

# practical Wireless

MAY 1993 £1.90

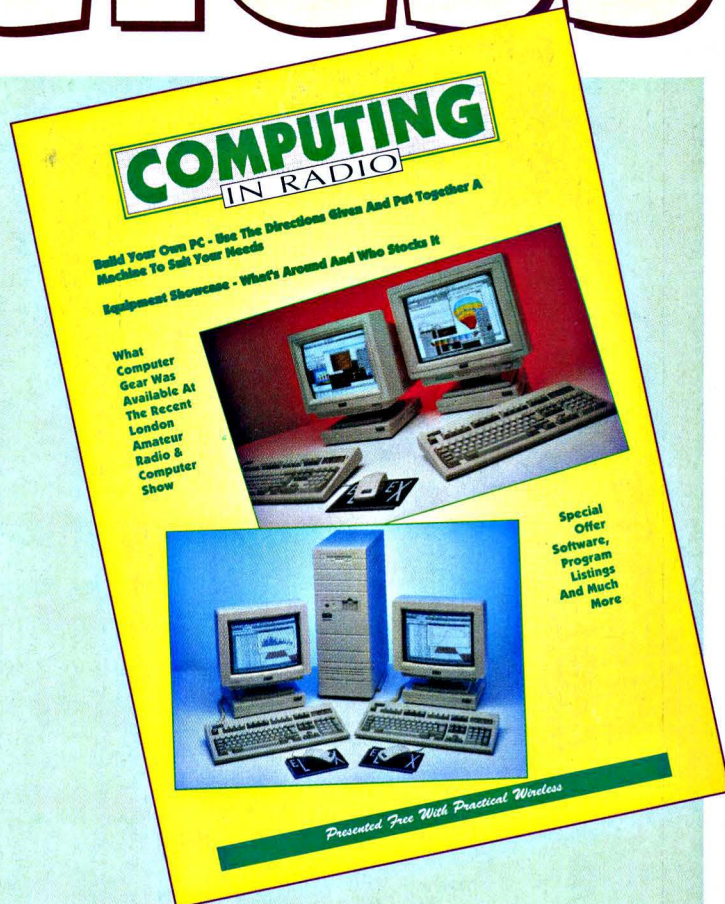
## FREE INSIDE 24-Page Computing In Radio Magazine

**Constructional**  
Build A Noise Bridge

**Antenna Workshop**  
Using Computers In Antenna Design

**Reviewed**  
The Yaesu FT-5100 VHF-UHF Mobile  
Transceiver

**And**  
The Icom IC-737 HF Transceiver



ISSN 0141-0857



**Plus**

Valve & Vintage - Looking At Older  
Equipment, Packet Panorama,  
Satellite Scene & Lots More!

**32-Page  
Marco Trading  
Catalogue**



# SMC

South Midlands Communications Ltd, S.M. House, School Close, Chandlers Ford Ind. Est., Eastleigh, Hants SO5 3BY

## A WINNING PAIR 'BEST COMMUNICATIONS RECEIVER 1992'



### FRG-100

*"Yaesu has succeeded in bringing improved technology and features within the price range of a much wider group of shortwave broadcast listeners. It has been a long time since Yaesu revamped their broadcast receiver but for many listeners it will be worth the wait! A good package at an affordable price."*

## AND ARGUABLY THE BEST DUALBAND HAND-HELD



- VHF/UHF Handheld
- Dual reception on same or different bands
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144-146, 430-440 MHz Expandable to 110-180,  
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- Enhanced save function for extended NiCad life
- MH29A2B Speaker/Microphone c/w LCD frequency display and most used keypad function buttons.
- Supplied with FNB28 NiCad & charger.

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WE KNOW YOU'LL LIKE IT !!!**

■ Prices and availability subject to change without prior notice. ■ Carriage charged on all items as indicated or by quotation.  
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■ Up to £1000 instant credit, a quotation in writing is available on request, subject to status. ■ Same day despatch wherever possible.

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**Birmingham 021-327 1497 Axminster (0297) 34918 Chesterfield (0246) 453340**



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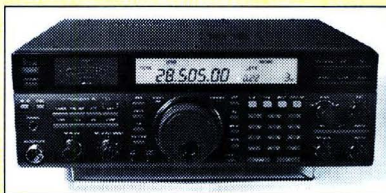
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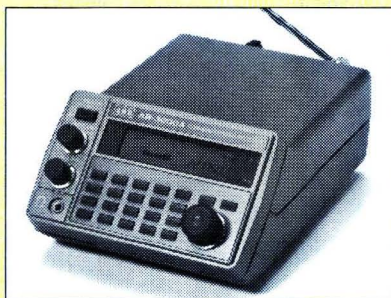


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## Coming Next Month

The PW 'Morse Special' where we take a look into the world of c.w., keys and all those extras to help you with Morse.

## Also coming in the June issue

The **FREE** Nevada Communications 72-page pull-out colour catalogue, full of electronic and radio equipment for the radio enthusiast.



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We give full warranty on all ICOM products bought from authorized ICOM UK dealers. In some cases the equipment will be

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Gordon G3LEQ & John G8VIQ at Birmingham, Chris G8GKC at Herne Bay and Doug G0LUH & Paul G7MNI in London all look forward to your visit.

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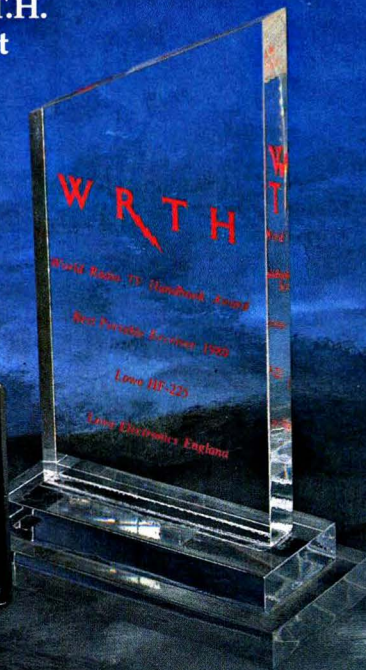
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HF-225 voted "RECEIVER OF THE YEAR" in 1990 by W.R.T.H.  
HF-225 "FINLANDIA" voted "BEST DX RECEIVER 1992" at  
the EDXC Convention in Finland. Final choice was from  
HF-225, NRD-535 and IC-R72E.



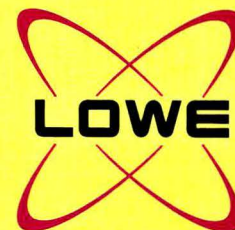
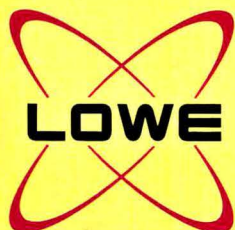
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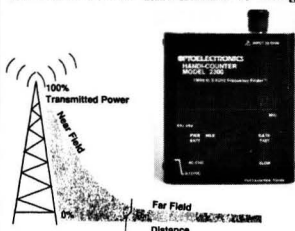
ALINCO KENWOOD YAESU ICOM DIAMOND MFJ MICROSET TONNA REVEX

## NEW! Highly Sensitive Frequency Counter

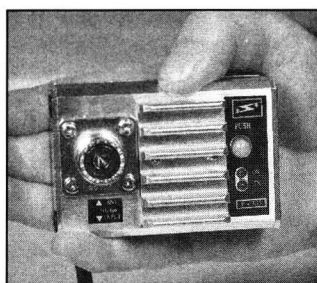
### Optronics "2300"

Self powered - it can sniff frequencies from over 100ft! 1MHz - 2.4GHz

£169.95 Inc. ni-cads & charger



## 2m FM MOBILE 25W £59.95!



Just plug the P-335 into your 2-3 Watt hand-held to turn it into a 25 Watt mobile rig.

- ★ 13.8V supply
  - ★ 25-30 Watts out
  - ★ 1-4W drive
  - ★ RF switched
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  - ★ Fused DC lead
  - ★ By-pass switch
  - ★ Size 74x50x24mm
- Add £5 postage and insurance

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**Ramsey 80m, 40m, or 20m Tx. kits.** A complete kit with board, components, controls and xtal. 1 Watt output ..... £29.95

**Ramsey DC 80m, 40m, or 20m receiver kits.** All you need to build a simple hf receiver that will copy CW, SSB and AM ..... £29.95

Ask for QRP leaflet



## DJ-180E £209



LCD display  
10 memories  
2 Watts out  
5 Watts (12V)  
Ni-cad pack  
AC charger  
Auto power off  
Battery saver  
5kHz-25kHz steps  
Helical aerial  
Memory expansions  
12 month warranty

DJ-F4E 70cms  
Model £289

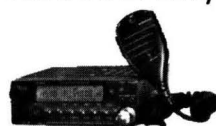
## DJ-F1E £279



144-146MHz FM  
40 memories  
5 Watts (12V)  
Ni-cad pack  
AC charger  
Reverse repeater  
DTMF tones  
S-meter  
Programmable steps  
8 scanning modes  
Rotary dial  
12 month warranty

Send for glossy brochures you're safe with Alinco!

## DR-599E 2m/70cms DR-119E 2m 50W



£699.95

Widely used by RAYNET



45W & 35W  
Full Duplex  
Remote repeater  
Extended Receive  
AM airband Rx  
Dual watch  
38 memories  
Auto band change  
Reverse & priority

**ALINCO ACCESSORIES**  
CTCSS unit DR-599 ..... \$52.95  
DTMF unit DR-599 ..... \$44.95  
Remote mount kit ..... \$36.95  
Spare DC leads ..... \$14.95  
CTCSS unit DR-119 ..... \$39.95  
Spare mobile mounts ..... \$19.95  
DJ-180 standard packs ..... \$39.95  
DJ-180 12V pack ..... \$54.95  
DJ-F/S/X stand packs ..... \$39.95  
DJ-F/S/X 12 V packs ..... \$64.95  
DJ-580E dry cell case ..... \$12.95

50W 144-146MHz  
14 memories  
6 channels steps  
Rx 130-174MHz  
Full scanning  
Reverse repeater  
Packet useable  
Mic and brackets  
Ultra sensitive

## Sunday 9th May HOCKLEY OPEN DAY!

10am - 5pm  
Talk-in G0PEP on 2m  
FREE ENTRY FREE FOOD  
FREE DRINK

Now in its third year. Annual service department clear out, bring and buy, local club attending, special offers, prices we dare no print, VHF and HF active stations etc., This is the one rally that costs you nothing and gives you all the refreshments free! It's great fun, very friendly and very popular.

## We pay CASH

For mint condition working gear with original boxes, manuals, leads etc.

Kenwood R-600 £125; Lowe HF-225 £200; Yaesu FRG-7700 £150; Sony ICF-SW7600 £75; Kenwood TS-140S £400; Yaesu FT-747GXII £280; Yaesu FT77/707 £150; Icom IC-725 £350.

For part exchange you get an even better deal! And remember we can also take in your radio gear against new Panasonic or Sony camcorders, video recorder, TV's and Hi-Fi.

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Micro size HF



TS-450 \$phone  
Midi size base

TS-850 \$phone  
Full feature base



The UK's largest selling

MFJ1270 TNC  
Mail box, HF/VHF, 32K RAM



£149  
(\$5 p&p)

MFJ949 ATU

300W, dummy load, wire, coax balanced



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(\$5 p&p)

MFJ1278 Data controller  
Packet, AMTOR, RTTY, FAX, SSTV etc



£319  
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MFJ HF SWR  
207 analysers



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160-10m battery operated.  
Tunes antennas in minutes

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Replacing the old title, Short Wave Listener's Confidential Frequency List, this handbook has been compiled from actual on-air monitoring by experts. Don't confuse it with out dated listings copied from other publications. You get frequencies, call signs, times, modes of operation, station locations and comments. You also get some interesting editorial on short wave monitoring. Ideal for new scanner owners, it runs to 200 printed pages!

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## 2m & 70cms Dual Bander DJ-580E

**£499.95**  
inc VAT

The DJ-580E hand-held is the most advanced design ever offered to the radio amateur. Building on the winning formula of the DJ-560E, ALINCO have now reduced the size dramatically and introduced a combination of innovative features that will make your operating even more fun and certainly more versatile.

It goes without saying that ALINCO offer you all the standard features you expect from a hand-held including dual watch, dual controls, scanning, searching, priority, etc. Of course ALINCO's standard of engineering and reliability is now becoming the envy of its competitors. (They're also pretty envious of ALINCO's prices!) Naturally you get a full 12 month warranty including parts and labour. It's the extra features that really make this a winner.

For example you now have ALINCO's patented circuit that retains full operation with dry cells even when battery voltage falls by 50%. Great for emergency applications. You get a programmable auto power off feature, battery saver, digital telephone dialler and three output power levels. And we've only just started! Key in a special code on the keypad and your rig will turn into a fully operational automatic crossband repeater. Key in another code and you will open up the receiver for a.m. airband reception and frequency segments up to 995MHz! You can even use the DTMF feature to send and receive two digit code messages.

**To learn more about the transceiver that has already taken the Japanese and American markets by storm, phone or write for a full colour brochure.**



**"The Most Comprehensive Specification Ever Offered!"**

Available direct or from your local dealer

Auto repeater mode  
AM Airband Reception  
Expanded Receive to 995MHz

**UK "Gold Seal" Warranty**  
Now with every unit  
Look for the sign on the box!

### Specification

<b>Tx</b>	144-146MHz 430-440MHz
<b>Rx</b>	AM 108-143MHz FM 130-174MHz FM 400-470MHz FM 810-995MHz
<b>Steps</b>	5, 10, 12.5, 20, 25kHz
<b>Memories</b>	42
<b>Power Output</b>	2.5/1.0/0.3 Watts 5 Watts with 12V DC
<b>Scan</b>	8 Modes
<b>Tones</b>	1750Hz plus DTMF Optional CTSS
<b>Sensitivity</b>	12dB SINAD -15dBu
<b>Size</b>	140x58x33mm
<b>Weight</b>	410g
<b>Accessories Supplied</b>	Ni-Cad pack, AC charger, belt clip, carry strap, dual band antenna.

## WATERS & STANTON ELECTRONICS

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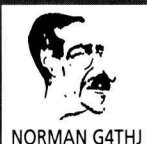
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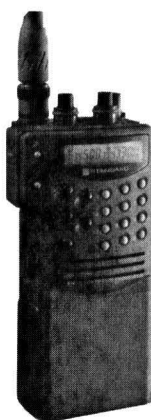
STANDARD YAESU ALINCO AEA MFJ KENWOOD DRAKE WELTZ ANTENNAS ACCESSORIES

STANDARD YAESU ALINCO AEA MFJ KENWOOD DRAKE WELTZ ANTENNAS ACCESSORIES

## THE NEW ONES FROM



**STANDARD.**



## C558 Twin Bander with AM

**£450**

Transmitter:		VHF			UHF		
RF Power Output	Battery Type	Hi	Mid	Lo	Hi	Mid	Lo
	CBT151GY	2.0W	2.0W	0.35W	1.5W	1.5W	0.35W
	CBT150	2.5W	2.5W	0.35W	2.0W	2.0W	0.35W
	CNB151GY	2.5W	2.5W	0.35W	2.0W	2.0W	0.35W
	CNB153	2.5W	2.5W	0.35W	2.0W	2.0W	0.35W
	CNB152	5.0W	2.5W	0.35W	5.0W	2.5W	0.35W

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

### C500 Accessories

CLC500	Carrying case C500 with CNB111 batter
CLC501	Carrying case C500 with CNB120 battery
CMP111	Speaker microphone
CMP113	Tie-pin microphone
CMP115	Speaker microphone (small size)
CNB111	Nicad battery pack (3.5W-VHF/3.0W-UH)
CNB120	Nicad battery pack (5)
EBATT	Empty battery case for dry cells
CSA111	Desk top charger CNB111 and CNB120 battery
C102/230-1	Plug-in charger CNB111 battery
CWC20	Plug-in charger CNB120 battery
CAD111	Charging adaptor for battery only
CAW1208	Mobile adaptor for direct use from car battery
CMC01	Mobile charger car battery to CNB111 battery
CMB111	Mobile bracket
CHP111	Headset with P.T.T switch
CTN500	CTCSS tone squelch unit
CTD500	Touch tone unit for use with remote control

### C164/468 Accessories

CLC160	Carry case for use with CNB160
CLC161	Carry case for use with CNB161
CLC162	Carry case for use with CNB162/163
CNB160	Nicad battery pack (6V @ 300ma)
CNB161	Nicad battery pack (7.2V @ 700ma)
CNB162	Nicad battery pack (12V @ 600ma)
CWC150K	Wall charger for CNB160/161/163
CWC151K	Wall charger for CNB162
CSA160E	Desk top rapid charger for all nicads
CAW150	Mobile power supply cable
CHP150	Headset with PTT/Vox
CMU160	Memory unit - 30 channels
CMU161	Memory unit - 200 channels
CAX03	Button cover
CAX160	Remote battery adaptor
CAW150	Mobile power cable
CCA160	Charging sleeve
CTN160	CTCSS module
CMP111	Standard size speaker/mic
CMP115	Small speaker/mic
CHP111	Headset boom/mic
CMP113	Tie-pin mic and earphone
CMB111	Mobile bracket

### Mobile/Fixed Equipment

C5608D	Dual band UHF/VHF 45W mobile transceiver RX coverage extendable
--------	---

Model No...	Price inc. VAT	Model No...	Price inc. VAT
C558	£429.00	CNB182	£65.00
C528	£399.00	CNB183	£59.00
C188	£269.00	CNB184	£39.00
CTN520	£50.00	CMC150	£14.10
CBT151	£12.50	CWC151	£17.50
CBT151G	£12.50	CMU181	£17.50
CNB151	£45.00	CHP111	£39.36
CNB151G	£45.00	CHP150	£47.50
CLC550	£12.99	CSA160	£70.50
CNB152	£72.00	CCA160	£12.00
CWC150	£14.68	CAX03	£4.50
CAW150	£14.10	CAX160	£27.50
CAW151	£9.50	CBH160	£7.50
CLC520	£12.99	CMU160	£17.50
CLC521	£12.99	CMU161	£22.50
CMP111	£35.25	CNB160	£40.00
CMP113	£35.25	CNB161	£45.00
CMB111	£14.69	CNB162	£79.00
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	with CNB181	1.2W	1.2W	0.15W	1.2W	1.2W	0.15W
	with CNB182	5.0W	2.5W	0.15W	5.0W	2.5W	0.15W
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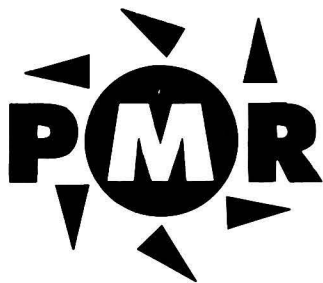
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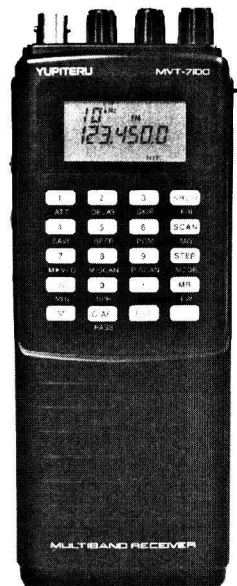
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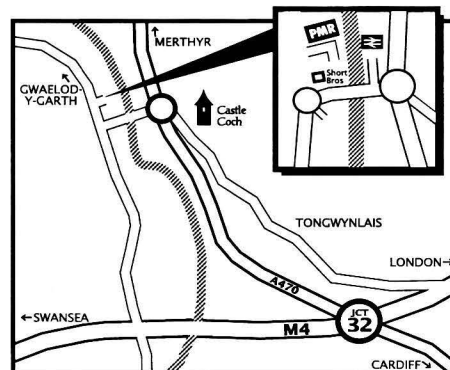


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Listening on the short wave broadcast bands nowadays, can be quite hazardous. It can even compromise our hobby, although the listener concerned has probably done nothing wrong!

Recently, following a spell in hospital, I got a distinct urge to build something. So, out I went to the shack to finish a project that's been waiting on the bench for some while.

As I was working on the partially assembled h.f. c.w. only rig, I listened to the short wave broadcast bands. The 31m (9.5 to 9.9MHz) band was proving to be entertaining, and there was a lot to interest me that morning. I particularly enjoyed a programme from Radio Switzerland International.

However, my problems started after RSI finished their English broadcast, and I had to re-tune to find another station. That's when I came across the telephone conversation!

I suddenly realised that a transmission I had tuned into, was an ordinary domestic telephone call and not a programme. It was fairly strong, and obviously from a fairly local cordless telephone.

Bearing in mind all the recent media coverage of so-called 'radio hams listening in to cellular telephones', I wasn't anxious to stay tuned. But how could I avoid this nuisance, especially when the signal was right in the middle of a legitimate international broadcast band?

I thought long and hard as to whether or not to trace the originator of the transmissions to warn them of the problem. In the end I decided against it.

I hesitated because I had become unstuck once before, when I warned a neighbour that their cordless telephone (a fully legal device) was audible on my car radio. The neighbour then told the whole village that I listened in to telephone conversations!

So, bearing in mind the recent bad (unwarranted) publicity regarding cellular telephones and so-called 'hams', I spoke to the Radiocommunications Agency about the problem of cordless telephones causing interference to other services. It turned out that in reality, there's nothing that can be done about the nuisance because the short wave broadcasting service (in common with amateur radio) is an un-protected service.

The legal types of cordless telephones have operating frequencies between 1.642 and 1.782MHz and within the 49MHz band. Despite the fact that I could have been listening to harmonics from a faulty legal cordless telephone, it could have been an illegal unit operating on around 3MHz (with corresponding harmonics on 9MHz).

The Radiocommunication Agency spokesman, although sympathetic, made it plain that apart from removing illegal cordless telephones from the market (which the RA does at the point of sale) that there's little they can do. But to try and help the situation, the RA has produced a very interesting information leaflet on cordless telephones (Ref. RA193) which is available free from the RA in London.

# Keylines



The leaflet on cordless telephones makes very interesting reading indeed. For example, did you know that long range cordless telephones **ARE** legal, particularly for rural areas?

Information on the long range type (Extended Range CT1), conforming to RA Specification MPT 1371 (as amended) is on the information sheet. These telephones can have a range of up to two kilometres.

Details on the range of frequencies for all the telephones are included, and it's in the region of 47MHz for the base unit transmit, and 77MHz for the portable unit transmit on the long range types. I think that both frequency ranges are near enough to amateur bands to cause problems for users of either amateur or telephone equipment!

To be honest, I'm concerned that with the increasing popularity of cordless telephones, the chances of there being problems will increase. The public must be made fully aware that such equipment renders any conversation totally insecure.

How long will it be before someone approaches an amateur, complaining that the amateur (legitimately operating on our own frequency allocations) is causing interference to his cordless telephone? It's likely to become a major problem in large towns.

I've already counted more than six cordless telephones working between 1.8 and 2MHz in my area. I wonder if they're supplied with callsigns, and how long it will be before the operators start working each other and offering QSL cards?

Before I round off this month, I've got to apologise to the various clubs who were affected by my recent spells in hospital. Because of my enforced 'horizontal polarisation', a few of my long-planned club visits had to be cancelled. As I know that most of the clubs involved had invited other clubs, the cancellations caused quite a few problems. Sorry about that, and I promise not to overdo the Christmas pudding next time. I'm looking forward to re-scheduling the visits. See you then!

Finally, readers will notice that we have a price increase this month. We're all conscious of prices nowadays, and I'm sorry it's necessary due to our rising costs. We strive to make *PW* good value for money, and will continue to do so. This month's issue really is full of good reading. I hope you enjoy it, and continue to do so.

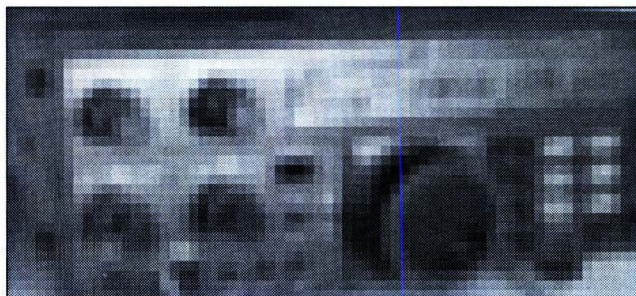
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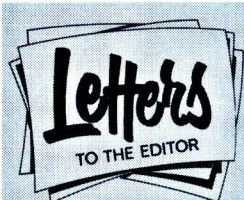
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Send your entry (photocopies acceptable with corner coupon) to: Competition Corner, Spot The Rig Competition, May '93, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Editor's decision on the winner is final and no correspondence will be entered into. Entries to reach us by Friday 21 May 1993.

**Competition Corner  
May 1993**



# Receiving You



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

**Dear Sir**

Reference to the 'Code Free Licence'. It is my opinion that as time progresses things become obsolete. For example the Ministry of Transport vehicle driving test no longer insists on the use of hand signals, these have been entirely replaced by indicator lights.

Surely by now Morse Code falls into a similar category and has been superseded by many other forms of transmission?

**M. Bignell**  
Halstead  
Essex

## ★★★★ Star Letter ★★★★★

**Dear Sir**

To c.w. or not to c.w., that's the question!

Dear *PW*, this c.w., seems to be a chore;  
I've seen it mentioned, in your pages  
many times before.

Some do like it, others mic' it,  
to many it's a bore.

I've heard some fast ones, and  
the slow ones, up and down the bands.  
And, if I may make so bold,  
some, with two left hands.

There's QRQ, and QRS, but I wonder what  
they call the rest?

The super boys, computer buffs,  
who squirt c.w. out in puffs.  
Can you read them? You may well-  
perhaps your VDU will tell?

But never mind, do not dismay,  
it takes all kinds, or so they say.  
So all you sparkers, young and old,  
who use this mode as good as gold,  
don't give up or let it die,  
just let the 'Antis' cry and cry.

This is because, you'll always win,  
and read the signals thru the din,  
of QRM with QSB,  
so just sit back,  
and drink your tea.

And to all you doubters, may I say,  
you're free to join us any day.  
All you need, is fist and ear,  
with some inexpensive gear.

So have a go, no more moans,  
just learn to love those old Morse tones.  
And when at last, you pass the test,  
and pin that medal on your chest.  
Allow yourself to fill with pride  
as you use that keyer by your side.  
Sending out those dits and dahs,  
to all the world both near and far,  
Working DX now with ease,  
and all you have to do, is squeeze!  
Have fun!

**C. J. Cowling, Redruth**  
Cornwall

**Editor's reply:**

**Oh dear, this 'No Code' topic has got 'em  
going! We're getting so much post,  
Our mail bags need re-sewing!**

**Dear Sir**

I notice that in the February edition of *PW*, you invite comment concerning the possibility of a 'No Code Licence'. I hope that this one dies the death as it has done before. If there are certain disciplines in examinations related to international regulations, then they should be retained. The h.f. bands are ideal DX bands, c.w. is constantly being used on them and any amateur worth his salt should have the ability to read and send Morse code at a given speed before being allowed on those bands.

I know that amateur radio is only a hobby, indeed a splendid one. But as long as it continues to be controlled by legislation then those who wish to get a little more from it should make the effort to fall in line with current requirements and not to seek an easy route to prime parts of the radio spectrum by calling for the abolishment of the Morse test.

Perhaps I am a little old fashioned in my thinking!

**Captain R. K. Nicholls**  
Epsom  
Surrey

**Dear Sir**

Peter Thornhill of the Plymouth Radio Club, suggested that I wrote to you about the Novice Licence problems I have had with my students.

My local technical college (where I took my RAE) refused to run the NRAE on the grounds that "we do not run the course so are not prepared to run the NRAE". (Of course they could not run the course because all instructors carry out the tasks voluntary).

I checked up on the night of the NRAE in June and twelve students took a City & Guilds Electrical Examination! I managed to arrange the NRAE with the help of the Somerset Novice Senior instructor, at a college some 30 miles away. When one of my students needed to take the September NRAE, this college was not running any City & Guilds Examinations and the nearest exam centre that I could find was Buckfastleigh, some 60 miles distant!

The moral of these experiences is even if you can find volunteers

to instruct the Novice Licence, it is a major problem finding an examination centre to run the NRAE for the students.

From April 1993, Colleges of Further Education will be directly responsible to the Department for Education. I wonder whether an approach could be made there, to prevent the superb idea of Project YEAR floundering on an administrative failing

**P. Hyde**  
Taunton  
Somerset

**Editor's comment:**  
**This seems to be a desperately sad situation, especially when so many people are trying so hard (and succeeding) training Novices and 'doing their bit', only to be let down at the last fence. I have written to the Government Minister responsible (with a copy to the RSGB), explaining the problems facing potential candidates. I intend to publish the Minister's comments when and if we receive a reply.**

**The *PW* team are always pleased to receive your letters on topical matters, suggestions, comments and criticisms. But please keep your letters as brief as you can, so we may publish as many as we can in 'Receiving You'.**



**Dear Sir**

I am going to take up amateur radio as a hobby and I have been reading *PW* for the last few months.

I am somewhat concerned about the proposal to introduce a 'No Code HF licence', i.e., to abolish the requirement to learn Morse code! Since I am profoundly deaf, I am unlikely to be able to make a QSO by speech since I can't hear very well, even with a decent hearing aid. I may be able to follow Morse code since it is mainly monotone! But if others cannot use Morse of the h.f. bands I would be unlikely to make many QSOs as a result.

Packet radio has made me think of taking up amateur radio, but the impression that I have got so far of it is that it is overcrowded! And one wouldn't have the feeling of a real-time QSO between continents with packet!

