that can handle frequencies from 10Hz through to over 1GHz for around £150. With a frequency range as wide as this you can see that the counter will serve you well over many aspects of the hobby from h.f through to u.h.f.

The other great advantage of the frequency counter is that it gives a direct read-out of the frequency although you do have to be careful not to overload the counter.

In the final part of Daril's letter he asks if it's necessary to own the measuring equipment or can it just be borrowed occasionally. Despite the temptation to share equipment between amateurs, the licence requires you to be able to demonstrate frequency accuracy on demand. I don't somehow think the inspectors would accept a trip round town to collect the gear as being acceptable!

The three photographs show a selection of frequency measuring equipment.

Unusual Radio Clubs

A couple of months back, I mentioned some unusual radio clubs. Since then I have learned a few more details about the International League of Esperantist Radio Amateurs (or Internacia Ligo de Esperantistaj Radio Amatoroj). The ILERA has members in 45 countries world-wide.

The main aims of the ILERA are to encourage the use of Esperanto for international contacts by radio amateurs and to encourage Esperantists to take up amateur radio as an interesting hobby and practical use of Esperanto. They also aim to standardise the Esperanto vocabulary of technical and procedural terms, to keep members in regular touch by organising nets and contest, to set up a Special Event Station at each Annual Congress of the Universala Esperanto-Asocio, and to issue a Bulletin of news (normally four times a year).

A free 12-lesson correspondence course on Esperanto is available from **Paul Hewitt G0NUE (QTHR)**, who is the secretary of the British section. A tape with notes in a basic QSO format is available for £2 including postage. If you are interested in learning more, contact Paul.

That's all the 'natterings' I have for you this month so, until next time cheerio and don't forget to keep your letters coming to me (address at the top of the colum).

Elaine G4LFM

The Alinco DJ-191 144MHz Transceiver

Richard Newton G0RSN takes a look at the latest (they've been incredibly busy this year!) release from the Alinco production line.

It's always difficult to write a review and the single most difficult thing is finding somewhere to start. So, I thought I would start by congratulating Alinco.

Presentation counts for a lot these days and this hand-held comes with a very nice 'stand-in' charger, a highly durable helical antenna and the normal carry strap and belt clip.

The DJ-191 is very smartly finished in black plastic and metal and it also seems very light for its size. The radio itself is uncluttered, relying almost entirely on push-button controls.

The only rotary switch is used for tuning through the v.f.o. and memory ranges. It also controls certain menu options (all other functions are done by push-buttons).

The transceiver has the normal controls you would expect to find. However, there are two **Press-to-talk** (**p.t.t.**) switches, and I'll say a little more about this later. Alinco have included standard Speaker/Microphone jack sockets for extensions and also for external power connection.

The Alinco DJ-191 is large by modern standards. It has very big, well labelled buttons and the only rotary switch is, again large and very easy to operate.

Display Selling Point

The DJ-191's large display is the main selling point in my humble opinion. I've never seen one as good as fitted on this radio!

All the display characters are massive. The main frequency display characters are about a third of an inch in height. The secondary indicators are actually a little smaller, but not much!

The excellent display is brilliantly complimented by a very efficient green 'back light'. The keys on the front of the Alinco DJ-191 are translucent, and are back lit.

One thing that has struck me about the Alinco DJ-191 is the apparently 'everlasting' battery pack. At the beginning of the review period I charged the battery using that delightful stand in charger. (what makes you think I liked it?) and didn't have to recharge it once. It's not a reliable test, but all I can say is that I was pleasantly surprised on how well it coped.

Without The Manual

When looking at a new hand-held, or any piece of equipment for that matter I always pick it up and try and use it without the manual. I think that this is a good indication as to how the radio has been designed.

There's nothing more frustrating than getting a new radio and then having to sit for hours with a book before even turning it on for fear of doing awful harm. However, in this respect, the Alinco DJ-191 is very simple to use.

To demonstrate its simplicity I gave the transceiver to several non-amateurs who were all able to figure out the basics. And on the more advanced features I looked at the manual and found it to be very well written, easy to understand and follow.

Volume And Squelch

The **Volume** and **Squelch** controls on the DJ-191 are press-buttons. I was a little dubious of this at first. However, positive pressure has to be applied and this reduces the possibility of accidental usage of these controls.

The **Squelch** is adjusted by depressing the **Function** key and then activating the buttons.

When activating the secondary functions of any key on the DJ-191, the operator depresses the **Function** key, (not unusual I hear you say). But, the slightly unusual aspect on this radio is that while doing this the operator has to maintain pressure on the **Function** key throughout the operation.

The 'double button' technique makes operating secondary functions a little cumbersome. It would have helped if the **Function** key had a short delay allowing these adjustments to be made one handed.

Many Transceivers

I've been fortunate to have the opportunity to have many different hand-held transceivers to look at and use during the course of my hobby and writing for Practical Wireless. And it's on my experiences of these radios that I base the following comments.

My home is on the outskirts of Bournemouth, and I've always received the Bournemouth repeater GB3SC on 145.625MHz as a very strong signal. This has been consistent with other Alinco equipment, Kenwood, Icom and Yaesu alike.

To my surprise, the DJ-191 did not receive GB3SC that well at all. At first I thought this may be due to location, but even in the loft conversion of my bungalow, leaning full stretch out of the 'Velux' window could only get a 55 report.

I'm **not** an advocate of comparing one radio to the other, however I feel compelled to mention that this is the first radio that I've ever used at my home that has not received GB3SC as an almost fully 'quietening' signal.

Of course, I realise that the 'bar graph' type 'meters' on modern hand-helds are not necessarily a fair indication of actual signal strength. For this reason I always listen first and decide on a report 'by ear', and find this a fair measurement.

One possible reason for the receiver's apparent lack of sensitivity is that the transceiver has an extended receive capability. I wonder if perhaps this particular unit has been optimised for a centre frequency out of the amateur band? I also replaced the supplied helical antenna with a telescopic, this did improve things, but the receive side still seemed to be somewhat 'down'.* ***See Editorial note below***

I should also mention I did hesitate to include what could be seen as a criticism, for I do feel that, on the whole, this is a good little radio. And why do we expect a hand-held radio to be as sensitive as a base station? After all, a hand-held is meant for essentially local communications.

I don't wish to appear to be contradicting myself, but I see little point in having a radio that is so sensitive you can hear many stations that you have no chance of working! With this high sensitivity comes breakthrough from pagers, computers and other similar sources.

**** Editorial comment: To see whether there was a problem with the review transceiver, 'Tex' Swann G1TEX checked the receiver sensitivity and found it provided a perfectly readable signal with 0.2 microvolts, (although a signal lower than this level could be detected). Tex reports that he considers it to be well within specifications.***

Computer Compatibility

The Alinco DJ-191 passed what I call my 'computer compatibility test' very well. Placed next to my PC and monitor it hardly suffered at all from noise.

In fact I was able to quite happily conduct a thrilling QSO with a local amateur, **Gerry G7JEZ**, while sat in my study right next to the PC. It started when I heard Gerry call a GW station.

As the pigeon flies (no crows in my area of Bournemouth, just pigeons!) Gerry is not that far from me. So, I thought that he could help with some audio reports.

Gerry was kind enough to return my call, giving me a very good signal report. We had a very interesting chat and I explained I was putting the DJ-191 through its paces.

Gerry told me that he was not one to 'gild the lily' and that if I wanted a frank critic of what the radio was like I had come to the right man. So, I thought that it only fair to use Gerry's own words to describe the transmitted audio on the DJ-191.

He said it was "BBC quality"! Gosh, I thought, that's pretty good ...Gerry then added..." Well perhaps I was a bit over the top" (oh! sudden deflation...but hold on there's more..."the audio is very good indeed, 'A5-star' quality"!

So, I took that to be a more than favourable report on the audio. My thanks to Gerry for taking the time to talk to me.

Flying Colours

So, the DJ-191 had passed its first 'on air' test with flying colours during working a contact some 4 to 5km away in town surroundings using the transceiver's helical antenna and about 1.5W. (And the contact was maintained on the low power setting).

Personally, I found that the Alinco DJ-191 was more easily operated in the left hand. Incidentally, just below the main p.t.t. button is a smaller p.t.t. button available as an option. This usually sends the 1750kHz tone burst, however it can be changed to be a second p.t.t. (but for low power only).

Full Marks

I found that the ability to be able to transmit on high and low power so easily on the DJ-191 (with the second p.t.t.) was very useful indeed...full marks to Alinco for this little innovation. There's no doubt that Alinco have responded to a market need, with a simple to use, straightforward hand-held.

The transceiver has the modern features such as DTMF and CTCSS (full CTCSS operation requires optional equipment to be fitted) but the emphasis is definitely on old style simplicity. For this, Alinco must be congratulated.

Unusually, the transceiver's microphone is mounted at the bottom of the front panel.

The Alinco DJ-191 will never set the world on fire. And that, in my opinion, is its greatest strength. It has been designed for simplicity and ease of operation. There's not a lot I can say about this except that the transceiver is a robust unit that exceeds its own expectations as far as the basic approach is concerned.

In saying the DJ-191 is basic I'm not suggesting it's 'cheap and nasty'. Quite the contrary, and if fact the transceiver boasts 40 memory channels and direct frequency input via the DTMF key pad. (This is an inexpensive option that will appeal to those who want a good quality, straight-forward product).

The transceiver is well manufactured, well presented and works well. The audio both on transmit and receive are of a very high quality.

There seems to be a move away from the 'all singing, all dancing' microscopic-sized radios seen in recent years. With the DJ-191, Alinco seem to have taken this move much further than any other radio I've seen in recent times.

The wonderful display and large well labelled buttons will make it a very popular radio. As will the fact the you don't have to be a genius to operate it. But for all its simplicity the DJ-191 can hold its own in the techno-mad world.

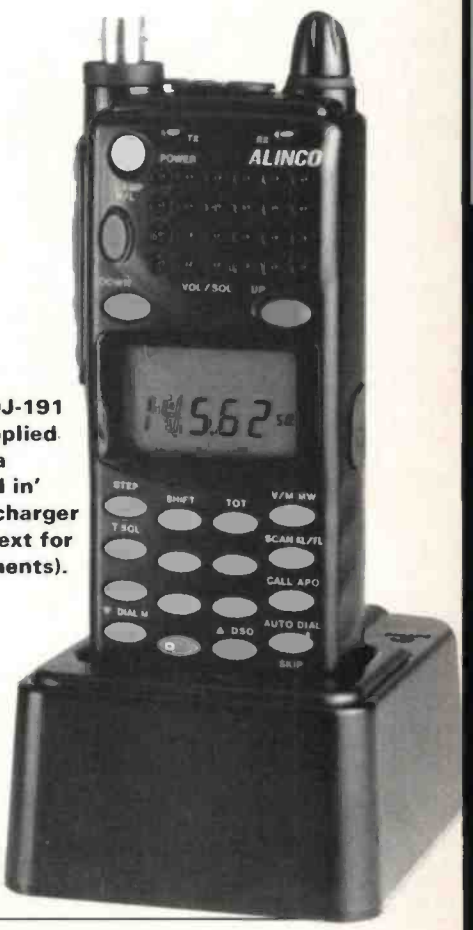
My thanks go to Waters & Stanton Electronics of 22 Main Road, Hockley, Essex SS5 4QS. Tel: (01702) 206835, FAX (01702) 205843, for the loan of the review model, which sells for £249 and is available from UK Alin co stockists.

PW

Manufacturer's Summarised Specifications

General

Frequency Coverage	144-146MHzMHz
Channel spacing	5, 10, 12.5, 20, 25, 30kHz steps
Power supply requirements	4.8-13.8V d.c. (4.8V d.c. standard)
Current consumption	TX on high power at 13.8V d.c. = 1.5A RX (squelched) 50mA (approx)
Operating temp	-10 to +60°C
Dimensions	57 x 151 x 28mm
Weight	approx 300g
Transmitter	
Output power	High: Approx. 5W (at 13.8V d.c.) Low: Approx. 300mW
Emission mode	F3E (f.m.)
Spurious Emission	-60bB below carrier level
Microphone	Electret condenser type
Receiver	
Receiver design	Dual conversion superhet (1st i.f. 21.7MHz, 2nd 450kHz)
Sensitivity	12dB SINAD <-16dBμ (144- 147.995MHz)
Selectivity	> ±6kHz at -6dB < ± 12kHz at -60dB
Audio output	More than 200mW (at 10% THD)
Speaker impedance	8Ω



The DJ-191 is supplied with a 'stand in' type charger (see text for comments).

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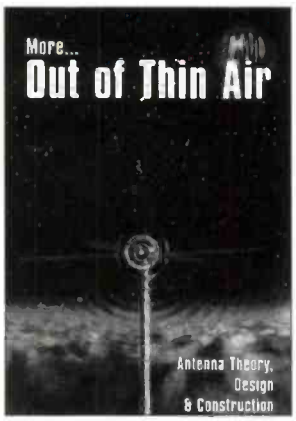

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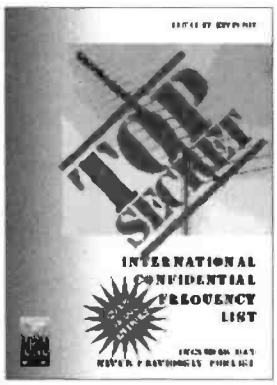

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From Screwdriver To 'Scope

Elaine Richards G4LFM says setting-up a workshop can mean lots of different things to different people. Here she takes three examples of a workshop set-up and details what you may need in each.

When you start out in radio as a hobby, depending on your interests you may only need a very simple tool box or you might want to set-up a full workshop.

So, let's look at Amateur 'X'. Let's assume they've got licensed recently, but don't have any real interest in home construction, but just need to put on the odd antenna connection, fix a mains plug or similar tasks. What sort of 'workshop' is needed?

You'd best start with a toolbox, so you have one place to keep everything. Now this can be one of those open toolboxes made of plastic with a handle in the middle.

You often see 'open' type in hardware shops at around the £5 mark. Or it could be a lidded box with a handle on the top available for between £10-20.

Basic Tool Box

So, what should you have in a basic tool box? The most expensive pieces are going to be a soldering iron and a meter of some sort. Let's look at a soldering iron and a stand first.

You can use just a simple 17W miniature soldering iron and one of those coil stands with a piece of sponge in the base. This will set you back around the £15-17 mark, unless you can get a bargain at a rally.

But if you can, I would suggest you invest in a temperature controlled soldering station. These are more expensive starting at around £40, but are much more versatile and reliable.

Mind you, if you want to get into some serious soldering and are looking to buy a soldering iron to last for years and years, buy carefully. You should think about buying an iron that has an adjustable temperature range and a grounded (or 'earthed') tip.

The Multimeter

The multimeter in your tool box should be a good quality unit. If you are sure you are only going to use it for the odd voltage reading and continuity testing, then don't spend too much money.

But, if you think you might need a better meter in the future, think about getting one with a built-in bar graph display (great when dealing with varying signals). It's also useful if it has a hold facility so it retains the reading whilst you are concentrating on making sure you are testing the right spot.

There are a lot of meters on the market. Have a look through some catalogues and you'll see the wide range of facilities and prices that go with it.

As for a basic tool kit, you should always try and avoid the cheap-to-buy and cheaply constructed ones. They won't last! If you buy good quality tools, they should last a lifetime.

Screwdrivers & Pliers

A set of miniature screwdrivers and a couple of flat-bladed and cross-head screwdrivers are a good start. I'm sure I don't need to describe how you use them!

Just make sure they are suitably sized for undoing mains plugs, equipment cases and the like. Another useful tool is a pair of long-nosed pliers, these are great for picking up the washer that has been dropped down inside the set!

Actually, long-nosed pliers are great for holding small components for soldering, if you decide to have a dabble. Other than the tools I've mentioned, for a basic tool kit I would just include a pair of wire cutters, the ones often called snip cutters are a good happy medium.

If you buy carefully, I think you could probably build-up a basic tool kit with the items I've metioned for about £50, (if you have to buy everything, including the toolbox).

Home Construction

Now onto Amateur 'Y', who's decided to have a go at a bit of home construction. A few extra bits and pieces are needed and this starts with the better sorts of soldering irons I mentioned earlier.

A set of 'helping hands' would also be a useful aid when building bits and pieces. They usually comprise a stand with a magnifying glass and a couple of large crocodile clips on 'arms', sometimes they even have a small light built-in.

Some anti-static protection used when building projects could save untold hours of fault searching later. Simple earth connectors are about £5 or so and you wear these around your wrist with the other end securely earthed.

The best thing to have is an anti-static workstation. This is usually a piece of anti-static bench matting, floor matting, a wrist strap, tweezers and an earthing cord.

Tool kits are available in many shapes and sizes.

I think you should also add a solder sucker or desoldering braid to the tool kit - just for those very rare errors.

A solder sucker can take a bit of getting used to, and make sure you can get extra nozzles as they have a habit of melting if you get them too close to the soldering iron! Trouble is you have to melt the solder to remove it.

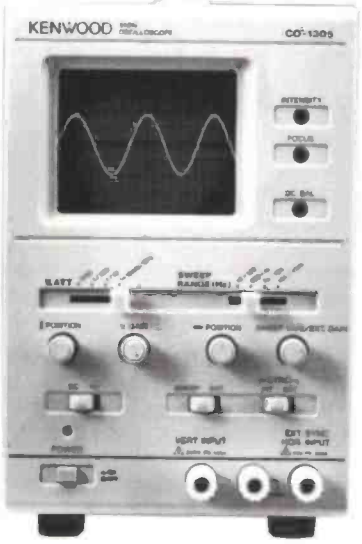
For fault finding, both freezer spray and switch cleaner can be invaluable. If you have got a piece of kit with an intermittent fault, then cooling it with freezer spray (or gently warming it with a hair drier) can make the fault appear when you are ready to search for the trouble.

Switch cleaner is used for a multitude of tasks, because sooner or later you get a noisy switch or potentiometer, that's why it should be in the tool box.

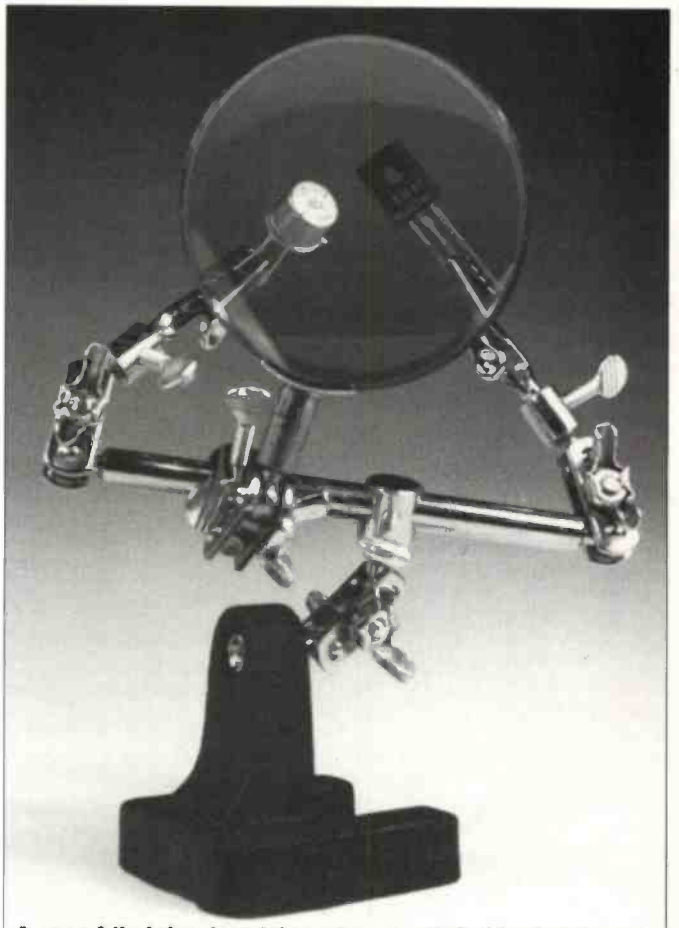
There are some things that look like cotton buds with very long sticks that you can buy for cleaning things in awkward places. These sorts

A soldering iron like this will probably cost you around £15-17.

Elaine G4LFM says "the multimeter in your tool box should be a good quality unit" and there are plenty to choose from.



A vital item in a comprehensive workshop is the oscilloscope.



A set of 'helping hands' can be a useful aid when home-brewing.

of bits and pieces can often be bought at rallies at good prices.

So, can things like pvc insulation tape, self amalgamating tape and heat shrink sleeving. They're all useful for the home constructor.

Test Equipment

Now, what if you are Amateur 'Z'. If you're getting seriously into home construction then you will need all the tools I've described so far plus a good range of test equipment. A good multimeter is worth its weight in gold but, in addition to the basic a.c. and d.c. ranges there are a few extras that can prove very useful.

Take a very close look at the specification of the a.c. range, ideally you want a response to at least 20kHz and preferably up to a few MHz. You will find many of the cheaper units cut off above 200Hz.

It's also worth considering one of the multi-function meters that includes capacitance measurement. This can be a great help when dealing with components that have lost their markings.

Whether you're dealing with logic, audio or radio, a good frequency counter is a must. It's advisable to select a model that can be configured as a timer as well as counter.

Vital 'Scope

Another vital item in a comprehensive workshop is a two-channel oscilloscope. This is essential when setting-up projects and is certainly a great aid to fault finding.

If you intend to do much work with digital circuitry you should also seriously consider getting a storage 'scope to capture the very short duration signals. When choosing your 'scope you should consider one with a 20MHz bandwidth as the bare minimum.

You will also need a signal source so you can align your new projects. The type of signal source depends on the type of project you will be building.

If you were to specialise in audio work you would need a low distortion audio signal generator. Ideally it should have a frequency range from around 10Hz through to 100kHz.

Signal Generators

For digital/logic work a function generator is essential. This should have as wide a range of features as you can afford.

The real expense comes when you move into signal generators for radio frequencies. Not only do you need a very stable frequency source, but the generator must exhibit low noise and feature an accurate attenuator.

Although there are cheap modern signal generators on the market, many suffer poor stability and leaky attenuators. It's extremely difficult to align a sensitive receiver with such a signal generator.

For most people the solution is to buy commercial equipment second-hand. You will find lots at rallies and advertised in many electronics magazines.

I've bought a number of Marconi units over the years and have always been impressed with the constructional quality. With some careful searching you should be able to pick-up a quality h.f. or v.h.f. signal generator for between £100 and £200. (Of course you can pay much more if you have the budget).

Bench Power

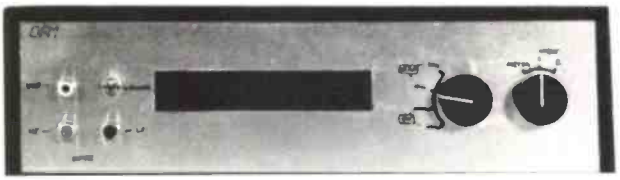
Finally, you ought to have a good quality bench power supply. Ideally this should have two separately adjustable supplies with at least 30V at 1A available.

To protect your new project from instant destruction, its worth paying a bit extra for a supply with variable current limiting. If you want to save some cash you could build your own power supply, as there are plenty of published designs around.

So that's it, a quick look at what the three different workshops offer. Really it all boils down to what you want to do with your hobby-time and how much you have available to spend. With careful shopping you should get years of service from some good equipment.

PW

Modding The Robin



Based on the original PW Robin frequency counter but with added functionality, this is Ken Ruiz's version.

Ken Ruiz G4SGF/ZB2MD shows you how to get faster display updates and a frequency offset reading on the PW Robin counter.

The modifications I'm describing are to the Robin Frequency Counter (*PW* July-August '91), which while preserving its original specification also permits more frequent display updates. I've also suggested a way of getting a frequency offset, so as to use it for displaying the received frequency when reading the local oscillator of a superhet receiver.

Please refer to the original PW Robin article. In order to update the display more often, the gating frequency (input to pin 5, IC3) must be increased. The easiest way to achieve this is by changing the timing crystal to 3.2768MHz and then taking the output from pin 7 instead of pin 12 of IC2. (The frequency at this pin is 50Hz).

The 50Hz frequency is then divided by 10 (5Hz) or by 100 (0.5Hz) to give display updates of five times per second or once every two seconds as originally. The resolutions respectively are on h.f. 1 or 10Hz, or on v.h.f. they are 10 and 100Hz.

The output from pin 7 IC2 is fed to an extra IC (IC20), a 74HC390 in a symmetrical divide by ten (biquinary) mode. Using one stage gives an output of 5Hz, two stages 0.5Hz, as shown in **Fig. 1**. Assembly of this small circuit can be on stripboard or you could add it to the p.c.b. as I did when creating my own board.

The Modification

If you attempt the modification on first assembly, it's a good idea to modify the decimal point display at the same time. The method used is similar to the original circuit when using the higher gating frequency to count for 0.1sec.

Moving the decimal point to the right one place gives a 'correct number of MHz' display. Shown in **Fig. 2** is the arrangement I used with a four-way switch. The switch assembly only replaces S1b in the original circuit - a separate switch is needed for S1a (original circuit), the power switch.

You may think that taking the 50Hz signal as the gating frequency would update the display 50 times per second with a 100Hz resolution on h.f. and 1kHz resolution on v.h.f. This state of affairs doesn't work because the latch and reset pulses are too long.

You might make it work by reducing R26 and R27 (in Fig. 1.2, p27 *PW* July '91) to about 100k, but these shorter pulses may not be long enough to perform their original functions. I haven't tried this because the five times per second update is fast enough to track tuning the v.f.o. on my transceiver to look like an instantaneous display.

Using the original circuit PW Robin as a digital frequency read-out is fine while the radio in question is a direct conversion receiver. If the receiver is a superhet receiver or a transmitter is used, problems may arise. In these circumstances just reading the frequency of the local oscillator will give the frequency of operation offset by the i.f.

Offset Frequency

It's a relatively simple modification to permit the counter to be used as an offset frequency read-out. All that's needed is add to (or subtract) the i.f. to (from) the local oscillator frequency. This is easily achieved using eight 4560B b.c.d. adder integrated circuits

The 4560B adder i.c.s has two sets of input lines and one set of output lines. The b.c.d. number appearing at the outputs is the sum of the numbers appearing as the inputs. The i.c. also has 'carry in' and 'carry out' facilities.

Carry out means that the sum of the input numbers plus the carry in (1 or 0) was more than 9 in total. Carry in means add one more to this count. It might help to think back to the 'carry one' tick on the simple sums we all started out on at school!

In the Robin, the connections between the counters (i.c.s. 7-10) and the display drivers (i.c.s. 11-18) are broken. The outputs of the counters are taken to the 'A' inputs of the eight 4560Bs. The value of the i.f. is programmed into the 'B' inputs and the sum of these two is presented to the display drivers, see **Fig. 3**.

The connections between (original) i.c.s 7-10 to IC11-18 are all by wires on the top of the board. Because of this the modification can be carried out on an existing Robin without removing it from its case or modifying the board (assuming the case is large enough to accommodate the extra circuitry).

As there are few interconnections between the new adder i.c.s, it doesn't seem worthwhile to create a p.c.b. You could make up your own layout using perforated board instead.

There are few problems when the i.f. is to be added to the local oscillator frequency (i.e. the l.o is below the received signal), but what if the l.o. is above the received signal. Now we need to subtract the i.f.

Subtraction Cheating

Well, subtraction can still be done with the circuitry described here, as long as we don't mind cheating a little! Let me give the example as I solved it for my transceiver (the G2DXK rig published in *RadCom* June-October '84).

The G2DXK rig uses an i.f. of 4.432MHz using cheap TV crystals. The l.o. for the 14MHz band runs from 9.567 to 10.167MHz. So I need to add 4.432(MHz) This operation only needs simple addition.

On the 7MHz band, the l.o. covers 11.432 to 11.932MHz. On this band I need to subtract 4.432(MHz) to give 7.000 to 7.500 on the display.

Now, instead of subtracting 4.432000(MHz), I add 95.568000(MHz) instead. The effect is for the 4560 i.c.s to add 95.568000 and 11.432000 to give 107.000000.

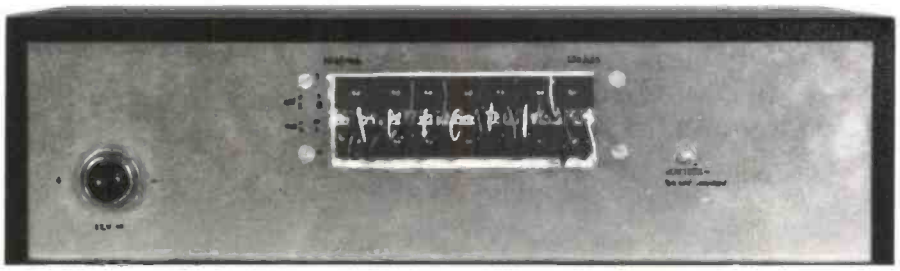
The leading '1' is not displayed as it 'falls' off the left hand end of the display. All I see is 07.000000MHz. See **Table 1** for the binary values of the offsets I used.

Fine, so now we can add or 'subtract' the i.f. but what if we need to do both and quickly, as on changing bands? The answer comes in an extra switch on the front panel.

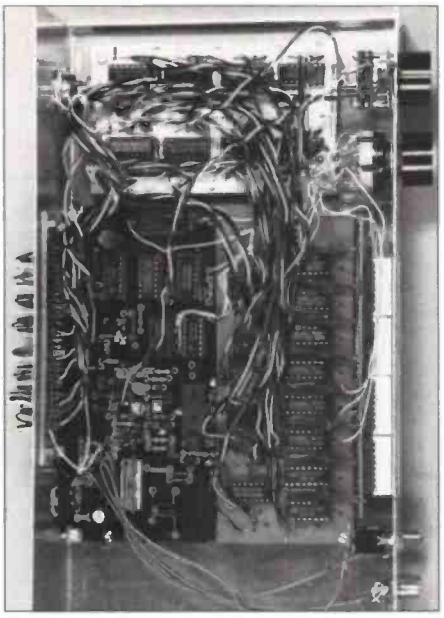
Looking at the BCD equivalents on 4.432 and 95.567 as required over the eight digits of the display you will see that some lines are permanently on logic level '0' and some are permanently on logic '1'.

Others are at logic 1 for 4.432 offset to become 0 for 95.567 offset, and vice versa. The problem is solved using a 3p-3w switch, as in **Fig. 4**.

The 'B' inputs to the adder i.c.s that are permanently at logic '0' are permanently grounded. Those that are to be permanently logic 1 are connected to S1c wiper. Those which are to be logic '1' for 4.432 (and 0 for 95.567) are connected to (new) S1a wiper, and



On the back panel is a patch panel to allow any offset to be quickly programmed into the adder inputs.



The offset p.c.b. is mounted above the original PW Robin board, and is connected to it by the mass of wires. Perhaps not so pretty, but, it is very useful!

those which are for '0' for 4.432 and '1' for 95.567 to (new) S1b.

The upshot of this is that when (new) S1 is moved to the far left, all the 'B' inputs are at logic '0', and the output of the adders i.c.s is exactly that which appears on the 'A' inputs. In other words the Robin display is unmodified.

On moving to the central position, the 'B' inputs see 04.432.000 and the i.f. is added to the l.o. signal. At the far right, the 'B' inputs see 95.567.000 and the i.f. is 'subtracted' from the l.o. signal. (The extra work needed to the transceiver is a socket on the back panel, an output for the l.o.).

On my Robin, I took all the 'B' inputs to the back panel and by means of jumper wires I can hard-wire program any offset that I require. For each 'B' input line I have four value 'buss' lines I can connect them to. I have lines labelled, 1, 1-0, 0-1 and 0.

The four buss lines are: permanent '1', '1' going to '0', '0' going to '1' and permanent '0' respectively. These are the four different input to the various 'B' input that are required to give offset readings above (or below), when changing the readings to above or below the count.

I think you will agree, this makes an already excellent counter even better. So get busy and get 'modding' your Robin.

PW

The original PW Robin article (by Mike Rowe G8JVE) was in the July and August 1991 issues of *PW*. Errors & Updates appeared in September and October of that year.

In the September 1993 issue of *PW* Mike Hughes showed us how to lower the power requirements of the counter.

Over a year later (October '94) Mike Rowe put a thermal oven into the PW Robin. In the same month George Fidler G3TDV extended the Robin to count time and capacitance.

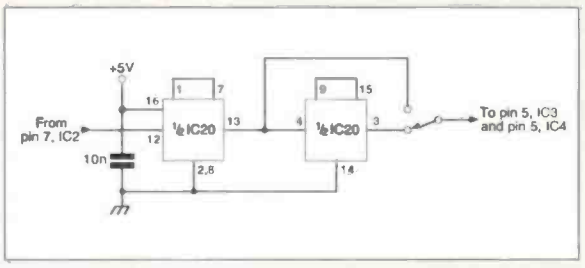


Fig. 1: An additional counter has to be added if you follow Ken Ruiz's mod for faster updated display. The i.c. has been given the number IC20 to distinguish it from the original Robin circuitry. The single switch allows normal or f/10 resolution for a faster update. This circuit does not alter the decimal point l.e.d.

Table 2

Dec	D	C	B	A
	8	4	2	1
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1

Table 2: The binary representations of the decimal numbers 0-9 to be used when setting your own i.f. offset. Check these with the values shown in Table 1.

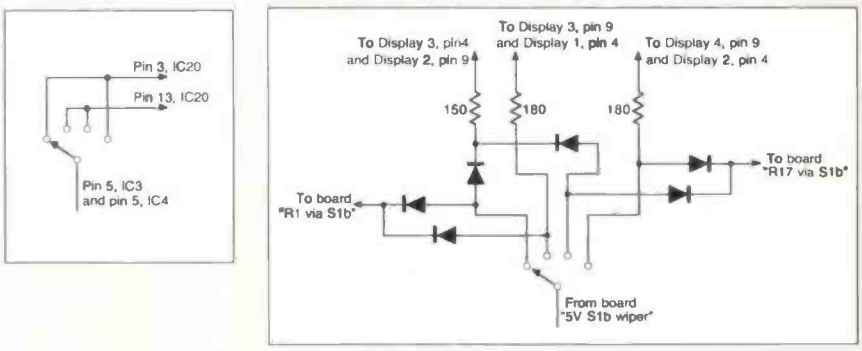


Fig. 2: A new range and resolution switch. Made by combining the simple switch of Fig. 1 and the function of the original Robin range switch.

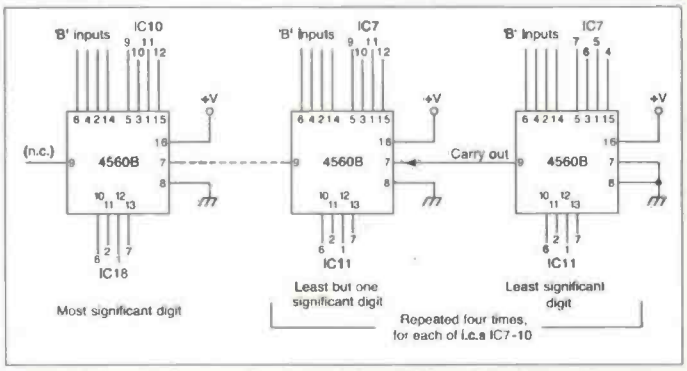


Fig. 3: The skeleton circuit of the adder circuit to give a frequency offset. The right hand pair must be duplicated for each of the counter i.c.s in the original PW Robin.

Fig. 4: The new count control switch. As shown, it is in the direct counting position. In the middle is 'offset-1', and to the right is the position for 'offset-2'.

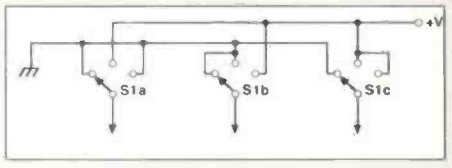


Table 1

0	4	4	3	2	0	0
0000	0100	0100	0011	0010	0000	0000
9	5	5	6	7	0	0
1001	0101	0101	0110	0111	0000	0000

Table 1: The binary representations of the two example numbers to be 'added' to the count. See text for more detail.

The Ultimate Transceiver? The Kenwood TS-870S

Rob Mannion G3XFD tries out the latest release from the Kenwood stables and wonders if it's the 'ultimate' in amateur radio transceivers.

During the first week of October I was over in Cork operating as EI/G3XFD. Not on *PW* business, but on holiday as the guest of my old friend John Tait EI7BA.

I had an excellent holiday and wonderful hosts. The Tait family even threw me a birthday party complete with cake of which (of course) I ate too much. Eunice Tait, John's wife, is a super cook and I couldn't resist the delightful chocolate cream sponge cake!

Along with delightful scenery, good weather (apart from the day before and the actual day of sailing home from Rosslare!) I had another marvellous surprise - in the shape of a brand new Kenwood TS-870S transceiver. And to top everything off, Kenwood air-freighted it over to me...I felt privileged indeed.

Of course I'd heard a lot about the TS-870S and the digital signal processing facilities, but little realised that the rig (described by one USA station as the 'ultimate') would arrive when it did. And, following my 'on air' tests at EI7BA's home (complete with formidable antenna 'farm') I too was left wondering about this amazing machine.

The Ultimate?

Anyone who claims that they've discovered the 'ultimate' (whether it be recipé, car, or 'dream' house) takes the risk of compromising themselves and their opinion...when the next 'ultimate' comes along. However, after trying this transceiver I wonder how long it will be before Kenwood can better it, because it's truly amazing.

No review, gathered from only a few weeks trying a transceiver such as the TS-870S, can truly reflect its capabilities and features. However, I can only try and convey the sense of wonderment gained from using the rig and I'm too aware that to provide a true representation of what the TS-870S can do, I'd need six months with the transceiver and at least two issues of *PW*!

So, what's it all about, **just what is so special** about the TS-870S? Well, in effect, it's a feature-packed state-of-the-art 100W transceiver with a truly 'magic' ingredient added...in the form of the digital signal processing. The effect of this has to be heard to be believed.

But before I wax lyrical, let's take a brief look at the circuitry and specifications. There are some interesting points and one in particular where I take Kenwood to task. More of that later!

Circuitry And Design

The circuitry and design on the TS-870S is very interesting and (incredibly) complex. However, (apart from the many extras) the concept behind the transmitter side is that of an all amateur bands unit covering from 1.8 to 30MHz, providing a.m., c.w., s.s.b., f.s.k., and f.m. modes. with an automatic antenna tuning unit (a.a.t.u.) built-in.

As is usual nowadays with the Japanese manufacturers, the receiver side provides general coverage, along with the amateur bands. So, in effect the operator of a TS-870S has a versatile package to hand, covering 30kHz (the receiver tunes far below what the specifications state) to 30MHz.

On the receiver side, basically speaking, Kenwood describe it as being a "Quadruple conversion" on a.m., c.w., s.s.b and f.s.k. (f.m. reception is provided by the receiver working in a dual-conversion configuration). And the 'fourth' conversion is the point where I beg to differ with Kenwood! (see below).

The first i.f. is very high frequency at 73.05MHz, the second is at 8.83MHz, the third at 455kHz and the **fourth** is at **11.3kHz**!

The 'fourth' i.f., as I've mentioned, is where I disagree with Kenwood's interpretation on an 'intermediate frequency'. I concede that the 11.3kHz (where the digital signal processing takes place) is in effect a 'conversion' (it has to be, because of the analogue-to-digital (a-to-d) conversion process, but I dispute that it should be referred to as an 'i.f.' in the conventional sense as we know it in radio communications.

Surely, following Kenwood's convention, **any stage** where there's **conversion** and subsequent signal handling involved, could be referred to as an i.f.? And as an example (suggested by several amateurs whose opinions were asked) the product detector came to mind. After all, a product detector is a 'mixer' followed by signal handling (albeit at audio frequencies) stages isn't it?

However, I've said my piece and I don't want my opinion to detract from the amazing performance provided by the transceiver itself. So, lets take a look at what you get for your money!

Digital DXing

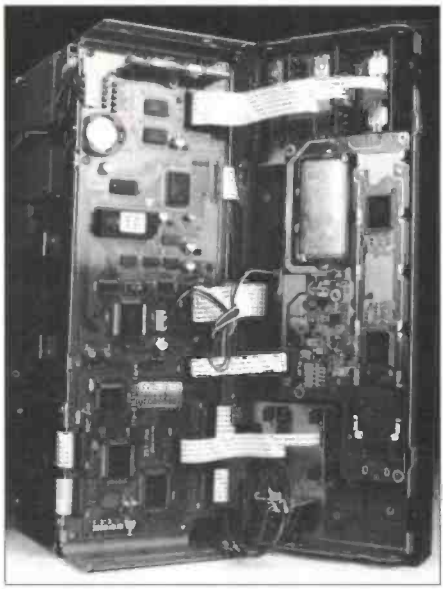
My first reaction to 'Digital DXing' with the transceiver was one of great surprise. The TS-870S seemed so quiet it appeared to be 'deaf'. But it's far from being deaf!

On the TS-870S if the signal is out of the digital signal processing (d.s.p.) 'passband' (if you can still use that term)...it's simply ignored. You don't hear the noise or the 'off channel' signal. The result is an amazingly quiet receiver which you have got to hear to believe.

So, once I'd got used to the fact the receiver was working, I suddenly realised that I could hear stations that would normally be totally buried under the noise. This fact was most noticeable on 3.5MHz s.s.b. during the evening.

Both John EI7BA and I (using his excellent range of antennas and marvellous location for h.f.) were able to work into the USA, South America and beyond with incredible ease and complete QSOs under the most difficult conditions.

And in fact, John actually worked an American amateur who was using a TS-870S himself. It was this station who passed on the



The inter-unit connections

information that they'd been told the Kenwood designers has specifically developed the TS-870S for European 3.5, 7 and 14MHz conditions! And although I'm unlikely ever to meet the anonymous designers, if I ever do, I'd like to tell them they've done a good job.

Signal Processing

The signal processing features on the TS-870S have to be the major point for anyone contemplating buying the transceiver. So, it's only fair to look at these in as much detail as possible in the space I've got.