You have the library at Sheffield University to thank for introducing me to this magazine!

**Johnathan Wells**  
**Sheffield**

**Editor's comment: We have tried to produce a balanced selection of letters on the 'No Code' licence topic. However, it's proved rather difficult, as we've only had two or three (so far) supporting a possible 'No Code HF Licence'.**

**Dear Sir**

I write to register my opinion that the present test for Morse Code should be retained. I am very much against the idea of a 'Code free' licence.

Nowadays, there are plenty of on-air lessons in Morse code and hundreds of classes in local colleges, schools and adult education institutes.

Local clubs also run classes.

All that is needed to pass the test is commitment, practice and time. Surely anyone who is keen on the hobby as a form of self-training, should be prepared to make the effort?

**John P. Rogers**  
**Woking**  
**Surrey**

**Dear Sir**

I think that the proposal for a 'No Code' licence is an excellent idea. With the facility available to send and receive the Morse code electronically, there is in my opinion, no practical necessity for a Morse code qualification. But I do think that there should be a period of Class B operation in order to get the on air experience. The length of qualifying period to be decided by the power that be.

Amateurs already with a Class B licence and many years of infringement free operating, should automatically qualify for an h.f. licence which should be granted on payment of licence fee plus the cost of present Morse test to cover the administrative costs.

The use of Morse code should still be permitted if required, as I fully appreciate the fact that there are amateurs that are very fond of radio communication by using the Morse code, and long may they remain with us.

**F. W. J. Neale**  
**Marlborough**  
**Wiltshire**

**Dear Sir**

My name is Kushan Edussuriya. I am a 14 year old boy, really interested in radio communications.

While going through the periodicals section at the British Council Library in Sri Lanka, I happened to come across one of your issues of *Practical Wireless*. After going through it, I found out that it was a really great magazine. It was the April 1992 issue with the information on the Kenwood TS-450S which was really exciting. The section 'Computing in Radio'

was very interesting to read. I want to congratulate you on printing such a great magazine.

While reading on, I came across your subscription coupon. I just wish I could read more issues of *PW*, but the subscription rates are just out of my reach. What I want to know is if I have any other way of getting same issue of *PW*. It would be a great help if you would let me know of way that I could read some issues of *PW*. Once again congratulations on your magazine.  
**Kushan Edussuriya**  
**Rajmalana**  
**Sri Lanka**

**Editor's reply:**

**Thanks for your letter Kushan, and I'm pleased to hear that the British Council Library continues to do an excellent job for readers such as yourself abroad. I would also be pleased to send you a copy of April 1992 PW, but unfortunately that issue sold out because of the popular 'Computing In Radio' supplement. However, I have no doubt that someone, somewhere may have a spare copy for you.**

**Dear Sir**

Ref. The 'Code Free Licence'. I have been interested in amateur radio for many years and obtained a class B licence in 1988. I found the RAE study stimulating, interesting, and much of what I learned, I remember and use frequently.

In 1991 I enrolled for an evening class to learn Morse. This cost me £55. I completed the course, but despite practice I never got beyond nine words per minute.

I have read many letters and articles in the amateur radio press over many years on the vexed subject of Morse. I still feel however, that some fundamental issues need to be addressed and answered.

I want to know: Why does Japan have a code free licence? Is it not interesting to note that they also have the highest number of radio amateurs *per capita* of any country?

An old argument was that in the event of war, the Government would have a ready supply of operators. I wonder, has anyone recently checked with the British Army on the need?

Another old argument is that as amateurs share some frequencies with commercial users, it is necessary to be able to converse in Morse so the station can be requested to shut down. This seems reasonable, so why not insist that only those who want to use those frequencies have Morse?

There's also the 'wally factor'. Why if we need to keep them off the h.f. bands, why do we not keep them off the v.h.f. bands?

Finally, I'm very interested in packet radio. But no one serious suggests I commit all the ASCII codes to memory. So, why commit commit an archaic code to memory in order to use the h.f. bands?

I'm not rabidly anti-Morse, I just object to having it thrust down my throat. Keep up the good work at *PW*.

**John (Max) Maxwell G7DXC**  
**Bracknell, Berkshire**

**Dear Sir**

The image of the radio amateur was rather tarnished recently by the media confusing us with scanner operators eavesdropping on private telephone conversations. The recent publicity highlighting the work of true radio amateurs in maintaining contact with isolated communities in Bosnia has done something to redress the balance.

For many years radio amateurs in the USA have been permitted to take part in phone-patch operations, helping to provide links between members of the armed services abroad and their families at home. With the increasing use of British service personnel in peace-keeping functions the extension of third-party traffic in this country to include phone-patch operation, possibly restricted to amateurs belonging to the RNARS, RSARS or RAFARS, would surely be welcomed by all service families.

Approaches are known to have been made to the RSGB on this matter, but in the absence of any definitive comments from this body, the time has perhaps come to ventilate it in a wider form.

**Kenneth Doughty GM0IJV**  
**Deerness, Orkney**

**Editor's comment: I agree with you Kenneth, and I shall ask the Radiocommunications Agency to comment on the matter. I hope to publish their reply and invite comments from other readers on this important topic.**



## The Amateur Radio Caravanning & Camping Club

Are any of you out there caravanners or tent campers? If so, you might be interested in the Amateur Radio Caravan & Camping Club, an independent RSGB-affiliated club, founded in 1979 and run by, and for, radio amateurs.

The Amateur Radio Caravan & Campers Club run weekend rallies, for relaxation, enjoyment of the countryside and each other's company, and even some amateur radio activities from time to time. Rallies take place between February and November, mostly in Northamptonshire or Leicestershire. This year, they shall also be visiting Derbyshire, Staffordshire and Hertfordshire. Their week-long holiday rally this year will be in Dyfed, Wales.

Anyone interested, should contact the **Membership Secretary Alan Gard G4LWA, 39 Disraeli Crescent, High Wycombe, Bucks HP13 5EL. Tel: (0494) 531755.**

## practical Wireless

### Six Month Subscriptions

Six month subscriptions are now available for *PW*. The subscriptions are only available for UK subscribers and cost £10.50. Potential subscribers can contact Kathy Moore on **(0202) 659930** for credit card orders, or use the form that can be found in the 'Arcade' section of *PW*.

### Calling All Ex-VP8s/ZD8s

Craig (ex-VP8AQQ) would like to hear from any ex-VP8s, with a view to arranging a meeting for all, or as many as possible (ex-ZD8s also welcome).

This will provide a good chance to meet others who have been to the Falklands or Antarctica, etc., so that stories can be exchanged, and old friendships can be renewed.

Craig suggests meeting at the Birmingham Amateur Radio & Electronics Show this year, and anyone wishing to attend should contact him **c/o YMCA Sports Centre ARC (G3TRF), Melrose Close, Maidstone, Kent ME15 6BD.**

### Miniature Voltage Controlled Oscillator

The McKnight Fordahl Company Ltd., have announced what they claim to be the smallest voltage controlled oscillator family using standard DIL 14-pin package. The new oscillator family has been specifically designed for fibre optic communications and any high performance application where smaller sizes and higher frequencies are required. The company say that a 160MHz version is available now, and a 311MHz version will be available during 1993.

**For further details from McKnight Fordahl, contact Graham Bird on (0703) 848961 reference MK 117.**



**Send your news and product information to our News and Production Editor Donna Vincent at 'Newsdesk '93' Practical Wireless, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW, tel: (0202) 659910.**

### Morse Seminar 1993

On May 15, at the Sherwood Community Centre, Mansfield Road, (home of the Amateur Radio Club of Nottingham), a Morse seminar will be held from 11am to about tea-time. Car parking will be available, but there will be a small admission fee, provisionally thought to be £1, with all profits going to RAIBC (the Radio Amateur Invalid and Blind Club), as last time.

It is planned to stage a variety of events such as demonstrations, mock c.w. tests, speed tests, exhibitions of Morse-related equipment and a series of mini talks, with something for all, from the beginner to the more advanced c.w. operator. There will also be several longer presentations.

Light refreshments, such as tea, coffee, crisps and choccy biscuits will be available. Details from **Ron Wilson G4NZU, 9 Greythorn Drive, West Bridgford, Nottingham NG2 7GG.**

### Waters & Stanton Scanners At Maplin

Waters & Stanton announce that a selection of their scanners, including Yupiteru and AOR, are now available through all 23 branches of the Maplin Electronic shops.

This follows the completion of the pilot scheme started last year, when seven of the top Maplin shops were stocked out with a selection of scanning receivers.

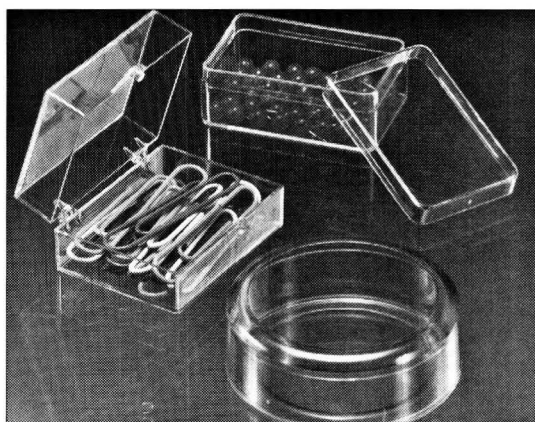
The after-sale service work will continue to be carried out by Waters & Stanton, who will also be able to offer telephone technical advice to customers before and after purchase.

The address of your nearest Maplin Electronics store can be obtained by either telephoning (0702) 206835 or purchasing the Maplin catalogue from any branch of W.H. Smiths.

### New Display Boxes In Polystyrene

A brand new range of small, lightweight high clarity polystyrene plastics boxes from Moss Plastic Parts is designed to display, store and protect a wide range of items. Possible applications include storing small electronic and machinery components, miniature radio projects, specimens and samples. Eight sizes of rectangular boxes are available in two styles, hinged or push-fit lid, covering sizes from 54 x 41 x 5mm (hinged lid) to 120 x 77 x 20mm (push fit lid). The company also produce a round display box with push-fit lid of 63mm diameter and 22mm in height.

**Further information from Moss Plastic Parts Ltd., Langford Lane, Kidlington, Oxfordshire OX5 1HX, tel: (0865) 842971, FAX (08675) 70135.**





## Battle Of The Atlantic Special Event Station

The Wirral and District Amateur Radio Club are to operate a special event station - callsign **GB8WA** - at the end of May 1993. The event is to mark the 50th anniversary of the Battle of The Atlantic. The Western Approaches was the name given to the large sector of North Atlantic ocean controlled from Liverpool. All Allied shipping was directed from Liverpool and enemy vessels were plotted in an attempt to prevent attacks on vital supplies.

To mark the occasion, one of the largest ever peacetime gatherings of naval vessels has been planned. The Queen and other members of the Royal Family will be in attendance.

The Wirral and District Club will be operating its special event station from Perch Rock lighthouse at New Brighton, the same location used in 1992 for the Columbus celebrations.

The special event station will be operational from May 27 to 31 (Thursday to Monday) and 24 hours a day operation is planned. The station will active on 3.5, 7, 14, 21 and 28MHz together with 144MHz. Operational modes are to be (h.f.) c.w. and s.s.b. and (v.h.f.) s.s.b. and f.m. Commemorative QSL cards will be given to all who confirm a contact via the RSGB QSL Bureau or via s.a.e.

Further information on the event and details are available from **Ron Cairns G3HFA, 71 Springfield Avenue, Newton, Wirral, Merseyside L48 9XB, tel: 051-625-7124** or **Gerry Scott G8TRY at 19 Penkett Road, Wallasey, Merseyside L45 7QF, tel: 051-2294472 (daytime) or 051-630-1393 (evenings).**



# Newsdesk -93

## The RSGB 1993 NEC Show

The Radio Society of Great Britain's annual show at the National Exhibition Centre in Birmingham, is to be held this year, on **Sunday 16 May.**

The RSGB announce that the one day event is being held to keep the costs down for traders who have been hard hit by the recession. This year's event coincides with the Nation Vintage Communications Fair. This show features all types of vintage radios, TV receivers, components, valves and publications.

The RSGB report that there is ample free car parking, and further details on the event can be obtained from **Norman Miller G3MVB at 178 Warley Hill, Brentwood, Essex CM14 5HF, tel: (0277) 225563.**

## SMC Awarded Camel Trophy Communications Contract

For the second year running, Hampshire-based South Midlands Communications Ltd., (SMC) has been awarded the contract to supply all communications equipment and a communications management team for the pres-

tigious 1993 Camel Trophy, to be held in remote, tropical regions of East Malaysia.

The Camel Trophy is an annual event involving two-man teams from all over the world driving Land Rover Discoverys through

some 1000 miles of the most inhospitable terrain the globe has to offer.

A dedicated communications vehicle will be equipped with Inmarsat satellite communications systems and virtually every form of

mobile radio communications will be provided.

SMC was awarded the contract following the success of the communications systems supplied for the 1992 Camel Trophy held in South America.

## Cave Radio & Electronics Group

Cave Radio and Electronics Group of the British Cave Research Association are a non-profit making organisation, dedicated to the development of electronic equipment to aid the exploration, surveying and scientific research of caves and pot-holes. A major part of their work involves v.l.f. 'through rock' radio communication, with a particular emphasis on its use in cave surveying and cave rescues.

If you require any further information on this, please contact **Mike Bedford G4AEE on (0274) 729777 working hours or (0535) 681873 evenings.**

## Maplin Electronics Support PW Elmer Award

Maplin Electronics are to support the *Practical Wireless* Elmer award. The award, introduced in 1992, is to encourage recognition of the many unsung people who have helped others into the radio hobby. The first *Practical Wireless* Elmer is Dr. Ken Smith G3JIX, awarded the honour for his many years helping young people into the hobby. Ken's award consisted of a signed water-colour Worthington cartoon, produced by John Worthington GW3COL, depicting G3JIX surrounded by his young friends.

The 1993 Elmer will receive a special prize from Maplin Electronics, in recognition of the nomination and to Maplin's support for the radio hobby. The prize will be presented together with the specially commissioned Worthington cartoon by G3JIX and the *PW* Editor.

This year's award is now open for nominations, and the presentation will take place during the October Leicester Show. Further details on nominations and how to reward your own helper, can be obtained by addressing an s.a.e. to the new *PW* offices in Broadstone, endorsed with 'PW Elmer 1993'.

## Mini Soldering Iron From Weller

Cooper Tools, manufacturers of soldering equipment marketed under the Weller brand name, have introduced a range of new mini, lightweight soldering irons. The Weller Mini Series 2000 features a choice of seven different soldering irons rated at 12, 15 and 20W.

The company claim that the new range is as easy and as light to hold as a pen. All the new range are fitted with long-lasting nickel soldering tips and come complete with a moulded-on 13A three-pin plug.

**Further details from Cooper Tools, Sedling Road, Wear, Washington, Tyne & Wear NE38 9BZ, tel: 091-416-6062.**





## No. 2

Fighting for the No. 1 spot, the NEW IC-737 from ICOM. Auto at & Keyer built in as standard, no silly "slider controls" and wonky plastic doors on this one! At last a real successor to the IC735, read what Henry F. Lewis, G3GLO has to say...

**Deposit £475.00 & 12 payments of £85.00**

## No. 3

My favourite for months, the Yaesu FT-890. With or without Auto ATU, a real winner for BASE or MOBILE H.F. Did you know that it is now available with SPEECH ANNOUNCEMENT, (as an option), for blind operators? Only from LYNCH!

**Without Auto ATU, Deposit £320.00  
& 12 payments of £75.00**

**With Auto ATU, Deposit £495.00  
& 12 payments of £75.00**

## No. 4

Probably the best selling H.F. transceiver in the world, the TS850S from Kenwood. Certainly one of the most reliable. A true base station radio from a world beating company.

**Without Auto ATU, Deposit £510.00  
& 12 payments of £95.00**

**With Auto ATU, Deposit £540.00  
& 12 payments of £105.00**

## No. 5

It's crept up in price, but it's now only the same cost as an old TS940S listed at, 4 years ago! The radio? Yaesu's FT990. For Peter Hart to use words like "thoroughly recommended", I can't really comment anymore.

**Without int. PSU & CW filter, Deposit £522.00  
& 12 payments of £125.00**

**With both options, Deposit £600.00  
& 12 payments of £135.00**

## No. 6

At the budget end of the market, the Icom IC-728 offers excellent performance together with the quality feel from this famous manufacturer.

**Deposit £195.00 & 12 payments of £66.66**

## No. 7

For those of you who want a good, no frills H.F. package but also want to dabble on 6 Metres, how about the Icom IC-729? Identical to the IC-728 at No. 6, but with 10 watts on 50MHz as well as a full 100 watts on H.F.

**Deposit £275.00 & 12 payments of £85.00**

## No. 8

Performance and flexibility of the "big boys", the TS-690S from Kenwood is still up in the TOP-TEN, and there's good reason. The price. Closely compare the spec of the '690 with other H.F. machines and the rig scores high up the ladder. Throw in a SIX METRE option giving a massive 50 watts output in addition to 100 on H.F., and you can see why this one is so popular.

**Without Auto ATU, Deposit £480  
& 12 payments of £85.00**

**With Auto ATU, Deposit £510  
& 12 payments of £95.00**

## No. 9

Want the No. 8 slot, but without SIX Metres? You got it with the TS-450S. 100 watts, General Coverage, All Mode, Selectable filtering in both I.F.s. Big radio features in a mid-sized package.

**Without Auto ATU, Deposit £449.00  
& 12 payments of £75.00**

**With Auto ATU, Deposit £480.00  
& 12 payments of £85.00**

## No. 10

A joint entry at No. 10, The Flagships from YAESU & KENWOOD, the FT1000 & TS950SDX transceivers. Both have features for the really serious amongst our H.F. operators, including 150-200W output, Dual Receive, Built in Power supplies & Auto Tuners as standard, the list goes on forever. If your serious, ring me for a tailored quotation to suit your needs. If your not, ring someone else!

**FT1000 & TS950SDX, deposits from as little as  
£700.00.**

# MARTIN

G4

## THE AMATEUR RADIO

### THE MARTIN LYNCH H.F. TOP TEN

## No. 1



Straight in at No. 1 is the new TS-50S from Kenwood. A real MINI-MOBILE H.F. Transceiver, no bigger than a TR751E 2M Multi! 500kHz to 30MHz, 100w out, matching auto ATU available as an option.

**DEPOSIT £199.95 & 12 payments of £66.67  
With matching Auto ATU, Deposit £295.00 &  
12 payments of £83.75**

# Twelve Months ZERO IN

Still saving up for that new RADIO, but worried about (you should be). Have no fear, LYNCHY's here! I've been a deposit, (no 50% as required by my competitors), and with NO INTEREST. The whole shabbang is subject to who have to wait for you to pay them each month. chappy! (or lassie as the case may be). Beaten the price the wait. Don't be shy, give it a try. I promise I'm

**HIGHEST PRICES PAID FOR**



IF YOU DON'T WANT TO TAKE ADVANTAGE OF MY FREE FINANCE AND WOULD RATHER PAY CASH, CHEQUE, CREDIT CARD OR TRADE-IN, THEN CALL 081 566 1120 TODAY FOR YOUR TAILOR MADE QUOTATION.

I promise you the best overall deal in the U.K. Get ringing, or you'll miss the bargains!



\*Please NOTE prices & monthly payments are based on 17.5% VAT & no more price increases! E&OE

**286 NORTHFIELD AVENUE, EALING, LONDON W5 4**



# MARTIN LYNCH

CHKS

## EXCHANGE CENTRE

### THE MARTIN LYNCH V.H.F. TOP TEN

It's got to be the LYNCH + muTek FT736RDX from Yaesu. The most flexible multiband 2/6/70/23 all mode transceiver available today. Complete FRONT END REPLACEMENT DESIGNED BY muTek, push this transceiver to the No. 1 slot. The performance is now exceptional - expect to see these being used in "VHF CONTESTS" around the world.

**FT736RDX, with muTek, 2/70 operation,**  
Deposit £495 & 12 payments of £125

**FT736RDX/6 with 6m extra,**  
Deposit £600 & 12 payments of £134.50

**FT736RDX/23 with 23cm extra,**  
Deposit £624.00 & 12 payments of £150.00

**FT736RDX/6/23 with all bands fitted, 2/6/70 & 23cm,**  
Deposit £733 & 12 payments of £165.00.

# No. 1

\* muTek FRONT END BOARDS available as "after fit kits",  
£199.95, plus £59.00 fitting charge if required.

## Months To Pay At INTEREST

Without beating the next PRICE INCREASE?, (if you're not  
even advertising it for months. There's no catch, a small  
spread the balance over a whole TWELVE MONTHS  
to the ladies at TRICITY FINANCE, (they're the battalion  
) giving approval and there it is - another happy  
price increase and got your new WIRELESS SET without  
much better at doing deals than I am at poetry!  
OR SECOND HAND GEAR!

### CALL, WRITE OR FAX - SPRING NEWSLETTER NOW AVAILABLE

Packed with interesting goodies, including 'First Impressions' by  
Ken Feather and Henry Lewis, an insight into using all the latest  
Handies and H.F. products from Japan, also a look at the latest  
HF Mini Mobile from KENWOOD, plus much, much more,  
TOGETHER WITH THE LATEST MARTIN LYNCH SECOND-HAND  
LIST!! WRITE OR PHONE FOR YOUR FREE COPY TODAY!!



UB. Tel: 081 566 1120 FAX (24Hr): 081 566 1207

### No. 2

Not a transceiver, but a WIDE BAND ALL MODE PORTABLE RECEIVER, the NEW MVT7100 from Yupiteru. As supplied by MARTIN LYNCH to the M.O.D. and countless other customers, this new model from Japan is truly amazing. 500kHz to 1650mHz, ALL MODE, in your hand? Are they serious? Yep. I'm handing them out like confetti. It's not a toy, it's the most incredible miniature receiver available.

**Deposit £49.00 & 9 payments of £44.45**

### No. 3

First the FT727, then the FT470 and now the FT530, YAESU get better and better at Dual Band portable design. Complete with CTCSS fitted as standard, (NONE of the others have), extended RX, AM/NBFM selectable, Auto Repeater facility, it's been the choice for hundreds already.

**Nicads & Charger included.**

**Deposit £79.00 & 9 payments of £50.00**

### No. 4

Icom were the first company back in 1980 to bring you a fully synthesised solid state transceiver - their technology in digital design carries on - witness the NEW IC-W21ET dual band Handie. Massive dual display, Extended RX, superb "feel" to the user.

**Nicads & Charger included.**

**Deposit £74.00 & 9 payments of £45.00**

### No. 5

Alinco have been knocking the "big three" for several years now and they continue to do so with the DJ-580. Ask around the Dual-Band Handie users and the odds are they'll be using one. All the bells and whistles, well built and very reliable.

**Nicads & charger included.**

**Deposit £49.00 & 12 payments of £30.00**

### No. 6

When Angus McKenzie, G3OSS said this is THE transceiver for Two metres all mode, he wasn't kidding. I've been selling them for years and there's still nothing to touch it. Full 25W out and don't forget the matching 70cm version, the TR851E!

**The TR751E 2M, Deposit £149.00**

**& 12 payments of £50.00. For the TR851E 70cm,**  
**Deposit £199.00 & 12 payments of £50.00**

### No. 7

Kenwood's TH-78E marches into the TOP TEN because of its performance, excellent ergonomics, (if SONY ever designed a dual band Handie, this is what it would look like), beautiful build quality and endless user features. For people who like mind blowing "ADVANCED" facilities, wait no longer.

**Deposit £49.00 & 12 payments of £35.00**

### No. 8

Want a simple to use, REMOTE HEAD DISPLAY, High-Power Dual-Band Mobile, that doesn't blow your brains away whilst QUEUEING ROUND THE HANGER LANE GYRATORY? (WHERE?) - Well get your cheque book out lads & ladies, the TM-732E from KENWOOD is for you! Yes, it's got all the gizmo's if you want them, but if you don't, then it's got to be the easiest mobile/base FM 2/70 transceiver available.

**Deposit, £69.00 & 12 payments of £50.00**

### No. 9

Hands up those who want a SINGLE BAND HANDIE, but quite fancy the thought of being able to listen to the "other mob" on 2 or 70? Thought so. Kenwood thought so as well. The NEW TH28E & TH48E. Single band FM Handie, but press one button, and instantly monitor the opposite band to the one your transceiving on. They're lower priced so I can offer them on my nothing to pay (but small deposit), for 3 months scheme.

**TH28E Transceiver on 2M, rx on 70cm,**  
**Deposit £39.00, £250 in 3 Months**  
**TH48E Transceiver on 70cm, rx on 2M,**  
**Deposit £49.00, £280 in 3 Months**

### No. 10

Still a firm favourite for people who want MULTI-MODE PORTABILITY on 2 Metres, the FT290R mk11, still has the market to itself. The rest have given up! Available with a "clip on" 25W linear, the FT290R is the perfect all rounder for 2M operation, either portable, base or mobile.

**Without matching linear,**

**Deposit £100 & 12 payments of £35.75**

**With Matching FL2025 Clip on Linear,**  
**Deposit £124 & 12 payments of £45**

...THE MARTIN LYNCH V.H.F. TOP TEN...THE MARTIN LYNCH V.H.F. TOP TEN...



# Club News

Please send in all of your 'Club News' items to Donna Vincent at the new editorial offices in Broadstone.

## Avon

**North Bristol ARC.** Fridays, 7pm. Self Help Enterprise, 7 Braemar Crescent, Northville, Bristol. RAE & Morse tuition available for members. April 9 - Kits, Bits & PCBs by John, Badger Boards, 16th - home-brew competition, 23rd - An Insight Into QRP by Bill Beacham, 30th - relax & chat evening, May 7 - committee meeting. **Tony G4ROX on (0272) 513573.**

## Bedfordshire

**Shefford & DARS.** Thursdays, 8pm. Church Hall, Ampthill Road, Shefford, Bedfordshire. April 22 - The Repair Of PCBs With Surface Mounted Devices, May 6 - VHF & SHF by Bryan G8DDK. **Paul G1GSN on (0462) 700618.**

## Berkshire

**Maidenhead & DARC.** The Red Cross Hall, The Crescent, Maidenhead, 7.30pm. April 20 - The PC Computer (part 2), May 6 - Bracknell 70cm Repeater GB3BN by Tim G4EMO. **Neil G8XYN on (0628) 25952.**

**Reading & DARC.** 2nd & 4th Thursdays, 8pm. The Woodley Pavilion, Woodford Park, Haddon Drive, Woodley, Reading. April 8 - WWII Radio Equipment (part 2) by Russel Dixon G8ORE, 22nd - The Optimised Doublet Antenna by Vin Robinson G4JTR, 24th - help with the Scouts Fox Hunt, May 13 - HF NFD Planning John Linford G3WGV. **Nick Challacombe G0LGG on (0734) 722489.**

## Buckinghamshire

**Aylesbury Vale RS.** 1st & 3rd Wednesdays, 8pm. Village Hall at Hardwick. April 21 - Members Shack Slide Show by I. Eamus G3KLT. **Martyn G4XZJ on (0296) 81097.**

## Cheshire

**Mid-Cheshire ARS.** Cotebrook Village Hall, Cotebrook, nr. Northwich, Cheshire. April 14 - talk by John Taylor of Castle Electronics, 21 - on the air night, 28 - History Of Computing by G4XFD, May 5 - Theatre Make-Up by Len Moss, 12th - on the air night. **Mike Baguley G7LQD on (0606) 331210.**

**North Cheshire RC Sundays** 7.15pm. Morley Green Club, Nr Wilmslow. April 18 - Radio Servicing by Castle Electronics. **Jill G00ZJ on 061-485 5036.**

**Stockport RS.** 2nd & 4th Wednesdays, 7.45pm. Room 14, Dialstone Centre, Lisburne Lane, Offerton, Stockport, Cheshire. April 14 - talk by The Fraud Squad, 28th - Solar Activity by Jim Tottle G4SSN, May 13 - Introduction To Packet Radio by Dave Wood G4UJD. **Jim France G3KAF on 061-439 4952.**

**Widnes & Runcorn ARC.** April 13 - construction night, 25th - Treasure Hunt, 27th - activity night. **Dave Wilson G70BW on (0270) 761608.**

## Clwyd

**Wrexham ARS.** Maesgwyn Community Centre, Maesgwyn Road, Wrexham. April 20 - Quiz, May 4 - talk by Peter Williams of the Whittington Astronomical Society. **Ian Wright GW1MVL on (0978) 845858.**

## Cornwall

**Cornish RAC.** Village Hall, Perranwell Station, Perranwell, nr. Truro, 7.30pm. April 12 - computer section night. **Geoff Bate on (0209) 820836.**

## Derbyshire

**Buxton Radio Amateurs.** April 13 - Quiz & live Morse, 27th - Walking Fox Hunt, May 11 - Explanation Of The Packet BBS Network. Lee Wood Hotel, Buxton, 8pm. **Derek Carson G4IHO on (0298) 25506.**

## Devon

**Appledore & DARC (Devon).** 3rd Mondays, 7.30pm. Appledore Football Clubroom. April 19 - Morse Class & Antennas & Feeders by G0FCL, 20th - construction techniques class, May 4 - construction evening. **Reg Lyddon G4ETJ QTHR on (0237) 477301.**

**Torbay ARS.** Fridays, 7.30pm. ECC Social Club, Highweek, Newton Abbot. April 23 - Trains 'n Things by Peter G4VFG. **W. Hipwell G3HTX on (0803) 526762.**

**Exeter ARS.** 2nd Mondays, 8.00pm. The Community Centre, St Davids Hill, Exeter. April 19 - annual inter-club quiz, May 10 - Surplus Sale. **B. Bolt (G392) 214204**

## Dorset

**Dorset Police ARS.** The Dorset Police ARS will now be holding regular monthly meetings, at force HQ on the first Thursday of every month, at 7.30pm. Membership is open to Police Officers, serving & retired, civilian employees, Special Constables & their immediate family. Further info from **PC 915 Richard Newton at Ferndown Police Station on (0202) 229351.**

## Down

**Bangor & DARS.** 1st Fridays, 8pm. Winston Hotel, Queens Parade, Bangor, Co. Down. May 7 - Medical Electronics by J. Brown G14BXX. **Des Buckley G13HCP on (0247) 460251.**

## East Sussex

**Hastings Electronics & RC.** 3rd Wednesdays, 7.45pm. West Hill Community Centre, Croft Road, West Hill, Hastings. April 21 - Junk Sale. **G3YFF on (0424) 830454.**

## East Yorkshire

**North Ferriby United ARS.** Fridays, 8pm. North Ferriby Utd. FC Social Club, Church Road, North Ferriby, East Yorkshire. April 9 - informal night, RSGB matters & My Importing & Exporting Experiences by Norman G4NJP, 23rd - night on the air, 30th - Demonstration & talk about the New Phasing Transceiver by John G3TDZ, May 7 - night on the air. **Frank Lee G3YCC on (0482) 650410.**

## Essex

**Braintree & DARS.** 1st & 3rd Mondays, 8pm. Community Centre, Victoria Street, Braintree. April 19 - Shack Talk. **M. J. Andrews on (0376) 327431.**

**Clacton RC.** Alternate Wednesdays. The Imperial Public House, Rosemary Road, Clacton-on-Sea. April 14 - Working Marine Mobile. **(0255) 672606, 436565 or 615207.**

**Vange ARS.** Thursdays, 8pm. Barstable Community Centre, Long Riding, Basildon, Essex. May 13 - X-Rays (part 2) by Barry. **Doris on (0268) 552606.**

## Greater London

**Acton, Brentford & Chiswick ARC.** 3rd Tuesdays, 7.30pm. Chiswick Town Hall, Heathfield Terrace, London W4. April 20 - Practical Problems In EMC by G3IGM. **Colm Mulvany G0JRY on 081-749 9972.**

**Clifton ARS.** 'Earl of Derby' Public House, Dennetts Road, New Cross, London SE14. April 16 - contest discussion. **Keith Lewis on 081-859 7630.**

**Loughton & DARS.** Room 12 of Loughton Hall, 7.45pm. April 16 - Video night. **Ray Pedley G0LWF on 081-500 2811.**

**Southgate ARC.** Winchmore Hill Cricket Club Pavilion, Firs Lane, Winchmore Hill, London N21. April 8th - Grand Surplus Equipment Sale, 22nd - London AR&C Show debrief, May 13 - Early Radar (part 3) by Stan Wood Marconi historian. **Brian Shelton G0MEE on 081-360 2453.**

## Greater Manchester

**Rochdale & DARS.** Mondays. T. S. Frobisher, Greenbank Road, Rochdale. April 12 - Five Million Volts, May 10 - Five Million Volts - aftermath. **Brian on 061-653 8316 or Dave (0706) 32502.**

## Gwynedd

**Dragon ARC.** 1st & 3rd Mondays, 7.30pm. Four Crosses Hotel, Menai Bridge. April 19 - The Grand Debate, May 3 - Surplus Sale. **Tony Rees GW0FMQ on (0248) 600963.**

## Hampshire

**Basingstoke ARC.** 1st Mondays,

7.30pm. Forest Ring Community Centre, Sycamore Way, Winklebury, Basingstoke. April 25 - 144MHz direction finding competition 0S175 - Fox Anne G1ZSF, May 3 - talk & demo of Magnetic Loop Antennas by Len G3MAO plus Junk Sale. **(0256) 25517.**

**Itchen Valley RC.** 2nd & 4th Fridays, 7.30pm. Scout Hut, Brickfield Lane, Chandlers Ford. April 9 - open meeting & natter night, 23rd - Nuclear Power by a speaker from BNFL. **Maurice Cheeseman G1IPQ on (0703) 736784.**

**The Submarine ARC.** Thursdays, 7pm. HMS Dolphin, Gosport, Hants. **Mr Talbot G0SBV on (0703) 898887.**

**The Three Counties ARC.** Every other Wednesday, 8pm. Railway Hotel, Liphook Hampshire. April 14 - Meteor Scatter by Mike G4XBP, Paul G4RRA & Kevin, 28th - AGM & on the air night, May 12 - Liquid Crystal Displays & Their Development by Dr David Cotes of Merck, Poole. **Kevin Roche G8GOS on (0420) 83091.**

**Winchester ARC.** 3rd Fridays, 7.30pm. Red Cross Centre, Durngate House. April 16 - Electromagnetic Compatibility by Nick Hooper. **Peter Simpkins G3MCL on (0962) 865814.**

## Hereford & Worcester

**Bromsgrove ARS.** 2nd & 4th Tuesdays, 8pm. Lickey End Social Club, Alcester Road, Burcot, Bromsgrove. April 13 - aerial construction (144MHz), 27th - Birthday party 10 Years!, May 11 - AGM. **Mr D. Edwards G4ZWR on (0527) 546075.**

**Bromsgrove & DARC.** Fridays. Avoncroft Arts Centre, South Bromsgrove, Worcester. April 9 - constructors competition. **Joe Poole G3MRC on (0562) 710010.**

## Hertfordshire

**Cheshunt & DARC.** Wednesdays, 8pm. Church Room, Church Lane, Wormley, nr. Cheshunt, Herts. April 14 - members forum, 28th - natter night, May 12 - members forum. **Roger Frisby G40AA on (0992) 464795.**

**Dacorum AR & TS.** 1st (informal) & 3rd (formal) Tuesdays, 8pm. The Heath Park, Cotterells, Hemel Hempstead. April 20 - Being an RLO by Roy G4UNL. **Dennis Boast G1AKX on (0442) 259620.**

**Hoddesdon RC.** Alternate Thursdays, 8pm. Conservative Club, Rye Road, Hoddesdon, Herts. April 15 - The Post Office Tower by George Morley, 29th - social night. **Roy G4UNL on 081-804 5643.**

**Stevenage & DARS.** Ground Floor Rear Suite, Sitec Building, Ridgemonk Park, 7.30pm. April 13 - practical night, 20th - QRP Operating Skills - Secrets & Techniques by Ron G4DDX, 27th - HF/VHF night on the air. **Pete Daly G0GTE on (0438) 724991.**

## Humberside

**Bridlington & DARS.** Alternate Thursdays, 7.30pm. Combined Cadet Building at Bridlington Upper School, Bridlington. April 15 - rally planning



meeting, 25th - East Yorkshire Rally, 29th - rally report, May 13 - Microwaves by Dave G3ZTR. **Norman Bedford G4NJP** on (0262) 673635.

## Kent

**Bredhurst T&RS.** Thursdays, 8.15pm. Parkwood Community Association, Parkwood Green, Rainham, Kent. **Martin Pearson G7JBO** on (0634) 365980.

**Bromley & DARS.** 3rd Tuesdays, 7.30pm. The Victory Social Club, Kechill Gardens, Hayes, Kent. April 20 - Death Valley by Bicycle By Dave Wellman G00BL. **Alan Messenger G7GBH** on 081-777 0420  
**Lancashire**

**Bury RS.** Tuesdays, 8pm. The Mosses Community Centre, Cecil Street, Bury, Lancashire. 2nd Tuesdays - lecture/talk nights & other Tuesdays - general natter nights. May 11 - Alarms (not clocks!) **Colin Fox G3HII** on (0204) 883212.

**Hesketh ARC.** Every other Tuesday. Birkdale, Southport. April 13 - How To Foxhunt. **Bernie G7DEM** on (0704) 63344.

## Leicestershire

**Charnwood ARCC.** 1st & 3rd Sundays. April 11 - Club Field Day HF, 18th - 40m QRP night on the air, May 2 - 20m QRP night on the air. The Albion, Loughborough. **Phil** on (0509) 232927.

## Lincolnshire

**Grantham RC.** 1st & 3rd Tuesdays, 8pm. Kontak Sports & Social Club, Barrowby Road, Grantham. April 20 - Oscilloscopes by Steve G6IPW, May 4th - Club Quiz. **John Kirton G8WWJ** on (0476) 65743.

## Merseyside

**Liverpool & DARS.** Tuesdays, 8pm. Churchill Club, Church Road, Wavertree, Liverpool. April 13 - Liverpool Show Preparation, 20th - Quiz, 27th - Surplus Sale, May 4 - Video - Radio Control Of Model Aircraft, 11th - Club on the air. **Ian Mant G4WWX** on 051-722 1178.

## Middlesex

**Echelford ARS.** Community Hall, St. Martin's Court, Kinston Crescent, Ashford, Middlesex, 7.30pm. April 8 - AGM, 22nd - Contest Operating by Justin Snow G4TSH, May 13 - natter night. **P. Townshend G6PMT** on (0344) 843472.

## Norfolk

**Norfolk ARC.** Wednesdays, 7.30pm. The Norfolk Dumping, The Livestock Market, Harford, Norwich. April 14 - Prehistoric Elephant Of West Runton by Dr Tony Stewart, 21st - construction night, 28th - First HF NFD Briefing, May 5 - Radio Bygones (update) by Tim Christianson, 12th - GB3NB Repeater AGM. **Jack Simpson G3NJK** on (0603) 747992.

## Northants

**Kettering ARS.** Tuesdays, 7.30pm. Electricity Sports & Social Club,

Eksdale Street, Kettering. April 20 - AGM, 27th - Repeaters by G. Dover G4AFG. **Len G0RDV (but QTHR as G7EHM)** on (0536) 514544.

## Nottinghamshire

**Mansfield ARS.** Polish Catholic Club, off Windmill Lane, Woodhouse Road, Mansfield. May 6 - AGM. **Mary GONZA** on (0623) 755288.

**Nottingham ARC.** Thursdays, 7.30pm. Sherwood Community Centre, Mansfield Road, Nottingham. April 8 - AGM, 15th - Forum - the committee have plans!, 22nd - Foxhunt No 1/Activity, 29th - Junk Sale, May 6 - Forum - WAB Awards by Kate G0FEZ. **Ian Miller G4JAE** on (0602) 232604.

**South Notts ARC.** Highbank Community Centre, Farnborough Road, Clifton Estate, Nottingham, or Fairham Community College, Farnborough Road, Clifton Estate. April 9 - on air - HF & VHF, 16th - talk-in S22/open forum members only, 23rd - talk-in S22/ SNARC sponsored trip to Friedrichshafen by Julian G0LXX. **Ray G7ENK** on (0602) 841940.

## Scotland

**Dundee ARC.** Tuesdays, 7pm. College of Further Education, Graham Street, Dundee. April 20 - QRP - History, Equipment & Tactics by Ty Nicholson G0MLNQ, 27th - construction night. May 4 - lecture by Harry Matthews Museum of Communications, 11th - construction night. **George Millar G4FSB**, 30 Albert Crescent, Newport-on-Tay, Fife DD6 8DT.

**Wigtownshire ARC.** Thursdays, RAE & Morse, chats, etc. Community Education Office, Stranraer Academy, 7.30pm to 10pm. **Ellis Gaston G60HPK** on (0776) 7215 evenings or (0294) 217979 day.

## Somerset

**Taunton & DARC.** 1st & 3rd Fridays, 7.30pm. The Basement, County Hall, The Crescent, Taunton. Other Fridays informally for station operation, Morse code class, natter. April 16 - Operating In Ascension Island by John Hanson. **Mr Lindsay-Smith G3WNI** on (0823) 680778.

**Yeovil ARC.** Thursdays. Red Cross HQ, Grove Avenue, Yeovil, Somerset. April 8 - Adjudication of constructors contest, 15th - Video - Melbourne Radio Club 1992, 22nd - AGM, 29th - committee meeting & natter night. **Cedric White G4JBL** on (0258) 73845.

## South Glamorgan

**Barry ARS.** Alternate Thursdays. Old College Inn. April 22 - Video by Dave GWOJGJ about Rhooe Airport. **Ann MacKay G7W0QT, QTHR.**

## South Yorkshire

**Barnsley & DARC.** Mondays. Radio club room & shack, at the rear of the Darton Hotel, Station Road, Darton, Barnsley. April 19 - Questions & Answers on RSGB matters by G4EJP & G4JKW, 26th - New Format Morse Test by Malcolm G4IHZ, 10 May - talk,

details to be arranged. **J. Caledon-Scott (0226) 230448.**

**Devonshire Arms ARC.** Mondays. Devonshire Arms Public House, Herries Road, Sheffield. May 11 - Visit to Doncaster Dome for Ice Skating & Swimming, 18th - Ten Pen Bowling at the Super Bowl on Halifax Road. **David G0JJR** on (0742) 446282.

**Mexborough & DARS** Fridays, 7.00pm. Harrop Hall, Dolciffe Road, Mexborough, South Yorkshire. **Tom Sheppard G0KSK** on (0709) 586329.

**Sheffield ARC.** Mondays, 7.30pm. Firth Park Pavilion, Firth Park Road, Sheffield. April 12 - Bank Holiday drop-in, 19th - QRP by Rev G. Dobbs, 26th - Quiz (round 3), May 3 - Bank Holiday drop-in, 10th - Quiz (round 4). (0742) 446282.

## Suffolk

**Felixstowe & DARS.** April 26 - on the air night, May 10 - Repeaters by Clive Garnham G6MCG. **Paul Whiting G4YQC** on (0394) 273507.

**Leiston ARC.** May 4 - The Use of Test Equipment Around The Shack - a hands on talk by Alan Melia G3NYX. **David Ferguson G6FS**, 3 Aldeburgh Road, Leiston, Suffolk IP16 4JY.

**Sudbury & DARC.** 1st Tuesdays, 8pm. Five Bells Inn, Great Cornard, Sudbury, Suffolk. May 4 - natter & noggin night with raffle. **Colin Muddimer G0PAO** on (0787) 77004.

## Surrey

**Coulsdon ATS.** 2nd Mondays, 7.45pm. St. Swithun's Church Hall, Grovelands Road, Purley, Surrey. April 12 - Visit to Brooklands Motor/Aircraft museum, May 10 - Surplus Equipment Sale. **Andy Briers G0KZT** on (0737) 557198.

**Horsham ARC.** Guide Hall, Denne Road, Horsham, West Sussex, 8pm. May 6 - Electronic Components by Tony G3NPF. **Peter Stevens G8SUI** on (0737) 842150.

**Surrey RCC.** 'Terra Nova' The Waldrons, Waddon, Croyden, Surrey. May 3 - construction contest. **Berni G8TB** on 081-660 7517.

**Sutton & Cheam RS.** 3rd Thursdays, 7.30pm. Sutton United Football Club, The Borough Sports Ground, Gander Green Lane, Sutton, Surrey. Natter nights - 1st Thursdays. April 15 - Junk Sale, May 4 - Visit to Didcot Power Station, Oxfordshire. **John Puttock G0BWV**, 53 Alexandra Avenue, Sutton SM1 2PA.

**The Kingston & DARS.** 3rd Wednesdays, 8pm. Alfriston, 3 Berrylands Road, Surrey KT5 8RB. April 21 - Secret Listeners by Brian Cannon G8DIU. **Ray Fuller** on 081-398 1128.

**Wimbledon & DARS.** 2nd & last Fridays. St. Andrews Church Hall, Herbert Road, Wimbledon SW19. April 30 - I Followed Rommel by Joan Nicholls. **Chris Frost G0KEB** on 081-397 0427.

## Warwickshire

**Stratford-Upon-Avon & DRS.** 2nd & 4th Mondays, 7.30pm. Home Guard Club, Main Road, Tiddington, Stratford-Upon-Avon, Warwickshire. May 10 - Preparing for the 144MHz DF Foxhunt. **Alan Beasley G0CXJ** on (0608) 82495.

## West Glamorgan

**Barr Beacon RC.** 1st Mondays & 3rd Wednesdays, 7.30pm. 112 Walsall Road, Aldridge, West Midlands. **C. J. Baker G0NOL** on (0922) 36162.

**Solihull ARS.** 3rd Thursdays. The Shirley Centre, 274 Stratford Road, Shirley, Solihull, West Midlands. Ivor Mantell G4NRY. April 15 - Circuits I Have Used by Peter Jones G4EQV. (0827) 53344 daytime.

**West Bromwich Central Radio Club.** Sundays 7.30pm, The Sandwell Public House, High Street, West Bromwich. **Ian Leitch G0PAI** on 021-561 2884.

## West Yorkshire

**Denby Dale & DARS.** Pie Hall, Denby Dale, nr. Huddersfield, 8pm. April 21 - American Adventure by Tony G0DDB, May 5 - Clocks by David J Poole. **Ivan Lee, Clayton Lodge, Sunnyside, Edgerton, Huddersfield HD3 3AD.**

**Halifax & DARS.** 1st & 3rd Tuesdays, 7.30pm. April 20 - Search & Rescue Dogs by Neville Sharp BEM. **David Moss G0DLM** on (0422) 202306.

**Keighley ARS.** The Ingrow Cricket Club, Ingrow, Keighley, 8pm April 8 - Junk Sale. April 8 - Junk Sale, 15th - night on the air, 22nd - natter night, 29th - QRP Construction Build It Yourself by Rev. G Dobbs, May 6 - natter night, 13th - Horse Racing at the Cricket Club/natter night. **Kathy Conlon G0RLO** on (0274) 496222.

**Wakefield & DRS.** Tuesdays, 8pm. First Floor Rooms, Ossett Community Centre, Prospect Road, Ossett. April 13 - Computers In Amateur Radio by Bob Firth G3WVF, 20th - AGM, 27th - on the air night. **Dave Ackrill G0DJA** on (0924) 240577.

## Wiltshire

**Trowbridge & DARC.** 1st & 3rd Wednesdays, 8pm. Southwick Village Hall, 8pm. April 21 - natter night, May 5 - Data Mode Symposium. **Ian G0GRI** on (0225) 864698.

News  
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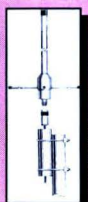
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Richard Newton GORSN has been upwardly mobile recently. He's had the chance to try a neat 144/430MHz dual-band mobile transceiver from the Yaesu stables.

The standard-size microphone clearly illustrates the small size of the Yaesu FT-5100.



Transceiver inobtrusive

My wife, Diane, is not a radio fan by any

Of course, I wasn't going to say no when the Editor asked me to try the Yaesu FT-5100. In actual fact, I really couldn't wait to get started!

When I unpacked the rig, I found that the FT-5100 comes with a mobile mounting bracket, fist microphone, power lead and operator's manual. Yaesu also supply a quick reference guide and schematic diagrams.

The first thing that struck me when I looked at the FT-5100 was its size. The transceiver is approximately 140mm wide, 155mm deep and 40mm high, in other words, it's small! These approximate measurements include protruding parts, such as knobs and heat sink.

stretch of the imagination. However, she found the FT-5100 transceiver inobtrusive and pleasant in appearance. This was a very important test, as we share the same car!

All the controls are on the front panel of the radio. I mention this obvious fact, because I'm sure that some of you will have experienced mobile radios where controls are situated on the side, on the top or even on the underside.

Mobile equipment with controls on the side can be most inconvenient and tiresome. But this is not the case with the Yaesu FT-5100.

I found the controls to be well labelled and set out in a logical and sensible order. All the controls are push button, except squelch, volume and balance.

The controls respond well and are very positive to the touch. The easy to read display is a black l.c.d. type on a yellow background.

### Many Features

The FT-5100 has many features and functions. To list them all would not be practical. Instead I'll mention some of the functions I found to be useful.

The radio comes with DTMF capability. This can be used to allow only a signal with a matching DTMF code to break the squelch. It also allows the radio to be used as a pager.

Another feature supplied with the FT-5100 is CTCSS. It is however, only supplied with a tone encoder and not the decoder, this being an optional extra.

Practically speaking, this means that you are able to access repeaters that use CTCSS tones. But you won't be able to use the feature to open and close squelch. This can only be done after fitting the decoder accessory.

### Variable Tuning Steps

The FT-5100 offers variable tuning steps, 5, 10, 12.5, 15, 20, 25 or 50kHz steps that may be chosen. It's also possible to tune in one MHz steps.

There are four banks of 23 memories, two banks to each band. Each band also has one call frequency, which can be retrieved at the touch of a single button.

The memories are easy to set. They can be set to

include all relevant details, such as DTMF tones, repeater shifts, and the like.

Additionally, both the v.f.o. and memories can be scanned. Upper and lower limits can be set for the v.f.o. scan, this is particularly useful on the wide 430MHz band.

When scanning you can set the FT-5100 to either remain on a busy channel until the signal has gone, or to pause for five seconds and then continue.

When monitoring both bands, I found the balance control very useful. This allows the received audio to be controlled or mixed from one band to the other.

An extension of the balance control is the mute function. This is in some ways even better. It allows you to monitor both bands at the same volume level, if signals are received on one band at a time.

If however, both bands are busy, then the band set to mute will have a greatly reduced audio output. This helps to stop feed-back, and in my case - confusion!

Another, very useful facility, is the ability to listen on either two v.h.f. channels or two u.h.f. channels at the same time. This means you can monitor the mobile calling channel (for example) while you're working someone on another channel.

The FT-5100 is a radio that you can turn on and enjoy straight away. You will, however, be finding new functions for weeks afterwards!

I was pleased that the FT-5100 comes with an easy reference sheet for functions. This was because I found the operating manual, although comprehensive, to be rather confusing and hard going.

### Automatic Shift Feature

With the FT-5100, there's an automatic repeater shift feature on the 144MHz band. This is an important safety feature.

The automatic shift means you don't have to fumble around looking for the off-set button when you're mobile. As soon as you chose a v.h.f. repeater frequency, the radio selects -600kHz shift.

Mentioning the automatic shift, brings me to an observation, rather than a criticism of the FT-5100. I wondered why some sort of VOX facility, or latched press-to-talk switch is not supplied with mobile radios?

It's the same with other mobile rigs. Usually you have to purchase a headset or similar device to add to the radio, to enjoy hands-free operation. And, don't forget that this is a requirement which is law in the UK.

### Wonderful Radio

The wonderful little radio will fit in most cars I'm sure. If you use the ingenious quick release mobile bracket, you can keep it safe all the time.

The transceiver has two fly leads at the rear. One is the power lead, which has a quick release plug and the other is a coaxial cable, terminating in an 'N' type connector.

### Transceiver Performance

The time had come to see what the transceiver performance was like. So, one sunny but cold day in February, Diane and I decided to go to the Purbeck Hills which are local to us.

We decided on a site near to Wareham in Dorset, about 300 metres above sea level. It was a fabulous v.h.f./u.h.f. take-off, and the views aren't bad either!

The antenna I took, was a Maldol VM727E. This is a dual band antenna giving triple 5λ/8 on 430MHz and 3λ/4 on 144MHz. This was mounted on a magnetic mount on the roof of the car.

The FT-5100 delivers 50W on high power on 144MHz



and 35W high power on 430MHz. To assist cooling, the radio has its own small automatic fan attached to the heat sink. Both bands have low power settings of 5W.

## Immediate Sarcasm

Out went the CQ call on 144MHz, and the only immediate reply was sarcasm from the passenger seat! However, while I was trying to defend our hobby, I got a reply.

Ashley G0RCO from St Austell in Cornwall replied to my call, we found a free frequency and started to chat. We were then joined by Pat G3WLK in Poole, and Steve at a club station G7MUD in Christchurch Dorset.

We were then joined by Barry G0RUM in Watford, Keith GU0RAG in St Peter Port, Guernsey and Chris FC1RZN just East of Cherbourg. I ended up speaking to Chris on 430MHz using low power!

I had timed it just right, as there were lift conditions on both bands at the time. Added to this, I was in an excellent location.

The conditions and location however, should not detract praise from what I found to be an extremely sensitive little radio. The FT-5100 earned very good reports from all stations contacted, especially on the transmitted audio.

Even Diane remarked on the clarity of the received audio. As if that was not praise enough, I thought the audio was excellent too.

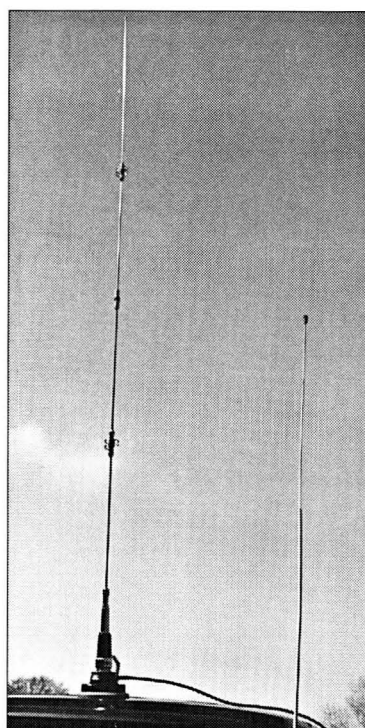
During some of the contacts the fan cut in. I'm pleased to report that the fan didn't interfere with the receive or transmit side of the radio at all. It was very quiet and most effective.

## Compact And Solid

To conclude, I must say that I think the FT-5100 is a compact and solid transceiver. The rig is easy to use, but offers some quite advanced features. It was a pleasure to operate.

My thanks for the loan of the review transceiver go South Midlands Communications at SMC House, School Close, Chandlers Ford Industrial Estate, Eastleigh, Hampshire SO5 3BY. Tel: (0703) 255111.

The Yaesu FT-5100 is generally available at a price of just under £650 as we go to press. (Due to the fluctuating £, it's advisable to check current prices before ordering).



**Fig. 1: The Maldol VM727E dual band antenna used by G0RSN during the review of the Yaesu FT-5100.**

# Review

**I must also pay tribute to the dual-band 144/430MHz mobile antenna used in the review. It was, as briefly mentioned the Maldol VM727E antenna, loaned for the tests by Lowe Electronic's Bournemouth shop. I'm grateful for the help from Lowes, and the antenna costs £47.95 inc. VAT and is available from all Lowe's branches (plus £3 p&p for mail order).**

## Manufacturer's Specifications

### General

Frequency coverage	144-146 and UK 430MHz Bands (Others available)
Channels steps	5, 10, 12.5, 15, 20, 25, and 50kHz
Frequency stability	< ±5ppm from -5 to +50°C
Mode	F3 (f.m.)
Antenna	50Ω un-balanced
Supply voltage	13.8V d.c.± 15%, negative ground
Current consumption	600mA receive
Transmit (high power)	11.5A 144MHz
Transmit (low power)	4A 144MHz
Transmit (high power)	9A 430MHz
Transmit (low power)	3.3A 430MHz
Operating temp. range	-20 to +60°C
Dimensions	140 x 40 x 155mm
Weight	1kg

### Receiver

Circuit type	Double conversion superhet
Intermediate freqs (144MHz)	17.7MHz and 455kHz
Intermediate freqs (430MHz)	21.7MHz and 455kHz
Sensitivity	<0.158µV for (for 12dB SINAD)
Selectivity	12/24kHz (-6/60dB)
Image rejection	Better than 65dB
Squelch sensitivity	at least 0.1µV
Max. a.f. output	3W into 4Ω @ 5% THD

### Transmitter

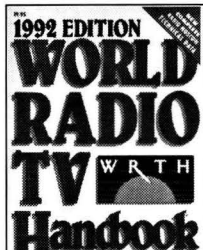
Output power	50/5W 144MHz
Output power	35/5W 432MHz
Modulation type	Variable reactance
Max. deviation	±5kHz
Spurious radiation	better than -60dB
Microphone impedance	600Ω to 10kΩ



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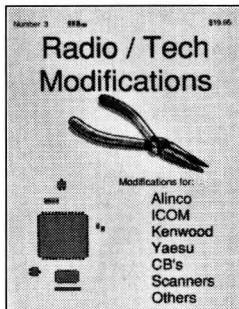


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# 1993 London Amateur Radio & Computer Show Report

I look forward to the Picketts Lock show, it's the first big show of the year and it provides the chance to meet old friends, make new ones and to see what's new. In fact, there's no doubt about it, the Picketts Lock event is fast becoming 'the' show of the south.

When I arrived for the 1993 two-day event, I was rather worried that the building work for the cinemas next door would take away car parking facilities. But there's nothing to worry about, as I now understand that the car parking will be increased even more for next year!

So, let's get on and take a whirlwind tour of the show itself. There was a great deal on offer, and if you missed it, do try to come next year!

## Trade Stands

The many trade stands were packed with good buys and some bargains, and it was interesting to note that prices (considering the precarious £) weren't too bad. There were some interesting new products on offer too.



**Sporty-looking Sandie Hunt (wife of Art Editor Steve) was so busy on the PW stand she ended up with blistered feet!**

The two stars of the show in the h.f. market were the newly-introduced Icom IC-737 h.f. transceiver, and the amazing Kenwood TS-50S 100W mini-mobile



**The balloon went up at the Icom UK stand, as Dennis Goodwin (centre) proved**



*Although it's officially called the London Amateur Radio & Computer Show, to most of us this popular event is known as the 'Picketts Lock Show'. Rob Mannion G3XFD had the opportunity to see most of the stands, meet readers and see what was new at Picketts Lock 1993 and now presents the PW show report.*

*All photographs courtesy of Mike Richards.*

rig. I'm pleased to report that *PW* was lucky in getting an IC-737 before the show, and it's reviewed in this issue.