The TS-870S (the 'S' designates it as the high power version of the transmitter, the low power version being available in Japan) design incorporates a two-channel Sigma-delta A-to-D converter, two two-channel Sigma-delta D-to-A converters and a single-bit Sigma-delta converter. Operating at a clock rate of 40MHz, the d.s.p. works on all modes. The adaptive filter functions include **Auto Notch**, **Line Enhance**, and **Beat Cancel**.

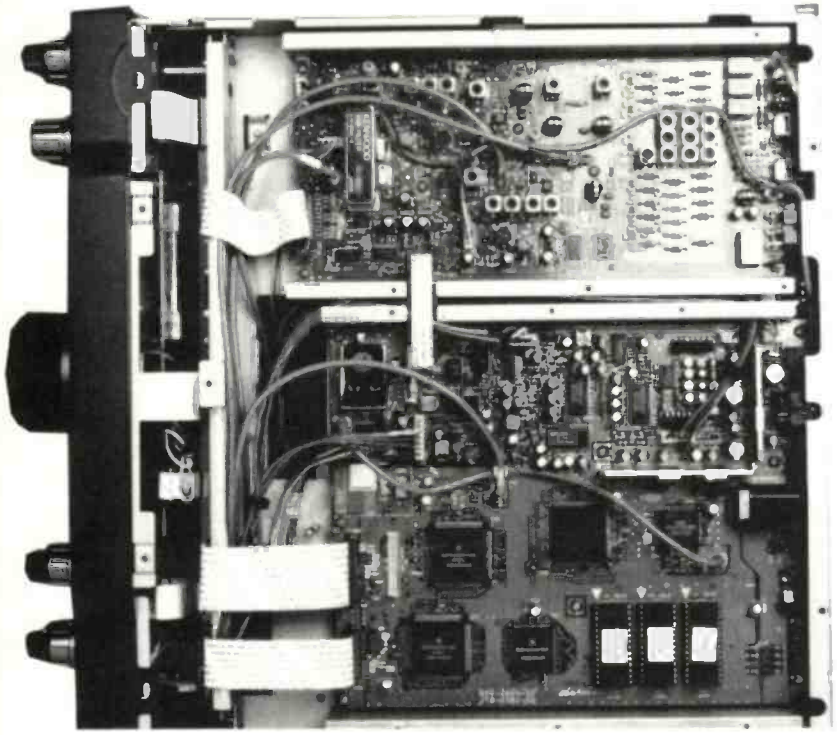
Kenwood claim (and my experience with the transceiver more than bears this out!) that d.s.p. is the most effective way of using current technology to separate what you want from what you don't want to hear. While receiving, you hear the most signal and the least noise (you have to experience it on 3.5MHz during the evening to fully appreciate the results).

The desgners also claim, that while transmitting, transmissions from the TS-870S only emit the desired audio components of the modulation without adding distortion. This is achieved by the incorporated 'transmit equaliser' combining high boost, bass boost and comb filter functions to further improve the signal.

On receive, with d.s.p. the operator can hear signals that are covered by noise on non d.s.p. fitted equipment. The enhancement is provided by the reduction of atmospheric and 'white' noise and to the rejection of adjacent frequency interference, including heterodynes.

Manufacturer's Specifications

General	
Modes:	J3E (s.s.b.), A1A (c.w.), A3E (a.m.), F3E (f.m.), F1D (f.s.k.)
Antenna impedance:	50Ω (with antenna tuner 20 to 150Ω)
Supply voltage:	13.8V d.c. (negative ground)
Current consumption	
Transmit:	22.5A (maximum)
Receive:	2A (no signal)
Usable temperature range:	-10° to 50°C
Frequency stability:	Within ±10p.p.m. (between -10° and 50°C)
Frequency stability (at room temperature):	Within ±10p.p.m.
Dimensions:	339x135x375mm (projections included)
Weight:	Approx 10.8kg
Transmitter	
Frequency range:	All amateur bands between 1.8 and 29.7MHz
Output power:	s.s.b./c.w./f.s.k./f.m. 100W (max) 20W (min) a.m. 25W (max) 20W (min)
Modulation:	s.s.b. (balanced) f.m. (reactance) a.m. (low level)
Spurious emissions:	-60dB or less
Carrier suppression	50dB or more
Unwanted sideband suppression (modulation freq. 1kHz)	50dB or more
Maximum deviation (f.m.):	±5kHz or less (wide), ±2.5kHz or less (narrow)
Transmit freq. characteristics	(-6dB) (TX bandshift 300Hz, TX bandwidth 2.3kHz) 300-2.6kHz
Trans. shift (XIT) range:	±9.99kHz
Microphone impedance	600Ω
Receiver	
Circuit type	Quadruple* conversion superhet (s.s.b./c.w./f.s.k./a.m) **(*see review for comments)** Double conversion superhet (f.m.)
Frequency range:	100kHz* to 30MHz **(* see review for comments)**
Intermediate frequencies:	(1st) 73.05MHz, (2nd) 8.83MHz, (3rd) 455kHz (4th*) 11.3kHz **(* see review for comments)**
Sensitivity (s.s.b./c.w./f.s.k.) at 10dB (S+N)/N)	100kHz to 500kHz 1µV or less 500kHz to 1.62MHz 4µV or less 1.62 to 24.5MHz 0.2µV or less 24.5 to 30MHz 0.13µV or less
(a.m.) at 10dB (S+N)/N)	100kHz to 500kHz 2µV or less 500kHz to 1.62MHz 31.6µV or less 1.62 to 24.5MHz 2µV or less 24.5 to 30MHz 2µV or less
(f.m.) at 12dB SINAD	28 to 30MHz 0.25µV or less
Selectivity	
s.s..b. (Low 300Hz) High 2.6kHz)	-6dB: 2.3KHz, -60dB: 3.3kHz
c.w. (width 200Hz)	-6dB: 200Hz, -60dBB: 450Hz
f.s.k. (width 500Hz)	-6dB: 500Hz, -60dB: 1000Hz
f.m. (width 14kHz)	-6dB: 14kHz, -60dB: 18kHz
Image rejection (1.8 to 30MHz)	80dB or less
First i.f. rejection (1.8 to 30MHz)	80dB or less
Notch filter attenuation	40dB or less
Receive incremental tune range:	±9.99kHz
Squelch sensitivity (s.s.b., c.w., f.s.k., a.m.)	100 to 500kHz 2µV or less 500kHz to 1.62MHz 20µV or less 1.62 to 30MHz 2µV or less
f.m.	28 to 30MHz 0.25µV or less
Audio output	1.5W (into 8Ω at 10% distortion)
Audio output impedance	8Ω



Internal view of the TS-870S transceiver.

The 'cleaning-up' capability of d.s.p. has a significant effect (as I've mentioned). The signal you're trying to receive seems stronger and clearer even though the S-meter reads the same strength!

In the manual Kenwood say that some may think a little 'magic' is being used...and I agree with this statement! With the usual difficult conditions on 3.5 and 7MHz I was copying stations I know would have been either very difficult or impossible to copy without the d.s.p.

Incidentally, although I've only briefly mentioned the manual (I only had the 'pre-production 'model') **it was good**. Mind you, with equipment as complex as the TS-870S, the manual **has to be good**.

However, (bearing in mind I'm not 'computer friendly') I soon found myself quite at home using the manual in selecting parameters on the keyer to suit myself. That's got to be a compliment to Kenwood!

Morse Mode

Working the Morse mode on the TS-870S is where the transceiver truly sold itself to me. The performance, facilities and ease of handling defy superlatives.

The built-in K1 'Logikeyer' (Kenwood even supplied a paddle key on loan with the rig for my benefit during the review!) was programmable for speed, weighting, messages (yes it's got that too!) and a great number of facilities I did not have time to use. Even keen contesters have been thought of as the designers have incorporated an auto-incrementing serial number system for contest QSOs.

The selectivity and d.s.p. facilities made it possible for me to work many weak stations on overcrowded bands. Another benefit was that the lack of noise and interfering signals also meant I could spend longer on the air without fatigue (a very important point).

On The Air

Of course, I used the TS-870S on the air from EI7BA's QTH and also my own more modest systems (long wire, 7MHz horizontal loop, and trapped-dipole). The results were impressive.

The reports on my audio were consistently good and many friends said they had no problems in recognising my voice. However, I found that the slightly 'switchyness' (a sort of 'clipped' effect) of the final audio was rather odd. This must of course, be due to the 'reconstructed' audio after the final digital-to-analogue conversion. But, after a very short while my ears became used to the sound and I found I was perfectly at home with the rig.

Although I only used the TS-870S on s.s.b. and c.w., I've no doubt it will be excellent on the other modes. But in rounding off this all-too-brief summary on the transceiver, I must mention how well it copes with the effects of nearby lightning and static 'crashes'.

During one storm in Cork when operating from EI7BA's QTH, I realised that the 'fizzing noise' (with only a slight reduction in signal strength!) was caused by a heavy static discharge from the antenna while it was connected to the rig! There was no damage and contact was maintained throughout the storm with the digital a.g.c. action coping extremely well.

So, in rounding off the review I can say I was immensely impressed with what the TS-870S has on offer for a 'main station'. It's an operator's delight, with the facilities including the amazing continuously variable a.g.c., and awe-inspiring d.s.p. likely to help anyone.

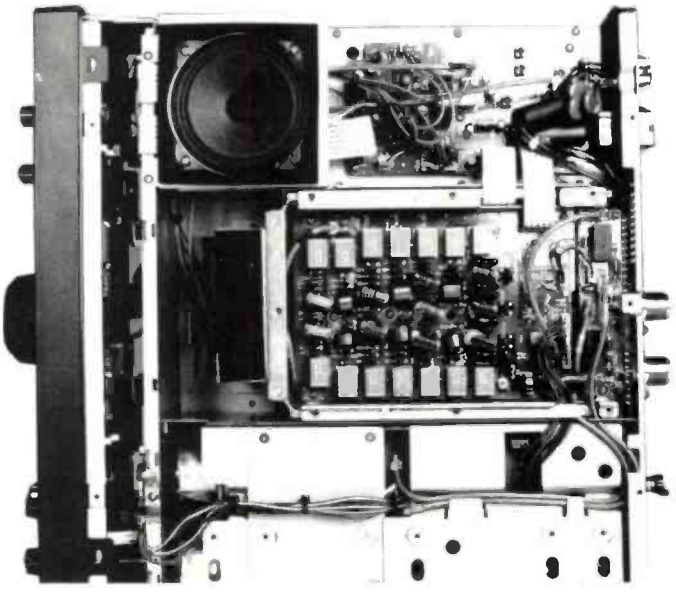
Finally, is TV line and field timebase interference a problem at your QTH? You can forget it with the TS-870S! And bearing in mind that we suffer more interference than we cause in the course of our hobby...that's got to be good news.

Reluctantly, I returned the transceiver to Kenwood for display on their stand at the Leicester show. But I'm looking forward to using it again in 1996, with our new 'On Reflection' feature, where reviewers will 'look back and reflect' on their original comments and findings in reviews on major items, with the benefit of hindsight and getting another chance to use the equipment (see 'Endnotes' in this issue).

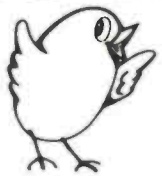
My thanks go to Trio-Kenwood (UK) Ltd., Kenwood House, Dwight Road, Watford, Hertfordshire WD1 8EB, for the loan of the TS-870S which is available from Kenwood approved dealers for £2399.95.

PW

Top view, showing loudspeaker and modularised circuitry.



Locking The Robin To Droitwich



Mike Rowe G8JVE, the designer of the popular PW 'Robin' frequency counter, describes an interesting frequency standard to improve accuracy on the instrument, courtesy of BBC Radio 4!

The frequency standard I'm describing was developed as a logical extension to the popular PW 'Robin' frequency counter. It provides an output of either 10 or 1MHz which can be divided by an add-on circuit down to drive the gating circuit of the Robin.

The output is phase-locked to the famous Droitwich transmitter (just south of Birmingham and very visible from the M5!) and its 198kHz BBC Radio 4 transmissions. The advantage of this over the crystal oscillator in the Robin, is one of frequency stability.

The crystal in the Robin has a frequency stability of approximately 20 parts per million (p.p.m.), whereas Droitwich has an accuracy of many times better than this. How this is achieved is described later in the article.

The unit has achieved good results at my location in West Sussex without the need for any external antenna. Despite this, I've included an external antenna socket which is fitted for difficult locations.

Droitwich Received

Look at the block diagram of **Fig. 1** and the circuit diagram in **Fig. 2**. Signals from Droitwich are received on an internal ferrite rod antenna. Alternatively they can be coupled in from an external antenna and amplified by Tr1 before passing to the double balanced mixer IC1 at 198kHz.

Oscillator injection is 200kHz (more about this later) and the resultant 2kHz i.f. is derived across the tuned circuit L2/C10,C12. The 2kHz is amplified by IC2a (part of a quad op-amp) and fed to a tuned filter configured around IC2b and c.

The tuning of the i.f. stage is fairly critical and to this end a multi-turn potentiometer (R19) is used. At this point the output of the filter splits, one path is rectified and is used to drive a tuning meter.

The other output goes to IC2d which is configured as a very high gain amplifier whose output is heavily clipped. This clipping effectively removes the amplitude modulation of the original Radio 4 signals.

The amplitude of the waveform is approximately 8V peak-to-peak and is fed to one input of the CD4046 (IC6) phase-locked loop. Because the rail voltage of the phase locked loop (p.l.l.) is 5V, the output from IC2d is attenuated by R43, R44 with shaping of the waveform by C28.

The other input of the p.l.l. is fed with 2kHz derived from the crystal oscillator. The 10MHz (from which the output is obtained) is generated by a Colpitts oscillator which is roughly tuned to frequency by C21.

Fine tuning of the 10MHz oscillator is by the varicap diode D2/3. This is controlled from the output of the p.l.l. via the network R37/C30 to R42/C31 and diodes D6/7. Resistor R41 is made up of four 10MΩ resistors.

Output level from the crystal oscillator is raised by Tr3 raises the output to t.t.l. levels. The 10MHz signal is shaped by IC3 providing a square wave output drive to the divider IC7 (providing 1MHz output), and to the divider chain IC5, IC4.

The i.c., IC4 is a dual counter arranged to divide by 50. This gives an output of 200kHz for mixer injection to the other Input of the mixer chip IC1.

Another dual counter, IC5, this time dividing by 100, feeds 2kHz to the second input of the p.l.l. This 2kHz input is compared with the i.f. derived signal and the resultant output of the comparator is filtered by R42, C31 before passing to the network around R37, C30. It has a very long time constant (narrow bandwidth) which removes any short term variations due to interference, fading, etc.

Diodes D6, D7 conduct when the output of the p.l.l. is very high or low, speeding up the locking of the p.l.l. When the circuit is 'in

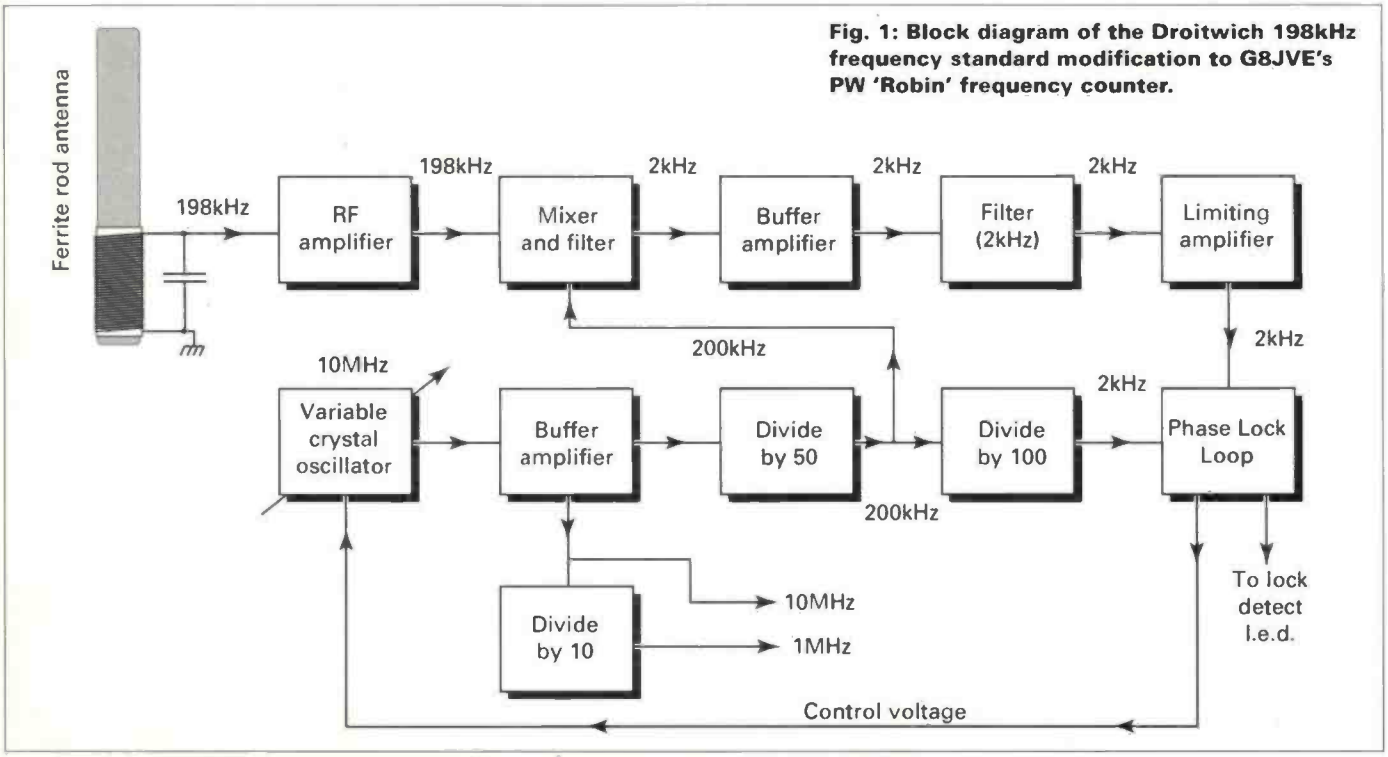


Fig. 1: Block diagram of the Droitwich 198kHz frequency standard modification to G8JVE's PW 'Robin' frequency counter.

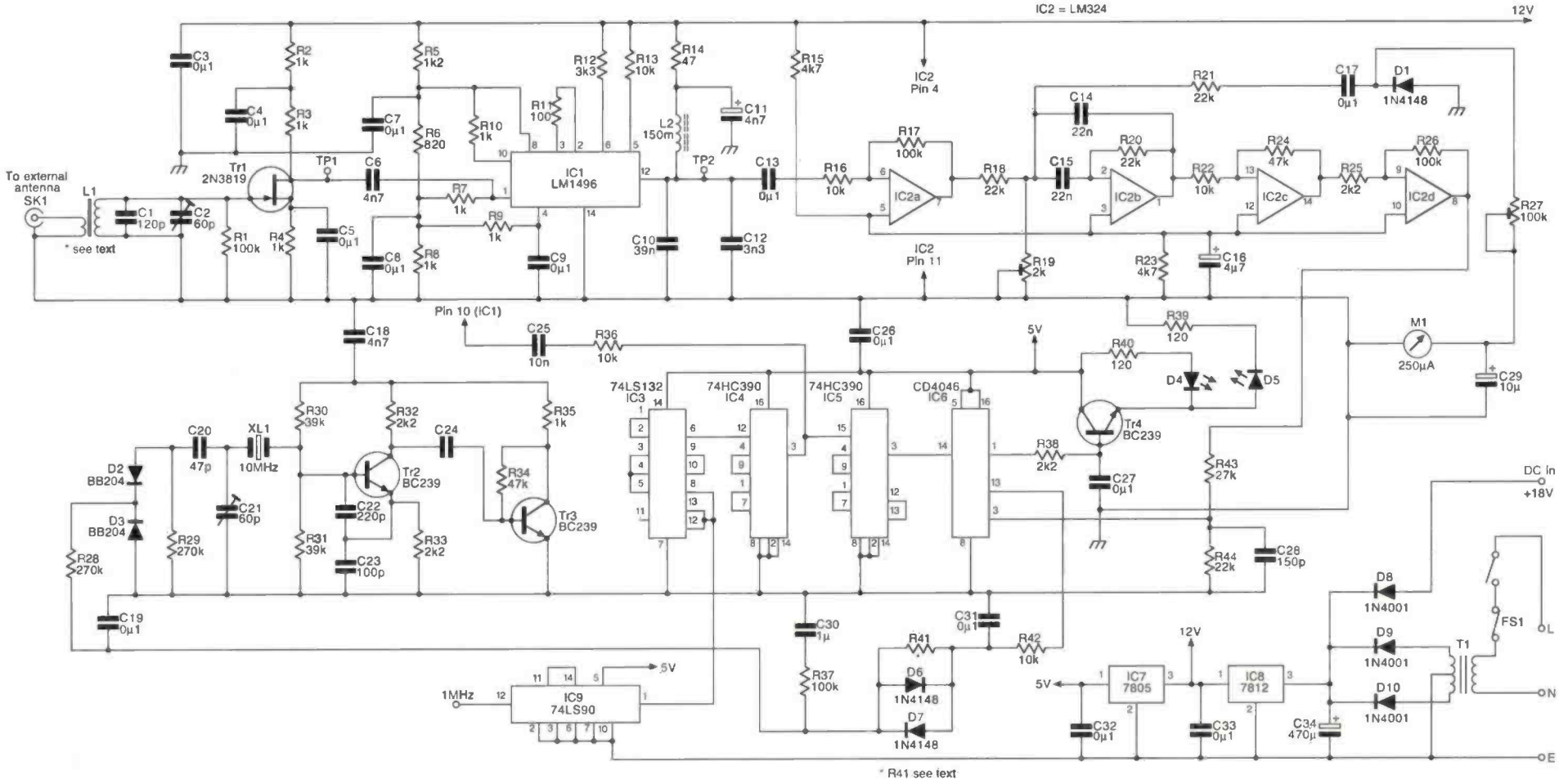


Fig.2: Circuit diagram of the add-on frequency standard unit.

lock' these diodes have little effect on the operation of the oscillator.