The fascinating little Kenwood h.f. mobile rig finally made its appearance at the show, and what an amazing package it turned out to be. I had already heard one on the air from the USA, but I wasn't prepared for it being so small! Our regular contributor, the Rev. George Dobbs G3RJV has a TS-50S, and we hope to publish the review very soon....watch this space!

The AKD stand, now well known for their 50, 70 and 144MHz f.m. transceivers was attracting a lot of attention. Although they're not releasing full details, it seems a new rig is on the way. Rumour has it that the new AKD product operates below 30MHz. Again, I say watch this space!

## Interesting Display

Martin Lynch had the interesting muTek front end boards for the Yaesu FT-736R on display. The claimed improvements the boards make to the original transceiver were creating a lot of interest, judging by the crowds on the 'Lynch' mob stand.

For mobile enthusiasts, I spotted another interesting and unusual product on the Tennamast stand. Norrie Brown GM4VHZ from Tennamast, has introduced a substantial magnetic h.f. mobile antenna mounting.

If you buy yourself one of the Kenwood mobile rigs, give Norrie a call, or Rose his XYL, who is appropriately GMONHH (Norrie's Home Help!). The mount could prove useful to you.

## Visitors From Abroad

I saw, and met many visitors from abroad at the show. I was pleased to meet many of our readers from the Netherlands, Belgium, Luxembourg, Sweden and Ireland. They certainly enjoyed themselves.

One or two of our foreign visitors suggested (as the Stanstead Airport Express trains pass by just across the road) that Ponders End station could be opened for the show weekend. So, how about it show organisers and British Rail? Ponders End station is within walking distance of the Picketts Lock Centre.

## Busy Show

The show was extremely busy on the Saturday, and I had a queue of readers waiting to talk to me. Sorry about that! It's nice to talk to you all, but I don't like to keep you waiting. One reader even suggested I give tickets out like they do at the Tesco delicatessen!

Quite frankly, you really needed two days to see everything on offer. Despite this I managed to visit the 'specialist gallery' to meet RAOTA, the immaculately turned out Air Training Corp lads, and other friends.

The computer side of the hobby was very well represented. There seemed to be large crowds around every

stand selling computer add-ons.

I'm afraid, that due to its popularity, the hall containing the 'Bring & Buy' became very crowded. However, it was worth the wait to get in, because there were some real bargains to be found. As well as buying a Heathkit general coverage receiver for one of my school radio club members, I was able to savour all the other goodies on offer.

One particularly popular stand was being run by the RAIBC. It was manned by (or so it seemed) by everyone from the RAIBC including Nick Chambers G0IRM's new guide dog 'Clyde'! This stand, as always was well supported and they were doing a good trade.

## Next Year's Show

I'm already looking forward to next year's show. The 1993 event coincided with a beautiful day, and I hope that if we're lucky enough for good weather next time, the ventilation in the building can cope.

Several readers commented on how hot it was inside the centre, and how little fresh air there seemed to



**Phil Jeffery on the Nevada stand wired-up for business.**

be. There was also the continuing problem with toilet facilities being somewhat overloaded. It would be a pity for such an excellent show to be spoilt by details that can be easily dealt with.

So, everyone on the *PW* and *SWM* team are looking forward to seeing **YOU** at next year's event at Picketts Lock. It is, as I've said before, fast becoming the event in the south. See you there in 1994!

**PW**



**A rare quiet moment on the Eastern Communications stands.**



*The noise bridge is a very useful piece of equipment for both the amateur and shortwave listener. The bridge Gordon Baillie-Searle GD4EIP is going to describe is easily made and doesn't require elaborate test equipment for setting up.*

# The Noise Bridge

**T**he bridge I'm describing can be used to determine the optimum antenna matching for both transmitters and receivers. It can be used to correctly match an antenna system without actually transmitting.

The unit may also be used to tune an antenna system for optimum performance with a receiver. So it can benefit both transmitting amateur and short wave listener, helping to get the optimum performance.

Once you have used a noise bridge, you'll find it indispensable. You'll wonder how you managed without one in the past.

This article is not a full construction article, neither is it a theoretical treatise on noise bridges. There have been a number of excellent articles on constructions and calibration published elsewhere. It would be useful to consult one of these other articles, a list of them are shown at the end of this article.

## Circuit Diagrams

The circuit diagrams in this article are for reference to help you to understand the noise bridge more. Although this isn't a construction article, the circuit can be built, and it would work. Some of the advertisers in *PW* make kits available, so check with them.

The circuit used here has been tested, but as this article is on the discussion of the types of noise bridges and their uses, the constructional approach is left for the reader to do themselves.

The noise bridge really consists of two parts. Look at the diagram of **Fig. 1**, this shows the circuit for the noise generator and amplifier and bridge circuitry.

The electronics shown in **Fig. 1**, (to the left of the points labelled A and B) generate the noise. To the right of these two points is the bridge circuit itself.

Low level wide band noise is generated by reverse biasing a Zener diode D1. Resistor R1 adjusts the current for maximum noise production.

The noise produced is boosted by two transistors Tr1 and Tr2, forming a wideband amplifier. The output from this amplifier (at points A and B) then feeds the bridge circuit.

## Differing Numbers

Some circuits have differing numbers of transistors in the amplifier stage instead of the two as shown here. Basically this only affects the power level of noise produced.

The circuit for a noise bridge, in the *ARRL Antenna book*, adds a 1000Hz audio tone into the amplifier. This modulates the noise, making it easier to identify.

Modulated noise is very useful when listening for a minimum signal while tuning. This is because you hear an audio tone, not the simple loud hiss produced normally. When using the noise bridge incorporating the 1000Hz tone, you should set the receiver for a.m. and not s.s.b. demodulation.

There are two basic forms of bridge circuit. The simple form shown in **Fig. 1** is fine when only the resistive portion of the impedance is to be measured.

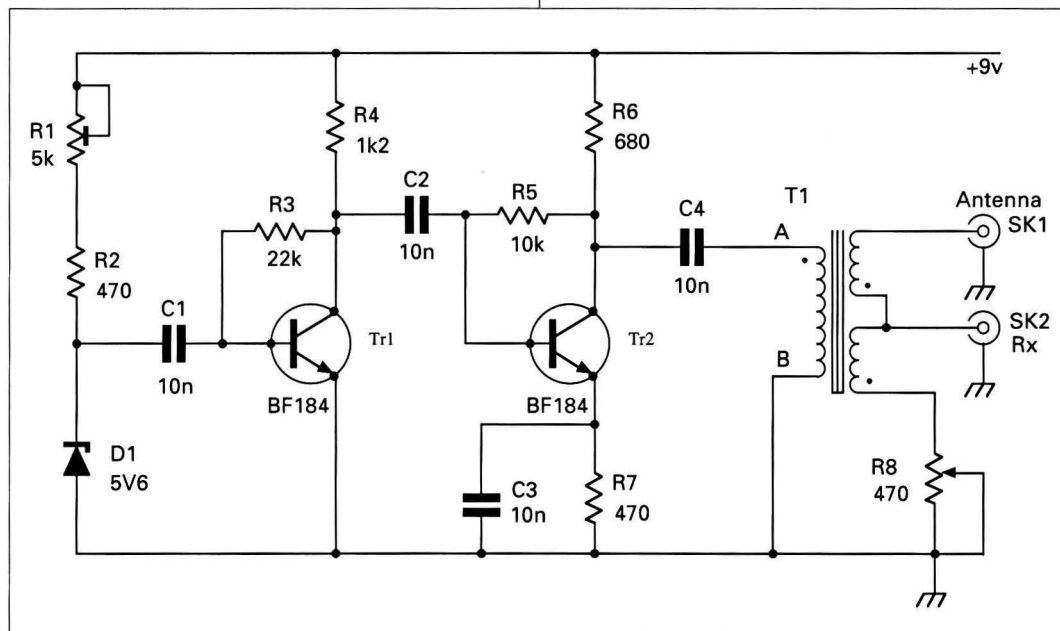
Shown in **Fig. 2** is a bridge circuit which can be used to measure complex impedances. In both methods a trifilar wound toroidal transformer is used.

The three wires that form both primary and both halves of the secondary, are very tightly coupled together. The wires are twisted together before winding them through the toroidal core. This technique improves the useful frequency range of the transformer.

The secondary winding of this transformer forms both halves of a bridge circuit. When the bridge is balanced the value of R8 equals the impedance of the antenna.

The receiver is used only as a detector, so that

**Fig. 1: This is the circuit of a general purpose noise bridge. With careful building it should be useful up to about 200MHz. See Fig. 2 for an alternative bridge circuit.**





you can hear when a null (minimum or no signal) has been reached.

In the diagram of **Fig. 2**, the bridge circuit has been modified to incorporate a variable capacitor C5. This capacitor, in series with the variable resistor R8, allows measurement of reactive components of the impedance.

The notional zero value of this control is set with the variable capacitor C5

approximately half-meshed. A new small capacitor C6, restores balance with a purely resistive load when the capacitor C5 is at this 'zero' setting.

The capacitor dial is calibrated to show capacitive reactance ( $X_c$ ) over one part, and inductive reactance ( $X_L$ ) over the other. When the capacitance of C5 is less than C6 a capacitive reactance is indicated. This will be found very useful using the noise bridge for tuning an antenna system to resonance.

## Tests And Measurements

The noise bridge can be used for a number of tests and measurements. The most usual tests carried out are testing an antenna impedance and resonant frequency.

Other tests require connection of the bridge output to short lengths of feeder line or other circuits. To help connect wires to the bridge for tests, make a short coaxial lead (150mm maximum) with crocodile clips, as shown in **Fig. 3**. This short connection, to the unknown socket of the noise bridge, allows any circuits to be attached to the bridge.

The trifilar toroidal transformer consists of three lengths of wire twisted together, and then wound onto a toroidal core with approximately ten turns. The black dot on the circuit diagrams, indicate the start positions of each winding.

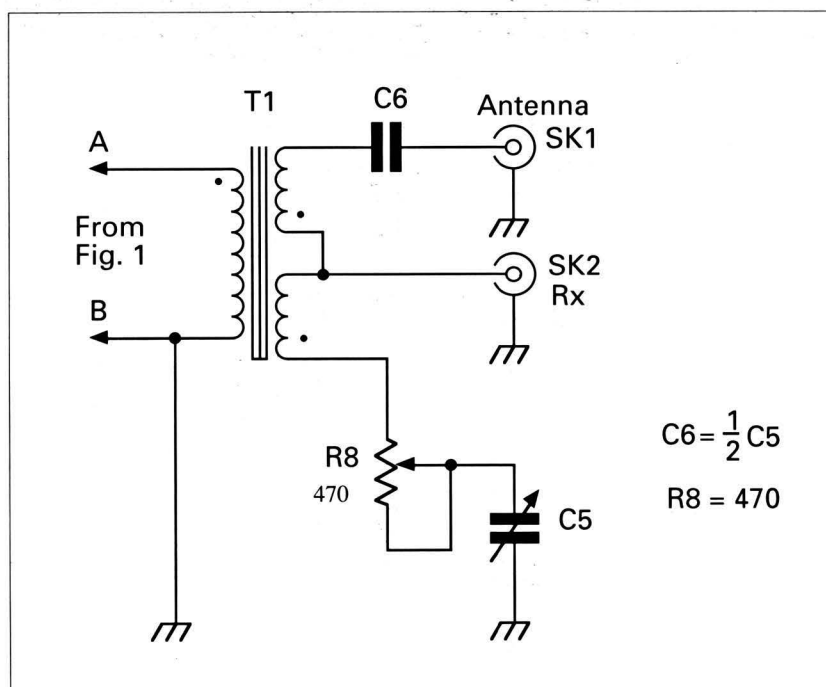
If you are building the bridge, take care to correctly identify the start and finish of each of the windings. It matters little which of the wires is used for primary or secondary winding.

I'm going to describe a number of tests in which the noise bridge can be used. But you'll soon find that after using the noise bridge for some time a number of other applications will become obvious.

## Antenna Tests

The antenna tests that can be carried out, include finding its impedance. To find this value, connect a receiver or transceiver to the receiver socket of the noise bridge. The antenna under test is connected to the socket marked 'antenna' on the noise bridge.

Practical Wireless, May 1993



**Fig. 2:** This is the alternative bridge output circuit. With this variation it's possible to measure inductive or capacitive impedances.

Switch on the noise bridge and the receiver. Tune the receiver to the required frequency that you want to find the antenna impedance. Adjust the resistor R8 control on the noise bridge until minimum noise is heard on the receiver. The impedance is read off the calibrated dial.

If the bridge has a reactance dial (capacitors C5/6 are fitted) then both controls are adjusted for minimum noise. The resultant position on the reactance dial can be useful for trimming the antenna to resonance or for obtaining the actual resonant frequency.

If the reactance shows capacitive, then the antenna is too short, and the resonant frequency is above the test frequency. The antenna can then be modified by adding wire until the reactance is zero.

On the other hand, if the reactance is inductive then the antenna resonant frequency is lower than the test frequency, and the antenna is too long. The antenna can be shortened to bring it to resonance.

## Balun Checks

Balance to unbalance transformers (baluns) may be checked, with the noise bridge, for: input impedance, transformation ratio and frequency response. Connect the noise bridge and receiver as above, connecting the receiver side of the balun to the 'antenna' socket of the bridge.

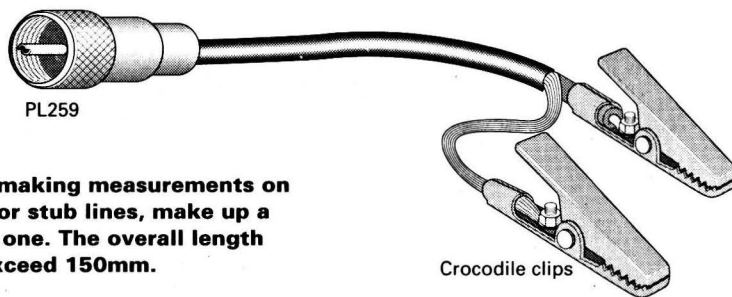
Place a non-inductive resistor (50Ω for a 1:1 balun or a 200Ω for a 4:1 balun) across the balun antenna side terminals. Next switch on the receiver and tune it to the desired frequency. Adjust the noise bridge controls for minimum receiver noise, and you'll be able to ascertain the input impedance when the balun is correctly terminated.

By tuning the receiver and measuring the values again, the various parameters for the balun may be checked over a range of frequencies. Using this technique, baluns can be constructed and tested for various cores and turns ratio, etc.

## Checking Stubs

The noise bridge is also useful for checking the resonance of quarter wave ( $\lambda/4$ ) stubs. The stubs, a





**Fig. 3: When making measurements on components or stub lines, make up a lead like this one. The overall length should not exceed 150mm.**

little longer than calculated, are connected as if it were an antenna system to be checked.

The receiver is set to the resonant frequency required, and the stub shortened little by little, while listening for minimum received noise. By careful trimming very accurately tuned stubs can be obtained.

### Antenna Tuner Setting

The settings, on an antenna tuner, for a given antenna can be found by use of a noise bridge. Connect the a.t.u. to the antenna socket of the noise bridge and the receiver as before. This effectively connects the noise bridge between the a.t.u. and the receiver.

Tune the receiver to the desired frequency and switch on the noise bridge. Set the control on the noise bridge to 50Ω (and 0 reactance if this control is fitted).

Adjust the a.t.u. to obtain minimum noise on the receiver. This setting will then give perfect matching between the antenna system and the set.

Make a table of a.t.u. settings by noting all the a.t.u. control settings at various frequencies. This will allow quick setting of the a.t.u. when changing bands.

In a similar manner an a.t.u. can be checked for correct operation. So when you purchase or construct an a.t.u. you can test it without transmitting. This is very useful for short wave listeners who may not know whether the a.t.u. is working or not.

### Bridge Underrated

The noise bridge is a very underrated piece of test equipment. It is not only useful to licensed radio amateurs but also to short wave listeners.

I hope that this article will rejuvenate interest in the noise bridge. Once you've become confident in its use, you will find more application for it. In my shack it is indispensable, and I am sure after using one you will also find the same.

The bridge described will produce a reasonable amount of noise up to about 200MHz. So it is useful for checking receivers and peaking up tuned circuits from h.f. to v.h.f. For this purpose the output from the noise bridge is taken from the antenna socket and the controls are adjusted to obtain maximum noise and not minimum as before.

PW

### Further Reading

'RF Noise Bridge' by E.A. Rule, *Practical Wireless* January 1982.  
*The ARRL Antenna Handbook.*

Other radio publications have published articles about the noise bridge. If you have difficulty in obtaining any of the articles, I will be happy to oblige if you would like to contact me.

### Shopping List

#### Resistors

Carbon film 5% 0.5W

470Ω	2	R2, 7
680Ω	1	R6
1.2kΩ	1	R4
10kΩ	1	R5
22kΩ	1	R3

Miniature rotary

5kΩ	1	R1
-----	---	----

Rotary

470Ω	1	R8
------	---	----

#### Capacitors

Miniature Ceramic

10nF	4	C1, 2, 3, 4
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#### Semiconductors

BF184	2	Tr1, 2
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#### Miscellaneous

A small metal box and two coaxial sockets, C5 may be a 100-500pF variable capacitor, C6 should have a value about half of the maximum value of C5. Zener diode D1 may be almost any 4.7 to 6.8V Zener diode of almost any power level. The bridge winding is made on an Amidon T50-5 type toroidal core.

Ferromagnetics PO BOX 577, Mold, Clwyd. N. Wales CH7 1AH, can supply the toroidal core. The best one is the Amidon T50 -5, but almost any T50 sized core could be used with some change in the noise bandwidth.





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# Radio Diary

\* Practical Wireless & Short Wave  
Magazine in attendance.

**April 18:** Marske-by-the-Sea Radio Rally will be held in the Marske Leisure Centre, High Street, Marske-by-the-Sea, near Saltburn, Cleveland. Doors open 11am. Usual traders, Bring & Buy & refreshments. Talk-in S22. **Mic G7ION on (0287) 610030.**

**April 18:** Cambridgeshire Repeater Group have their Amateur Radio Rally at Philips Telecom PMR - Catering Centre, St. Andrews Road, Chesterton, Cambridge. Trade stands, Bring & Buy, Auction, hot food & drinks. Doors open 10.30am. **Mike G6CQ on (0223) 358985 Ext. 3310.**

**April 26:** The Bury (Lancashire) RS will be holding another Hamfeast/Rally at the Leisure Centre, Bolton Street, Bury. **Laurence G4KLT on 061-762 9308.**

**May 3:** Dartmoor Radio Club Rally will be held at Yelverton War Memorial Village Hall, Meavy Lane, Yelverton, Devon. Doors open 10.30am. Talk-in S22. **Ron G7LLG on (0822) 852586.**

**May 9:** The 9th Yeovil QRP Convention will be held at the Preston Centre, Monks Dale, Yeovil, Somerset. Featuring lectures, displays of home-made QRP equipment & vintage radio, on-air QRP stations & trade stands. Refreshments, doors open 9am, admission £1.50, talk-in S22. This convention is not a rally, but a convention for amateurs not only to attend interesting lectures about the technology & practice of low power communication, but also to meet other QRPers. There will also be the usual friendly QRP Contest on 3.5 & 7MHz, during the evenings of the previous week. This event is known as the QRP 'Funrun'. **Peter Burridge G3CQR on (0935) 813054.**

**May 16:** The RSGB Show at the NEC Birmingham. See this month's Newsdesk for more details.

**May 16:** The 2nd National Vintage Communications Fair will be held at the NEC, Birmingham. Doors open 10.30am to 5pm. Hundreds of items for sale, including vintage radios, telephones, gramophones, jukeboxes, radiograms, etc. Admission will be £3. **Jonathan Hill on (0398) 331532.**

**May 16:** The Parkanaur Rally will be held at the Silverwood Hotel, Lurgan, Co. Armagh. Doors open 12 noon. Admission £1. Plenty of parking. Usual traders. Refreshments available. Talk-in S22. All proceeds of this rally will go to the Stanley Eakins Memorial Fund, a very worthy charity. **W. A. Hutchman, 35 Carlingford Park, Newry, Co. Down, N. Ireland BT34 2NY.**

**May 30:** Maidstone YMCA Radio Rally will be held at YMCA Sports centre, Melrose

Close, Maidstone, Kent ME15 6BD. Doors open 10.30am (10am for disabled). Entry is £1 per adult. Exhibition station GX3TRF (on h.f.). All-day video show for juniors. Refreshments & snacks available. Bring & Buy tables for hire. **Brenda Puncher G0LJK on (0622) 850277.**

**May 30:** The 17th Annual East Suffolk Wireless Revival will be held at the Maidenhall Sports Centre, Ipswich, Suffolk. Bring & Buy, car boot sale, vintage radio display & RAIBC, BYLARA, scout radio, RAYNET stands, etc. Non-radio stalls & children's play area. Refreshments & bar. Admission £1, which includes car parking. Talk-in on S22 (GB4SWR). Send s.a.e. for free maps. **Bob Baal G7HZV, 14 Gainsborough Road, Felixstowe, Suffolk IP11 7HS.**

**May 30:** Plymouth Radio Club Rally will be held at Plymstock School, Church Road, Plymstock. Traders stalls, Bring & Buy, refreshments, talk-in S22, parking facilities. Doors open 10.30am. **Derek Foster G7ESZ QTHR.**

**June 6:** Spalding & DARS are holding their Jubilee Mobile Rally at Springfields Gardens, Spalding. **Mr T. Kettlewell G4TWR on (0775) 722940.**

**June 20:** Denby Dale & DARS Annual Mobile Rally will be held at Shelley High School. Doors open 11am (10.30am for disabled visitors). Ample parking, traders, car boot sale, food. Talk-in S22 & SU22. **Philip G4FSQ on (0484) 644827.**

**\*July 10:** The Cornish Rally will be held at Penair School, Truro. **Barrie Thomas G0NNR on (0872) 862046.**

**July 11:** Galway Experimenters Club will be holding its 3rd Annual Rally in the Convent of Mercy in Galway City. **John Walsh E16BHB on 010 353 93 24913.**

**July 25:** Colchester Radio & Computer Rally (including Car Boot Sale), will be held at St. Helena School, Sheepen Road, Colchester. **Frank G3FIJ on (0206) 851189.**

**\*July 25:** Scarborough ARS will be holding their Radio Electronics & Computer Rally at the Spa, South Foreshore, Scarborough. Doors open 11am. Many traders, Bring & Buy, refreshments & bar. **Ross Neilson G4NZZ on (0723) 514767.**

**July 25:** Norfolk Amateur Radio Club & Hewett School Radio & Electronics Group will be holding their Rally at the Hewett School, Hall Road, Norwich. Doors open 10am. Admission £1 adults, OAPs/disabled/children 50p. Free parking. Trade stands, Bring & Buy, displays. **Sheila G0KWP on (0603) 618810.**

*If you're travelling long distances to rallies, it could be worth 'phoning the contact number before setting off, to check all is well.*

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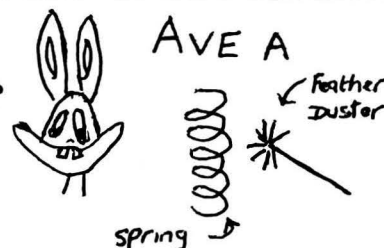


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W5. Tel: 081 566 1120

### MERSEYSIDE

Amateur Radio Communications,  
38 Bridge Street, Newton le Willows.  
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In the second part of the simple QSOs in French by Gareth Roberts GW4JXN, the user should remember that the basic guide to speaking French provided by the series, will not necessarily be as a native-speaking French person would say it. Having said that, we hope you enjoy your QSOs better, and enjoy the challenge and pleasure speaking a foreign language can provide.

# Basic QSOs In French

English	French	Technical	Pronunciation
<p>I have a new rig/linear/antenna which I am testing.</p> <p>Is my modulation Ok? Your modulation is good/bad.</p> <p>What is my exact frequency?</p> <p>I'm using a speech compressor.</p> <p>Does this make any difference?</p> <p>Thank you for the test.</p>	<p>Je suis en train de tester mon nouvel équipement/amplificateur linéaire/ma nouvelle antenne.</p> <p>Est-ce que ma modulation est bonne? Votre modulation est bonne/mauvaise.</p> <p>Quelle est ma fréquence exacte?</p> <p>Je me sers d'un speech compresseur.</p> <p>Est-ce que cela change quelque chose?</p> <p>Merci d'avoir fait ce test.</p>		<p>Zhe swi on trang de testay mon noovel ekimpomg/amplifateur linayayr/ma noovell anten.</p> <p>Es se ke ma modulasion ay bon? Votr modulasion ay bon/movayz.</p> <p>Kel ay ma fraykins ecsact?</p> <p>Zhe me ser dung speech compresseur.</p> <p>Es se ke sela shon kel ke shoz?</p> <p>Maresee dawwahr fay se test.</p>
	<b>Social</b>		
<p>From the shack I can see mountains/sea/moors.</p> <p>I have a friend/wife/children in the shack with me.</p> <p>He is a visitor/ a short wave listener.</p> <p>She is a visitor.</p> <p>He intends to sit his radio exam.</p> <p>I am at home/at work/at a friend's house.</p> <p>This is a demonstration/special station.</p> <p>I have visited your country.</p> <p>I hope to visit your country.</p> <p>We had a nice time.</p> <p>Excuse my French.</p> <p>I wish I could speak your language as well as you speak mine.</p> <p>Can we continue in English?</p> <p>May I say it in English?</p> <p>May I explain it in English?</p>	<p>De ma cabine de transmission je vois des montagnes/la mer/des collines.</p> <p>J'ai un ami/ma femme/mes enfants dans ma cabine avec moi.</p> <p>C'est un visiteur/amateur récepteur d'ondes courtes.</p> <p>C'est une visiteuse.</p> <p>Il a l'intention de passer son examen de radio amateur.</p> <p>Je suis chez moi/à mon travail/chez un ami.</p> <p>C'est une station de démonstration/une station spéciale.</p> <p>J'ai visité votre pays.</p> <p>J'espère visiter votre pays un jour.</p> <p>Nous nous sommes bien amusés.</p> <p>Excusez mon français.</p> <p>Je voudrais bien savoir parler votre langue aussi bien que vous parlez la mienne.</p> <p>Pouvons-nous continuer en anglaise?</p> <p>Puis-je le dire en anglais?</p> <p>Puis-je l'expliquer en anglais?</p>		<p>De ma kabin de transmission je vwa day montain/la mer/day colin.</p> <p>Zhay un ami/ma fam/mays onfon don ma kabin aveck mwa.</p> <p>Set un visitor/amateur resepteour dond coort.</p> <p>Set une visiteuse.</p> <p>Il a l'antonsion de pasay son ecsomon de radio amateur.</p> <p>Zhe swi shay mwa/a mon travail/shayz un ami.</p> <p>Set une stasion de demonstasion/une stasion spesial.</p> <p>Zhay visitay votr pay.</p> <p>Zhespair visitay votr pay un zjour.</p> <p>Noo noo somm bian amusay.</p> <p>Ecsusay mon fronsay.</p> <p>Zhe voodray bian sawwar parlay votr long awsi bian ke voo parlay le mien.</p> <p>Poovon noo continuoo-ay on aonglay?</p> <p>Pwi zhe le deer on onglay?</p> <p>Pwi zhe lecsplikay on onglay?</p>
	<b>QSL</b>		
<p>Could you please send me your QSL card?</p> <p>I would be very pleased to get a QSL card from you.</p> <p>I shall send you my QSL card via the bureau/direct.</p> <p>My name is in the American/British call book.</p> <p>Is your name and address in the call book?</p> <p>Can you give me your address and telephone number over the air?</p> <p>What is your postal code/telephone code?</p> <p>This is my address and my telephone number.</p>	<p>Veuillez m'envoyer votre carte QSL</p> <p>Je serais très content de recevoir votre carte QSL.</p> <p>Je vous enverrai ma carte QSL par le bureau/directement.</p> <p>Mon nom est dans le registre d'appel Américain/Britannique.</p> <p>Est-ce que votre nom et votre adresse sont dans le registre d'appel?</p> <p>Pourriez-vous me donner votre adresse et votre numéro de téléphone par radio?</p> <p>Quel est votre numéro de code postal/téléphone</p> <p>Voici mon adresse et mon numéro de téléphone.</p>		<p>Vayay monwva-ay votr cart key es el?</p> <p>Zhe seray tray conton de resevwar votr kart key es el.</p> <p>Zhe voo onveray ma kart key es el par le beoro/directmon.</p> <p>Mon nom ay don le rehistr dappell amayrican/britanik.</p> <p>Es ce ke votr nom ay votr adres son dans le rehistr dappell?</p> <p>Pooray vooome donnay votr adres ay notr numayro de telephone par radio?</p> <p>Kel ay votr noomayro de kod postal/telephone?</p> <p>Vwasi mon adres ay mon noomero de telephone.</p>
	<b>Concluding Remarks</b>		



<p>May I thank you once more for this call? I wish you a very good morning/afternoon/evening/good weekend.</p> <p>Merry Christmas and a Happy New Year. I send you my best regards. All the best to you and yours I look forward to working you again. May I wish you 73, 55, 88 and make this my final?</p> <p>Back to ... from ... who is waiting for any concluding remarks from you. So best wishes and good DX. Goodbye until next time/until the pleasure of seeing you again</p>	<p>Puis-je vous remercier une fois de plus de cet appel? Je vous souhaite une bonne journée/bonne nuit/ un bon weekend.</p> <p>Joyeux Noel et Bonne Année. Je vous envoie mes meilleurs souhaits. Meilleurs souhaits pour vous et les vôtres.</p> <p>Je serai content de vous contacter de nouveau. Puis-je vous souhaiter soixante-treize, cinquante-cinq, quatre-vingt-huit et j'en ferai ma transmission finale. Je passe le micro à ... de ... qui attend vos éventuels commentaires finaux. Meilleurs vœux donc et bon DX. A revoir à la prochaine/au plaisir de vous revoir.</p>	<p>Pwi zhe voo remaysay un fwa de plu de set appell? Zhe voo soo-ate un bon zhornay/bon nwi/un bon weekend.</p> <p>Zhoyoe noel et bon anay. Zhe voo onwva may mayor soohay. Mayor soohaypoor voos ay lay votr.</p> <p>Zhe seray conton de voo kontakstay be noovoh. Pwi zhe voo soohaytay swasont trayz, sankont sank, katrvan wheat ay zhon feray ma transmission feenal. Zhe pass le micro a ... de ... ki aton voh ayvontoo-el com-ontair finoh. Mayor voe donk ay bon day ics. Ohrevwar a la proshane/oh palyzir de voo revwar.</p>
<p align="center"><b>Stating Future Intentions</b></p>		
<p>This is ... signing off and clear with ... and now standing by for a call on this frequency. ... now monitoring this frequency and waiting for any call.</p> <p>... now changing frequency, to ... ... now returning to the calling channel. ... now going QRT.</p>	<p>Ici ... qui signe avec ... et qui est prêt à recevoir un appel sur cette fréquence. ... qui écoute maintenant cette fréquence et qui contrôle un appel. ... qui change maintenant de fréquence à ... ... qui revient à la chaîne d'appel. ... qui devient QRT/cesse transmission/quitte l'écoute.</p>	<p>Isi ... ki seen aveck ... ay ki pret a resevwar un appell sir set fraykons. ... ki acoot mannon set fraykons ay ki kontrol un appell.</p> <p>... ki shonzhe mannon de fraykons a ... ... ki reviang a la shane dappell. ... ki devian key er tay/ses transmission/keet latcoot.</p>
<p align="center"><b>For those who have some French already here is a list of the most common radio technical words and phrases. The pronunciation is not given here.</b></p>		
<p>amplifier - l'amplificateur power supply - la source de courant transmitter - l'émetteur transceiver - le récepteur-émetteur rig - l'équipement receiver - le récepteur operator - l'opérateur/opératrice antenna - l'antenne</p> <p>vertical antenna - une antenne verticale vertical rod - une tige verticale rotating antenna - une antenne rotative frequency modulation - la modulation de fréquence amplitude modulation - la modulation d'amplitude sideband - la bande latérale upper sideband - la bande latérale supérieure lower sideband - la bande latérale inférieure wavelength - la longueur d'onde calibrator - l'appareil d'étalonnage cross modulation - la transmodulation metal case - le carter métallique dial - le cadran jack - douille de jack plug - la prise dummy load - charge factice parasitics - les modulations parasites ground wave - une onde de sol sky wave - une onde ionosphérique</p>	<p>a meter - un compteur a digital frequency meter - un compteur à fréquence digitale continuous wave - ondes entretenues (f) modulated wave - ondes modulées pulse modulation - ondes modulées par impulsions lightning protection - la protection contre la foudre feeder - la ligne de connection coaxial cable - un câble coaxial shielded braiding - le tressage blindé omnidirectional antenna - une antenne omnidirectionnelle directional antenna - une antenne directionnelle antenna tuning unit - un transformateur d'antenne indoor antenna - une antenne d'intérieur sound frequency - la fréquence de tonalité carrier frequency - la fréquence porteuse absorption wavemeter - un compteur d'ondes d'absorption log book - le carnet d'écoute disturbance - le perturbation deviation - la déviation fading - la chute d'intensité condensor - le condensateur variable - variable fixed - fixé preset - réglé transistor - le transistor the range - la portée rotator - un rotateur</p>	<p>antenna matching - l'adaptation d'antenne single sideband - une émission à bande latérale unique to radiate - rayonner to tune up - régler RF amplifier - l'amplificateur de haute fréquence skip zone - la zone de silence troposphere - la troposphère final stage - l'étage final (m) switch - le commutateur standing wave - l'onde stationnaire (f) speech processor - compresseur de tonalité aurora - l'aurora auroral - auroral low pass filter - filtre passe-bas (f) high pass filter - filtre passe-haut band pass filter - filtre passe-bande (f) earth - terre to earth - relier à la terre line of sight - ligne de visée balun - le dispositif d'équilibrage ionosphere - l'ionosphère repeater - le relais/réémetteur satellite - le satellite coil - la bobine valve - la lampe/le tube insulator - un isolateur</p>



### The French alphabet

Used for stating Q codes and also for stating call signs.

Letter	French Name	Pronunciation
A	ah	ah
B	be	bay
C	ce	say
D	de	day
E	eux	yh
F	effe	ef
G	ge	zhay
H	hache	ash
I	i	ee
J	ji	zhi
K	ca	ka
L	elle	el
M	emme	em
N	enne	en
O	o	oh
P	pe	pay
Q	cu	kay
R	erre	er
S	esse	es
T	te	tay
U	u	i/u
V	ve	vay
W	doubleve	dooblway
X	icse	ics
Y	igrec	eegrec
Z	zède	zed

### French Colonies

Some of the former French colonies which might count as your rarer countries. The feminine adjective in brackets used after e.g. la station.

Country	Adjective
Le Tahiti	tahitien (ne)
Le Gabon	gabonaise (e)
Le Martinique	martiniquais (e)
Le Madagascar	malgache
L'Algérie	algérien (ne)
Le Maroc	marocain (ne)
La Tunisie	tunisien (ne)
L'Indochine	indochinois (e)
La Guyane	guyanais (e)

### Numbers together with their pronunciation

1	un	un
2	deux	dyh
3	trois	trwa
4	quatre	catr
5	cinq	sank
6	six	sease
7	sept	set
8	huit	weat
9	neuf	nough
10	dix	dis
11	onze	onz
12	douze	dooz
13	treize	traiz
14	quatorze	catorz
15	quinze	kanz
16	seize	says
17	dix-sept	dis-set
18	dix-huit	disweat
19	dix-neuf	disnough
20	vingt	vant
21	vingt et un	vany ay un
22	vingt-deux	vant dyh
30	trente	tront
31	trente et un	tront ay un
40	quarante	karont
50	cinquante	sankonte
60	soixante	swasont
70	soixante-dix	swasont dis
80	quatre-vingt	katr van
90	quatre-vingt-dix	katr van dis
100	cent	son
200	deux cent	dyh son
1000	mille	mil
2000	deux mille	dyh mil

### Days of the week

Sunday	dimanche	domonsh
Monday	lundi	lyndy
Tuesday	mardi	mardee
Wednesday	mercredi	mercredee
Thursday	jeudi	jydee
Friday	vendredi	vondreddee
Saturday	samedi	samdee

On Sunday - dimanche

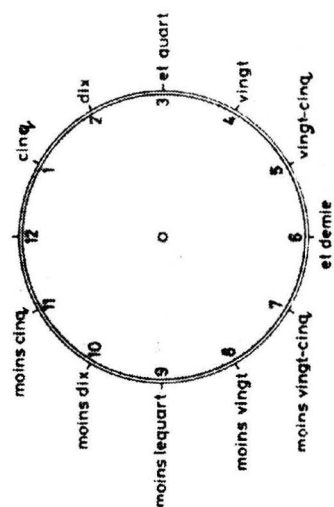
On Sundays - toutes les dimanches

Next Sunday - dimanche prochain

Last Sunday - dimanche dernier

### Time

1 o'clock	il est une heure	il ay une oeur
2 o'clock	il est deux heures	il ay dyh oeur
2.05	il est deux heures cinq	il ay dyh oeur sank
2.55	il est trois heures moins cinq	il ay trwa oeur mwan sank



### Common French Christian names of operators.

It's easier to recognise them in the QRM if you have seen them before.

Bernard	Luc
Charles	Leon
Claude	Marc
Christophe	Max
Daniel	Marcel
David	Mathieu
Etienne	Nicholas
Florent	Pascal
Francois	Pierre
Guillaume	Philippe
Jean	Regis
Jean-Paul	Roger
Jean-Claude etc	Serge



# The Icom IC-737 HF Transceiver

*Rob Mannion G3XFD had the opportunity to try the newly-launched IC-737 transceiver recently. So, after he'd 'taken off' to enjoy the bands for a while, he's now landed with his report!*

Personally, I'm convinced that the major manufacturers deliberately choose names and reference numbers that are already well known to enhance the popularity of their transceivers. For example, to me, the Boeing 737 jet is the work horse of the medium-haul air routes in service with airlines all around the world. So, with its appropriate name, perhaps the Icom IC-737 will end up in the same popular category.

In my job as *PW* Editor, I get the chance to try many new products, and occasionally even suggest ideas myself. However, in the case of the IC-737, the Japanese manufacturers have beaten me to the suggestion and provided just what I needed - an excellent main display.

## Excellent Main Display

In my opinion, by far the best selling point of the IC-737 is going to be its excellent main display. The display itself is black on a dark yellow background. It's large and the comprehensive list of extra annunciators (I'm assured that's the correct term!) provide as good a display as you can find on amateur radio equipment.

In previous reviews I've said that I regard the tuning knob and the display of a transceiver to be of utmost importance. Technical purists may scoff, but when you're paying over £1000 for a transceiver, it won't soften the blow to your purse if you know the rig's performance is better than other models if you're not pleased at the way it handles!

Icom, in my opinion have cracked one or two problems with the IC-737. The best results of their efforts is of course the main display, and the second has got to be how easy it is to 'drive'.

Again, many of our readers will know that I'm not that quick in finding my way through modern equipment manuals. In fact, much equipment (especially from the Far East) still suffers from 'Japanese English' translations. This is not so with the IC-737 step-by-step clearly illustrated manual.

The controls, together with the simple explanations made it possible for me to be on the air within five minutes or so of unpacking the rig. Well done Icom, you're making life easier in this respect!

## Good Looking

I must admit that I consider the IC-737 to be a handsome rig. It's good looking and the controls are well positioned. And, for a left-hander like me, there didn't seem to be any problem in using the controls either.

The transceiver is thoroughly practical and pleasing to use. I've no doubt it will, with certain refinements, become an extremely popular rig for contest working and other occasions where the user-friendly controls and excellent display help. After 24 hours of contest working, the big display and easy-find controls are bound to be helpful!

Finally on the ergonomics side, I must mention the miniature illuminated 'beeping' switch indicators on the IC-737. They're certainly tiny, but they did their job very well and assisted me in operating the rig. Another helpful idea from Icom.

## The Circuits

From what I've heard, the circuits used in the Icom IC-737 are interesting. Unfortunately, I didn't get access to any circuits or even a block diagram, so in this respect I can't comment, other than repeat the specifications.

The IC-737 receiver is of the triple-conversion type, with the first intermediate frequency being a high 69MHz. The second i.f. is the familiar 9MHz and the third is the standard 455kHz. The model I had on review came without the optional c.w. filters.

Along with covering all the h.f. amateur bands the IC-737 is a general coverage receiver. The rig comes complete with a (front panel selected) second antenna socket, enabling the operator to switch antennas (more about this later).

Unusually in my opinion, Icom have dispensed with a variable r.f. gain control and there's no way of controlling i.f. gain. Additionally, the r.f. pre-amplifier is either switched in or out, and the operator can't adjust the gain of this stage from the front panel.

The receiver is fitted with a simple attenuator, which can be controlled from the front panel. The attenuator is not adjustable, and is either 'in' or 'out'.





# Review

## The Transmitter

The transmitter circuits seem to be very straightforward, and the output power is continuously adjustable from 10 to 100W. Again, I didn't have any circuits available and can only comment on my own observations.

Transmissions on 'phone are simple and extremely straightforward, and when viewed on my oscilloscope, they seemed very clean. Measured power outputs seemed to be very close to the maker's specification.

When it comes to operating on c.w., the operator has several choices for transmit-receive switching. To this end, the IC-737 permits either semi-break-in or full break-in (more on this later).

The transceiver is also fitted with an automatic antenna tuner. The manufacturer's claim an automatic tuning time of less than 7 seconds, and 3 seconds during band changing.

## On Air Tests

The acid test of any rig, is of course the on air tests. One of the hardest tests (in my opinion!) for any rig is to be on the air during one of the various h.f. contests. And so it was during one of these contests, that I ended up trying out the IC-737.

During my tests I worked on all the bands, only failing to get QSOs on 10 and 18MHz. But, as is usual for me, I mainly operated on 7 and 14MHz.

The 7MHz band is not only my favourite band (for both c.w. and s.s.b. operation), but I consider it to be an excellent testing ground. Providing your rig is up to it, you can get a QSO at any time of the day or night on 'good old forty'.

On 'phone I received excellent reports on the audio quality from the IC-737. I was also pleased to find that the receiver's selectivity was adequate for s.s.b. operation.

Up on 14MHz, I found that the rig's 100W (flea power compared to what the USA stations were running into beams), got me contact after contact on s.s.b. I also found it to be excellent on 21MHz and up on 28MHz.

On 28MHz during the contest, I found some diabolical

signals originating from Eastern Europe. The transmissions (a form of s.s.b. I think) were spluttering and drifting all over the place, but in most cases I could copy the stations I was working. This says a lot for the front end of the IC-737 and its very high (69MHz) intermediate frequency.

## On The Key

Operating on the key with the IC-737 was an interesting experience. I soon found that the semi break-in was rather noisy, as the relays clattered. Because of this I found myself selecting the full break-in, and I completed many QSOs, finding the facility to be excellent.

I tried out the internal keyer briefly, as I don't seem to be able to get on very well with them nowadays. On my own rig I prefer using the old 'pump handle' type, but I found that the internal keyer on the Icom to be very good. It's a useful facility.

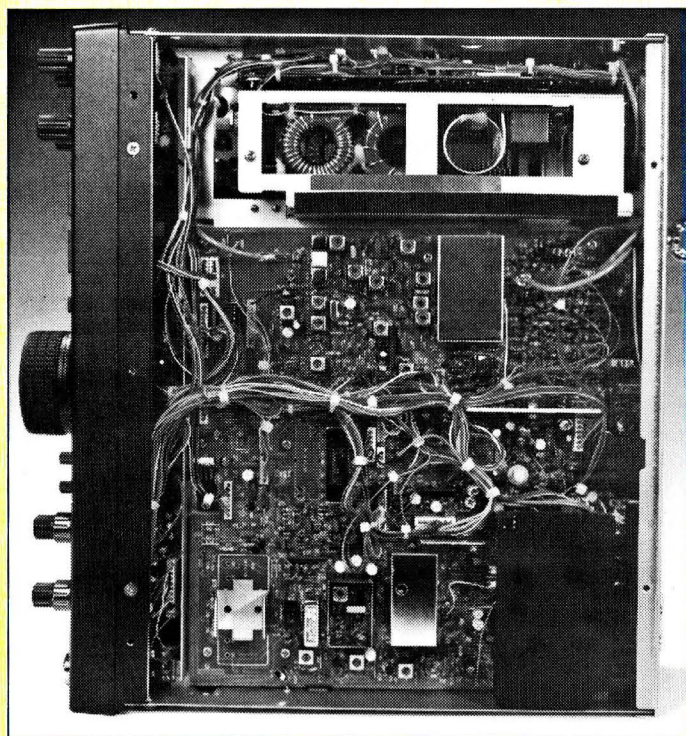
Although receiver selectivity was adequate on s.s.b., I consider that anyone buying this transceiver should go for the c.w. filter option. It will make a good receiver even better.

Incidentally, it's perhaps a good time now to mention that the display tells you when the c.w. filter is selected. Another useful aid on the main display is the 'plus' or 'minus' annunciator. This (very clearly) shows exactly where you are. Helpful if you're like me and often forget you've still got i.r.t. or i.t.t. selected!

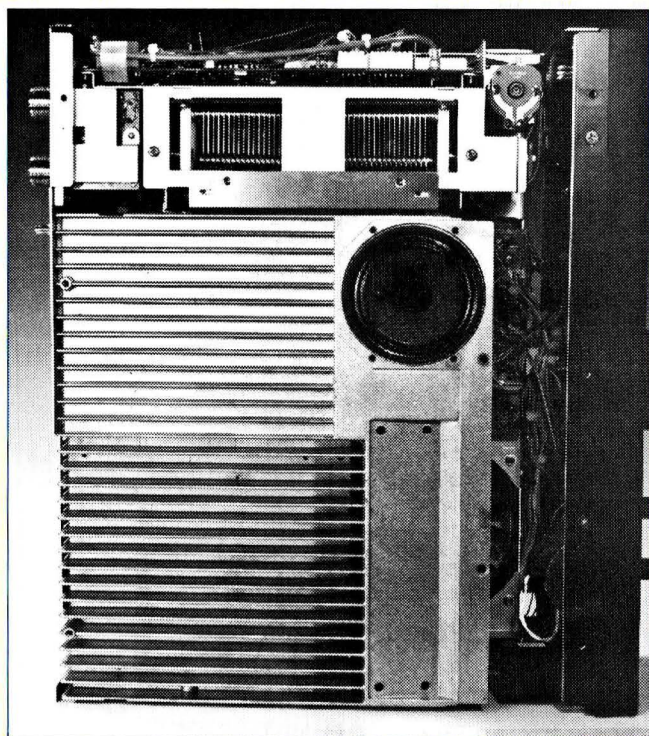
## Antenna Tuning

The automatic antenna tuning on the IC-737 is very good. I found it was quick, but not as quick as the specifications claim. However, and despite this I discovered it was capable of matching into some rather 'difficult' loads.

The a.t.u. even managed to match successfully into a long wire on 7 and 14MHz, and the rig was quite happy. It proved itself to be reliable, and only on a few occasions was I able to achieve a better s.w.r. into my antenna by using my (manual) a.t.u.



An inside view of the IC-737, showing the main p.c.b. and the automatic antenna tuning unit compartment.



The massive heat-sinking in the IC-737, which has a maximum power output of 100W, is clearly seen in the photograph, together with part of the a.t.u. variable capacitor and the two antenna sockets.



## General Coverage

I've got to admit I nearly made a mistake when trying out the general coverage receiving side of the IC-737. At first I thought the receiver was deaf, but it turned out to be G3XFD forgetting his theory!

At first, when listening on the medium waves and below 3MHz, I thought the receiver was not so sensitive as expected. However, I decided to try a long wire, directly connected into the antenna socket.

I was brought to my senses as soon as I disconnected the outer ring cover of the N-type plug. The receiver burst into life and I realised that the external a.t.u. I'd connected for testing, was severely attenuating everything below 3MHz.

My lesson was learned. I enjoyed listening to medium wave DX, and to the many interesting l.f. signals. These included the many aircraft directional finding beacons I could hear. It was fascinating, and I can understand why so many people specifically listen out for them.

On general coverage the receiver was very sensitive, and the selectivity was a great help in sorting out the after dark crush. Incidentally, the manufacturer's specifications say the receiver covers from 500kHz to 30MHz. This wasn't the case with the IC-737 I had, and it received very well down to around 75kHz.

## Gain Control

There's much I like about the IC-737. But on the down side, I personally feel that the lack of a variable gain control on the r.f. or i.f. is a mistake.

I also feel that the r.f. pre-amplifier could benefit by having a variable gain control. The amplifier is either switched 'in' or 'out' as the design stands.

In my experience, a variable r.f. gain (and i.f. gain) is very helpful. In the past I've found that by turning the front end gain down, and compensating with extra gain in the i.f., can help you complete a QSO under very difficult conditions.

## Summing Up

In summing up my impressions of the IC-737, I've got to say that it performs well and is a delight to operate. The controls and user-friendly approach have had a lot of thought put behind them. Icom also have the right approach for the user manual.

I think that Icom have come up with a transceiver that will appeal to many operators. In particular, I feel that the excellent main display will prove to be very helpful for operators with poor or failing sight.

The memory capability, although I didn't use it much, is very useful. Whatever you do is clearly displayed on that marvellous display. And in conclusion, I think that with the inevitable production modifications, natural improvements and refinements that come with such equipment, the IC-737 will become a popular buy with amateurs.

**My thanks go to Martin Lynch of the Amateur Radio Exchange Centre, 286 Northfield Avenue, Ealing, London W5 4UB. Tel: 081-566-1120, for the loan of the review transceiver which they can supply for £1495 (prices stated were correct as we went to press in March) plus £10 carriage.**

**As I've mentioned, optional c.w. filters for the Icom IC-737 are available. The filters are supplied for the 9MHz and 455kHz i.f.s as:**

**FC100 500Hz (9MHz i.f.) @ £65**

**FL101 250Hz (9MHz i.f.) @ £69**

**FL52A 500Hz (455kHz i.f.) @ £129 This filter is an 8-pole lattice type.**

**FL53A 250Hz (455kHz i.f.) @ £129. This filter is of the 8-pole lattice type.**

# Review

## Manufacturer's Specifications

### General

Frequency coverage (general coverage receive)	500kHz to 29.995MHz ( <b>See note in text</b> )
Amateur bands	1.8 to 1.9MHz, 3.5 to 4MHz, 7 to 7.3MHz,
10.100 to	10.15MHz, 14. to 14.35MHz, 18.068 to
18.168MHz, 21 to	21.45MHz, 24.890 to 24.99MHz, 28 to 29.7MHz
Mode	s.s.b., c.w., a.m., f.m.
Number of memory channels	101
Frequency stability	< ±200Hz from 1 minute to 60 minutes (after that < ±30Hz/hr at 25°C
Power Supply	13.8V d.c. ±15%
Current drain	Transmit 20A
Receive	1.6A (squelched) Max. a.f. output 2.1A
Dimensions	330 x 111 x 285mm
Weight	8.04kg

### Transmitter

Output power	s.s.b., c.w., f.m. 10-100W continuously adjustable
Output power	a.m. 10-40W continuously adjustable
Spurious emissions	< -50dB
Carrier suppression	> -40dB
Unwanted sideband	> -50dB
Microphone impedance	600Ω

### Receiver

System	Triple conversion superhet
Intermediate freqs.	First 69MHz, Second 9MHz, Third 455kHz
Sensitivity	(Pre-amp on) 500kHz -1.8MHz a.m. <13μV for 10dB S/N, 1.8 to 29.995MHz s.s.b., c.w., <0.16μV for (a.m. <2μV for 10dB S/N), (f.m. 28 29.7MHz, 10dB S/N. <0.5μV for 12dB SINAD
Squelch sensitivity	s.s.b. <5.6μV at threshold, f.m. <0.3μV at threshold
Selectivity	s.s.b., c.w. >2.1kHz -6dB, <4kHz -60dB, a.m. >6kHz -6dB, <20kHz -40dB, f.m. >12kHz -6dB, <30kHz -50dB.
Spurious and image	>70dB rejection ratio
Audio output	>2.6W with 10% distortion into 8Ω load
Receiver and Transmitter independent tune	±2.5kHz maximum

### Automatic Antenna Tuner

Impedance matching range	16.7 to 150Ω unbalanced (<3:1 v.s.w.r.)
Min. Operating power	8W
Waiting time (bandchange)	<3 seconds
Tuning time	<7 seconds
Tuning accuracy	1.5:1 or less v.s.w.r.
Insertion loss (after tuning)	<1dB



*Do you have an AR-3000 scanner and an IBM PC? Simon Collins G4SGI has a piece of software that will allow you to control your scanner from the PC.*

# PC Control of the AR-3000

I had read with interest, an article in a recent issue of *Short Wave Magazine* about controlling a 'CAT' controlled scanner from an IBM PC computer. In his column Alan Gardener, said that there was no software available to control the AR3000 scanner.

I had, in fact, been working on a piece of software for some time that would do just that. This program I have called 'Scan'. Not a very fancy name perhaps, but a piece of software to do a job.

## Not The First

My program is not the first to be used in this way, PC-Monitor is just such a package that works with the Yaesu FRG-8800 or the FRG-9600 radios.

Let me just say what you will need, other than the AR-3000 of course. I have written this software to run on an IBM PC, XT, AT or any other computer which is compatible with these three models. It will run on a humble monochrome 8088 based PC, such as the one Peter Hunter boasted, in his column 'Bits & Bytes', of having bought for £50. It will also run on the latest '486 based' 'Super-whizzo' windows-ready brute, with megabytes of memory.

You will need to be running a version of MSDOS (or

A hard disk is recommended, but it will run on a machine with two 360K (5.25in) disks. Two 720k (3.5in) drives are also OK to run the system. A printer and or a Microsoft (or compatible) mouse can also be used.

So what do you get for your money? The frequency can be entered from the PC's keyboard. This applies to either of the two v.f.o. frequencies. These two v.f.o.s can be either fixed, or both variable. If they are variable, then one may be set with a constant offset to the other. This is useful for those transmissions, such as repeaters, that have two frequencies in use.

The step rate for the v.f.o.s may be set in all the various steps available. Each one of the AR3000's commented memories may be set or looked at on screen. The memories may be used as a random frequency scan. With the AOR AR-3000 stores not only the frequency, but the mode as well.

Any of the AOR's scanning modes may be used, and any active frequency can be added to a memory channel. An additional feature is that the program checks to see if the frequency has been logged before.

## Special Features

For the more professional users, there are two special

features. A single frequency watch (SFW) allows the activity on a single frequency to be logged and the activity per hour can be calculated.

The second special feature is offset simplex reconstruction (OSR). This function allows both sides of a dual frequency simplex transmission to be monitored. Each of the v.f.o.s is set to one of the frequencies, and the system switches intelligently between both frequencies.

A comprehensive logbook may be stored to disk, or may be printed out on an optional printer. Help screens about the program operation, or of bandplans are available at the press of a button, which should make the program easy to use.

## Microsoft Mouse

If you have a Microsoft (or compatible) mouse, the program can be even easier to control. The mouse may be used to select the receiver's mode, and to tune the set. It may be used to page through the memories, to select the receiver's front panel parameters or just to select options from the bottom of the screen.



PCDOS) later than 2.0. You must also have at least 512K of base memory. So, those of you with Amstrad PC1512 or PPC512s will be OK.

The machine must have at least one serial port free (either COM1: or COM2:). The screen may be of almost any type. If you are unsure what that might be, the program will work with monochrome text only, Hercules standard, CGA (Colour Graphics Adapter), EGA (Enhanced Graphics Adapter), or VGA (this one has several versions of the name, but is usually just known as VGA).

I think that my piece of software will enable anyone with an AR-3000 and a PC to enjoy the facilities of the radio without the difficulties of needing to constantly refer to the manual for those less used, but interesting, facilities.

The Scan program is supplied with a 30-page manual to get you up and going. If you have a mouse, then that should be the last time you need to use the manual.

A copy of the Scan program is available from 46 St. Michaels Road, Cheltenham, Gloucester GL51 5RR.

PW



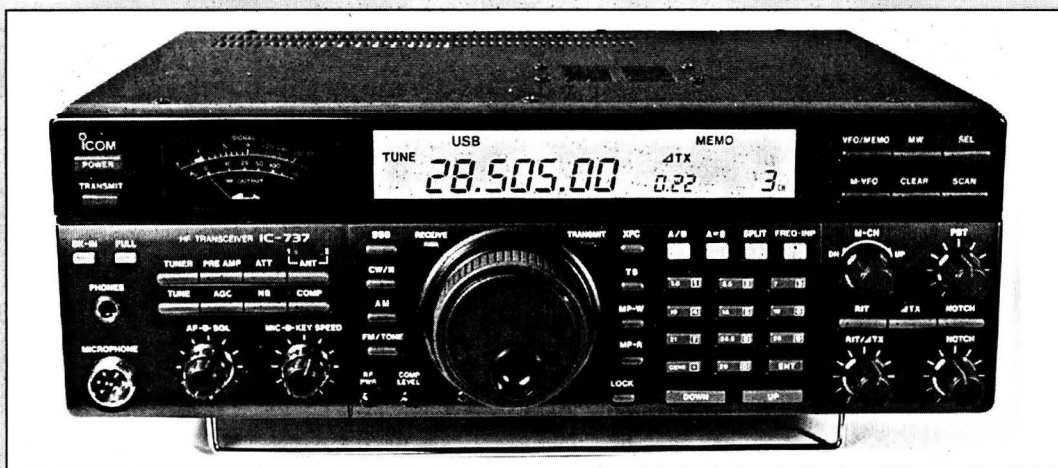
# MARTIN LYNCH

G4HKS

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First reviewed by Mr Henry F. Lewis, G3GLO, in the MARTIN LYNCH Spring Newsletter, it was obvious that ICOM have designed a true high performance, H.F. Transceiver to a remarkably competitive price. Comparing the strong signal handling with his TS950SD, Henry remarked,

"The SSB performance was excellent, the filter has a good shape factor which coupled to the effective PASS BAND TUNING, gave the IC-737 high marks when compared directly to the Kenwood, fitted with two filters, whilst listening to weak signals surrounded by QRM".

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*If you want to get an amateur A licence the technical requirements are fairly easy to learn. You will need to know about the legal requirements, but all that is fairly routine. But you must pass a Morse test at twelve words per minute, and that is a horse of a different colour, says Ralph J. Lamdem.*

# Morse from your PC

**L**istening to and interpreting Morse, is essentially a conditioned reflex - you hear the sound and immediately the letter forms in your mind. But the trouble is that conditioned reflexes are only formed by conditioning, that is, practice. To practice Morse you need to enlist a patient and experienced sender, and arrange time when you are both free : quite a bit of time! Local Radio Societies are very generous with their time, but then there will be a journey and a fixed time. So what better than to get your friendly PC to teach you. There waiting to be switched on, infinitely patient and accurate, always willing.