The capacitor, C30 must be a polyester or similar type type. (An electrolytic is most definitely **not** suitable due to leakage).

On Frequency

Only when the 10MHz oscillator is exactly on frequency will the injection be 200kHz and the i.f. 2kHz to lock to the 2kHz derived from the divider chain.

Should the 10MHz drift for example (let's say 2kHz) the i.f. would be 40Hz off frequency and the input to the p.l.l. 0.4Hz off frequency. In this case the p.l.l. will obviously be 'out of lock'. The output of the p.l.l. would go either high or low (depending which way the oscillator had drifted) and the resultant d.c. voltage applied to the varicap would pull the circuit back on frequency.

Power supplies for the unit are from an on-board mains unit with regulators for 12 and 5V. The split supply for the amplifiers IC2 is by the potential divider R15/R23 which provides 'an artificial' mid-point ground.

The Construction

Let's now look at the construction side. It's quite straightforward as the project is built on a single double-sided printed circuit board (***please see Editorial panel at end of text***).

The p.c.b. should be carefully examined for solder bridges, etc., before starting. Any errors at this stage may be difficult to detect once building has commenced.

I suggest that the i.c.s (with the exception of the voltage regulators) are mounted in sockets. These are fitted first to provide a guide to the location of the other components.

Now fit the links shown on the layout (five in number) followed by all the resistors and diodes. (taking care with the polarisation of the diodes).

Note that many of the resistors are soldered to both the ground plane and the underside tracking to provide ground returns to some circuit elements. Also remember the square pads (which have no components fitted) will also need to have a wire soldered to both sides to provide earth returns for some of the i.c. pins.

Next fit all the capacitors and trimmers. Avoid overheating the film trimmers as this will cause damage.

Capacitors C9, C11 and C29 have their 'earthy' legs bent at right angles close to the body. **They are then soldered to the ground plane**. They do not have a hole through to the other side the board.

Now fit all the remaining components and Vero pins for the various off-board connections and test points. The voltage regulators are mounted 'back-to-back' and share a common heatsink. It's probably best to screw these onto the heatsink before soldering them into position.

The mounting holes in the p.c.b. are in alignment with the fixing pillars on the recommended case. The ferrite antenna is mounted on the rear panel with stand-off

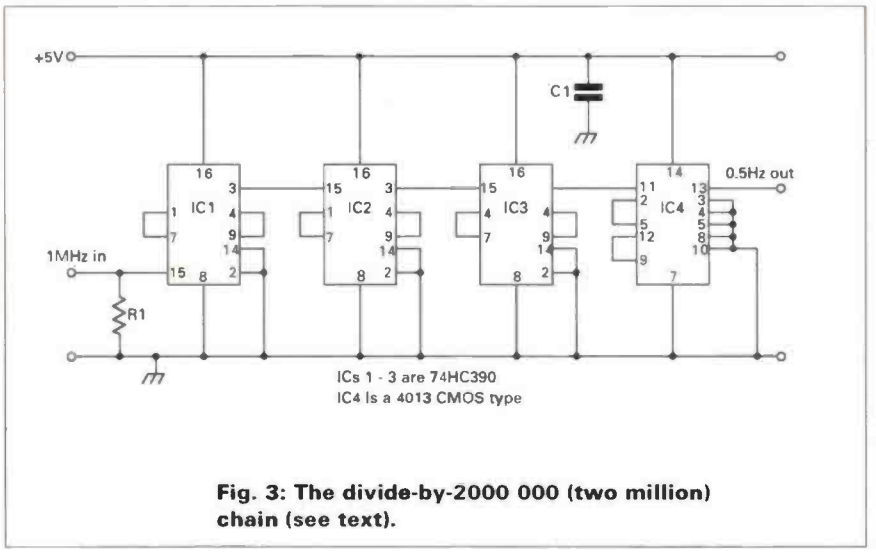


Fig. 3: The divide-by-2000 000 (two million) chain (see text).

pillars and Nylon 'P' clips. (The output and external antenna sockets are also mounted on this panel).

The **Lock** indication l.e.d.s (D4 and 5) are mounted on the small p.c.b. They're secured on the front panel together with the tuning meter and power switch.

Finally, double check all component positioning and the tracking side for any dry joints or track bridging. With an multimeter check both the 5 and 12V lines for shorts to earth and to each other, as either could be disastrous.

The Alignment

To start the alignment, with the unit powered either from the a.c. mains or external d.c., check the validity of the 5 and 12V lines. Using your existing Robin, set the 10MHz oscillator on frequency using C21.

Now switch off and remove IC1 and connect a 2kHz signal to TP2, set the meter potentiometer R19 to about 50% and adjust R27 for maximum reading on the tuning meter. This is fairly critical and should be carefully adjusted.

Switch off and refit IC1, switch on and adjust C2 and the position of the coil on the ferrite rod for maximum on the meter. This can also be checked with an oscilloscope on TP1.

By now the **Lock** (D5, green) l.e.d. should be illuminated possibly the red one (D4) will be flickering, if so, carefully adjust C21. This is best done by 'rocking' the control until a mid point is found when only the lock l.e.d. is on.

Final slight adjustment of R19 and C2 for maximum meter reading will ensure that the unit is fully aligned. Check by switching off and on again the red **Unlock** light should briefly glow and then extinguish, changing over to the green **Lock** l.e.d.

Next, set the meter deflection using R27 so that a strong 198kHz signal gives approximately 80% f.s.d. Now the unit will then ready for use.

Existing counters may be set up using the 10MHz output, trimming the clock until the

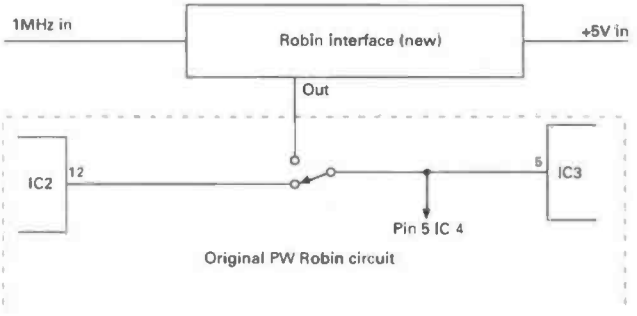


Fig. 4: Switching required between original PW Robin circuit and new (add-on) frequency standard unit (see text).

display reads correctly. Alternatively, many counters and synthesised signal generators may be operated from the 1MHz output feeding this into the external standard input.

Robin Interface

To enable the Droitwich standard to be used with the PW 'Robin' it's necessary to build a small interface board. The 'Robin' clock is designed around a 4.194304MHz crystal which is binary divided to give 0.5Hz output.

The Droitwich standard gives either 10 or 1MHz output, so obviously, this cannot directly replace the internal crystal. The 'Robin' interface board divides the 1MHz signal by 2,000,000 to give an output of 0.5Hz. The circuit is shown in **Fig. 3**.

The 1MHz input signal passes to the first of three identical divide-by-100 i.c.s (74HC390) and then to a 4013 connected as a divide-by-2. This 0.5Hz signal is used to drive the gate and control circuitry in the 'Robin'.

Using The Standard

The 'Robin' can easily be modified to operate using the external standard. This can be either done on a permanent basis cutting out the internal clock completely, or may be switched in as required, as shown in **Fig. 4**.

Having constructed the interface board, this may be mounted on the rear panel of the case using 'stand-offs', together with a suitable 1MHz input socket and miniature single pole double throw (s.p.d.t.) switch.

Refer back to the original circuit of the PW Robin (*PW* Jul/Aug '91). Cut the track running from pin 12 of IC2 (4040) to pin 5 of IC3 (4538) and pin 5 of IC4 (74AC00). Connect the centre contact of the switch to the IC3/IC4 side of the cut.

Now connect one pole to the output of the interface board and the other to the IC2 side of the cut. The 5V for the interface may be connected to the output of the regulator IC19. The 'Robin' may now be run from the external standard with a very high degree of accuracy.

PW

The original PW Robin article (by Mike Rowe G8JVE) was in the July and August 1991 issues of *PW*. Errors & Updates appeared in September and October of that year.

In the September 1993 issue of *PW* Mike Hughes showed us how to lower the power requirements of the counter.

Over a year later (October '94) Mike Rowe put a thermal oven into the PW Robin. In the same month George Fidler G3TDV extended the Robin to count time and capacitance.

Shopping List

Resistors

Carbon film 0.25W		
47Ω	1	R14
100Ω	1	R11
120Ω	2	R39, 40
820Ω	1	R6
1k.Ω	8	R2, 3, 4, 7, 8, 9, 10, 35
1.2kΩ	1	R5
2.2kΩ	4	R5, 32, 33, 38
3.3kΩ	1	R12
4.7kΩ	2	R15, 23
10kΩ	4	R13, 16, 22, 36
22kΩ	5	R18, 20, 21, 22, 44
27kΩ	1	R43
39kΩ	2	R30, 31
47kΩ	2	R24, 34
100kΩ	4	R1, 17, 26, 33
270kΩ	2	R28, 29
10MΩ	4	R41a, 41b, 41c,41d
Preset Multi-turn vertical		
2kΩ	1	R19
Miniature skeleton horizontal		
100kΩ	1	R27

Capacitors

Ceramic		
47pf	1	C20
100pf	1	C23
120pf	1	C1
150pf	1	C28
220pf	1	C22
10n	1	C24
Polyester		
3.3nF	1	C12
4.7nF	2	C6, 18
22nF	2	C14, 15
39nF	1	C10
100nF	14	C3, 4, 5, 7, 8. 9. 13, 17, 19, 26, 27, 31, 32, 33
1µ F	1	C30
Electrolytic		
4.7µ F	2	C11, 16
10µ F	1	C29
470µ F	1	C34
Trimmer		
60pf	2	C2, 21

Semiconductors

2N3819	1	Tr1
BC239	3	Tr2, 3, 4
MC1496	1	IC1
LM324.	1	IC2
CD4046	1	IC6
74HC390.	2	IC4, 5
74LS132.	1	IC3
74LS90	1	IC9
7805	1	IC7
7812	1	IC8
1N4148	3	D1, 6, 7
BB204.	2	D2, 3
IN4001	3	D8, 9, 10

Miscellaneous

l.e.d.(red)	1	D4
l.e.d.(grn)	1	D5
XL1	1	10MHz (Maplin)

You will also need a 1A fuse and holder, one 15-0-15 6VA (Maplin) transformer, one LW Ferrite Rod (Maplin), one 150mH Toko coil, one 250µA meter, heatsink for IC7/8, Case (Maplin KC61R), BNC sockets (2 off); IC sockets (if required)

We apologise that due to lack of space and production difficulties, the necessary printed circuit board designs and associated component overlays for this project will appear in next month's (January 1996) *PW*. Please accept my apologies. Rob Mannion G3XFD.

MARTIN LYNCH

G4HKS

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A big thanks to all of you who sent their kind wishes on the arrival of our new baby son, Henry.

Jennifer is doing just fine and so is our new member of the Lynch family. There again, naming the kid after a world famous DX'er he had to be okay, didn't he?!

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Why does MARTIN LYNCH continue to outsell ALL of his competitors, when it comes to HF Equipment?

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Martin Lynch is the only company that sponsors the RSGB HF Convention each year, usually with a top manufacturing company such as Kenwood or Yaesu, both of which are happy to be associated with the U.K's No. 1 retailer. When buying a major piece of HF gear, (or any other for that reason), check to see if the company is capable of first demonstrating the radio itself, (you would be amazed how many retailers can't), can offer REAL back-up in the event of a break down, collects at the company's expense in the event of a warranty claim, offer a 5 Year trouble-free cost free ownership period, offer top trade in values and will offer a "MONEY BACK GUARANTEE" if the item purchased is not suitable*

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- ✓ The only company offering 5 Years Warranty on new or 15 months on Used.
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CONTACT STEVE JELLY - OUR DATA COMMS EXPERT FOR FULL INFORMATION

Harding's home-brew

Keen constructor Stephen Harding G4JGS dishes up some more ideas and suggestions which help him enjoy the hobby and produce excellent home-brewed projects. He aims to help you to do the same in your workshop.

Amateur Radio is different things for different people, that's one of the things that makes it so interesting. My interests in radio began in my early teens when valves, dry batteries and accumulators were still an everyday part of radio for many households.

You had to do things to the radio, besides turning it on, to make it work. One of the great highlights of using radio, was illicitly listening to Radio Luxembourg in bed snuggled down under the sheets with a pair of earphones on.

Listening time was usually limited by the time before parental detection (and confiscation of headphones) or when the dry batteries 'went flat'. (These, scrounged from Grandma's hearing aid when they were a bit low, usually ran out completely on the radio!).

On my schoolboy pocket money, buying new batteries was out of the question, so local ingenuity came into use. By remaking the dry batteries, it was surprising how well you could extend their life.

But the downside was that it was a surprisingly messy process which brought me into regular conflict with my Mother. I persevered, and it paid off.

Receiver Kit

Having decided that it might be better to encourage me rather than beat me, my parents bought me a two valve short wave receiver kit and a soldering iron. I built the radio, and guess what, it didn't work!

At that stage, I hadn't a clue where to start so I took it to bits and started all over again. By this time, I'd learnt how to solder and I guess this was the key skill that really enabled me to enjoy the magic of radio and with my parent's blessing.

Shortly after this, a cousin of mine gave me a couple of ex military radio sets. Neither worked, so out came the soldering iron and within a very short period, both were working again.

Then it was back to Grandma to scrounge the hearing aid batteries again, and a friend and I had a great means of communicating between our two villages. The radios gave us many hours of fun and we learnt how to get the best from our sets the hard way because in our remote part of agricultural Berkshire, there was no one to turn to for advice.

If it didn't work, we had to fix it. Spares were a real problem with the nearest Army surplus store being in Reading for which the return bus fair was half a week's pocket money.

However, we found that the village rubbish tips were a wonderful source of old radios which could be stripped for components. I learnt a lot about how they were constructed and started something my colleagues say I have perfected...the art of scrounging and barter.

Full Member

From those early beginnings right up to today, I've been a full member of the 'Bin Divers Society'. My shack is filled, much to my wife's annoyance (but children's delight) with things that will come in useful one day.

My friend who I had used the army sets with went on to become a TV salesman. But I stayed at school studying for 'O' levels and playing radio in the Army Cadet Force (something which I still do).

Exams continued to dominate my life for the next few (too many) years so my interest in radio waned. This however, changed when I took up a teaching post in a school which has an Army Cadet Force (ACF).

I became involved with the ACF and found to my absolute delight, a room full of radio equipment. They included 19, 52, 62, 88 sets and many others.

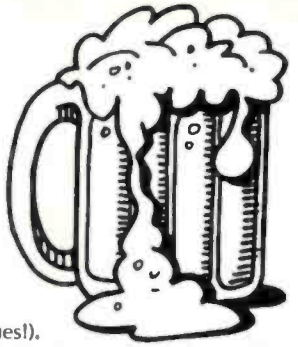
In a very short time I had a fully working radio station. Along with them came the legal entitlement to use ACF allocated military frequencies and a stack of books telling me how to make the best use of it.

Now I began to understand what I had found by practice all those years ago. I was 'hooked' on the magic of this piece of wire hung out in the air on which I could hear the world, but only talk to bits of Great Britain and occasionally Germany and Ireland when I could get away with it.

Radio Amateur's Examination

I had to take the RAE, and along with a small group of others, studied under the guidance of the late **Graham Fox G4GIW/G8FGP**. Unfortunately though, I had very little scientific background, physics having given up on me because you had to be in top set Maths to do Physics, and I wasn't!

Because of my lack of physics I had to learn the theory from the bottom up and it was a struggle. However, I passed the RAE well because I had learnt the licensing regulations off by heart, and I chose all the questions requiring a practical approach for Paper 2. (I was lucky because I was working in education and knew how to beat the exam by using the right techniques!).



It was class A or bust, so I taught myself Morse, passed and got my licence. But it was then back to that dreadful dilemma that seems to have haunted my life.

With a young family, finances were always severely stretched so there was no money for radio. So it was a case of adapt, scrounge, improvise and build from scratch.

Again it was whatever local ingenuity could devise but it got me on air with about 500mW of c.w. on 1.8 and 3.5MHz using an ex-Army 62 set. 'Phone operation came later when I rewound the modulation transformer to produce a pretty grotty a.m. signal.

Battery Powered

The equipment was still battery powered. So, I set about designing and building a power supply which led me into the most painful and sobering experience of my life.

Two h.t. voltages were needed, one for the receiver and one for the transmitter. By using a transformer with centre tapped secondary winding and a full wave rectifier I could do exactly what I wanted, see **Fig 1**.

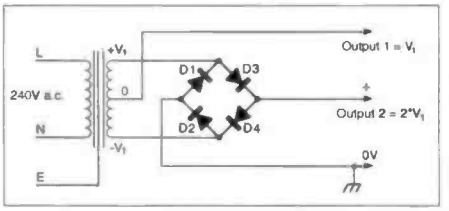


Fig. 1: A 'two rail' h.t. powers supply design used by G4JGS (see text).

So I set to and built the p.s.u. I started by bolting all the components, some of which were pretty bulky into an old military radio case whose shape did not allow the most practical layout.

I then started to wire things up and shortly the whole thing resembled a form of multicoloured spaghetti. It was a real rat's nest!

To cut a long story short, something wasn't right. And while I was leaning over the power supply, the transformer blew up showering my face with molten plastic and pitch. The transformer had got so hot that it melted the pitch round the windings which in turn ruptured the plastic case.

I spent three very painful, dark stumbling days cursing my folly and wondering whether I would see again. I was lucky I am pleased to say.

Your Workshop?

What has this got to do with your workshop you might be asking? Well, for me, as I have

Fig. 2: A temperature controlled soldering iron station (in this case a Weller type), with the associated stand and essential sponge (see text for comments on techniques).

tried to show, the emphasis has always been on making or adapting things at minimum cost.

Providing you can solder, use a few simple hand tools, use your ingenuity and be prepared to have a go, it is surprising how much more satisfaction you can have.

Let's look at soldering for a start. To many people, soldering is a form of 'glueing'.

Providing the solder holds the bits together, it will do! Unfortunately, this is usually far from the truth.

The art of soldering is to form a continuous bond of metal all over the surfaces of the joint. The worst enemies of good soldering are dirty surfaces and not enough heat.

Many components, especially those that have been recycled, have leads which need scraping to remove the oxide layer that may have formed. It's best to place the component lead on a flat surface and scrape it with a sharp edge, such as a modelling knife.

Printed circuit boards should be rubbed over with steel wool or a p.c.b. cleaning 'rubber' until they are bright all over. Keep your fingers off while you're doing it, there's nothing worse than finger grease for attacking the delicate copper tracks and making bad solder joints.

Choosing the right solder is important too. For Amateur Radio and most hobby electronics construction, flux cored solder should be used.

The flux is a chemical that helps removes surface oxides and prevents them from reforming during the soldering process. The solder should be thin so that it melts easily without drawing all the heat from the joint.

Be careful not to buy solder intended for making joints in copper plumbing, and don't waste your money buying solder in a dispenser. Just buy the biggest roll of solder that you can afford. If you really want a dispenser, you can make one from an old plastic cosmetics or soap bottle.

The Iron

The soldering iron is important. It needs to be light enough for you to use comfortably, and it should also have a long very supple lead preferably covered with heat resistant material.

If the lead is damaged in any way, don't use the iron. Either replace the mains lead, or the iron.

Additionally, the iron itself must be sufficiently powerful to provide enough heat to complete a good soldered joint. An iron of 15W used carefully will be satisfactory, but a 25W iron is better.

Low voltage irons are best because if you do solder through the lead, at least you are isolated from the mains! They also have the advantage that they can be run from a couple of car batteries for field days, holidays and the like.

A very nice feature, though not essential, is the ability to be able to change the size and shape of the bit. This can be done to suit the work you're doing.

Whatever type of iron you have, when not in use, it should be in a stand to protect you and the iron from damage. The stand should contain a small sponge which is kept damp.

Every time you pick the iron up to use it, wipe the tip on the sponge to clean off any dirty residue. After you've used the iron, wipe it again before putting it back into the stand.

Using the sponge soon becomes a habit. The photograph, **Fig 2**, shows a temperature controlled low voltage iron which can be picked up very cheaply second-hand.

Soldered Joints

Now to making soldered joints. If you can make a good mechanical joint by winding the component lead round things like solder tags do, **Fig 3a**. Not only will it hold things in place, it will be a much stronger joint.

When working on p.c.b.s, push the component lead through the hole and bend it sideways, **Fig 3b**. Then apply the tip of the iron to the joint and heat it, as shown in **Fig 3c**.

When you think the joint is hot enough (only a second or two should be needed) gently feed the solder into the joint, as in **Fig 3d**. The idea is to use the heat of the joint, not the heat of the iron, to melt the solder.

Keep feeding the solder into the joint until there is sufficient there to make a good joint and you can see it 'wetting' all the surfaces, as in **Fig 3e**. (This illustration also shows the excess lead trimmed, with the actual process underway.)

Try not to inhale the fumes produced by the melting flux as it is not good for you. Wherever possible, use an extractor fan when you're soldering.

Remove solder and iron and let the joint cool before inspecting it. It should be shiny, smooth and 'feather' into component leads smoothly.

Anything which is dull, rough or otherwise suspect, should be carefully reheated to make a good joint. Don't overdo the heating or you may lift copper tracks off p.c.b.s or damage sensitive components.

An illuminated magnifying glass is very useful for looking at solder joints (and it's the sort of thing you can ask your children to give you for a birthday or Christmas present). Once you are satisfied with the joint, cut off any excess lead with a sharp, and I mean sharp, pair of wire cutters, as already shown in **Fig 3f**.

Ten tips for good soldering

1. Thoroughly clean component legs and other surfaces to be soldered.
2. Use thin, flux-cored solder.
3. If you can make a good mechanical joint first, do so.
4. Use a hot iron.
5. Make sure the bit is tinned before use.
6. Wipe the bit on a damp sponge before and after making a solder joint.
7. Heat the joint, not the solder.
8. Inspect the joint after soldering before going on to the next one.
9. Once the joint is good, cut any excess component leads off with a sharp cutter.
10. Remember not to inhale the flux fumes.

Wiring Layouts

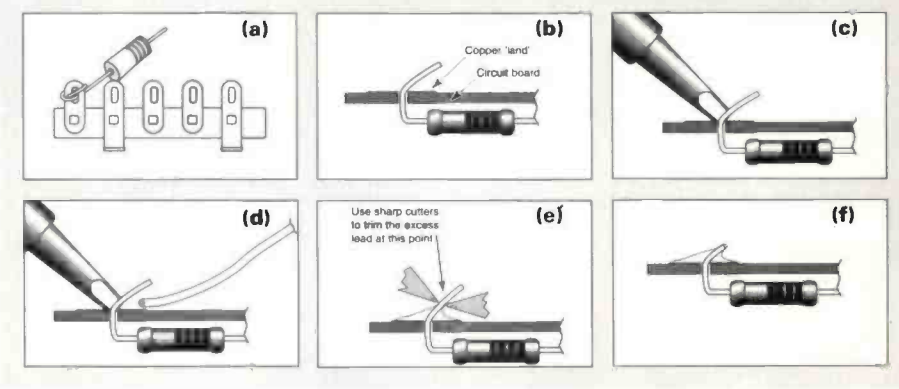
Now to another of my 'hobby horses'....the subject of wiring layouts. When I first started dismantling old equipment, wiring was an 'art form' with cable runs neatly formed with lacing thread.

The art of lacing seems to have disappeared and has been replaced by modern methods. However, the underlying principles of good wiring remain the same.

My advice is don't just use any old cable. It's really worthwhile investing some money in a small drums of five or six different colours.

Red and black cables are a must for power feeds and earthing points. But how you use the other colours is up to you, although I think it's worthwhile setting your own wiring standard and **sticking** to it for all your projects.

You may find a visit to one of your local electrical installers will enable you to buy cheap drum ends. The illustration, **Fig 4**,



Figs. 3a, b, c, d, e and f: Soldering techniques recommended by G4JGS (see text for explanations).

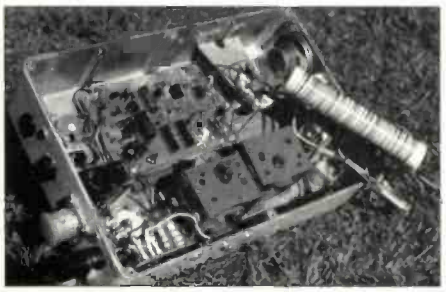


Fig. 4: A completed 3.5MHz c.w. transceiver built into a (recycled!) former television camera case! (see text).

shows the wiring layout in one of my construction projects, a 3.5MHz QRP c.w. transceiver.

Plan Carefully

I always try and plan my layouts carefully before I commit myself. In my experience, there is no substitute for paper, pencil and ruler.

At very least, you need a block diagram showing what is coming into and out of each block. From this you'll know how many wires you will need and you can decide whether single or multiple wires, ribbon cables, etc., will be the best answer.

You can also plan cable routes and (a very important aspect), the location of all earthing (0volts, signal returns) points. Here you can spot the easily made mistakes like running a signal line next to the power input to an oscillator, a connecting pin in an inaccessible corner and so on. Don't be afraid of trying different layouts to see if you can improve things.

The Case

Once I'm satisfied with my layout, I mount all the hardware bits into the case. All control shafts are cut to length, knobs fitted, switches mounted and labelled in pencil so that when the wiring up is completed, it can all be tested.

Some people advocate wiring everything up and testing it before boxing it up. But I've seen too many piles of electronic 'spaghetti' in shacks where projects have never been really completed to be convinced this is a good idea.

The next stage is to wire in all earth points, and these should be as short as possible. If you try and put these in later, you may find it difficult with longer wires around.

Then it's onto the longer wires. To keep them together and tidy, I use heat shrink sleeving. This comes in a wide variety of colours and diameters.

When the sleeving is gently warmed with the tip of the soldering iron or a hot hair dryer it shrinks. It then holds the wires tightly together.

The professionals almost completely encase their wiring in sleeving. But unless you have access to a very cheap source, I suggest you only use short pieces about a centimetre long placed so they will give the wiring a nice form.

Pass the wires through the sleeving as you solder them in making sure the wire has a nice 'lay' to it. I always leave the supply wires to last, and I don't fit them until I have very carefully inspected the wiring layout.

After the supply lines are in, test. If all is well, shrink the sleeving and use a few strategically placed pieces of double-sided sticky tape to secure it all in place.

As an alternative to heat shrink sleeving, you can use spiral cable wrapping. But be warned...it's not cheap!

When I cut a wire to length, I use good sharp pair of wire cutters and with a stripper, cut back the insulation about 3mm. You can use pliers or wire cutters to strip the wire, but it needs practice to be able to do it reliably, and all too often the wire gets shorter and shorter along with your temper!

Each wire end is then lightly tinned after the strands have been twisted together. Solder the least accessible end of the wire first, thread it through the sleeving and then solder the other end in place.

Pull the wire into shape, and then go on to the next wire. In confined spaces and awkward corners, I use a pair of bent tweezers to hold the wire. Not only do they take up less space, but if you slip with the soldering iron, you don't burn your fingers!

Ten tips for good wiring layout

1. Plan the layout first.
2. Keep signal and supply lines separated.
3. Put in all the earth returns and earthing tags first.
4. Fit the longest wires first and work down to the shortest.
5. Use small pieces of heat shrink sleeving to hold the wires together.
6. Strip the wire ends, twist the strands together and 'tin' before fitting.
7. Wherever possible, make a good mechanical connection before soldering.
8. Use tweezers to hold and manipulate the wire in inaccessible places.
9. Pull each wire into the shape of the case.
10. Use double-sided sticky tape to hold the wires in place.

Professional Appearance

If you've made a good job of your project, it will not only give it a professional appearance, you'll be able take it all out of its case while it's still wired up. That way when you paint the case, the paint only goes on the case, not the contents!

The illustration, **Fig. 4**, shows the case of the QRP transceiver. The case is recycled from an experimental TV camera control box that nearly got thrown away!

Final Advice

My final short and simple advice is, don't let anything put you off! And don't make excuses, like "I haven't got a well equipped shack" (I haven't either!).

My 'shack' is a steel cupboard and a bench, **Fig. 5**, in the garage. The steel cupboard houses the radios and is the operating 'nerve centre' shared with 'Number 2 son' (who was 2E1CQW and is now G7UUX, following the results of the May RAE!).

The bench is widely used for a great range of activities from mending the car and making household repairs. I also use it for 'pricking out' the bedding plants as well as building electronic devices.

So, there's no reason why you should not work off the kitchen table providing you protect it. Many *PW* and *Radcom* articles have been written on this subject.

My experiences in amateur radio gave me the opportunity to learn about electronics, have fun and through trying out loads of ideas. I gained enough experience, knowledge and confidence to get a job in the professional broadcast electronics industry and I still enjoy this wonderful hobby!

PW

Ten tips to keep the cost down

1. Build it, don't buy it.
2. Scavenge everything that might be useful one day.
3. Barter and swap what you can't scrounge.
4. Use local ingenuity copiously.
5. For every new part, use at least three recycled parts.
6. Look for a cheaper alternative.
7. Do I really need this project?
8. Plan things carefully.
9. Modify something you don't need or use.
10. Keep a folder of useful information, circuits, specifications etc. and try and use the ideas.

Fig. 5: Successful home-brewing does not need a huge workshop. Stephen Harding's home-brewing facility only occupies a small section of his garage.

Pass The 'Black Country Screwdriver' Please!

Ben Nock G4BXD shares his experiences as a 'disabled' enthusiast working in many aspects of practical amateur radio.

Glad as I was to be asked to contribute a short article to the 'Workshop Special', with directing attention towards the 'disabled' (or whatever this week's 'politically' correct term is!) constructor, I had to stop and think. Just what is it about my disability that required special consideration? For (like most disabled folk I'm sure) the problem is that to us, we're the 'normal' people!

On leaving school I got interested in electronics. In fact, since the last year at school (too many years ago for my liking) I have been hitting things with the 'Black Country screwdriver'*, prising out valves and generally messing about ever since. In the beginning of course, it was mostly guess work..."lets try this", quickly followed by the inevitable shower of sparks and explosions.

Editorial translation. Wolverhampton Library, who specialise in the local 'Black Country' dialect provided confirmation that this tool is in fact a (large) hammer! **Editor.*

Servicing Course

Opting for a spell at Garrets Green Technical College on a Radio & TV Servicing Course, things started to get a little more organised. Now it was "ahh, this is the faulty bit" (followed by the explosion)....", but there was that necessary air of confidence starting to form.

".....quickly followed by the inevitable shower of sparks and explosions!"

Practical experience is a great teacher. Books are fine, but a few light explosions tend to sharpen up your response times enormously.

Although I am regarded as a disabled person, some would say I was more able than most 'normal' folk. As I was born without complete arms and with a only a single finger on either side, I've always had difficulty with the simplest things, including gripping and lifting, and paying my way at pubs, etc!

If you only have little grip then getting out tight screws can be a real pain. And when coupled with limited 'reach', the effects of those minor explosions were doubly worrying. But perseverance will always win out, or so I'm told.

Space Consideration

I suppose that space should be the first consideration. And this can bring its own problems.

The normal concept of a disabled person is that of someone confined to a wheelchair. This, of course, can give rise to difficulties in reach and lifting. Although a motorised chair would be great help to me, it would make carrying military stuff easier, and getting back from the pub a doddle!

Space, if you have it of course, should be used wisely. Remember that remarkably true saying that 'we expand to fill whatever space we have'!

Shelves are very handy. But make sure they will hold whatever you intend to put on them, brain damage is hard to repair.

If you are going to try your hand at construction it helps if you have a space that can be called your own. This is because there's nothing more off-putting to the new constructor that to have to keep putting away their tools just so as the inconsiderate family can have its dinner on the dining room table.

You should create your workspace at the right height, the right depth and make sure it can carry the weight expected. The joy of constructing can be hampered by feeling tired due to working on the wrong height of surface.

You have to be 'in the mood' all the time and the right working environment will greatly help. Correct use of lighting is essential. As well as the room light, I use one of those adjustable angled lamps that can be positioned just where wanted. It's a great help in small jobs.

The Tool Rack

Easily the most important bit to any workshop, be it for the able or 'disabled' constructor, is the tool rack. There's an old saying that 'any job is easy with the right tool' ...and I fully agree!

I've been to other shacks where the occupant is attempting open heart surgery on a set with nothing more that a pocket screwdriver and an old ball pen case. It just won't do you know!

With the present popularity of local 'car boot' sales, there's no need to worry about the cost of tools. Although it's very nice to have brand new shinning tools, all hanging on pegboard, labelled and clean, in reality it's different.

Ben Nock G4BXD hard at work on his workbench. The 'third hand' being provided by the portable vice on the bench. Note the rubber bands on the hand-tools, to provide necessary grip (see text).

Most of us have a tatty old tool bag or box if we're lucky. But, given a few trips to the boot sales, we should be able to amass a fairly well equipped armoury for little outlay.

Clamp Aid

Small portable vices, of the type that either clamp to the edge of the work surface or even sit on top of it on a wide base, have been an invaluable aid for me. These portable vices are very useful in holding the various bits of plugs and sockets that seem to take three hands to fabricate at the best of times.

Any job that requires a couple of components to be soldered together, requiring two hands for the components, a hand for the soldering iron and a hand for the solder itself is made all that easier with the help of a vice.

And it's a fact that you can never have too many screwdrivers. Invariably the most stubborn screw will have a different head to the two drivers you already have.

Another useful tool is the electric screwdriver. These can also be found at boot sales, both of mine were obtained this way and cost only £2 each complete with the charger !

Useful Idea

Continuing on with tools, another useful idea is to magnetise the screwdrivers. This can be done by simply drawing them

Annotated photograph showing Ben's workshop Equipment Index: (A) 'scope 20MHz or better; (B) signal generator 1 -220MHz a.m./f.m.; (C) spectrum anaylser 0-1GHz; (D) 2 - 30V p.s.u./A; (E) 13.8V 4A p.s.u.; (F) frequency counter 600MHz; (G) power meter using v.h.f./u.h.f.; (H) a.f. signal generator; (I) f.e.t. multimeter. (see text for recommendations on equipment.)

across the back of a large speaker magnet several times.

A magnetised screwdriver is most useful if a screw drops into an enclosed space. Of course, this trick will not work with brass screws, but, a little candle wax on the end of the screwdriver will also generally help out in this case.

Really good pliers and cutters are the other most useful tools. The cutters of course should be kept sharp, as this factor makes it a lot easier to cut the wires!

Using cutters for trying to snip screws and bolts, etc., will not only ruin and blunt the cutter but make it useless later on for small wire jobs. If you stick to using the right tool for the job then life afterwards is made easier.

Even simple pliers are most useful, along with the vice, for holding things. An elastic band around the handles will make them into a pair of grips and can be used to hold components in place while you hold the other one, the solder and the iron.

You should also obtain (at least) a pair of pointed nose and a pair of wide flat nosed pliers. And it's also a good idea to ensure that the handles have a good gripping surface.

Handle Sleeving

If the handles on your tools are of bare metal, then some heatshrink sleeving (possibly several layers) is a good idea. This will really help you grip them.

Personally, I find a good selection of spanners, small ones from 8 to 4BA plus a similar range in imperial measurement, are invaluable. That might sound strange...but to 'able handed', holding a nut with pliers while tightening or otherwise is easy, however, for those of limited grip holding a small spanner onto the job is a lot simpler.

A small adjustable spanner is most useful as are a few in more usual larger sizes, 3/8in, 1/2in, etc. And although proper box spanners seem quite expensive, a small socket set (from car accessory shops) or 'car boot' sales, can be most useful in many instances.

Test Equipment

Test equipment is of course one area where a little expense will be incurred. It has to be said though, that a small outlay in the test equipment department will make many tasks much easier later on.

In my opinion, probably the sort of items that would be useful include a signal generator, and an obvious choice, a test meter (analogue or digital). I would also include frequency counter, a power meter, dummy load, a valve and transistor tester and a good power supply.

I have obtained, over the years, a good selection of test gear but for those starting out there are easier options. Take a general coverage receiver for instance...they can be very useful.

Assuming a 500kHz to 30MHz coverage and a modern receiver, you not only have a frequency measuring facilities, you also have a wavemeter and a signal generator. Assuming the set has a 455kHz i.f. then the local oscillator is most likely on 955kHz to 30.455MHz...a feature we can use to advantage.

Nearly all receiver oscillators can be heard outside the set and be used as a signal source. Of course the stability and drift are dependent upon the quality of the receiver, but, in place of nothing better, it's an easy option.

Scanners also make ideal frequency counters. If you are trying to tune up a piece of surplus p.m.r. gear onto 144MHz for instance, a scanner can be used to listen for the correct harmonics of the multiplier chain.

Power Supplies

Bench power supply units (p.s.u.s) can be the first construction project. There's little point in spending loads of money when some of the test equipment can be easily home built.

There are many circuits for p.s.u.s, but obviously take care with the mains side of things. But if you approach the task of building a p.s.u., then simply read up on the subject first before proceeding with straightforward common sense.

Either a variable supply, say 5 to 30V at about 2A is quite a useful supply. A p.s.u. with several fixed voltages, say 5/12/24V at about 2A, will also be handy.

Many more mobile sets are around these days, so a 13.8V supply capable of anything from 10 to 30A would also be a good thing to build. A 13.8V 25A p.s.u. is quite easy to construct, and there are many circuits in books such the ARRL and RSGB manuals will show you how.

Signal Generators

I've looked briefly at simple signal generator sources (using the shack receiver), and audio generators are again quite easy to build. There are several one 'chip' circuits that provide sine, square and triangular waveforms which run on batteries and end up as quite small units.

However, radio frequency (r.f.) signal generators are a different kettle of fish, and chips. Don't forget, that if you are going to use a generator to align sets, then the generator itself needs to be stable and accurate.

Low frequency generators are perhaps not too hard to get going. But once you get over a few MegaHertz then stability and accuracy can be hard to achieve.

It might be wise to start with building an audio and i.f. frequency generator and rely on a bought-in signal generator for h.f., v.h.f. and u.h.f. work. To this end, many of the older Marconi generators (and other types) can be quite cheaply purchased at rallies and shows and will serve the amateur constructor quite well.

Tips And Ideas

Time for more tips and ideas now. **Simon G0THS,** has passed on an interesting idea for those of limited grip.

Simon says "I am disabled due to an accident six years ago that left me just the use of my right arm. I still do the same work on radios, etc., that I used to do before the accident but I kept coming up with the same old problem of keeping things still as I worked on them.

"I tried all sorts of things to get around this problem but I was not very happy with them. So, after scratching my head a little, I thought of using something that was very cheap and readily available in most shops".

"Yes, you guessed it, I thought of the 'Blu Tack' pliable sticky material and by 'eck does it save a lot of messing around'! I just get a few small blobs of Blu Tack and put them on the bench, it holds small radios in place as you work on them, p.c.b.s and even microphone plugs.

"However, 'Blu Tack' does have one little problem. It gets very sticky and soft if it gets hot. Despite this it's still easier than using a vice, small 'G' clamp and those little 'helping hands' things that you still need two hands for! (one to hold the job in place and one to tighten the gadget, etc.)".

With regard to the vices (the 'helping hands') mentioned by Simon, in my particular situation, I find the small clamp on vice most helpful. But obviously, if you have the problem of holding one thing while tightening up just such a vice clamp, then Simon's idea might suit you better.

Rubber Mat

While on the subject of holding things, I would suggest you get yourself a good rubber mat to work on. A mat will hold things still, stop the odd scratch on the table top and, if the right sort is found, can provide an anti-static protection if you're working on CMOS devices.

The type I have on my work bench is smooth on one side and ribbed on the other. The side I use depends upon how much grip I want. The ribbed side holds screws better and stops them rolling off the bench.

I'm hesitating mentioning holding things in your mouth because I don't recommend it. I have suffered with ruining my teeth, wearing them down prematurely, by stripping wire and holding screwdrivers.

When ever possible I would recommend that you try and find another way of coping rather than to wear away at your teeth, I am sure all the dentist amateurs reading this will agree. I have recently had a pair of gum shields made at my dentist, in an attempt to slow down tooth wear, perhaps worth thinking about in other cases.

Editorial comment: *Having also badly damaged my teeth by using them as wire strippers/grippers and pliers over many years, I fully agree with Ben. It's all too easy for 'digitally disadvantaged' radio enthusiasts to fall into this habit. Avoid it at all costs and let the Dentist earn the (around £160 per tooth) 'crowning' fees from elsewhere! **G3XFD**.*

Aids & Gadgets

These days there are many aids and gadgets around than were available a few years ago. I have already mentioned the electric screwdriver. You can even get screwdriver bits for a normal drill, and if you're using a modern electronically controlled drill you have full control over the speed and other facilities.

For example, there's a small unit, usually seen at markets, etc., which resembles a drill chuck. Into this chuck you can insert different screwdriver tips.

".... there's nothing more off-putting to the new constructor that to have to keep putting away their tools just so as the inconsiderate family can have its dinner on the dining room table."