This is not the first PC Morse tutor, but it is written in Basic, so that any PC with a basic compiler and a music facility can use it - if you don't know whether yours has this feature call BASIC, type PLAY "A" and see what happens. You should hear a note, and if you do this program is useable. The program is listed on page 39, and basically divides into a series of subroutines. These correspond to the logical process of receiving a Morse message, so I will explain the program by describing the computer code.

## Coding

Lines 120-170. This is called at the start of the program, and it stores the musical equivalent of each letter in the alphabet, in the note A in the middle key. You can change this if it offends your musical taste, but it seems a useful compromise. You will note that only the codes for alphabetic characters are given, but the complete set, including numerals, punctuation marks, and so on, are easily added, remembering that 14A is a dash, 112A is a dot, and each symbol is followed by a pause, p4.

## Header

Lines 190-340. The header routine gives a bit of flash to the start of the practice, but it also lets you select from three useful alternatives that are displayed on the screen.

The first enquiry 'Text file is ?' allows you to select the bit of text you want to play. You can use any ASCII file, or you can write your own data by switching the PC on, Typing CON>TMP.TXT to write to a file TMP.TXT for example, and then inputting the text. You will need to put inverted

commas at the ends of each line. Finish off with key F6 (Function 6).

Assuming you have found your text file, the next enquiry is 'Speed w.p.m.'. You can just put the number in here. The processor will limit the speed to twenty words per minute or so, but if you can read Morse that fast you don't need a tutor anyway!

The final enquiry, 'Mode - Code first, Text first Runon, Wait at line end', is answered by a single letter, C, T, &c. This lets you set the output in the way that's best for you. At first, when you are learning the code itself, you can use 'Text first'. Here each letter appears on the screen, then you hear the code. 'Code first' is the other way round. In either case, if you get lost, press any key and the code will stop until you press again. 'Wait at line end' will play a whole line of code then wait for you to write it down. Start the next line by pressing any key. 'Runon' is for real men: it just pumps code out continuously, showing each line when it finishes.

## Reader

The rest of the program is devoted to reading the text and sounding out the code. Lines 400-470 open the file and reads it out one line at a time, passing each line down to the subroutine in lines 490-570.

These dissect the input line character by character, and identify it, adding each recognised character to a new line. Note that you will have to extend this subroutine if you want to include more symbols. If any characters, for example full stops and commas, are not recognised they are replaced by an asterisk. The number corresponding to each ASCII character is converted into the range 1 to 26, and this number is used to select the correct Morse symbol in subroutine 590 and display the reconstructed line in subroutine 610.

When you have learned the code you will still need to go to your local club to get someone to polish up your transmitting technique. While in principle you could transmit to your PC, get it to recognise your fist, and comment on the technique, this would need a complex input-output program, quite expensive, and some fairly complex software to measure your sending speed before trying to identify the characters. And attempts to use the keyboard for key input are foiled by the rather low speed at which the keys are scanned.

But if you are prepared to enter sixty-five lines of program, perhaps an hours work, and spend a few hours listening, you will acquire an instinctive knowledge of the Morse code. Happy hamming.



```

10 'MORSE 03-18-1992 Morse code program.
20 'This program was written:
30 'Control System Consultants
40 'Reading, Berks, England.
50 ' Copies are supplied for hobby use only. No responsibility can be taken
60 ' for problems or damage resulting from its use.
70 DEFINT I-N:OPTION BASE 0:DIM SYM$(60)
80 GOSUB 190:GOSUB 120' Header. Input data
90 GOSUB 400' Read and interpret text
100 END
110 '
120 DATA "p4","112a14ap4","14a12aaap4","14a112a14a112ap4","14a112ap4","112ap4"
"112aa14a112ap4","14aa112ap4":'A-G
130 DATA "112aaaap4","112a14ap4","14aaap4","112a14aa112ap4","112a14a112ap4":'-L
140 DATA
"14aap4","112a14ap4","14aaap4","112a14aa112ap4","14aa112a14ap4","112a14a112ap4","112aaap4":'M
-S
150 DATA
"14ap4","112aa14ap4","112aaa14ap4","112a14aap4","14a112aa14ap4","14aaa112ap4","14aa112ap4":'T
-Z
160 FOR I=0 TO 26:READ SYM$(I):NEXT
170 RETURN
180 '
190 CLS:COLOUR 3,4' Header, data input *****
200 WIDTH 40:LOCATE 5, 15:PRINT"M O R S E"
210 LOCATE 7,5:INPUT"Text file is ? ".FLNM$
220 LOCATE 9,5: INPUT"Speed w.p.m ?:".NWPM
230 LOCATE 11,5:PRINT SPACES$(20)
240 LOCATE 11,5:PRINT"mode - Code first, Text first"
250 LOCATE 12,5:PRINT" Runon, wait at line end";
260 IR$=INKEY$:IF IR$="" GOTO 260
270 IF IR$="c" OR IR$="C" THEN FLAG1=1 ELSE IF IR$="t" OR IR$="T" THEN FLAG 1=2
280 IF IR$="r" OR IR$="R" THEN FLAG1=3 ELSE IF IR$="w" OR IR$="W" THEN FLAG 1=4 ELSE
GOTO 260
290 NWPM=12*NWPM:N1=INT(NWPM/100):NWPM=NWPM-100*N1
300 N2=INT(NWPM/10):NWPM=NWPM-10*N2
310 S$="MST"=CHR$(N1+48)+CHR$(N2+48)+CHR$(NWPM+48)
320 NSEC=2:GOSUB 360
330WIDTH 80:COLOR 7,0:CLS
340 RETURN
350 '
360 IH$=TIMES:I=0:WHILE I<NSEC
370 IF IH$<>TIMES THEN I=I+1:IH$=TIMES
380 WEND:RETURN
390 '
400 OPEN "I",1,FLNM$:NROW=4:LINE INPUT£1,A$' Read text lines
410 WHILE NOT EOF(1)
420 GOSUB 490'Read and soundline by characters
430 IF FLAG THEN GOSUB 590' Print it
440 LINE INPUT£1,A$
450 NROW=NROW+1:IF NROW=22 THEN NROW=4
460 WEND
470 RETURN
480 '
490 D$="":FOR I=1 TO LEN(A$)
500 C$=MID$(A$,I,1)
510 N=ASC(C$):FLAG=-1
520 IF N> 64 AND N<91 THEN NN=N-64 ELSE IFN>96 AND N<123 THEN NN=N-96 ELSE IF N=32
THEN NN=0 ELSE NN=0:FLAG=0
530 IF FLAG THEN D$=D$+C$ ELSE D$=D$+"*"
540 IF FLAG1=1 THEN GOSUB 590:GOSUB 610 ELSE IF FLAG1=2 THEN GOSUB 610:GOSUB 590
ELSE IF FLAG1=3 OR FLAG1=4 THEN GOSUB 590
550 IR$=INKEY$:IF IR$="" THEN GOSUB 640
560 NEXT:IF FLAG1=3 OR FLAG1=4 THEN GOSUB 610:IF FLAG1=4 THEN GOSUB 640
570 RETURN
580 '
590 PLAY SYM$(NN):RETURN
600 '
610 LOCATE NROW,1:PRINT D$
620 RETURN
630 '
640 IR$=INKEY$:IF IR$="" GOTO 640 ELSE NSEC=1:GOSUB 360
650 RETURN

```

#### Note:

This program uses the musical note 'PLAY' facility of GWBASIC on an IBM PC or compatible using MSDOS or PC DOS.

Those of you who are using QBASIC with MSDOS5 should have few problems.

One other peculiarity of GWBASIC is the use of a single quote ', to mean REM.

When running BASIC, a REM statement in the program causes the computer to ignore the rest of that line. Lines in which this ' symbol appears, may be ignored beyond that point.



# Bits & Bytes

## The Computer In Your Shack

*Peter Hunter  
G0GSZ welcomes  
you to his regular  
look at all aspects  
of amateur radio  
computing. We're  
also very pleased to  
announce that  
because the column  
has proved to be so  
popular, 'Bits &  
Bytes' will appear  
monthly as from  
this issue of PW.*

Welcome to the monthly (as from this issue) helping of 'Bits & Bytes'. But enough of blowing my own trumpet, it's time to get down to business!

Recently I've had many letters and packet messages with information about 3in disks for the Amstrad PCW range. I can't possibly answer them all, so I'll just say thank you to everyone.

However, the **ONLY** source of Amateur radio software seems to be, as I said last time, PDSL. Write and ask for a copy of their CP/M catalogue.

One amateur wrote giving details of a superb packet radio program for the Amstrad machines. He is not QTHR so I won't give any details here. If you want a copy, send me a formatted disk, plus return p&p, and I'll get a copy for you.

The best price I've seen for the 3in disks is from 'Linefeed,' 59A Hilda Road, London E16 4NQ. Tel: 071-474-1765. A box of 10 disks costs £15.95 inclusive of VAT and postage. The information was sent in by Jonathan Bardell G8HHR, who has just broken the habit of a lifetime by writing to PW! Many thanks for that info Jonathan.

Cyril Goodwin G7NKB, needs any information about his WANG computer, vintage 1983. Its CPU is an Intel 8086, but it's not IBM compatible.

The machine has twin 360K 5.25in disks, 640K RAM, and runs MS-DOS 2.01. Cyril is looking for any amateur radio software for this machine, especially anything for packet, as well as an IBM emulator program. If you can help, please write to me and I will pass the information on.

### Micro Drive Cartridges

Further to my plea for Micro Drive Cartridges, I'm happy to say that I now have all I need. Thanks, especially, to Tony Fishpool G4WIF, and Gary O'Neill, (who takes the RAE in May). I hope all goes well for you Gary, and look forward to working you on the air sometime.

Adrian Rees, of 4, Moorland Road, Ellesmere Port, South Wirral L66 1NF, has an APRICOT F1. Adrian would like to hear from anyone who can help him with information about this machine. He especially needs some software for the F1.

Peter Davies G1XCB, has a TRS80 (26-3004) and a Kantronics KPC 2. He can't get the BASIC program in the back of the Kantronics manual to work properly, and is desperate to get active on packet with this set-up. If you can help please let me, or Peter, know.

### Bedtime Reading

If you're looking for some bedtime reading, I have two books of interest. One is called *Interfacing PCs And Compatibles* (BP272) and starts by explaining the basics of how the PC works. The book then explains how the various interfacing circuits are designed.

The second book, a follow up from the first, is called *Electronic Projects For Your PC* (BP320) and it explains how to use the computer as a test-bed. Both books are

small, pocket sized, of around 100 pages, and are very informative.

The books, both written by R. A. Penfold, cost £3.95 each and are available from PW at £3.95 each plus £1 p&p (please use the order form in the Arcade section of the magazine: Editor).

Both books are published by **Bernard Babani (Publishing) Ltd., The Grampians, Shepherds Bush Road, London W6 7NF**. If you send them a stamped, self addressed envelope, they will send you a catalogue of their full range of Radio, Electronics and Computer books.

### Latest Mode

If data communications is your thing, you may well be interested in the latest mode to amateur radio, called PACTOR. This topic is very much of interest (and has been discussed by) 'Packet Panorama' contributor Roger Cooke G3LDI.

Some people say that packet isn't very reliable on h.f., though it's undoubtedly one of the easiest modes to use. Other operators say that AMTOR is the most reliable mode on h.f., but is nowhere near as easy or flexible as packet.

The obvious answer therefore, is to combine the two! And this is what a group of very enterprising amateur radio enthusiasts in Germany have done. The result was PACTOR.

I've had the pleasure of trying PACTOR mode. This took place when I reviewed a PACTOR controller made by the world famous 'PacComm' (of TINY-2 fame).

It took place at the same time that the **Radio Amateur Invalid and Blind Club (RAIBC)** decided I was eligible for an h.f. rig upgrade. My FT-707 was exchanged for an FT-757GX. I am very grateful to RAIBC for the loan of this superb transceiver.

The PACTOR controller does AMTOR and RTTY as well. It also has a built in electronic keyer, so you can send AMTOR without the need of a computer!

### Simplicity Itself

The PacComm PACTOR controller is simplicity itself to use and operate. To install the unit, all you have to do is connect the supplied RS232 lead between the controller and your computer.

Next, you plug the power lead into the unit and connect the other end to a 12V d.c. supply. Then you connect a further lead from the controller to your transceiver. Finally, run up the supplied software on your computer, switch on the radio and controller, and you're in action!

The software supplied is called PTCT and it's a dedicated Pactor controller program for any PC. As this program did everything that I wanted it to, I didn't bother trying any other software. Despite this, I'm sure any comms package would do the job.

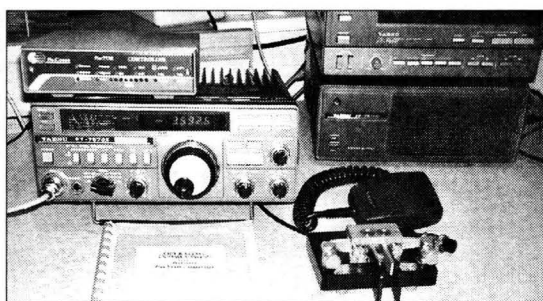
The PTCT is a very well written program, it has built-in **Help** at the press of a key. It also has a capture to disk facility, so you can peruse the action at leisure.

Changing modes requires no more than a key press. A 'short' (11k) on disk manual comes with the program for those who need it. The program is itself only about 56k in size and a configuration file is also included.

### Activity Frequencies

The majority of the PACTOR activity is to be found on the AMTOR frequencies. This unit can be set to automatically detect PACTOR/AMTOR/RTTY if you wish.

**Fig. 1: The PACTOR controller sitting on top of the Yaesu FT-757GX.**











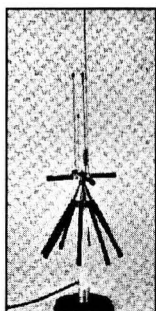
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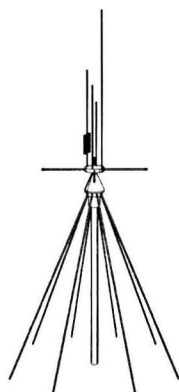
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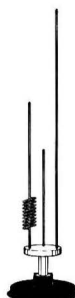
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# Antenna Workshop - Antennas And The Computer

This month Peter Dodd G3LDO, shows you how to create a new antenna, or improve an older one using a computer to predict how good it should be.

Many of the antenna polar diagrams, such as shown in Fig. 1, are produced by calculation rather than measurement. But to find analytical solutions for other than the simplest of antennas is not an easy matter.

With only the use of slide rules and logarithmic tables, the calculation procedures were time consuming and laborious. So it's not surprising that mathematical modelling of complex antennas and their environment has only really been developed since the advent of the computer.

Twenty years ago proven antenna modelling algorithms were converted into computer programs. I have a copy of a manual compiled in 1974 called *The HF Antenna Handbook of Calculated Radiation Patterns*. This manual was compiled for the professional h.f. communication engineer. It enables him to select a suitable antenna for a specific communication link.

This month I'm looking at antenna modelling software and its use in amateur radio. In future articles I will be using some of this software when investigating new antennas, so it is useful to be able to understand how they work.

## Numeric Electromagnetic Code

The most comprehensive of all the computer programs that has emerged recently is the Numeric Electromagnetic Code (NEC). It is based on a number of numerical procedures, which were unified into a General Moment Method by R.F. Harrington and published in 1968.

The moment method

converts the integral equation into a series of simultaneous linear algebraic equations. These can be readily solved by numerical (matrix) methods.

The NEC computer program has been used by the professionals, for some time

Both the source code and a compiled program are available as public-domain software. Unfortunately though, they only appear to be available in the USA.

I shall give only a very simplistic explanation of the

represented by sections carrying constant current called pulses as shown in Fig. 2.

Pulses are centred on segment boundaries, and have the same length as segments, except for pulses of half-length and zero current placed at wire ends. The greater the

number of pulses, the more closely the model will represent the real current distribution.

Once the magnitude and phase of the current is known, then the complex impedance for any part of the element can be calculated. The total antenna electromagnetic field pattern can be built up from the magnitude and phases of the currents in the individual pulses.

Antenna systems are often made up of more than one element. They may be driven, as in the HB9CV style of

antenna, or they may be parasitic as in the Yagi style of antenna.

The MININEC program can only model straight element antennas. A bent element is modelled as a number of straight elements connected together. The number of wires would depend on the number of bends.

A pulse is located at each wire junction, and overlaps on to all wires forming the junction. The number of segments for each wire are specified when the antenna model is set up.

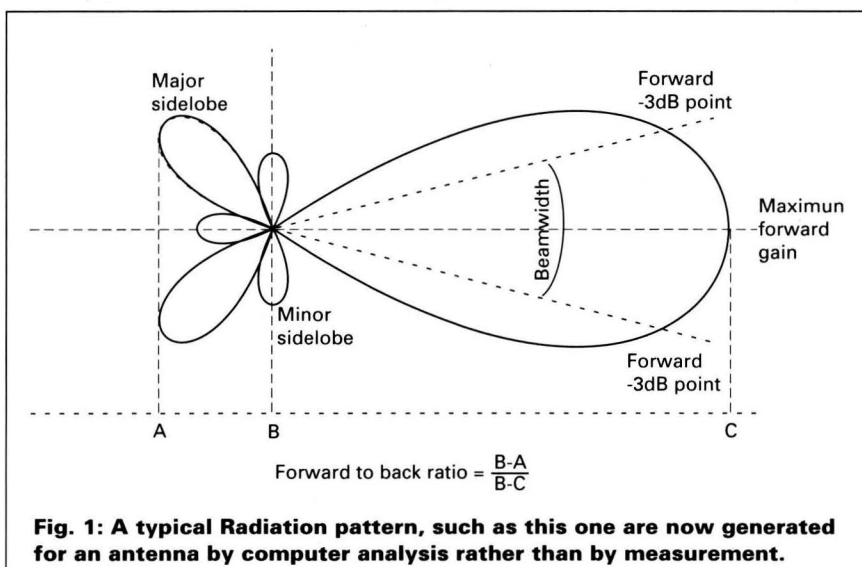


Fig. 1: A typical Radiation pattern, such as this one are now generated for an antenna by computer analysis rather than by measurement.

now, to analyse the interaction of electromagnetic waves with conducting structures. An NEC model may include non-radiating networks and transmission lines, perfect and imperfect conductors, lumped element loading and ground planes.

Originally written in FORTRAN for mini-computers, it has been converted for use with a number of other large computers. But it is a large and expensive program, which rather puts it outside the reach of most of us.

## Stripped Down Version

Fortunately however, a stripped down version of NEC, with many of the NEC capabilities, has been developed. Written in BASIC for IBM PCs or compatible computers it's called MININEC.

method the program uses. Let us consider the simplest of antennas, the half-wave dipole. The current distribution approximates to half a sine wave with the current maximum at the centre or feed point and zero at the ends.

The integral (sum of all the small sections) of this current distribution is transformed into matrix equations by dividing the antenna model into segments. The current distribution over the length of the dipole is

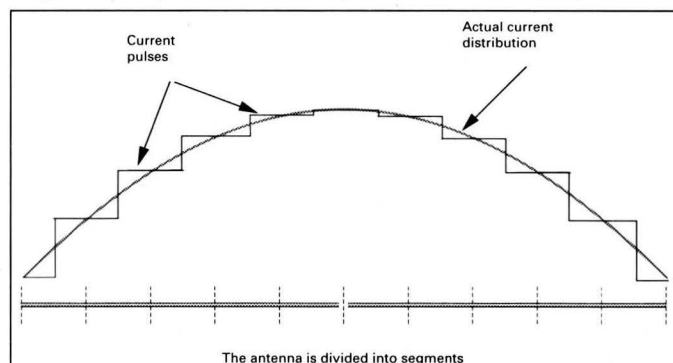


Fig. 2: For the purposes of analysis the antenna is considered to be made up of several small 'pulses' or segments.





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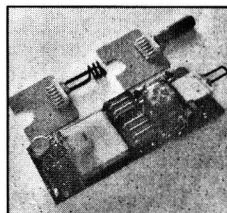
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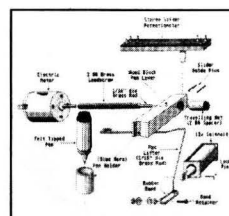
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## Not The Easiest

The MININEC software is not the easiest of programs to use. However, 'amateur' derivatives of MININEC are now available. Two of the best known ones are MN and ELNEC.

I will describe certain features of these programs. I am not able to describe them in any detail in an article of this length, as both of the programs have many paged manuals.

These programs use the same antenna modelling algorithm as used in MININEC. No mathematical changes have

**Table One.** Comments are in italics and are not necessary in the file.

2-Ele VHF Reference Yagi	<i>Title for the antenna file</i>
Free space	<i>Ground description</i>
144.5 MHz	<i>Hz, KHz, or GHz may also be used</i>
2 wires, millimetres	<i>inches, meters, centimetres, millimetres.</i>
11 0,-495,0 0,495,0 2	<i>(For each wire: No: of segments,</i>
11 150,-520,0 -150, 520 2	<i>XYZ coordinates of ends, diameter)</i>
1 source	<i>Number of sources</i>
7,100,0	<i>Source pulse number, voltage, phase</i>

has only two continuous wires strung around the spreaders. A Yagi element composed of tapered sections of telescoping tubing may be modelled by

driven from a main menu and antenna data is entered by selecting the WI wire option. In MN antenna characteristics are specified in text files.

An example of an MN antenna file, for a two element Yagi, is shown in Table 1.

## Antenna Geometry Display

Both programs have a graphical display showing the antenna, using the data entered. The ability to view the antenna geometry is an important feature. Earlier versions of these programs did not have this capability and it was very difficult to spot antenna geometry co-ordinate mistakes without a lot of practice.

The Figs. 3 and 4 show the graphics display of a Double-D antenna. This antenna is a two-element compact Yagi with the elements bent to form a pyramid

configuration (to be the subject of a future article). Because of its unusual geometry this antenna is a good test of a graphics display.

The image can be rotated in either the horizontal or vertical planes. Additionally, wire currents may be viewed after the impedance is calculated.

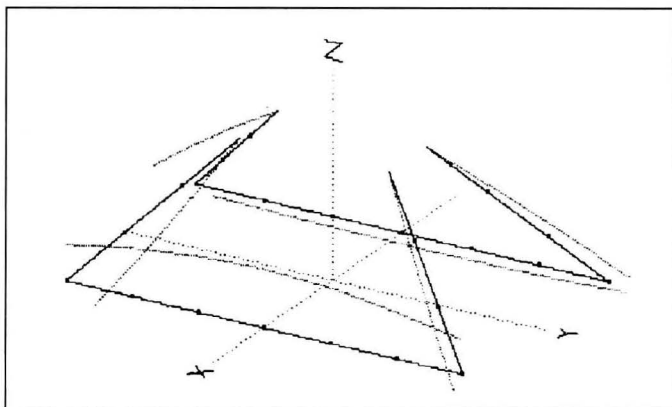
With ELNEC, the graphics display comprises of three views of the antenna, as shown in Fig. 4. Note that the 'Front', 'Right Side', and 'Top' views are relative to the coordinate system, not the direction the antenna is pointed.

On colour displays, each wire is shown in a different colour. This feature is very useful for tapering, described below.

## Acute Angles

When wires intersect, particularly acute angles, more segments are required for accurate results. Increasing the number of segments by the required amount may lead to intolerably slow program execution or the maximum allowable number of pulses to be exceeded.

An alternative is to break the joining wires into several one-segment wires of different lengths. A short notional wire is used near the junction. Other



**Fig. 3: A screen-grab of the Double-D antenna after entering all the data.**

been made although they both have additional features. Both programs use the three dimensional Cartesian co-ordinate system X,Y and Z to refer to points in space.

As with MININEC, only straight elements can be modelled. A bent wire is modelled by connecting two or more straight wires.

Wires are considered to be connected when they share the same XYZ co-ordinates at an end point. For example, each loop of a cubical quad antenna is described by four separate wires whose end points lie at four points.

A two element quad is modelled as eight wires, even though a real antenna actually

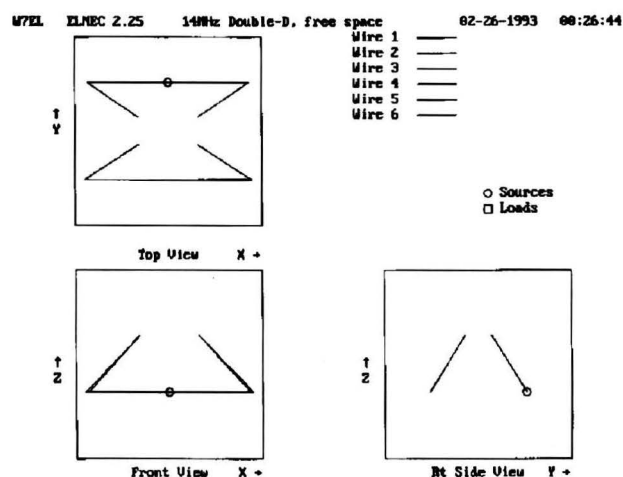
using several connected wires having different diameters.

As wires are divided into segments for analysis, generally, using more segments results in higher accuracy, but the analysis takes longer. The number of segments required depends on the geometry of the antenna and on the accuracy required.

For example, 5-25 segments are generally used for dipole elements and 20-100 for full-wave loop elements. Many segments are required for very closely spaced wires, such as folded dipoles or embedded transmission lines.

## Menu Driven

With ELNEC, the program is



**Fig. 4: The ELNEC three views of a Double-D antenna.**



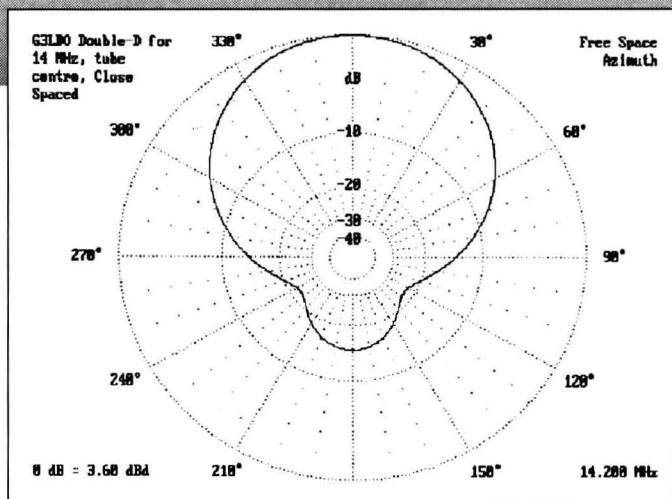


Fig. 5: From MN, the same plot of the Double-D antenna.

notional wires increase in length as their distance from the junction increases. This technique can achieve a much greater accuracy with a moderate total number of segments.

Tapering can be done manually or automatically. Automatic tapering is a feature of both programs.

### Pattern Plots

An antenna radiates in all dimensions but pattern plots have only two dimensions.

Both programs use a standard method of representing the pattern, with elevation and azimuth plots.

The far-field antenna pattern can be plotted on a logarithmic

or linear (dB) polar plot. The plots of a Double-D antenna are shown in Figs. 5 and 6.

Both of the programs normally use the maximum electromagnetic field magnitude for all calculations. This means results are independent of wave polarization.

At h.f., horizontal and vertical polarization components generally intermix upon ionospheric reflection. So using the maximum field is a realistic way to characterise h.f. antenna performance.

Sometimes however, it is important to isolate one polarization component. These polarization components can be displayed separately on the same plot as shown in Fig. 6.

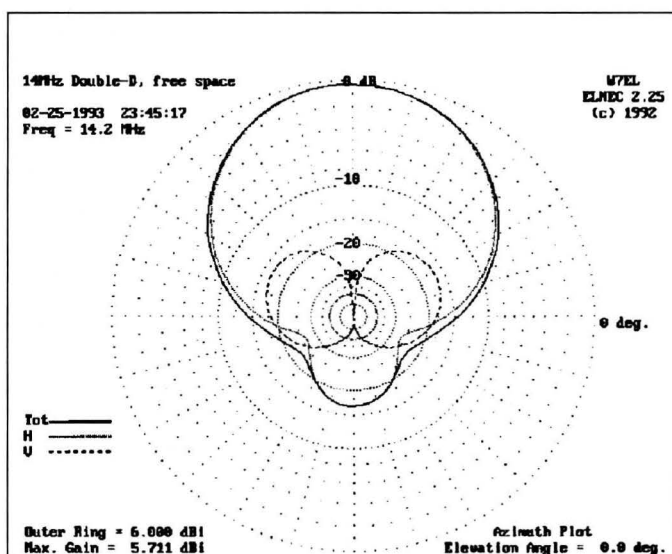


Fig. 6: From ELNEC, the plotted pattern of the Double-D antenna (grabbed from the screen).

### Lumped Circuits

These programs can also model lumped circuits such as resistors, capacitors and resistors. This allows the programs to model trapped multi-band antennas or antennas containing a resistive load, such as a Rhombic or a Berverage antenna.

Both MN and ELNEC will model the effect of ground on an antenna. They provide free space, ideal ground, or 'real' ground environments.

If either a perfect or 'real' ground is specified, a perfect ground is assumed for impedance and current calculations. The 'real' ground description is used only for determining the shape and strength of the far field (pattern).