The chuck fits into a normal drill but it has an in-built clutch facility so that over tightening is not a problem. With the small, speed controlled, cordless drills available today, you should not have to ruin your teeth on tight screws!

Patch Leads

I also find that I can never have too many 'patch leads made up. I've found the very flexible connecting wire, multi-stranded, fitted with crocodile clips on both ends especially helpful.

In my workshop I have a large selection or red and black ones made up and I find them most useful when constructing. With the 'croc' clips on the end I can clip together several wires that otherwise I could not hold together while I did something else.

Fitting some leads with 'croc' clips on one end and a 4mm banana plug on the other is most useful when using the test meter. The 'croc' clipped end can be attached to point of measurement leaving the hands free to carry out adjustments, etc.

Photograph illustrating the way which Ben G4BXD uses pliers and a portable vice to advantage (see text).

A Great Joy

I must say that I find constructing a great joy. It's a great part of the hobby for me and I'm sure a lot more of you could have a go, and enjoy it....if you can follow a few simple guidelines.

Firstly, get some space, you need to be able to lay things out and leave them in place when going to bed (that's if you have to sleep of course!).

Next, get some tools. Every job is much easier with the right tool. Removing crosshead screws out with a flat-bladed driver is **not** the right tool for the job.

Then you should get some test gear. If you have a bit of test gear, and using it enables you to construct or repair something, you feel a lot happier. A happy feeling promotes an increased interest in the hobby.

Uphill Struggle

For those of you classed as 'disabled', you don't need me to tell you what an uphill struggle life usually entails, let alone messing with a few bits of wire! But I would say, that given a little thought, many obstacles can be overcome and the rewards for home construction are pride and satisfaction with a job well done.

You may start with pre-packaged prepared kits. And even if the p.c.b. is already done for you, with the components sorted and fixed, the box already drilled and labelled, so what? Have a go, I am sure you will enjoy home-brewing. As I've already said...'More power to the Black Country Screwdriver brigade'!

PW

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Christmas offer

Valve & Vintage

Once again it's Phil Cadman G4JCP's turn to look after the PW 'wireless shop'. This month Phil suggests ideas on reproducing 'valved' audio effects, takes a look at an elderly Cossor receiver and recommends some interesting books for Christmas.

Firstly, let me thank those of you who wrote in response to my first column. I do reply to all letters although it may take me a couple of weeks to do so!

During the weekend of August 29 and 30th the BBC celebrated the 50th anniversary of the founding of the Light Programme. Over the weekend many archive recordings were rebroadcast on the Light Programme's successor channel, Radio 2.

I'm sure many people, myself included, wished to enter the sprit of the occasion by listening on vintage radios. But we were thwarted by the fact that Radio 2 is only broadcast on Band II v.h.f.

It's was ironic because this month I had promised to tell you how to give radios without v.h.f. capability a new lease of life. And there are also those sets which are too fragile for daily use yet are much more pleasant to listen to than modern radios.

Valve Sound

'Valve sound' in the context of vintage radios is a misnomer. The warm, mellow sound associated with old sets is more a product of the acoustic properties of the loudspeaker and cabinet than anything to do with 'valve sound'.

So, why not drive the older set's loudspeaker with a modern transistor radio? This **can be** done but the results are likely to be disappointing.

Furthermore, you could damage the transistor radio's output stage. The loudspeakers found in almost all old radio sets have an impedance of just 3Ω. These will draw excessive current from a transistor output stage designed for 8Ω or more.

It's much better and safer to use an external amplifier between the transistor radio and the set's loudspeaker.

The diagram, **Fig. 1**, shows where to break the existing connection between the set's loudspeaker and the output transformer. Notice that one side of the transformer secondary is usually connected to chassis.

Connect the amplifier's negative or common output to this point. Take the positive or live output to the isolated side of the loudspeaker.

You may be lucky, the set's internal loudspeaker could be connected via a plug and socket arrangement making the whole operation easy. If not, cut or unsolder the wire at a point which will cause least disturbance to the set.

Take care if you unsolder the wire at the loudspeaker tag, and use the minimum amount of heat necessary. The flexible wires leading from the connections to the voice coil assembly can easily come adrift if a tag gets too hot.

External Amplifier

The external amplifier should be mains powered and have an output power of at least 10W into an 8Ω load. And I'm pleased to say that several suppliers sell suitable amplifier kits. For example, Maplin's 15W amplifier kit (LT23A) with its matching power supply unit kit (LT24B) should be ideal.

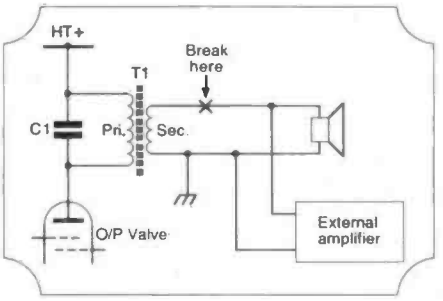


Fig. 1: Connecting an external amplifier to utilise the cabinet and loudspeaker combination of the mixer.

Take the feed to the amplifier from the headphone output of the radio. Put a resistor of about 220Ω (1/8thW, or more) across the headphone output.

The actual value is not at all critical. It simply provides a sensible load for the radio's output stage.

If the radio has a stereo jack socket, then use two 220Ω resistors. Wire one from ring to sleeve and the other from tip to sleeve.

Then put another two 220Ω resistors (wired in series) from ring to tip. Take the audio from the junction of these two resistors. This gives a crude (but effective!) stereo-to-mono mixer.

Next, wire a resistor of between 4 and 16Ω between the positive output of the amplifier and the set's loudspeaker. The resistor should be a wirewound type (connecting carbon types in parallel is acceptable) of 7W or more.

There is no 'correct' value. Just experiment until you get the sound you want.

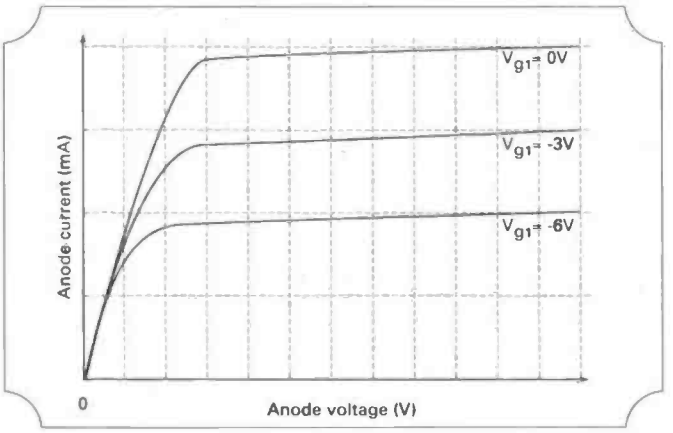
Why The Resistor?

Why use the resistor? It's simple really, the series resistor mimics the high output impedance of the traditional pentode output stage when operated without feedback.

By looking at **Fig. 2**, you'll see that the anode current of a pentode is almost independent of anode voltage. Basically, this happens because a pentode tries to push the same **current** through a load whatever its impedance. Pentodes are said, therefore, to have a **high output impedance**.

The diagram, **Fig. 3**, shows

Fig. 2: Anode characteristics of a pentode (see text).



the large variation of impedance with frequency exhibited by a typical loudspeaker. The large peak at 60Hz marks the bass resonant frequency of the loudspeaker. Above 1kHz the inductance of the voice coil begins to dominate producing a gradual rise in impedance.

Since voltage equals current times impedance, a constant current drive to a loudspeaker will produce a voltage curve similar in shape to the impedance curve. At lower frequencies, (let's say below 1kHz), audio output will also follow this curve. However, this ceases to be true at higher frequencies.

The natural roll-off of the loudspeaker and the capacitor (C1) across the transformer primary will produce a progressive fall in high frequency output. In addition, the radio's cabinet will add its own 'colourations' to the audio reproduction.

The resulting sound may not be 'high fidelity' but many people find it considerably more pleasing than the sound produced by transistor radios!

Finally, one important point, don't be tempted to leave the output transformer in circuit. At the very least the sound quality will be adversely affected.

Melody Maker

Now it's time to look at an old 'favourite', my Cossor 'Melody Maker', model 500AC which is actually working. And to be honest, there was very little wrong with this set apart from a thick layer of dust and some very 'tired' valves.

The 500AC is a typical five-valve mains-only superhet covering the long, medium and short wavebands. All valves are Loctal types, namely: **7S7** (frequency changer), **7B7** (i.f. amplifier), **7C6** (detector and a.f. amplifier), **7C5** (a.f. output), **7Y4** (full-wave rectifier).

After I'd cleaned and checked the chassis I switched on. After warming-up the set produced a few weak stations. Very good, I thought, but why the low sensitivity?

Remember, a lot of old radios do not have built-in aerials. If you cannot spot a ferrite rod aerial or loop aerial then connect few feet of wire to the aerial terminal at the rear of the set. In some cases an earth may help too (**but not with an a.c./d.c. type of receiver**).

I found the circuit of the Cossor 500AC in the first volume of my *Radio and Television Servicing* six-volume set of books. Base connections for the valves were given, and printed nearby were all the important electrode voltages.

None of the voltages I measured agreed with the published values. And, contrary to what you may expect, most measured **high**. All the valves were drawing less current than they should and so were probably low emission.

Low Emission

Low emission also means low gain and this was confirmed by a lack of strong stations when I tuned across the medium waveband. Worse still, the stations I expected at the low frequency end of the dial were simply not there.

The absence of stations at one end of a waveband is almost certainly due to the local oscillator valve not having enough gain. (This is assuming there's no mechanical reason as to why the oscillator should stop oscillating).

For instance, at the l.f. end of each band the vanes of the tuning capacitor are fully enmeshed. Touching (short-circuiting) vanes **can** produce the same lack of stations as a worn-out valve but without the general lack of sensitivity. Listen for any tell-tale crackles which can indicate touching vanes.

Only a new set of valves will restore the Cossor to anything like full performance. Unfortunately, the Loctal valves it uses are rather rare nowadays and new old-stock examples are expensive. I think it's time to add a set of second-hand valves to my wanted list!

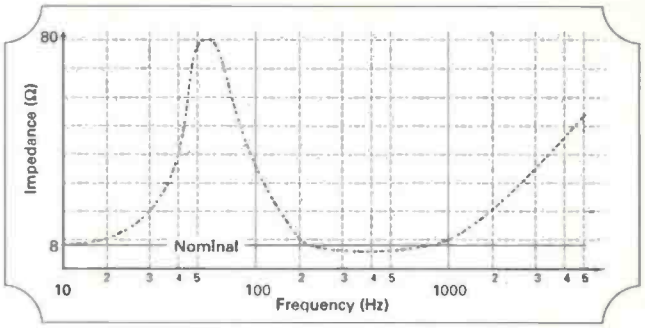
Books for Christmas

Now for some ideas for books for Christmas presents. On page 55 of the August issue of *PW* there were details of some useful valve data books now stocked by the PW Book Service.

Two of the books, originally published (in 1959) by The Radio Corporation of America, are the *RCA Receiving Tube Manual* and the *RCA Transmitting Tubes* manual. Both manuals are comprehensive; each entry gives details of the base connections, heater voltage and current and usually the valve's maximum ratings.

Many entries give information on actual operating conditions and the most popular valve types have some characteristic curves reproduced. Second-hand RCA valve manuals are quite rare in this country and so these reprints are particularly welcome.

Fig. 3: Loudspeaker characteristic curve.



Next comes *Essential Characteristics (Tubes and Transistors)* originally published by the American company General Electric. This more recent book lists many valves of American origin not made by RCA and therefore are not listed in the RCA manuals mentioned above.

Finally there is the *Electron Tube Locator*. This is a new book more suited to the valve collector and historian rather than the valve constructor.

My Favourites

I think both the RCA manuals are excellent and are much more than simple data books. Here are some other books which number among my personal favourites.

Radio! Radio! (second edition) by Jonathan Hill (Sunrise Press, ISBN 0 9511448 20). This is a very readable book about the development of the domestic radio set from its beginnings through to the arrival of the transistor radio. It boasts nearly 1,000 photographs of domestic radios, loudspeakers and valves.

Next is *70 Years of Radio Tubes and Valves* by John W. Stokes (The Vestal Press Ltd, ISBN 0-911572-27-9). The title tells it all. It's simply essential for valve aficionados.

The *History of the British Radio Valve to 1940* by Keith R. Thrower (MMA International Ltd, ISBN 0 9520684 0 0), is in a similar vein but restricts itself to UK valve development.

Finally, covering the history of radio and TV manufacture in this country, there is the excellent book *The Setmakers* by Keith Geddes and Gordon Bussey. It is published by BREMA, the British Radio & Electronic Equipment Manufacturers' Association. (ISBN 0 9517042 0 6)

And don't forget the Babani reprints I mentioned last time!

Valve Holders

Most, if not all, valve suppliers can supply valve holders. However, they may not be able to supply valve holders for all the valves they sell.

Valve holders for common bases such as B9A, B7G and Octal are all readily available. Those for Mazda Octal, and the old American and British four, five and seven pin bases are much harder to find.

It's best to always use new valve holders wherever possible. So do try to salvage any uncommon valve holders you may come across.

The choice of insulating material **should** be dictated by the application. For example you should preferably use PTFE for low noise audio amplifiers and for v.h.f./u.h.f. applications. Power output valves should have ceramic holders unless they are octal based when the common thermoplastic types will usually work fine.

Closing Time

It's closing time! So, until it's my turn 'in the shop' again I'll say cheerio and wish you all a very Merry Christmas and a prosperous New Year. Please keep your letters and E-mails coming. You can send your letters to me either via the *PW* offices, via E-mail to **phil@oldpark.demon.co.uk** or direct to me at: **21 Scotts Green Close, Scotts Green, Dudley, West Midlands DY1 2DX**.

Late News: National Vintage Communications Fair

There's good news for fans of the National Vintage Communications Fair. In response to demand from both traders and visitors alike, organiser **Jonathan Hill** has agreed to stage a Christmas Special. It will be held on Sunday, December 3, at the National Exhibition Centre, Birmingham. For further details, telephone Jonathan on **(01398) 331532.**

IAN POOLE G3YWX

EQUIPMENT SPECIFICATIONS

This month Ian Poole G3YWX takes a look at the mysteries behind spurious transmitter signals.

There are a number of parameters which look at different aspects of the output from a transmitter. Last month I took a look at power output and the ways it can be expressed.

However, this is not the only important specification. The 'cleanliness' of the output is also very important.

It's no use having a very high power transmitter if it radiates a lot of 'large signals' on other frequencies. These spurious signals can cause interference to other radio users and in the worst case they may even jam vital services.

However, the most usual cause of radiating high levels of unwanted signals is that interference is caused to the neighbours' televisions and radios. This can be very annoying for them especially if your operating coincides with their favourite programme!

Unwanted Signals

Unwanted signals arise in a number of ways. One way they arise is from the harmonics which are present on any signal.

Harmonics are generated when a signal is passed though an amplifier or mixer. These circuits will all have some non-linearity (in fact for a mixer it's an absolute necessity), and this will result in some harmonics being generated. Obviously the more linear the circuit the lower the levels of the unwanted signals.

Another type of unwanted signal arises when signals are passed through mixers. Here sum and difference frequencies will be generated, only one of which will be required.

In fact a number of signals will be present on the output of the mixer, including the two original signals. All the unwanted signals must be removed by very 'careful filtering' otherwise the transmitter output will contain many unwanted signals.

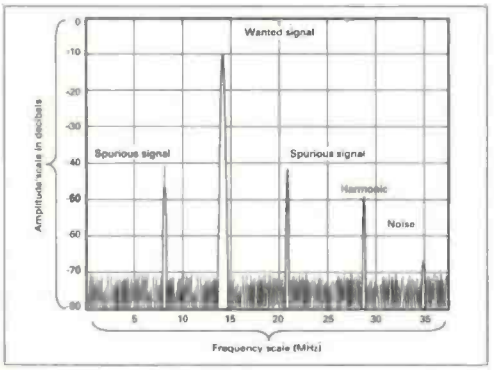


Fig. 1: A typical spectrum analyser plot.

Ideally it would be nice to ensure that no power was radiated on other frequencies. Unfortunately this is not possible.

Filters are therefore used at various stages in the equipment to ensure that any unwanted signals are reduced in level.

Perfect Filter

Unfortunately it's not possible to produce the perfect filter and this means that small levels of unwanted signals will always be present. They however, must be reduced to a level where they will not cause any harm.

To see the levels and frequencies of unwanted signals an instrument called a spectrum analyzer is used. Spectrum analysers are normally quite expensive, but they are an essential tool for the radio frequency designer.

In many respects analysers are similar to an oscilloscope having a cathode ray tube (c.r.t.) display. However, instead of showing the amplitude of the waveform against time, they show amplitude against frequency.

Normally the amplitude axis is logarithmic and calibrated in decibels. A typical plot from a spectrum analyzer might look like the one shown in **Fig. 1**.

In the **Fig. 1** example it can be seen that the main signal falls at a level of -10dB, and the next strongest signal is at -41dB. This means that the second signal is 31dB below the main one.

When stating the level of a spurious signal the levels are not normally given in absolute levels, i.e. a given number of watts or milliwatts. The more usual way is to relate them to the level of the wanted signal.

In other words a spurious signal will be said to be a certain number of decibels below the carrier. Sometimes this will be referred to as a certain number dBc.

In the previous example the figure could have been given as -31dBc. The more negative the number is the smaller the spurious signal level. In other words a spurious signal level of -40dBc is better or lower in level than one of -31dBc.

The method is easy to use because it's easy to see the difference between the main signal and the spurious signal on a spectrum analyser. Measuring absolute levels is not normally quite so easy or accurate on an analyser.

Ideal Levels

The ideal level for spurious signals would be zero, however, this is obviously impossible. Normally transmitters are specified as having all spurious signals at a level which is at least 40dB below the carrier or -40dBc.

Often the specification is left rather vague because the levels of harmonics and other spurious signals will vary according to the band or frequency in use. Typically the levels of harmonics maybe at levels of -50dBc or even as much as -60dBc.

In cases where interference is being experienced it may be necessary to add a low pass filter to an h.f. rig, or a band-pass filter to a v.h.f. rig. In this way any out-of-band signals will be reduced even further as shown in **Fig. 2**.

That's all for this time, next month I'll be taking a look at transmittter intermodulation products. Don't forget you can write to me via the *PW* Editorial offices with your queries.

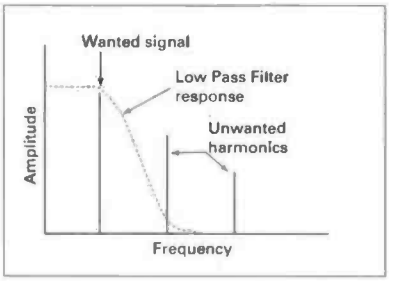


Fig. 2a: Action of a low pass filter in removing spurious signals.

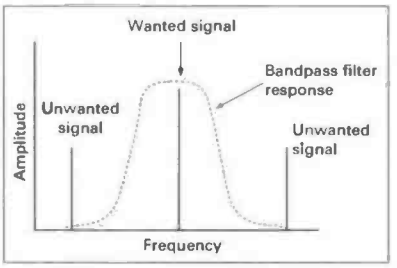


Fig. 2b: Action of a band-pass filter in removing spurious signals, the unwanted signals are rejected.

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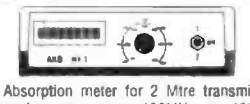

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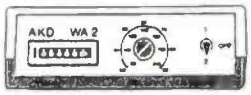

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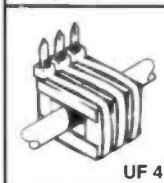

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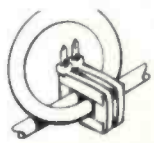

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DAVID BUTLER G4ASR

VHF REPORT

This month David Butler G4ASR takes a look at recent events on the 50MHz band and explains how a simple callsign can provide a lot of geographical information!

The first Sp-E opening recorded this summer on the 50MHz band was on 25 April. After a faltering start the season really got going and from mid-May there were almost daily openings lasting well into August.

In addition to the transatlantic openings to North America and the Caribbean (which I've already reported on) there were openings to Africa and Asia. And of course there was activity from the rarer parts of Europe also.

An area of Africa that isn't heard much is Western Sahara. But at the end of May **Tim KC0PA** became QRV on the 50MHz band (and h.f.) for a period of ten weeks.

Originally Tim used the callsign S0/KC0PA but was advised by the ARRL DXCC Desk that they would have great difficulty in approving his operation with the S0 call. However, they advised that if he obtained permission from the UN commander and used the call sign 4U/KC0PA his operation would be approved.

Advice Followed

The ARRL advice was duly followed and by the end of June Tim had worked over 25 countries on the 50MHz band. He was using an Icom IC-551D running 80W into a 3-element Yagi from locator IL46. (Any QSL cards go via Tim's manager VE9RHS).

Surprisingly, a number of other stations, S0RASD, S01MZ and S07URE also appeared on the band during the summer. The good news is that the club station S0RASD (IL56) now has a resident operator so it will be QRV all year round. (QSL cards for this station go via EA2JG and those for S07URE go via the Spanish Society EA4URE).