The efficiency of a ground radial system cannot be determined, and the impedances given for low (less than about  $\lambda/5$ ) horizontal antennas won't be correct. (Impedances will be over assumed perfect, not real, ground).

The resistive part of the impedance of low horizontal antennas will be unrealistically low, which also results in incorrectly high reported gain.

The pattern of a low horizontal antenna will have the correct shape provided that all parts of the antenna are at the same height. The above limitation was consciously made by the authors of MININEC to keep the code size and computation time reasonable. Perhaps the necessary code can be included in future modeling programs as PC power continues to increase.

The programs will tell you what happens to your signal as a result of ground absorption or partial reflection. This is valuable in determining the best height for an antenna. You can learn a lot about the limitations of vertical antennas.

### Foremost User

Dr Brian Austin, G0GSF, one of the foremost users of antenna analysis software notes "Without a doubt these two very similar 'amateur' programs leave the 'professional' codes in the shade as far as user friendliness is concerned. In fact once one has experienced the ease with which a virtually unlimited range of wire type antennas can be analysed using them, I can see no need to go back to the professional PC-based programs."

The MN program is available from: **Brian Beezley, K6STI 507-1/2 Taylor, Vista, CA 92084. USA.**

The ELNEC program can be obtained from: **Roy Lewallen, W7EL, PO Box 6658, Beaverton, Oregon 97007, USA.**

PW

### Further Reading

'MININEC: The Other Edge of the Sword', *QST*, February 1991, by Roy Lewallen, W7EL (who wrote the ELNEC program) is recommended reading.

*Radio Engineering F. Terman 1937, Chapter 15 Antennas. HF Antenna Handbook of Calculated Radiation Patterns, Communications Research Centre Ottawa Canada by JL Thomas and SD DuCharme, April 1974.*

*Field Computation by Moment Methods. R.F. Harrington, Macmillan Company, New York, 1968.*

*The New MININEC (Version 3): A Mini-Numerical Electromagnetic Code. J C Logan and J.W. Rockway. Naval Ocean Systems Centre, San Diego, California. 'Technical Topics', Radio Communication, August 1992.*



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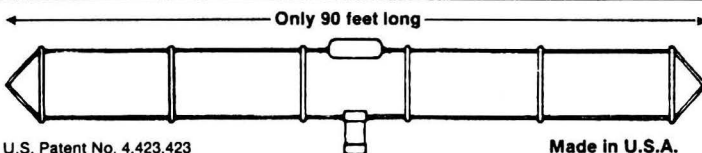
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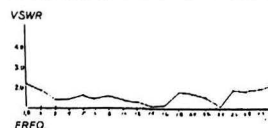
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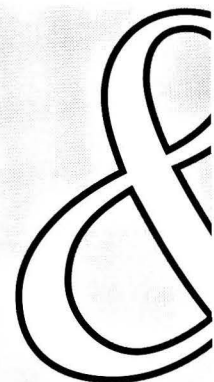
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Ron Ham's vintage 'wireless shop' is open for business once again, and he invites you inside to savour the warmth of hot valves and the smell of freshly polished wooden cabinets. Aah, those were the days!

# Valve



Welcome to the 'Valve & Vintage' wireless shop! Once again I begin by thanking you all for your interesting and friendly letters. This series is intended to help you. And because each episode is based on my daily post-bag, there may be unavoidable areas of repetition.

In view of this, I ask our regular readers to bear with me. This is because we are winning new friends each month who are likely to be complete newcomers to radio, and they may not have seen the previous issues.

One old-timer who has seen many issues of *PW* is **Laurence Mason** (Hassocks West Sussex) who wrote, "My boyhood dream was to have a radio small enough to hold in the palm of my hand. The invention of the transistor and now the microchip has of course made this possible".

Laurence continued "My little Grundig 15-band World Radio, no bigger than a paperback, is all I could wish for. And yet...there's the thought of all those separate components individually wired up, each doing its known job and able to be replaced if it failed!"

"The smell of old solder melted with the iron, the checking of each valve stage with the meter.

copy of the *Telsen Radiomag*, in **Fig. 1**. After reading it, I was pleased to pass it on to the wireless library at the Amberley Chalk Pits museum.

The 1920s wireless magazines are a mine of information about components that were designed for the home-constructor. Mostly in those days of course, they were mounted on a wooden breadboard, with an Ebonite front panel.

The issue of the *Telsen Radiomag* David sent me, contained a couple of blueprints. These showed how to make the Telsen 'Nimrod 2', **Fig. 2** and the 'Jupiter 3'.

The upper section of each plan is devoted to the components on the panel. The lower area on the plan is devoted to the layout of the parts on the base-board.

Reading 'Valve & Vintage' took **Ian Glen** (Berwick-on-Tweed) back to his school days. This was during the early 1940s, when he and several other lads built crystal sets and one and two valvers on a breadboard.

The column also reminded **Peter Wood** (Ashted, Surrey) of his boyhood days during the Second World War. This was when he was given a three valved Osram 'Music Magnet'. This set was originally supplied around 1927, in kit form, for solderless wiring.

## Breadboard Components

The old 'breadboard' components such as chokes, condensers, coils,

valve-holders and intervalve transformers can still be found today from second-hand sources. Don't

forget, that before using such components, to have a low-resistance test-meter handy to check the continuity between connections.

In those days, it was common practice to use a nut, bolt and washers to terminate the 'business' part of the component. This created a terminal post for the circuit connecting wire to make a wrap around joint.

Let's consider a valve-holder. When checked with the test-meter, there should be zero resistance between the pin-socket and the top of the terminal post.

If however, there's no reading or one showing a resistance, then check for corrosion between the bolt-head and the washers compressing the pin-socket connection. Next, undo the nut and bolt assembly and fit new washers if required.

My advice about checking of bolts, nuts and washers also applies to coils, chokes and transformers, which were often wound with enamelled covered wire. Don't forget that the enamel is an insulator, and enough must be scraped off to expose the bare copper at the connection points.

I remember that I once had an Eddystone communications receiver in for service, and it had lost sensitivity on one range due to an open-circuit antenna coil. In this case, the coil ends were unsoldered from their lugs, the enamel thoroughly cleaned off and the joints re-soldered to complete the repair.

## Famous Pairing

Now it's time to remember a famous pairing of transmitter and receiver. There aren't many 'Valve & Vintage' readers who haven't heard about the TR1154 and R1155.

"The availability of World War II surplus got us really going, and it was then I acquired an ex-RAF R1155 which gave me lots of listening pleasure for many years," wrote **Ian Glen**, who later followed it with an Eddystone 640.

The early receiving station of **Brian Mulleady GM0KWL** (Falkirk, Central Region) comprised of an Eddystone and an Echophone, Model EC3 seen on the right of **Fig. 3**. Brian thinks EC3 is of American manufacture and would like to know more about it.

My suggestion, if our own readers can't help you Brian, is to drop a line to the American Radio Relay League (ARRL) who should point you in the right direction.

Incidentally, Brian is now the secretary of the **Stirling & District Amateur Radio Society**.

During the Second World War, **R. C. Reilly** (Penzance, Cornwall) served as a wireless operator and used the famous combination R1155/TR1154. Although he did not pursue his radio career after the war, he can still manage 20-25w.p.m. on the key.

Now that retirement is looming Mr Reilly's thoughts are turning toward amateur radio. To this end he wonders about the possibility of obtaining and using this type of equipment on the air.

Although I sympathise with you Mr Reilly, and those among you who for nostalgic reasons, would like to use their particular type of wartime sets on the air again, I can't recommend it. Especially if you're not an experienced radio engineer.

For instance, very high voltages (something around 1200V) are required to run the T1154 transmitter. Additionally, the power supply units for 'ground' operation, are massive.

I don't want to be a killjoy, but please remember that when these sets were used in anger, 50 years ago, they were designed for a particular job. They were brand new and on peak performance.

When the 1154s were built, there were no neighbouring television sets for the designers to worry about. So TVI proofing was never considered. If you want the best results from today's world of amateur radio, then it's better to get the right equipment.

Despite my advice Mr Reilly, I think that there are occasions when the gear can be used. I really admire the efforts that the engineers have made toward keeping old service gear working for special events. They can be a fitting tribute in memory of the operators who gave their lives using them.

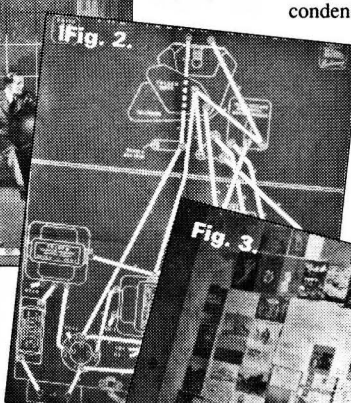
## Original Condition

The meaning of restoration to me, is to clean the equipment and leave it as near the original condition as possible. This enables present and future generations to learn about the technology of the time when the equipment was made.

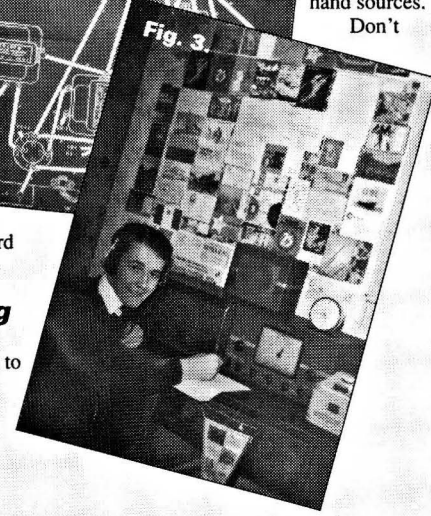
Restoration can go wrong. If a faulty capacitor, scribed with its date of manufacture and military number (prefixed 'ZA' for the army and '10E' for the RAF), is replaced with a modern component, then students will only see how it was repaired in



**Fig. 1.**



**Fig. 2.**



**Fig. 3.**

Good luck to those taking this up again". Thanks for the memory Laurie, and I think you've probably just softened many hearts toward vintage radio!

## Telsen RadioMag

At this point, I'm going to thank **David Waugh** (Co. Down, N. Ireland) for sending me the Number 3



# Vintage

By Ron Ham

Fig. 4.

the 1990s and not the technique of manufacture in the 1940s.

For example, take a look at the upper chassis layout of the Wermacht's Torn. E.b. receiver, Fig. 4. Most likely the insulation of the three tubular capacitors on the left of the coil turret is very low. They need to be renewed before the set could work. But I think it would be a pity to disturb such a beautifully engineered layout.

Valve replacement has to be carefully considered too. This is because they all had their individual service identity. These references were 'AR' or 'AT' for the British Army Receiving or Transmitting, 'NR' or 'NT' for the Royal Navy and 'VR' or 'VT' for the Royal Air Force.

Most of the meter movements fitted to British equipment were adorned with a broad arrow or a crown. German valves and sets displayed the Eagle and Swastika. These insignias are an important part of European history, and speaking personally, I believe it is more important to preserve this, than to get the set working.

## Manuals

I'm often asked where manuals and valves for early amateur, domestic and military wireless equipment can be obtained. My advice is that you first look among the advertisers in *PW* and/or our sister journal *Short Wave Magazine* where you're likely to find people offering these services.

For instance, on pages 74 and 75 of the March *PW* there are two firms offering a wide variety of service sheets. There are also two firms with good stocks of valves.

My recommended course of action should help **Martin Sammut 9HIMS** (B'Kara, Malta). Martin is looking for the circuit and any other information available for a Vidor CN354, which he plans to restore.

My thanks go to Mr T. A. Rhodes for telling us that his company, **Langrex Supplies Ltd, 1 Mayo Road, Croydon, Surrey CR0 2QP, tel: 081-684 1166**, are "probably the most comprehensive valve suppliers in the UK".

Langrex Supplies can also supply the early 2V filament valves that I mentioned in the February column. Mr Rhodes also mentions that they have an extensive library of old valve data, including manufacturers publications and books by Bernards and *Wireless World*.

While on the subject of service manuals, it's worth mentioning that the reference sections of some public libraries have back issues of *Radio And Television Servicing*. These were first published in the 1950s, by George Newnes and now by Macdonald and Jane's. Each edition of *Radio And Television Servicing* has data and circuits about sets that were produced during the year indicated on the spine of the book.

However, if it's amateur or military information that you're really after, don't forget to enquire at your local radio club. You'll find help there, especially among the old timers who enjoyed, like I did, the government surplus bonanza of the late 1940s.

## Collectors

Time to look at some collectors and collections now and we start off with **John Francis** (Torquay) who at the last count had 57 'old radios' which, after restoration, he displays in his attic. John has a particular interest in short wave receivers, and at present he is restoring a Hallicrafters 'Skyrider' Model SX28.

"My present project is the restoration of a Hallicrafters 'Super Skyrider' SX16," wrote **Peter Wood**. Most of these sets were featured in various radio publications between 1945 and 1950.

Another of the 'Skyrider' range is the 5-10, seen in Fig. 5, being used as a tuneable i.f. amplifier during 432 and 1296MHz tests, by **Brian Oddy G3FEX** (Storrington) in August 1962.

Brian writes the monthly 'Long Medium Short' pages for *Short Wave Magazine*. As its name suggests, Brian's Hallicrafters

was designed specifically for the 56MHz (5m) and 28MHz (10m) bands. In fact, ranges 1 and 2 tune through 25 to 40 and 38 to 65MHz respectively.

A customer of mine with a 'Skybuddy' (a look-a-like to the 5-10) got caught by the r.f. gain control, which can be seen on the far left in the photograph. He thought the set had failed because it was 'dead', but he had overlooked turning this control clockwise until it 'clicked' on!

My piece in 'Reflections' last August about the Telefunken 'Torn. E.b.', prompted **Ragnar Otterstad OZ8RO** (Norway), to drop us a line. Nice to hear from Norway Ragnar.

Ragnar is a keen collector of Second World War communications equipment. He points out that the Torn. E.b. (Tornister Empfänger b. which means, back-pack receiver b.) was widely used by the Wermacht, and after the war was put to good use by amateurs in his native Norway.

In his letter Ragnar said "We often used a 'B2' (British suit-case transmitter receiver) with a German receiver in those days". For the past 14 years he has specialised in collecting German military and resistance sets, and he would be pleased to correspond with anyone

sharing this particular interest.

In Glasgow, **W. Gibson GM0KMG** has added an early Cossor 'Melody Maker' and a Globe 'Scout' transmitter to his collection. The former needs a

complete re-wire and the latter is missing a 6146 valve. Fortunately, the 6146 is still fairly easy to find.

## Specialised Equipment

One advantage of being a radio service engineer, is that you get the chance to repair specialised pieces of equipment. You could then try it out afterwards.

On one occasion I soak-tested an American Hammarlund HQ 180, top left Fig. 6, next to my three Eddystone receivers (680X, 770R, 770U). The repair was needed after it had been plugged in to the wrong mains voltage. Fortunately the fuses blew in time to save the mains transformer from burning up.

Valved communications receivers made by Collins, Hallicrafters National and RCA, plus those in Fig. 6, are very much sought after by collectors who wish to restore them to their former glory.

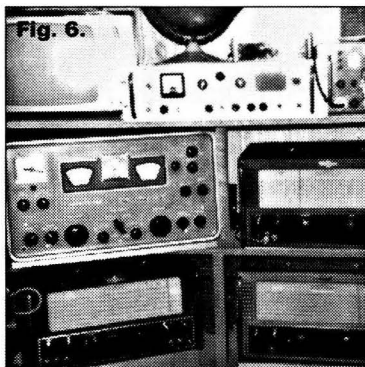
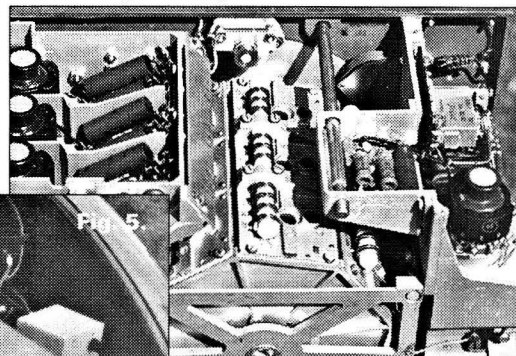
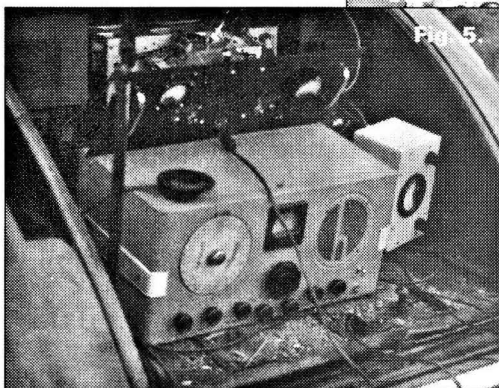
## Short Wave Bands

Finally this month, let's take it as read that the short wave bands are spread between 1.6 and 30MHz. The majority of these are in small sections dedicated to amateur, civil and military communications, science and international broadcasting.

Before the advent of instant news and satellite television, people would get up in the small hours to listen to the radio. They would meet at the home of a friend or neighbour who owned a short wave set, to listen to a special sporting event being played in some distant country.

I joined in too. Being a cricket enthusiast, I often took my Eddystone 680X off its beacon duty to hear play in a test-match coming direct from Australia, India or the West Indies. Those were the days!

See you next time, and don't forget to keep writing those 'Valve & Vintage' letters to me, whether it be with memories, tips, requests for help or suggestions. Send them to 'Faraday', Greyfriars, Storrington, West Sussex RH20 4E.







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In his column this month, Roger G3LDI will be looking back to a show last year, bringing you a new packet group, offer a few commands, and then offer a barbecue invitation for your diary later this year.

Panorama

# THE PACKET

**A**t the end of September last year I suffered a back injury, which is still giving me problems even now! It also prevented me from attending one of my favourite shows, at Leicester in October. Fortunately, Jim G4BDW, took a camera along and came back with a few photographs and a full report of what he had seen at the show.

I had to include a photograph of the PW stand with, judging by the balloons, an air of festivity for the 60th anniversary celebrations! I understand they are working on a new layout for this year. Look out for their stand, at major rallies it really is something to see.

A view of the BARTG stand at Leicester, is shown. In the foreground are, on the left, Ed G0INA who is Chairman of DANPAC and sysop of GB7BAD.

On the right is Ian Brothwell G4EAN who is the Secretary of BARTG.

## Changes At BARTG

There have been some changes at BARTG of late, and Ian G4EAN, is now in charge of rally bookings. Organisers can contact Ian if they'd like BARTG at their rally.

Mark Ashby G6WRB, is now handling sales of

BARTG's range of books, so look out for them. Listen out for Bob Canning G0ARF, who will be running the GB2ATG transmissions on 3.5 and 7MHz at 1930GMT.

This year, the BARTG Rally will be on Sunday September 12 at the Sandown Exhibition Centre. All the usual attractions will be there and admission will be £1.50 for adults and £1.00 for OAPs. Children under 14 can go in free. Further details may be obtained from Peter Nichol G8VXY.

The picture below shows the Siskin Electronics stand at Leicester. Phil Bridges on the left, must have had a good day judging by the smile on his face!

Phil and the boys at Siskin are always very helpful with their after sales service. Should you have any problems with equipment bought from them, they're very quick to sort them out.

## Group In Wales

To help the newcomers or listeners who want to become actively involved with packet, this month I'm featuring a packet group in Wales. Details of the Swiss Valley group may be found in Table 1.

If you wish to contact this group, Roy the secretary is on the telephone, or you can send a packet message to Jeff the Chairman, whose packet address is GW0JKB @ GB7AKJ.#45.GBR.EU

## Some Commands

In this section about the FBB BBS, here are some of the commands that don't seem to be used very much. Use '%' to show who is connected, outstanding mail, your message mask, FBB statistics, channels in use and connect times.

The '>' command allows you to send a message to another user of the BBS who is connected at the same time. Just type '>' followed by the user's callsign and the message you wish to deliver. This must not be longer than one line.

Use '=' and you can actually connect to another user and have a chat. Try the '=' followed by the other user's callsign. Once connected, all BBS functions cease.

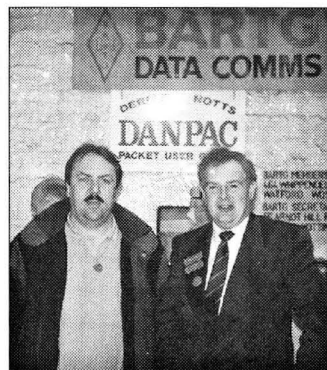
When you've both finished your chat, type a 'control+Z' to return you both to the BBS. That's it.

## Norfolk Barbecue

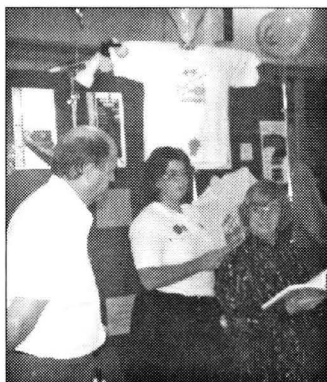
This year, our annual Norfolk packet radio group Barbecue will be held on Sunday June 27. This event must be gaining in popularity, already amateurs have booked in from Victoria, Canada and Sydney Australia! Plenty of good food, good fun and hopefully again good weather! Parking is no problem, talk-in will be on v.h.f./u.h.f.

There are to be games for the kids, prizes and, of course, a raffle! Book early to avoid disappointment. Further details from either G3PDH or myself, both of us are QTHR.

That's about all I have room for. Packet group secretaries, please let me have details of your packet group. Remember, the beginner has to start somewhere!



Two of the reprobrates looking after the BARTG stand.



Balloon's and floating T-shirts seen on the PW stand at last year's Leicester show. From the left are Mike Richards G4WNC, Elaine Richards G4LFM and Carol Mannion (G3XFD's boss)



The Siskin Electronics team, Phil bridges (left) has time to smile, it must have been a good day!

Table 1.

### Swiss Valley Amateur Radio and Data Group

The Group HQ is situated near the town of Llanelli which is in the county of Dyfed, West Wales.

The Group's Officers are:

<b>Club callsign</b>	<b>GW0SVR</b>
Chairman	Jeff GW0JKB
Secretary	Roy GW0KJZ. Tel: (0554) 820207
Treasurer	Fred GW7EMU

(All of the above are QTHR or mail can be left at GW0SVR @ GB7AKJ) Members of the group will have access to wide range of useful information, both on paper and computer disk including PC shareware programs. A yearly subscription to the group costs just £3.00.

73 de Roger, G3LDI @ GB7LDI, QTHR, tel: (0508) 70278.

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OPC288	DC lead .....
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E8F89	1.50	EY500A	3.00	QOV06-40A Mull	4.00	6BJ6	2.25	12AU7	2.25
E8F89	1.50	EZ80	1.50	QV03-12	10.00	6BN6	2.00	12AX7	3.00
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EC91	6.50	GY501	3.00	R19	3.00	6BR7	6.00	12BA6	2.50
EC333	7.50	GZ32	6.50	SP41	6.00	6BR8A	4.00	12BE6	2.50
EC335	7.50	GZ33	4.50	SP61	4.00	6BS7	6.00	12BH7A GE	6.50
EC331	2.25	GZ34 GE	7.50	U19	10.00	6BW6	4.50	12BY7A GE	7.00
EC332	2.25	GZ37	4.50	U25	2.50	6BW7	1.50	12C7	20.00
EC333 Siemens	3.00	KT61	7.00	U26	2.50	6BZ6	2.50	12HG7 12GM7	6.50
EC385	3.50	KT66	12.50	U37	7.50	6C4	1.95	30L1/2	1.50
EC388	4.75	KT66 GEC	P.D.A.	UAB80	1.50	6C6	3.50	30P4	2.50
EC391	2.00	KT88	15.00	U8F89	1.50	6C8A	3.00	30P19	2.50
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ECH42	3.50	OBE	2.70	UCL82	2.00	6CGT GE	5.25	300B(PRI)	120.00
ECB81	3.00	OC3	2.70	UCL83	3.00	6CH6	5.00	5728	70.00
ECL80	1.50	OD3	2.50	UF89	2.00	6CW4	8.00	805	50.00
ECL82	1.50	PC97	2.00	UL41	10.00	6D6	3.50	807	5.00
ECL83	3.00	PC900	2.00	UL84	2.00	6D05 GE	12.00	811A	18.50
ECL86 Mull	2.50	PCF80	2.00	UY41	4.00	6D08B	9.50	812A	52.50
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EF41	3.50	PCF805	1.70	Z803U	25.00	6H6	3.00	871A	25.00
EF42	4.50	PCF808	1.70	ZD21	3.00	6HS6	4.95	2050A GE	10.00
EF50	2.50	PCZ200	3.00	3B28	20.00	6J5	3.00	5763	10.00
EF54	4.50	PCL82	2.00	4CX250B EIMAC	75.00	6J6	3.00	5814A	4.00
EF55	3.50	PCL83	3.00	4CX250B STC	45.00	6J7	4.00	5842	12.00
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EF86	5.00	PCL86	2.50	5V4G	4.00	6J6C GE	11.25	6550A GE	15.00
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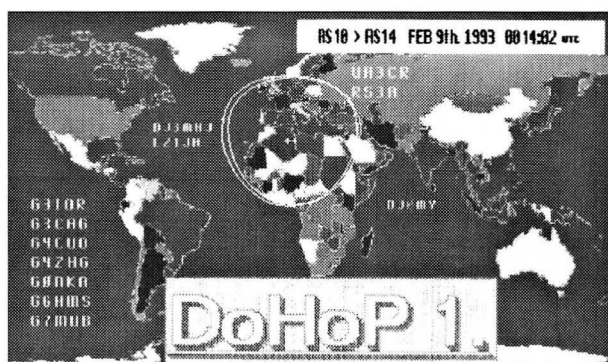


# WTF L L W T A S

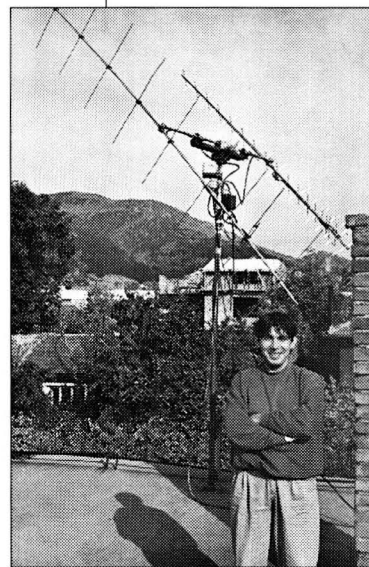
The QSL cards for MIR QSOs have been a long time coming for many. Severe



The idea is to transmit to one satellite, and have its transponded output go across space to another satellite. This satellite listens on that frequency, and then



Up in front are Richard G7MUB, Ted G6HMS and Ian G0NKA. One of the main

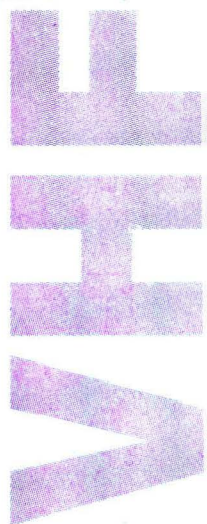


**Fig. 2: Rumen LZ1JH, one of the European DoHop participants shown alongside his 145 and 435MHz antennas.**

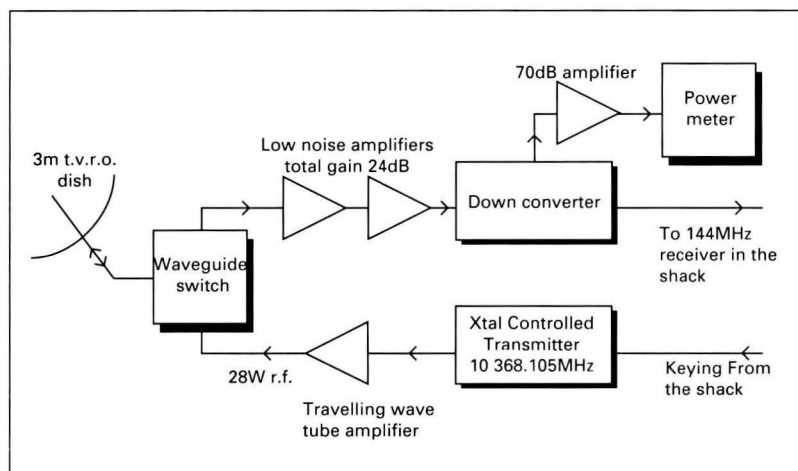
E N D



# Report



**Fig. 1: Block diagram of the 10GHz e.m.e. system used at G3WDG/G4KGC (see text).**



*This month I'm going to concentrate on activity on the microwave bands and the 10GHz band in particular. It may surprise you to know that activity on the latter band is particularly high in the UK. We lead Europe, if not the world, in microwave expertise.*

Conditions during the first two weeks of February were quite good. There were numerous v.h.f. contacts being made from the UK with stations as far away as southern France, south-east Germany and Switzerland.

Conditions were also good on u.h.f. Many people, including **G4LDR** (IO91) and **G7KQW** (IO93) reported working **HB9ASB** (JN36), **HB9AMH/P** (JN37) and **HB9MIN/P** (JN47) on the 430MHz band.

**Sam Jewell G4DDK** (JO02) reports that on February 13/14 he worked **HB9AMH/P** and **HB9MIN/P** on 10.368GHz at a distance of 684km. He also reports that **HB9AMH** also worked **G3LQR**, **G4BYV**, **G0BPU** and novice station **2E1AVS** running 3W output.