Another African 50MHz operator, **Eric 5T5JC** has been active from Mauritania (IL30) for the last two years but went QRT in August. Fortunately he has passed his equipment on to 5T5BN (IK28) so look out for this new station next summer.

Other African stations to appear this year in UK log books have included CN2JA, CN8NS, CT3FT, D44BC and . Others included EH8ACW, EH8BPX, EH9IB, EH9IE, EH9RY and 5T6E.

Activity From Asia

Activity from Asia was very low this summer. And apart from occasional openings to 4K, 4X and 5B4 there was very little else in the way of DX.

However, for those prepared to dig them out there were a number of rare European stations worth catching. Among these were C31HK, HV3SJ, HV4NAC, OH0JFB, T70A, T72EB/A, T93M, Z32BU and 4U0ITU.

A number of stations from eastern Europe were also active including US2YW/P, UT5AO, UT6X, UT8AL, UU8JJ, UX0FF, UX1MF and UY5ZZ. It's not known if all had permits for 50MHz however!

Unfortunately there were also a number of pirate stations active on the 50MHz band during the summer. So if you worked TF5CW, TZ6VV, 3V8BB, 5R8DG and 7X2CR don't waste your time and money sending for QSL cards.

Sporadic Openings

A number of operators have still been reporting that Sp-E openings are occurring the 50MHz band. (By the time you read this though that propagation mode will have disappeared.) The last opening I noted (I'm writing this on October 1) was on September 17.

John Edwards GM7NVA (IO85) reports catching a Sp-E opening on September 7. Between 1900-1945UTC he worked stations in HB9, I, OE, SP, YU1 and 9A. John, using 25W and a 6-element Yagi, also heard the CT and ZB beacons but despite calling for some time no further contacts were made.

There were a number of Sp-E openings on September 16 with European stations being reported on the band as early as 0730UTC. The main events occurred between 0930-1100UTC, 1410-1430UTC and 1500-1615UTC.

The openings in the morning gave contacts with stations in OE, SP, S5,YU and 9A. Propagation in the afternoon was to the south with contacts being made with CT, EA, EA6, F and IS0.

As I mentioned earlier the incidence of Sp-E propagation will now be non existent. Therefore, at this stage of the solar cycle, there will be very little in the way of DX on the 50MHz band for at least six months.

Auroral & Meteor Modes

The only activity on 50MHz will be produced by auroral openings and meteor shower modes. Some auroral events may be preceded by an E-layer type opening approximately 24 hours earlier. This is termed a pre-auroral enhancement.

So, if you note an unusual opening on 50MHz don't forget to look for an aurora the following evening. (Don't miss out!).

Although Sp-E openings can occur during the winter, these events are generally few and far between. Last year the band was open on twelve days between 27 December and 20 January.

The winter Sp-E openings are normally quite weak and the m.u.f. doesn't rise much above 60MHz or so. However, there's always the exception and openings have been noted on the 144MHz band in the winter but these are fairly rare.

It's also possible that the transatlantic path to North America can open up on the 50MHz band. But again this is not normally expected.

During the years around the peak of the solar cycle the period between November to March produces some of the best DX conditions known. We've a few years to wait before F2-layer propagation returns but when it does you'll certainly know about it. The band will literally be open world-wide to all continents.

Callsign Recognition

Interestingly, the release of the 50MHz band to many countries within Europe and beyond has brought with it the attendant problem of callsign recognition on a world-wide basis.

Apart from confirming what country a certain callsign is allocated to, familiarity with the callsign structure can be very helpful. It will enable you to eliminate obvious mistakes when working with weak or partly unintelligible stations. This practice may be particularly useful in contests.

All callsigns have a fixed format as allocated by the International Telecommunication Union (ITU). To this end amateur radio callsigns are made up of one or two characters (either two letters or one letter plus one digit), followed by a single digit, then a group of not more than three letters.

The initial one or two characters, called the prefix, denote the country to which the amateur station belongs. For example, ES is Estonia, EU is Belarus and EJ is the Irish Republic. (The latter Irish prefix is used for offshore islands).

It's all 'standard stuff' to the HF DXer. So should it be for **you** too!

Apart from identifying the ITU country the prefix can also indicate special authorisation. For example, an EH station is simply a Spanish operator with a 50MHz permit. When the station operates on other bands he/she reverts to the EA prefix.

If you hear an EB station on the 144MHz band it indicates a Spanish v.h.f. class. The prefix may also indicate a certain type of station.

You'll be familiar with a GB callsign which indicates a special event station within the UK. But what about GC, GH, GP and GT? Just to put you out of your misery these are club stations in Wales, Jersey, Guernsey and the Isle of Man respectively.

Geographical Area

Sometimes the single digit following the prefix can denote the geographical area or region. For example, an SM7 station is located in the southern part of Sweden whereas an SM2 will be in the northern tip of Sweden. (Well worth knowing in an auroral opening!).

Similarly an EA3 station is situated in the Barcelona area of Spain whereas an EA6 is in the Balearic Islands, both of these being in Europe. However, an EA8 (Canary Islands) or EA9 (Ceuta and Melilla) station are both located in the African continent. All within Sp-E range of the UK on the 50MHz and 144MHz bands.

The single digit can also indicate the licence class or other special

Don't get lost in the intricate world of amateur radio callsigns and prefixes. Just follow G4ASR's useful guide in 'VHF Report' this month and you'll identify that mystery station!

authorisation. For example a G7 holds a B licence allowing operation on all bands from 50MHz and up, an ON8 is a foreign amateur in Belgium and an OK0 is a repeater in the Czech Republic.

Stations on the east coast of England might occasionally hear a PD0 callsign. Believe or not this indicates a Dutch operator with a D class licence authorising operation on the 144MHz band.

Dutch Class Ds can use f.m. only, on crystal controlled channels S10, S11, S13, S14, S15, S16. They're permitted to a maximum of 25W d.c. input!

The Suffix

So much for the prefix and digit, now what about the 'back half' of the callsign, or suffix as it's known? Surprisingly perhaps, this can also provide information.

In Hungary, for example, the first letter after the call number indicates the geographical area or region. Also in Hungary (and in the Czech Republic) the letter K indicates a club station.

A suffix can also indicate the licence class. An obscure example is an Icelandic station with a single serial letter callsign (e.g. TF3A). This indicates that the operator has been licenced for 25 years and holds a 500W C class licence!

Separated Solidus

Sometimes it's possible for a callsign to have a prefix which is separated from the rest of the callsign by a solidus (/). For example some recent v.h.f. expeditions have included CT/G3SDL, ID9/I2AE and TF/G4DHF. This indicates temporary operation in another country.

A suffix may also be separated from the rest of the callsign, for example: ES8RJ/8, I2ADN/8 or W2CAP/1. These indicate from which geographical part or region of the country a station (normally portable) is operating from. And of course you can also get a combination of both types as depicted by TF/G4AFJ/M or LA/DL7YS/P.

References (useful Books)

RSGB Prefix Guide
RSGB Amateur Radio Call Book
RSGB Amateur Radio Operating Manual
ARRL Operating Manual

Invaluable Information

From the example I've provided it should be apparent that in many cases the callsign can provide invaluable geographical information. By using this knowledge and cross referencing with locator maps you can eliminate many impossible combinations of callsign and locator.

In a number of instances it's possible to identify a specific locator square from the callsign alone. Although you cannot, and should not, work backwards from a locator square to a complete callsign, it may be possible to eliminate certain callsign groupings if initially only the locator information is received correctly.

For instance, you may have partially received the callsign ???HBR and the locator JN60XS. Checking the locator map indicates that the station is located on the Isle de Ischia.

Instantly you recall that islands situated off the coast of Italy in this area have calls prefixed with IC8*. That's our station - must be IC8HBR. Except that you still need to hear him say "IC8" to the satisfaction of your own conscience! **Dave obviously got top marks in geography! Editor.*

As I've just explained you can sometimes deduce a large amount of information just from a single callsign. Let's suppose I heard UT5UYA calling CQ on the 144MHz band. Reference to a list of ITU allocations shows that stations in the block URA-UZZ are located in the Ukraine.

Is there more information to be gleaned? The answer is yes. Another specialist list indicates that the first letter in the suffix, 'U', means the station is located in Kiev. Furthermore it shows that the last two letters 'YA' are allocated to club stations.

By using other maps it can be shown that Kiev is in locator KO50 and oblast 065. (Each administrative region is assigned a three digit number, commonly called the oblast number. This is frequently used for award purposes.)

So, from just a single callsign I can ascertain that I was listening to a Ukrainian radio club situated in Kiev. It was in oblast 065, locator square KO50, on a bearing of 81° and 2350km away.

Intricate Systems

Obviously, instant recall of the world's intricate callsign systems doesn't come easy. Fortunately, specialist operating manuals are available that catalogue most of the information that you'll require.

One problem with the books is that callsign systems are for ever changing throughout the world. So it's therefore impossible to keep books right up-to-date.

The only way to keep up-to-date with changes in operational procedures, or for learning about the latest DXpeditions is to haunt the bands. Swop news with other DXers and listen a lot!

Access to the DX Cluster and information groups on the Internet are also a mine of information. Monthly newsletters are a good way to learn about events fairly quickly after they have happened, but the deadlines for the v.h.f. columns in monthly magazines are simply too long for late breaking news.

In other words to be a successful DXer you need always to use the grapevine for both technical and operating information. So...listen and learn!

Deadline Time

It's deadline time again. And if you've made any DX QSOs recently or just wish to pass on any news please let me know about it.

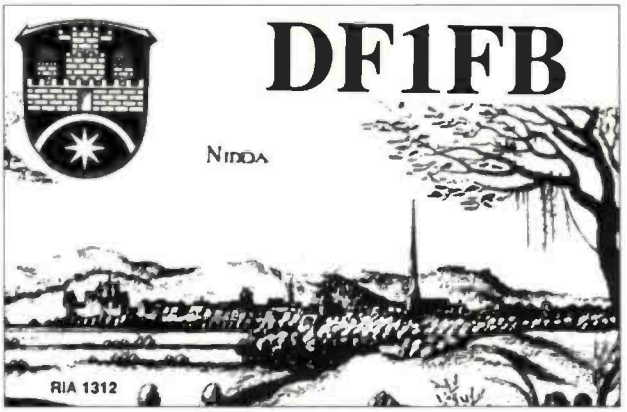
As usual send details (to reach me by the end of the month) to: **Yew Tree Cottage, Lower Maescoed, Herefordshire HR2 0HP. You can also contact me via packet radio @ GB7MAD, the DX cluster @ GB7DXC or the Internet davebu@mdlhrl.igw.bt.co.uk Alternatively you can telephone me on (01873) 860679.**

END

LEIGHTON SMART GW0LBI

HF FAR & WIDE

Leighton Smart GW0LBI provides his usual fascinating round-up on h.f. band activity and introduces more keen reporters.



September's reports yet again indicate that conditions on the h.f. bands have been relatively poor. Certainly, during the daytime very little of interest has been heard here; although the late afternoon and evening has tended to provide some good openings to certain parts of the world.

However, conditions should improve as winter approaches, particularly on the higher frequency bands. And 28MHz is still showing signs of life, albeit via Sporadic 'E' propagation, but the long standing problem of lack of occupancy is still very obvious!

And while on the subject of '10 metres', I've received a letter about the band. It suggests that 'B' licensees should be granted access to 28MHz.

If Class Bs were allowed use of 28MHz, with limited power output, they could increase band occupancy. The letter suggests (hopefully) access could ensure that the band remains part of the amateur radio allocation, and out of the hands of the 'use it or lose it' brigade.

And if the DTI were ever to change their policy on conversion of 26/27MHz multi-mode rigs, this would also take a great number of currently illegal sets out of circulation, and onto the increasingly occupied 28MHz band. This seems a viable solution to me. What do you think?

The Low Bands

On to your reports now, and I'll start off with the low bands with **John Heys G3BDQ** near Hastings. And John starts off by saying that the new sunspot cycle has started at last! About time too, eh John?

Using a 60m long end-fed wire mounted at 13m above ground on 1.8MHz John reports working s.s.b. with LY3NCI (Lithuania) at 2006UTC, 9H0DX (Malta) at 2104, as well as Scottish and Irish stations and other Europeans.

Meanwhile, 'QRP man' **Eric Masters G0KRT** in Surrey has been using his QRP Plus 5W rig and a 26m end-fed wire antenna to work 1.8MHz low power s.s.b. contacts. He contacted G4OSY in Croydon at 2212, and club station GX0BRC/P at 2032, while his 3.5MHz log includes Novice station 2E0AIZ, Tom in Cambridgeshire at 2209, and DL2SWK/P Germany at 2008UTC.

The 7MHz Band

The 7MHz band has been very productive again this month. And first of all it's over to early bird **Ted Trowell G2HKU** on the Isle of Sheppey. Ted, using a Ten Tec Omni V at 70W and a G5RV dipole worked (all c.w.) listed contacts with VP2MDE (Montserrat), RK9XWH (Asiatic Russia), KG9N/C6A (in the Bahamas), ZL2AGY (New Zealand), and IA5/IK4OCT (Toscano Archipelago) all at around 000UTC.

Like Ted, another 7MHz early bird is **Charlie Blake RS96034** in Milton Keynes who reports s.s.b. reception of ZL2BCG (New Zealand) in QSO with G0AOR at 0540, XEVIC (Mexico) in contact with OM2DX (Slovak Republic) at 0534, CP6DA (Bolivia) working LA2PA (Norway) at 0609, DJ2HY (Germany) in contact with G0EKD at 0616, SP2CCO(Poland) working G3DPW at 0551UTC.

Charlie also logged CE1RYJ (Chile) in QSO with F5OYT (France) at 0540, and M100G, an English special event station celebrating 100 years of radio, located 60km north west of London, received at 1155UTC, all were heard by using an NRD 525 receiver and an 11m sloping wire antenna for reception.

John G3BDQ has been busy here on 7MHz in mid evening, listing c.w. DX contacts with 4S7ZAG (Sri Lanka) at 2127UTC, JG3TRB(Japan) and a host of other Japanese stations around 2100, VK2KM (Australia) at 2120, VU2PAI (India) at 2029, PT7VJD (Brazil) at 2102, and 9Q5MR (Zaire) at 2119UTC.

The 14MHz Band

I'll begin the 14MHz band section with long time correspondent **Don Mclean G3NOF** in Yeovil. Don's monthly propagation report indicates that daytime conditions have been generally poor; the short path to Asia on 14MHz has often been open at around 1500UTC onwards, with African stations coming in at around 1700.

Don's vast log lists amongst others HI8FCR (Dominican Republic) at 2315UTC (QSL via Box 25226 Santa Domingo, Dom. Rep.), HS0/G3NOM (Thailand) at 1625, (fast QSL route via G0CMM), N7QXQ/HR6 (Roatan Island) at 2222, V51BO (Namibia) at 1752, (QSL via Box 1823, Tsumeb) XR0Y (Easter Island) at 1509 (QSL via WA3HUP) and 5H3MZ (Tanzania) at 1908 (QSL via Box 174 Malindi, Kenya). Don uses a Kenwood TS-950 rig and a TET HB33SP beam antenna.

There's a change of mode this month for s.w.l. **David Henry** of Aberdeen, who has been logging RTTY contacts using a Trio R1000 receiver and a 20m long wire antenna. David mentions reception of W1CX (USA) at 2221UTC, EO50FI (Ukraine Republic) at 1420, OD5PL (Lebanon) at 1808, and VA3MM (Canada) calling 'CQ Asia' at 2251UTC.

Now it's over to new reporter **Brian Waddell GM4XQJ** from Falkirk. Brian says that it's time for mandatory bandplans after suffering immense QRM from PACTOR on the 14.060MHz QRP frequency!

Brian lists QRP contacts with K1JKS (USA), 3D2PN (Fiji), SV2DGZ (Greece), and FY5YE (French Guiana) on c.w., and AP2TM (Pakistan). He also listed FM5GX (Reunion Island), 3V8BB (Tunisia), and ZC4C (British bases on Cyprus) on QRP s.s.b.

Another new correspondent is **Chris Brown G0UNJ** in Manchester, using a Yaesu FT-107S and a home-brew quarter-wave vertical for 14MHz. Chris reports s.s.b. contacts with ET3SIO (Ethiopia) at 1803UTC, DU9RG (Phillipine Islands) at 1252UTC, and 5X4FI (Uganda) at 1840, despite this...Chris says the bands were in poor shape!

Now it's down to Skewen in West Glamorgan and **Carl Mason GW0VSW**. Carl reports 100W contacts with VE3JPN (Canada) at 1812, N4REL (USA) at 1441, SV1BJL (Greece) at 0408, and XK3FH (Canada) at 1228UTC using a simple G5RV antenna.

Last but not least for this band comes **Gordon Foote G7NCR** in Bristol. He uses a Howes DcRx single band receiver and a loft mounted receive antenna.

Gordon reports s.s.b. reception of the Flatholm Island joint expedition between Barry RS and the Bavarian RS (IOTA EU 124) to commemorate Marconi's first experiments in 'radio across water' in 1897. He reports GB5FI working CN8MC (Morocco), CT3FT (Madeira Island), W7HUY USA, VE6JFW (Canada), RV3DB (Russia), G4SQA, OO5VT (Lebanon) and YO9CSM (Romania).

18 & 21MHz Bands

Finally, a quick look at the 18 and 21MHz bands now, as space is limited this month. Don G3NOF has made 18MHz s.s.b. contacts with CO7KR (Cuba), J73VE (Dominica) at 1947, (QSL: N4SPQ), PJ8AO (Leeward Islands) at 1202, (often heard at this time on 18.136MHz) and TJ1AO (Cameroun) at 1811UTC.

Ted G2HKU lists his 21MHz contacts with K2LE and N3AO (both USA). They were both around mid-day, using an HF 6 vertical antenna.

Thanks Again

Well, that's it for this month. My thanks again to all our reporters for their time and effort which makes this column what it is.

However, I am desperate for photographs of yourselves to make the column prettier! So **please** send them in.

Reports and information by the 15th of each month to **Leighton Smart GW0LBI, 33 Nant Gwyn, Trelewis, Mid Glamorgan, Wales CF46 6DB. Tel: (01443) 411459. (Please mark your envelope 'HF Far & Wide').**

PETER SHORE

BROADCAST ROUND-UP

Peter Shore brings you the latest news from the world of international broadcasting.

Deutsche Welle (DW) has once again had to stop operations at its relay station in Sri Lanka because of security problems in the region of Trincomalee where the station is sited. Fighting has flared up regularly since the breakdown in April of the cease-fire agreement between the government and rebel Tamil Tigers.

The Sri Lankan army is patrolling the DW station's perimeter to prevent damage to the installation, while the staff are staying in Colombo, the country's capital. The winter schedules came into effect at the end of September, at the same time as the continental European clock changes.

As a result, many frequencies and programme times changed in the world of international radio. Here is a summary of what's happened around the bands.

Programme Schedules

Radio New Zealand (RNZI) in English can be heard at 1850 to 2215 on 11.735; from 2216 to 0457 on 15.115; 0458 to 0715 on 11.90 and from 0716 to 1206 closedown on 9.70MHz. The station re-opens at 1650 on 5.96 and changes frequency again at 1850 to 11.735MHz.

The RNZI station carries the 1100UTC BBC World Service Newsdesk on 9.70MHz. All programmes are carried on a 100kW transmitter at Rangitaiki in the North Island.

The programme *Mailbox* on Monday is on at 0430, Thursday at 0830 and Friday at 1930UTC and includes Arthur Cushen's regular DX information, as well as answering listeners' letters. Letters can be sent to **RNZI, PO Box 123, Wellington, New Zealand**, or **FAXed** to **+64 4 4741 433**. If you are connected to E-mail, write to **rnzi@actrix.gen.nz**, and find the station on the World Wide Web a **http://www.actrix.gen.nz/users/rnzi**

Radio Singapore International has English to Asia at 1100 to 1400UTC on 9.53MHz daily. You can dial in for the latest frequency information on **+65 353 5300** and FAX the station on **+65 259 1380**.

Radio Bulgaria has English to Europe at 2000-2100 on 7.335 and 9.70 and at 2200-2300 on 7.105 and 9.70,

and to North America at 0000-0100 and 0500-0600UTC on 7.48 and 9.70MHz.

There is also a transmission to Asia at 1230-1330 on 9.81 and 11.605MHz. Radio Bulgaria can be reached at **4 Dragan Tsankov Boulevard, Sofia 1040, Bulgaria**, or by **FAX** on **+359 2 650 560**.

The Voice of Vietnam in Hanoi, which celebrates its 50th anniversary this year, has moved to its regular winter frequency of 12.02MHz which includes the European services at 1130 (to Eastern Russia), 1330, 1600, 1800, 1900 and 2030. Contact the Voice of Vietnam at **58 Quan Su Street, Hanoi, Vietnam** or **FAX** on **+84 4 261122**.

Radio Damascus has English for listeners in Europe at 2005 until 2100 on 15.095MHz, and to Australasia and America at 2105-2205 on 12.085 and 15.095MHz.

Listeners to 5.875 and 9.605MHz on a Sunday in September might have been surprised to hear a live commentary of the Bank of Ireland Gaelic football final. An organisation called Irish Overseas Broadcasting (IOB) Limited worked with RTE to hire BBC transmitters at Skelton in Cumbria and Woofferton in Shropshire to relay the match. The IOB asked for reception reports to be sent to **PO Box 4950, Dublin 1, Eire**.

Digital Radio Service

Radio Austria International is one of the first international broadcasters to take advantage of Astra's new Digital Radio (ADR) service. If you want to tune in to the new digital service - which offers sound approaching CD quality - you will need to buy a new black box, and those are currently in short supply in the UK and continental Europe. A number of other international broadcasters are likely to take up capacity on ADR once the service has gained acceptance from consumers.

Radio Norway

Radio Norway International continues to transmit English on Sundays. Tune in at 0700 on 7.18, 1300 on 7.315, 9.59 and 15.605; 1400 on 11.84, 1500 on 9.52 and 11.73; 1900 on 5.96, 6.195, 7.485, 9.59MHz short wave and 1314 kHz medium wave; 2200 on 6.17 and 6.195 and on Monday (Sunday in the target zone) at 0100 on 6.01 and 0300 on 6.03MHz.

From neighbouring Sweden, English can be heard at 1715 on 6.065, at 1830 on 6.065, 7.24 and 9.655; 2130 on 6.065 and 7.23 and 2230 on 6.065MHz. All these transmissions are also carried on medium wave on 1179kHz (and there is a medium wave-only transmission at 2330UTC). The station has a new site on the World Wide Web: **http://www.sr.se/rs**

Radio Australia

Radio Australia, which is in the middle of a government review of its operations, has stopped broadcasts in the Thai language. The station has said that a majority of people listen to the BBC World Service and Voice of America's Thai services, and that those who want to tune to Australia prefer the station's English services.

That's the end of this month's summary of the world of international radio. If you log anything interesting, or hear any snippets of news that might interest fellow *PW* listeners, please drop me a line via the Editorial offices in Broadstone. Until next time, good listening!

ORF
RADIO AUSTRIA INTERNATIONAL

END

MIKE RICHARDS G4WNC

BITS&BYTES - COMPUTING IN RADIO

Mike Richards G4WNC rounds-up the latest news from the computing in radio world.

Despite various pleas, it appears that no one has managed to get the PSA OSP programs to work with the SoundBlaster AWE32 board. **Stan White** has tried, but without success. If you know different, please drop me line.

Windows '95

I'm still waiting to find enough space on my hard drive to run the latest Windows '95 release. The reports I have so far look good.

I've even seen one report from **David Moisan** in the States indicating that you can run HAMCOMM and JVFAX successfully under Windows '95. I'd be pleased to hear from any readers who can confirm this.

NuMorse Update

Great news for all those sweating over the Morse test. **Tony Lacy** of **NuMorse** fame has just sent me the latest update of this popular Windows based tutor.

The NuMorse program makes excellent use of the Windows graphical interface to produce a very friendly easy to use program. To ensure that you learn the proper rhythm of the code NuMorse uses what's known as Farnsworth coding for sending at the slower speeds.

With the Farnsworth system a slow overall sending speed is achieved by stretching the gaps between characters and words rather than spoiling the sound of each character. For the UK test you would therefore set the character speed to 12w.p.m. and the program then stretches-out the gaps to give the required overall speed.

By using the Farnsworth technique your ear becomes accustomed to the sound of the 12w.p.m. code and as you become more proficient you just cut down the thinking time between characters. As well as providing straightforward random streams of characters, NuMorse can draw its text from a disk file or the keyboard.

One of the most powerful features of the NuMorse tutor is its drill modes. Here the program analyses your responses and will adjust the speed and message content to coach you on your weak areas. Closely associated with this is the program's ability to produce statistics showing your performance in response to the tests.

You can also set a range of filters to determine the characters that are included within the random groups. This feature can be supplemented by adding a weighting to certain characters so that they are sent more frequently.

NuMorse is also extremely flexible in the way in which the tones are sounded. While you can use the PC's internal speaker, the preferred option is to use a SoundBlaster compatible system. If you do this, not only do you get a better class of tone, but you can use NuMorse's speech output as well.

In addition to providing status information, the speech option can be configured to give voice announcement of each character. So, how do you get a copy of the great tutor - you can either order **Disk 3** from my readers offers at the end of the column, or you can contact Tony directly at **58 Bilbrook Road, Codsall, Wolverhampton WV8 1ER**.

The price for a registered copy of NuMorse is £20. If you have CompuServe access you can register your shareware version via on-line shareware registration (GO SWREG). When using this system the NuMorse registration IO is 1721. My thanks to Tony for kindly supplying the review software.

New RAE Tutor

Yet more Windows software! Are you trying for your Radio Amateur's Exam? If so, the new Lucid RAE tutorial from **G. Butler G4BVX** could be a great help.

The NuMorse program makes excellent use of the Windows graphical interface to produce a very friendly easy to use program.

The Lucid RAE program is a rather novel application that provides an on-line tutorial so you can swot-up whilst playing with your PC! The program centres around the use of separate text files for each of the main topics that are selected from a menu system within the main program.

Once a topic has been selected you can then scroll around to find the text you want. The only snag with this part of the program was the slow reaction of the text viewer used.

Whilst it was okay if you wanted to read through from the start, it was painfully slow if you wanted to skip through to a sub-section. However, all was not lost as you could always use the Windows Notebook to directly view the text files.

Included with the Lucid tutor was an RAE examiner. This was a simple package that produced 100 RAE multiple choice questions that could be used to check your progress.

Although there were one or two minor mistakes in the review copy, it was a very neat idea. For future releases it would be great if the program told you the right answer in cases where you were wrong.

In fact, some simple programming ought to be able to capture the student's weak areas, link with the tutor program and customise the lessons to focus on the weak areas. One final request for future releases would be to replace the awful pink background with something a little more tasteful!

If you would like to try the Lucid RAE tutor, a demo copy can be obtained from the author **G.W. Butler, 18 Hobart Road, Ramsgate, Kent CT12 6NW**. Please send an s.a.e. plus high density IBM formatted 3.5in disk.

If you want a full, registered, version of the software you will also need to send a cheque/postal order for £17.50. My thanks to G. Butler for supplying the review software.

Internet News

The hot Internet news is the latest version of Netscape Navigator. This popular WWW browser has gained a very strong position among Internet users due to its wide range of advanced WWW features.

Special Offers

Here's the full list of reader's offers with all the latest software. Please leave up to 2 weeks for delivery.

IBM PC Software (1.44Mb disks):

Disk 1 (Order Code **DK1**) - JVFAX 7.0, HAMCOMM 3.0 and WEFAX 3.0

Disk 2 (Order Code **DK2**) - DSP Starter plus Texas device selection software.

Disk 3 (Order Code **DK3**) - Ultrapak 2.1 and NuMorse

Disk 4 (Order Code **DK4**) - Mscan 1.3 and 2.0

Printed Literature:

Beginners Utility Frequency List (Order Code **BL**)

Complex Signals Utility Frequency List (Order Code **AL**)

Decode Utility Frequency List (Order Code **DL**)

FactPack 1 Solving Computer Interference Problems (Order Code **FP1**)

FactPack 2 Decoding Accessories (Order Code **FP2**)

FactPack 3 Starting Utility Decoding (Order Code **FP3**)

FactPack 4 JVFAX and HAMCOMM Primer (Order Code **FP4**)

FactPack 5 On the Air with JVFAX and HAMCOMM (Order Code **FP5**)

FactPack 6 Internet Starter (Order Code **FP6**)

For the printed literature just send a self addressed sticky label plus 50p per item (£1.50 for four, £2.50 for 7 and £3.00 for 9). For software send£1.00 per disk (£1.75 for 2, £2.50 for 3 or £3.00 for all 4) and a self addressed sticky label (don't forget I provide the disk!).

The latest version (2.0) is a major development that transforms Netscape into a complete Internet tool. Up until now most Net users have had to accumulate an assortment of applications, i.e. FTP, mail, WWW browser, etc. Netscape Navigator 2.0 is supplied as a complete suite of integrated applications all ready for action.

Among the enhancements to the Web browser are support for simultaneous streaming of video, audio and other data. This means that you can listen to audio and watch pictures as they build-up rather than have to wait until all the data has been transferred.

To cover your E-mail requirements Netscape 2.0 includes a full mail program so that you can both send and receive mail using Netscape's built-in security systems. News is another area that features in the new release with a complete application that allows the user to read, sort and post messages to newgroups.

The newsgroup messages can be displayed fully threaded to make it easy to follow a complete topic without having to jump about. The security features of Netscape are very good and employs a 40bit key that, at the last count, took a considerable computing effort to break. There is talk that this could be enhanced to 64bit if the US export laws are amended.

In addition to these basic, but vital upgrades, the new Netscape Navigator has been designed to make life easier for Internet developers. For more information contact Netscape at **http://home.netscape.com/**

Disk Diresctories

Over the past couple of months I've had a few of my readers' offers disks returned with a note saying the files are empty. Each time I've checked the disks, all appears to be fine.

The problem appears to be a lack of understanding of disk directories. For some time now all my special offer programs have been supplied in their own sub-directories. The reason for doing this is to allow me to put several programs on one disk without mixing-up all the files!

If you're unsure of how to access sub-directories, here's a few tips. If you're running in MS-DOS, first insert the readers disk in drive A and type **A:** to log on to that drive. Next type **DIR** to show the content of the root directory. If you're doing this on my **Disk 1** you will get the following display:

```
HAMCOMM     <DIR>
JVFAX       <DIR>
WXFAX       <DIR>
```

To switch to the JVFAX directory all you have to do is type CD\JVFAX. If you type DIR again you will then see the program files thus:

```
.DIR
..DIR
INSJV70.EXE
READ.ME
```

For more details either check-out your MS-DOS manual or look out for a good basic computing book such as *PCs Made Easy* (available from the **PW Book Service for £15.95 plus £1 P&P (UK), £1.75 P&P (overseas).**

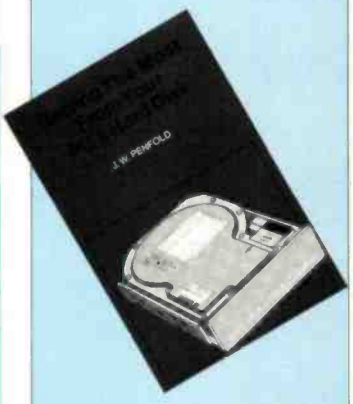
Audio Switch Box

Dave Dyngley has sent me an E-mail asking if I know of a switch box that can be used with a transceiver to provide switching between microphone and data system. Dave's current system uses the Commslab RSD116 interface and HAMCOMM and JVFAX programs.

Other than building one yourself, I'm not aware of any ready built switch boxes. However, if you know different please write and let me know.

That's it for this month, so until next time keep computing and sending your letters to me Mike Richards G4WNC, 'Bits & Bytes', PO Box 1863, Ringwood, Hants BH24 3ZD. CompuServe: 100411,3444; Internet: mike.richards@bbcnc.org.uk

Two books that would make good 'stocking fillers' (your stocking of course) are available from the *PW* Book Service. These books are suitable for anyone who has just bought an IBM PC but didn't get any documentation about MSDOS with it.



The first book *Getting The Most From Your PC's Hard Disk.* (BP280) by J. W. Penfold takes you through the rigours of fitting and preparing a hard disk. Then follow three chapters showing you how to organise your data and keep it secure.

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END

ANDY EMMERSON G8PTH

FOCAL POINT

Andy Emmerson G8PTH reports on an ATV contact which took place between the UK and the Netherlands during August.

A very exuberant-looking Hans faces the camera (almost) as he celebrates his flea-power feat sending P5 signals across the North Sea on 10GHz... without a lift!

Just one report this time, but what a report! It concerns a spectacular contact, or rather set of contacts, between the UK and the Netherlands.

Nothing spectacular in that, I hear you say, except that this was with P5 pictures on 10GHz and without a lift! In fact it may change your whole perception of the 10GHz band and its possibilities. Why waste time struggling with expensive power devices on 430 and 1270MHz when you can achieve perfect contacts on 10GHz with flea power?

There's got to be a catch and yes, there is if you want to see it that way. But just as a bottle can be either half-full or half-empty, depending on your viewpoint, I think the opportunities presented on the 10GHz band are the most exciting thing I've heard in ages. See for yourself anyway...!

The catch. Oh yes, the catch. Well, you need an over-water path but it can be a lengthy path.

Then, if conditions are right (and remember, you don't need a tropo opening, merely calm weather) then you too could work international DX over paths up to 300km or more. Is this special pleading? I think not.

August Event

The actual contacts were made over the weekend of August 19/20 this year (and were set-up by letter a couple of weeks beforehand). But the genesis of the idea goes back to meetings at several BATC conventions.

The convention is where **Bob G8OZP** met **Hans Dekker PE1ECO** and his colleagues who visit our ATV meetings regularly. They conceived the idea of trying ATV on 10GHz across the North Sea under normal conditions.

The hook-up in August involved Bob, located on the sea front at Aldeburgh, Suffolk and Hans, who was on the foreshore at the north-west tip of Walcheren, the most westerly point of the Netherlands.

Note that neither of them was on an elevated position (this is crucial). Both Bob and Hans were at the top of the beach, barely above sea level.

Bob's transmitter was a DRO-stabilised affair producing 900mW on 10.278GHz into a 1m prime focus dish. His receiver was a converted satellite LNB and home-brew electronics.

For his part, Hans had a similar receiver and 250mW of transmit power on 10.4GHz to a 750mm dish. Several other amateurs joined in the QSO on the Dutch side, including **PA0VHF** and **PA0BOJ**.

Surface Ducting

Bob G8OZP says signals in both directions were absolutely rock-steady P5, exploiting the propagation mode of sea surface ducting. It appears that the signal is launched into a layer of air just above the surface of the water, the duct is formed by the changing air density caused by water vapour just above the sea.

Signals enter this duct, graze the sea surface and are refracted back into the duct, rather like the action of a stone skimming on water. The height of the duct is not very great.

Bob and Hans noted that passing ships interrupted their signals and in the end they could predict visually when their signals would be lost due to action at sea.

This proves that ducting is not taking place in the upper atmosphere. Height, which is normally an advantage in v.h.f. and u.h.f. work, is in fact of no help with the duct mode of propagation. Bob also worked **PE1DCD/P** stationed atop sand dunes at the Hook of Holland and the received signals were noticeably noisier despite similar transmit power over there.

Signal levels were remarkably constant over the weekend. Tests were carried out from 10.00 to 18.00 on Saturday and from 10.00 to 16.30 on the Sunday.

The sea was quite calm and Bob now wants to repeat the experiment under rougher sea conditions, although he fears the results will prove contact impossible. "This is real amateur radio", says Bob. "The theory may be well known but at least we were able to prove it in a practical and very real manner".

QRP Experimenters

To provide a bit of variety Bob and Hans also tried out some QRP experiments. Bob brought along a 10mW Gunn diode transmitter that he makes available as a kit, together with the prototype of a new kit-built receiver.

Bob is making available kits of parts for his equipment designs; the Gunnmod 2 transmitter costs just £20 or £30 with a pre-tuned Gunn oscillator, whilst the receiver will work out around £65. For details send an s.a.e. to **Bob Platts G8OZP, 220 Rolleston Road, Burton on Trent, Staffs DE13 0AY.**

Solid P5 pictures were achieved even at this low power level! "By Sunday afternoon we were running out of new things to do", continues Bob, "so just for fun I removed the dish antenna and pointed the waveguide feed alone towards Holland. Amazingly Hans could still receive my pictures at strengths from P0 to P5, albeit with heavy fading. But at this stage we really did run out of things to do"!

Because of the wide frequency split (10.278 and 10.4GHz) teams were able to pull off one other stunt, namely simultaneous full-duplex working and loop-back (with Bob re-transmitting Han's signals to Walcheren). The path was 145km or 290km for the round trip.

Needless to say all this was achieved with P5 signals and no problems. Operation was also tried on 1270MHz, with Bob sending 15W. Results were nowhere near as good as 10GHz, with signals of P3 to P5 strength and much fading.

You might be thinking that working ATV from the UK to the Netherlands on 10GHz was a first... but it's not. In fact it's interesting to note this was achieved by **Paul G8IXE** and **Ken G4ALN** back in the late 1970s. Exactly how, and where from and to, I must investigate, also whether they too exploited sea-level propagation.

The sea-level technique also works at lower frequencies, although possibly not so effectively owing to the longer wavelengths. I recall French amateurs used to transmit 430MHz pictures to us Brits from the dunes at Ounkirk with great success. Perhaps they still do but we haven't had any reports of this.

That's all I've got time and room for this time so cheerio for now. Keep your letters coming to me at 71 Falcutt Way, Northampton NN2 8PH.

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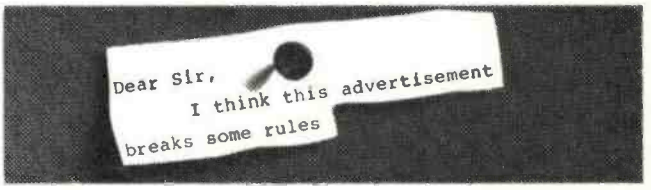

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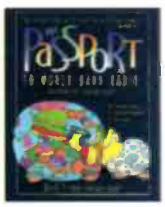

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G.L.Benbow G3HB
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G.L.Benbow G3HB
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92 pages. £4.99

REVISION QUESTIONS FOR THE NOVICE RAE (RSGB)
Esde Tyler G0AEC
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60 pages. £5.00

THE NOVICE LICENCE STUDENT'S NOTEBOOK
John Case GW4HWR
This is the recommended course book for anyone taking the Novice Licence. Covering all aspects of amateur radio and electronics it would be useful to anyone starting out in amateur radio. Every left hand page is for your own notes of explanation.
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Doug DeMaw W1FB
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EMC

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Robin Page-Jones G3JWI
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W. I. Orr W6SAI
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Steve Money
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RCA RECEIVING TUBE MANUAL

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Re-published by Antique Electronic Supply (Arizona)
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This is a stiff covered paperbacked novel-sized book. And if you've got an interest in transmitting with valves...this is a useful reference source for valves up to 4kW input. The RCA authors have included some interesting practical circuits using their valves, including some for s.s.b., v.h.f. and others. Highly recommended reference source. 318 pages. £9.95.

Projects

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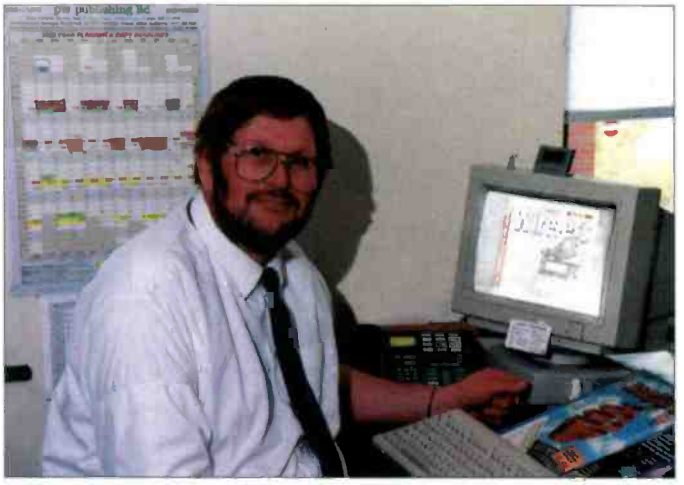
ENDNOTES



Radio enthusiasts come in many 'shapes and sizes', that's why the *PW* Editorial team decided on including a selection of workshop and test equipment features this month. Personally, I found them all very interesting and I hope you found them to be encouraging.

Beginners and those interested in home-brewing have been catered for and we had the special article from Ben Nock G4BXD. Both Ben and I ('digitally deprived' in different ways!) hope that his article will encourage others who perhaps doubt their own ability...to have a go at home-brewing. However, unless you want to 'pay' frequent visits to your Dentist please remember our warnings about using your teeth!

I don't know about you, but I think 1995 has really 'whizzed' by. It certainly doesn't seem that a year has gone by since I put the 'finishing touches' to the December 1994 issue. But there you are, another year gone by and there are many more fact-filled *PW*s coming your way!

As from the January issue, we're dropping the 'themed' approach to every month's *PW*. And although we'll have the occasional 'themed' issues with popular subjects (such as Morse, and mobile), we're planning to provide as much general interest as possible. In other words, each *PW* will be packed with 'goodies' for you, with antennas, projects and ideas.

One new idea we're introducing is taking a second look at major review items. These occasional features will reflect on a reviewer's first impressions of a major item.

The new feature will enable us to get over a problem that's with us all the time - trying to evaluate equipment in a relatively short period. With a 'second look' a reviewer will have had time to reflect on their comments and evaluations (good or bad!). And to 'kick off', so to speak, I'm intending to report back on the Alinco DX-70 h.f. plus 50MHz mobile rig which I took on holiday with me to Ireland recently.

Next month, as we usher into Volume 72 of *PW* we've got some interesting projects to 'power you up and not leave you penniless', and get you ready for 50MHz operations! So, don't miss a good 'practical' read.

Rob G3XFD

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 similar 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.

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