The station at **G4DDK** consists of a 600mm Andrews dish mounted on a tower at 11m above ground, and the assembly is rotated by a G600 rotator. A low noise amplifier is mounted at the dish fed by a pyramidal horn which is both wideband and uncritical in design.

An 11m length of **FSJ4-50** Heliac coaxial cable brings the microwave signals into the shack. This is where a post low noise amplifier (l.n.a.) of **WB5LUA** design, boosts the signals before going into a **G3WDG** receive converter and an **FT-221R**.

On transmit, the 144MHz i.f. is up-converted to 10.368GHz with a **G3WDG** transmit converter to drive an **ITT** travelling wave tube (t.w.t.) to 6W output. Results so far have been very encouraging with 17 locator squares worked from home with stations in **G**, **GW**, **DL**, **F**, **ON**, **PA** and **HB9**. Excellent stuff!

## Work The World

Imagine also that you were able to work the world with less than 30W, and with an antenna small enough to fit into many suburban gardens. It's not impossible, just read on!

On January 31 1993 **Charlie Suckling G3WDG** and his wife **Petra G4KGC**, made the first UK contacts via the moon on the 10GHz band. Yes, that really is 10 000MHz! **And they were only running 28W and a 3m diameter TV receive only (t.v.r.o.) dish!**

Using the t.v.r.o. dish, contacts on c.w. using the call sign **G3WDG**, were made at 2230UTC with **WA7CJO** in Phoenix, Arizona peaking 539. This was followed by a contact at 2300UTC with **SM4DHN** in Hagfors, Sweden with signals peaking at 529.

A test on the previous evening with **WA7CJO** was partially successful, with **G3WDG/G4KGC** clearly hearing the US station.

Unfortunately, the American station had pre-amplifier problems, and was unable to hear the 10GHz signals from Northamptonshire.

During the contacts made on January 31, **G4KGC** operated the equipment in the shack on a frequency of 10 368.105MHz. During this time, a hardy **G3WDG** stayed outside to keep the dish pointing at the moon!

## Echo Testing

After the contacts were made from **G3WDG**, a period of time was spent echo testing. This was done by transmitting at the moon, and then listening for the signals to come back about 2.5 seconds later.

Weak yet consistent echoes were almost immediately received, and they were loud enough to be worked if it had been another station. The echo testing proved that it's quite feasible for two stations using dishes of 3m diameter and 25W transmitters to contact each other via the moon!

## Relatively New Experience

Contacts via the moon on the 10GHz band are a relatively new experience in the history of amateur radio. The first recorded tests were conducted in October 1987 by **W3IWI** who obtained permission to use a 43m dish at the Green Bank Radio Observatory.

He then made some tests with **I4BER**, who was also using a radio telescope. But although signals were heard, a two-way QSO was not completed.

In January 1988 **WA5TNY** and **W7CNK** carried out tests using 3m and 3.7m dishes. But once again signals were heard but no complete contacts were made. Later that year, on August 27 1988, the first 10GHz e.m.e. contact was made between **WA5VJB/KF5N** and **WA7CJO**. Nowadays the log of e.m.e. 10GHz contacts and

includes **DK3UC/P**, **I4CHY/4**, **I6ZAU**, **HB9AGE**, **SM4DHN** (who made the 1st two-way s.s.b. contact on December 2 1990), **K2UYH**, **WA5TNY**, **WB5LUO**, **WA6EXV** and **W7CNK**. Now added to this unique list of microwave experimenters are **G3WDG/G4KGC**. Congratulations to **Charlie** and **Petra**!

## Remarkably Strong

The signals from the **G3WDG** set-up via the 780 000km path to the moon and back, were remarkably strong. Those from **SM4DHN** would have been 3dB stronger. But he was using circular antenna polarisation, unlike **G3WDG** and **WA7CJO** who were both using linear polarisation.

It's worth noting that circular polarisation is normally used to combat the effect of Faraday rotation. This effect is caused by the 'twisting' of an electromagnetic wave as it passes through the tropospheric and ionospheric regions.

However, above 7GHz or so the effect of Faraday rotation diminishes and by the time you reach the 10GHz region it's virtually non-existent. Therefore, if you are transmitting a horizontally polarised (linear) signal at 10GHz through the troposphere (or ionosphere) the chances are it will be received at the far end in the same polarisation plane.

If you carry out this exercise at v.h.f. or u.h.f. it's very unlikely to be received at the distant end with the same polarisation unless the path is purely line-of-sight. That's one of the reasons why the **AMSAT** people use circular polarisation to work low orbiting v.h.f. satellites.

## Doppler Shift

Perhaps we'd better look at Doppler shift and its interesting effect. No doubt you're familiar with the way that sound from a moving



vehicle's horn, changes in pitch as the vehicle comes towards you, and then changes again as it goes away from you. This effect occurs in exactly the same way with radio signals from earth-orbiting satellites (the moon is a satellite too!).

On 144MHz the effect will amount to a maximum of a few hundred Hertz, but at 10GHz it can be a few tens of kHz. The Doppler shift on echoes was about 14kHz, and was predicted accurately by the VK3UM e.m.e. program (obtainable in PC format from me by sending one 5.25inch disk, packaging and sufficient stamps) to allow the receiver to be accurately set on frequency. This is essential when using narrow i.f. filters.

Another interesting point about 10GHz signals received off the moon, is the sound of the note. It sounds rough, very similar to rain scatter, and if you heard it on the 144MHz band you might even think there was an aurora!

The effect on the reflected e.m.e. signal is caused by libration fading. This is a consequence of bouncing a signal off an irregularly shaped moon surface, and spectral spreading. On lower frequencies the fading is very rapid and causes c.w. signal to be cut up severely.

On a c.w. signal, a long dash for example might easily be translated into five dots, if the received signals are not sufficiently high above the noise floor.

## The System

The diagram, in **Fig. 1**, shows the system used at the station of G3WDG/G4KGC. In simplistic terms, the receive side consisted of an antenna-mounted low noise amplifier, in conjunction with a down converter (output at 144MHz). This fed a 144MHz/28MHz converter in the shack, and into an Icom IC-735 h.f. transceiver.

The transmit side was mounted at the antenna. It consisted of a crystal-controlled transmitter (keyed from the shack) driving an amplifier. The output was fed into the 3m t.v.r.o. dish shown in the photograph, **Fig. 2**.

More specifically, the received signals pass through a WG16 change-over relay into a h.e.m.t.

(High Electron Mobility Transistor) low noise amplifier. This amplifier has a waveguide input (to keep the losses to a low level) and the signals are then fed into another h.e.m.t. equipped l.n.a. with s.m.a. connectors.

The s.m.a. connectors are low loss devices for s.h.f. work. The total gain of the block is around 24dB.

The amplified signals are then connected to a length of thin p.t.f.e. coaxial cable (approximate loss 4dB) to allow for dish rotation. The signals are then into the antenna mounted down-converter, with the overall noise figure from l.n.a. input to i.f. output being measured as 1.1dB.

The 144MHz i.f. output from the down-converter is split into two channels. One channel feeds a 100m run of UR67 coaxial cable to a home-made m.o.s.f.e.t. converter, and the IC-735 transceiver in the shack.

The second channel is connected to a wide-band amplifier having a gain of 70dB, and fed into a Hewlett Packard HP432 power meter located at the antenna. The function of this set-up is to allow the dish to be tracked with moon noise (described later).

The transmit side, mounted at the antenna, consisted of a crystal controlled c.w. transmitter module running only 1mW output. This was sufficient to drive a Hughes 1177H t.w.t. amplifier to 28W output.

Keying of the transmitter, with a hand key at 12 w.p.m., was achieved by use of a reed relay. The relay switched the collector supply to the final multiplier on the local oscillator chain on and off, via a 100m length of flexible wire!

## Surplus Dish

As already described, the antenna at G3WDG consisted of a surplus 11GHz Andrews 3m diameter t.v.r.o. dish. This was erected on an elevation/azimuth mount, originally intended for static satellite TV use, but was modified for motor drive.

The dish was obtained surplus from a local electronics company, and it was moved to the QTH of G3WDG in November 1992. During the Christmas period, foundations were laid for the tower section, shown in the photograph, **Fig. 3**.

In January 1993 the dish

was placed on its mount and the elevation/azimuth motors fitted. This allowed the dish to rotate in azimuth between 230-280°, and in elevation between 35-27°. These limits (or moon window) allows contacts to be made with stations in Europe and North America.

The dish was obtained with the original 11GHz t.v.r.o. feed system. Fortunately, the front-fed scalar horn arrangement worked perfectly at 10.368GHz and no modifications were necessary. The only adjustment needed was to alter the polarisation angle of the feed, to that predicted by the VK3UM program.

The 3dB beam-width of a 3m diameter dish being used at 10GHz, is approximately 0.7°. Move the dish by this amount (in either azimuth or elevation) and your receive power drops by half! It's therefore very important to keep the antenna pointing at the moon with an accuracy much greater than this, because you don't want to lose precious dBs when the signals are only a few S-points above the noise floor.

Bearings in both azimuth and elevation were pre-calibrated using a compass and spirit level. They were and accurate to about one degree or so, thus enabling the dish to be positioned fairly accurately in the first instance.

A telescope attached to the dish is one method of sighting the moon, but never works if it is cloudy! The preferred method is to use moon noise. Yes, the moon does exhibit thermal noise just like the sun, but not so much!

Final positioning of the dish antenna was accomplished by looking for a peak in moon noise. This is approximately 1.7dB above cold sky, on the HP432 power meter and making adjustments at least every minute.

## Small Dish Results

Let's now look at other small dish results. For example, at the QTH of WA7CJO a total of 12 stations have now been worked via e.m.e. on the 10GHz band.

He uses a Collins h.f. transceiver at 28MHz, up-converting to 10.368GHz and then driving a t.w.t. amplifier

to 300W output. A 4.8m diameter dish is located on top of an SCR584 positioner, allowing remote control from the shack.

The e.m.e. system at the QTH of G3WDG/G4KGC presently requires two people to operate it, one in the shack and the other at the dish. In addition, the



tropo system has to be dismantled and moved up the garden taking about two hours to set up.

The Suckling team are happy to run tests with anyone capable of running on 10GHz e.m.e. You can telephone Charlie or Petra on (0933) 411446 if you want a schedule or details of the WDG kits for the 10GHz band.

## Letters And Deadlines

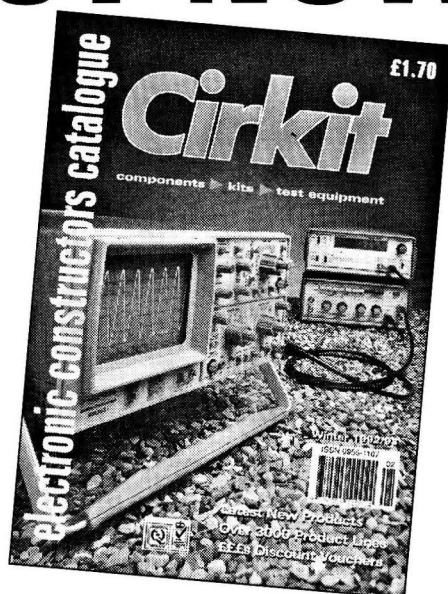
As usual please send your letters and photographs on v.h.f./u.h.f. and microwave activity to reach me by the deadline at the end of the month at the very latest. Don't forget that I can also receive messages via packet radio at my mailbox GB7TCM or at my DX cluster GB7DXC.

**Fig. 2: The simple solid dish, mounted on a small tower for the G3WDG/G4KGC e.m.e. experiments.**

E N D



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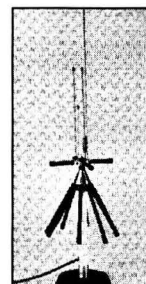
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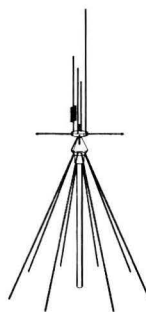


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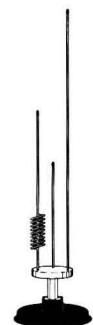


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*This month Peter looks into tape recording techniques, so you can record your favourite programmes from around the world.*

Round-up

**R**adio seems to play second fiddle to television in virtually every way. This can be seen in many different ways.

Whilst television sets have benefited from push button tuning for many years, radios with preset tuning are still in the minority. Video recorders have been around, and in common use, for several years and programming one to record favourite programmes is an everyday occurrence in homes up and down the country.

### Record Radio Programmes

When it comes to trying to record radio programmes, however, life enters a new and difficult phase! Radio recorders are definitely in the minority.

In fact, if you walk in to any electrical retailer from the large chains to local shops, you would be hard pressed to find a radio recorder. And tracing a radio recorder that offers half decent short wave reception would be next to impossible.

Why should it be difficult to get a radio recorder? There's far more drama available on domestic radio than television every day of the year.

On radio there are concerts from around the world, both classical and pop. Comedy features in radio schedules almost every day.

Clearly there is a school of thought which suggests that radio listeners just do not want - or need - to record programmes. As a reasonably ardent listener, I would disagree and I'm sure that a majority of the readers of *Practical Wireless* are of the same opinion.

### The Answer

When it comes to finding a radio recorder, what might the answer be? Fortunately, there is one radio receiver, available in Britain and the rest of Europe (and further

afield, too), which has an in-built cassette recorder.

The radio in question is made by the Taiwanese Sangean company, but is sold under a variety of different trade names in other parts of the world. Here in the UK, the old established Roberts company imports the set, calling it the RC818, whilst in Europe, Siemens market it as the RK670.

The Sangean receiver is a full coverage table-top radio, with continuous short wave from 1.615MHz to 30MHz. It also covers long wave, medium wave and f.m. (with stereo).

There are 45 memories in the receiver to program often used frequencies into. There's also a clock and alarm function switch the set on and off automatically.

The receiver's clock can also be used to set the start time for a recording to be made. There are limitations though, as no stop time can be input. This means that the tape will continue recording until it reaches the end. And only one start time can be preset.

### Performs Reasonably

The Sangean receiver set performs reasonably well on short wave. It's equipped with narrow and wide filters and can resolve single sideband with its b.f.o.

There are connections for headphones, tape output and an external antenna. The bottom line is that in the UK, the Roberts version retails at around £200, so it doesn't rank amongst the cheapest short wave radio sets on offer.

### The Solution

So what is the solution for someone who wants to record from the radio but can't spend a fortune? The answer is to buy an electronic mains time switch (of the sort often used to switch lights on at night and deter burglars).

Digital timers are now

readily available in electrical shops for about £20. Several on and off times can be programmed, and they are generally accurate timekeepers.

All you do is plug in a four or two-way extension lead and connect the power leads of a radio and a tape recorder. Then link the line output from your radio set to the line input of the tape recorder.

The next job is to tune in the receiver to the frequency of the station you want to record. Then programme the start and stop times of the item you want, and 'Bob' should be your uncle. It's cheap and effective.

Some of the newer short wave radios on the market, such as the Sony ICF-SW77 or the Grundig Satellit 700, have built-in clocks. These can control tape recorders by a remote socket, negating the need to use a mains time switch. But it's necessary to check that the remote control output actually works with any recorder you possess!

### Broadcast Bands

Now on to the broadcast bands. The biggest story to emerge recently followed swiftly on from the inauguration of President Clinton in the USA.

The President is looking for ways to save money and suggested that Radios Free Europe and Liberty could be closed. This would save some \$650 million over the next five years.

There has been a storm of protest. Senior station staff have suggested that it would be disastrous for the emerging democracies of the former Soviet Union, if the moderating voices of the Munich-based stations were to be silenced.

Even members of the Russian parliament are saying that it would be sad if the stations did close. But if they do stop, the short wave bands might be much less packed here in Europe!

### World Service

The BBC World Service restarted its Albanian service after an absence of 25 years at the beginning of March. Transmissions at present are on the air at 1830-1900 on 7.105 and 9.77MHz from UK transmitters.

The World Service will be on the Astra satellite by the time this edition of *Practical Wireless* hits the streets. If you have an Astra dish, tune to the audio sub carriers of UK Gold where you will find World Service in English, together with BBC Radios 1 and 4.

Slovak Radio from Bratislava will have an overseas service in foreign languages from the beginning of April. The complete schedule is:

English to Australasia at 1030-1100 on 11.99, 9.505 and 7.345MHz

Slovak to Europe at 1400-1500 on 6.055MHz

Russian to Europe at 1830-1900 on 9.505, 7.345, 5.96MHz

English to Europe at 1930-2000 on 7.345MHz

German to Europe at 2000-2030 on 9.605 and 5.96MHz

French to Europe at 2030-2100 on 9.605, 7.345 and 5.96MHz

English to the Americas at 0100-0130 on 9.58 and 5.93MHz

French to the Americas at 0200-0230 on 11.99, 9.81 and 5.93MHz

I suggest that you check an hour before and after the times I've given. The schedule received from the station is unclear on GMT timings against Central European Times.

Enjoy your listening on the broadcast bands, and don't forget I enjoy reading your letters which are passed on to me from the *PW* office. See you next time!

**E N D**



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RSGB'93 is organised by the RSGB Exhibition and Rally Committee.

*Trade stand enquiries to E and R Committee  
Chairman, Norman Miller, G3MVB, 178 Warley Hill,  
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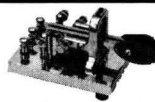
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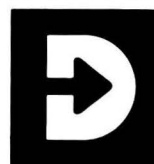
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# ARCADÉ

## The PW Shopping Arcade

Welcome to the *Practical Wireless* 'Arcade'. In this section of the magazine, you'll be able to find all those important services 'under one roof' - just like the shopping arcades you see in the High Street.

Let your eyes 'stroll through' the Arcade every month and you'll find all departments open for business including: The Book Service, PCB Service, Binders and details of other *PW* Services. Make a regular habit of 'visiting' the Arcade, because in future, you'll have the chance of seeing special book offers and other bargains. And don't forget, this Arcade is open wherever you're reading *PW*!

## Services

### Queries:

Practical Wireless,  
PW Publishing Ltd., Arrowsmith Court,  
Station Approach,  
Broadstone, Dorset BH18 8PW.

We will always try to help readers having difficulties with *Practical Wireless* projects, but please note the following simple rules:

- 1: We **cannot** deal with technical queries over the telephone.
- 2: We **cannot** give advice on modifications either to our designs, to commercial radio, TV or electronic equipment.
- 3: All letters asking for advice **must** be accompanied by a stamped self-addressed envelope (or envelope plus IRCs for overseas readers).
- 4: Make sure you describe the problem adequately, with as much detail as you can possibly supply.
- 5: Only one problem per letter please.

## Back Numbers

Limited stocks of many issues of *PW* for past years are available at £1.80 each including post and packing. If the issue you want is not available, we can photocopy a specific article at a cost of 85p 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 stamped self-addressed envelope.

## Binders

*PW* can provide a choice of binders for readers' use. Plain blue binders are available, each holding 12 issues of any A4 format magazine. Alternatively, blue binders embossed with the *PW* logo in silver can be supplied. The price for either type of binder is £5.50 each (£1 p&p for one, £2 for two or more). Send all orders to PW Publishing Ltd., FREEPOST, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW.

## Constructional Projects

Components for *PW* projects are usually readily available from component suppliers. For unusual or specialised components, a source or sources will be quoted.

Each constructional project is given a rating to guide readers as to the complexity.

**Beginner:** A project that can be tackled by a beginner who is able to identify components and handle a soldering iron.

**Intermediate:** A fair degree of experience of building radio or electronic projects is assumed, but only basic test equipment will be needed to complete any tests and adjustments.

**Advanced:** A project likely to appeal to the experienced constructor. Access to workshop facilities and test equipment will often be required. Definitely not for the beginner to attempt without assistance.

## Mail Order

All items from *PW* are available Mail Order, either by post or using the 24hr Mail Order Hotline (0202) 659930. Payment should be by cheque, postal order, money order or credit card (Mastercard and Visa only). All payments **must** be in sterling and overseas orders **must** be drawn on a London Clearing Bank.

## PW PCB Service

Orders and remittances should be sent to:

**Badger Boards, Blackberry Lane, Four Oaks, Sutton**

**Coldfield B78 4JF. Tel: 021-353 9326**, marking your envelope PW PCB Service. Cheques should be crossed and made payable to **Badger Boards**. When ordering please state the article title as well as the board number. Please print your name and address clearly in block capitals and do not enclose any other correspondence with your order.

We have talked to Badger Boards about the club and group discount on orders, and they are happy to continue this service. Club secretaries and group leaders should contact Badger Boards direct for the new discount rates.

Please allow 28 days for delivery.

Board	Article (Project) Title	Issue	Price
WR314	UHF Pre-Amplifier	Dec 92	£3.45
WR313	10MHz Transmitter	Nov 92	£4.65
WR312	Receive/Mixer (Getting Started)	Nov 92	£4.15
WR311	Oscillator BFO (Getting Started)	Sept 92	£2.60
WR310	1.2GHz Pre-scaler	Aug 92	£3.75
WR309	Volt Reg/Divide by 100	Aug 92	£3.15
WR308	TTL 1MHz Oscillator (Getting Started)	July 92	£2.20
WR307	Crystal Checker (Getting Started)	June 92	£4.25
SET	<b>WR303/304/305/306</b> Inductance Bridge	Apr 92	£19.30
WR302	GDO (Getting Started)	Apr 92	£4.75
WR301	Challenger Receiver	Feb 92	£4.75
WR300a	OSCAMP Oscillator	Mar 92	£4.75
WR300	OSCAMP Amplifier	Feb 92	£5.20
WR299	Multivibrator (Getting Started)	Jan 92	O/S
WR297/298	Additional Beaver boards		O/S
SET	<b>WR295/296</b> PW Beaver	Oct 91	£12.00
SET	<b>WR292/293/294</b> Chatterbox	Aug 91	£14.00
SET	<b>WR290/291</b> Robin Freq. Counter	Aug 91	O/S
SET	<b>WR292/293/294</b> Chatterbox	Aug 91	£14.00
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WR288	Morse Master	Jun 91	£4.89
WR286	Meon-4 (RF PA)	Jun 91	£5.54
WR287	Morse (Speedbrush)	May 91	£4.85
WR255	Meon-4	May 91	£6.76
WR285	Scope Probe PSU	Apr 91	£4.87
WR284	Scope Probe	Apr 91	£5.75
WR283	Sudden Receiver	Mar 91	£4.54
WR282	Repeater Toneburst	Feb 91	£5.10
WR281	High Voltage PSU	Jan 91	£4.70
SET	<b>WR263/264 +WR276-80</b> Marland Transmitter	Jul 90	£21.96
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WR199	Meon 50MHz Transverter	Oct 85	£5.71
WR161	Marchwood 12V 30A PSU	Oct 85	£6.83
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Please use the order form on page 65 for all items in the *PW* arcade.







# B O O K S

The books listed have been selected as being of special interest to our readers. They are supplied direct to your door. Some titles are overseas in origin.

## HOW TO ORDER. PLEASE USE THE ORDER FORM ON PAGE 65.

**POST AND PACKING;** add £1.00 for one book, £2.00 for two or more books, orders over £40 post and packing free, (overseas readers add £1.75 for one book, £3.50 for two or more for surface mail postage) and send a postal order, cheque or international money with your order to **PW Publishing Ltd, FREEPOST, Arrowsmith Court, Broadstone, Dorset BH18 8PW.** Please make your cheques payable to PW Publishing Ltd. Payment by Access, Mastercard, Eurocard or Visa also accepted on telephone orders to Poole (0202) 659930. Books are normally despatched by return of post but please allow 28 days for delivery. Prices correct at time of going to press. Please note: all payments must be made in Sterling.

## LISTENING GUIDES

### AIR BAND RADIO HANDBOOK (4th Edition)

**David J. Smith**  
Extensively revised & updated (October 1992). Air band radio listening enables you to listen-in on the conversations between aircraft and those on the ground who control them, and is an increasingly popular and fascinating hobby. A new chapter on military air band has been added. The author, an air traffic controller, explains more about this listening hobby. 190 pages. £7.99

### AIR TRAFFIC RADIO 8th Edition

**Compiled by Ken Davies**  
Completely revised (early 1992) to make this a comprehensive guide to UK airband communications. Frequencies and abbreviations used in UK air traffic control. Where to listen for tower, ground and radar control in civilian and other airports. Includes a section on off-shore oil related use. 72 pages. £4.50

### VHF/UHF SCANNING FREQUENCY GUIDE (THE)

This book gives details of frequencies from 26MHz to 12GHz with no gaps and who uses what. Completely revised and enlarged (February 1993), there are chapters on equipment requirements as well as antennas, the aeronautical bands, as well as the legal aspect of listening using a scanner. 150 pages. £9.95

### DIAL SEARCH 1992/94

**George Wilcox**  
The listener's check list and guide to European radio broadcasting. Covers m.w., l.w., v.h.f. & s.w., including two special fold-out maps. Also includes a full list of British stations, a select list of European stations, broadcasts in English and 'Making the Most of Your Portable'. 46 pages. £4.25

### FERRELL'S CONFIDENTIAL FREQUENCY LIST 8th edition

**Compiled by Geoff Halligey**  
Completely revised, much larger & spirally bound for easy use. Now covers 1.6-28MHz in great depth, all modes and all 'utility' services, with new reverse frequency listing showing every known frequency against each call sign. Who's using what frequency and mode, what's that call sign? These are some of the answers this book will help you find. 544 pages. £17.95

### FLIGHT ROUTINGS 1992

**Compiled by T.T. & S.J. Williams**  
This guide was produced with the sole aim of assisting airband listeners to quickly find details of a flight, once they have identified an aircraft's call sign. Identifies the flights of airlines, schedule, charter, cargo and mail, to and from the UK and Eire and overflights between Europe and America. 122 pages. 0/P

### GUIDE TO FACSIMILE STATIONS

**12th Edition**  
**Joerg Klingenfuss**  
This manual is the basic reference book for everyone interested in FAX. Frequency, call sign, station name, ITU country/geographical symbol, technical parameters of the emission are all listed. All frequencies have been measured to the nearest 100Hz. Included are 300 sample charts and their interpretation. 416 pages. £18.00

### GUIDE TO FORMER UTILITY TRANSMISSIONS 3rd Edition

**Joerg Klingenfuss**  
Built on continuous monitoring of the radio spectrum from the sixties until the recent past. A useful summary of the former activities of utility stations providing information for the classification and identification of 'new' & 'unknown' radio signals. 227 pages. £8.00

### GUIDE TO UTILITY STATIONS 11th Edition

**Joerg Klingenfuss**  
This book covers the complete short wave range from 3 to 30MHz together with the adjacent frequency bands from 0 to 150kHz and from 1.6 to 3MHz. It includes details on all types of utility stations including FAX and RTTY. There are 19549 entries in the frequency list and 3590 in the alphabetical call sign list plus press services and meteorological stations. Included are RTTY & FAX press and meteorological schedules. There are 11800 changes since the 10th edition. 534 pages. £24.00

### HF OCEANIC AIRBAND COMMUNICATIONS 4th Edition

**Bill Laver**  
HF aircraft channels by frequency and band, main ground radio stations, European R/T networks and North Atlantic control frequencies. 31 pages. £3.95

### INTERNATIONAL RADIO STATIONS GUIDE BP255

**Peter Shore**  
As in 'Broadcast Roundup', his column in *PW*, Peter Shore has laid this book out in world areas, providing the listener with a reference work designed to guide around the ever-more complex radio bands. There are sections covering English language transmissions, programmes for DXers and s.w.l.s. Along with sections on European medium wave and UK f.m. stations. 266 pages. £5.95

### INTERNATIONAL VHF FM GUIDE (THE)

**7th Edition.**  
**Julian Baldwin G3UHK & Kris Partridge G8AUU**  
This book gives concise details of repeaters & beacons world-wide plus coverage maps & further information on UK repeaters. 70 pages. £2.85

### MARINE UK RADIO FREQUENCY GUIDE

**Bill Laver**  
A complete guide (reprinted January 1993) to the UK s.w. and v.h.f. marine radio networks. Useful information, frequency listings and the World Marine Coastal Phone Stations. 62 pages. £4.95

### NEWNES SHORT WAVE LISTENING HANDBOOK

**Joe Pritchard G1UQW**  
A technical guide for all short wave listeners. Covers construction and use of sets for the s.w.l. who wants to explore the bands up to 30MHz. Also covers the technical side of the hobby from simple electrical principles all the way to simple receivers 276 pages. £15.95

### POCKET GUIDE TO RTTY AND FAX STATIONS (THE)

**Bill Laver**  
A handy reference book listing RTTY and FAX stations, together with modes and other essential information. The listing is in

ascending frequency order, from 1.6 to 26.8MHz. 57 pages. £3.95

### RADIO LISTENERS GUIDE 1993

**Clive Woodyear**  
This is the third edition of this radio listener's guide. Simple-to-use maps and charts show the frequencies for radio stations in the UK. Organised so that the various station types are listed separately, the maps are useful for the travelling listener. Articles included in the guide discuss v.h.f. aerials, RDS, the Radio Authority and developments from Blaupunkt. 56 pages. £2.95

### SHORT WAVE LISTENER'S CONFIDENTIAL FREQUENCY LIST 8th Edition

**Bill Laver**  
Covering the services and transmission modes that can be heard on the bands between 1.635 and 29.7MHz. The guide's main objective is to quickly direct the listener to the frequency, or band of frequencies most likely to provide the type of stations that are being sought. 187 pages. 0/P

### SOUNDS EASY The complete guide to Britain's radio stations

**Compiled by Ken Davies**  
A guide to the numerous local radio stations throughout the UK. If you do a lot of travelling this book is invaluable. Itemised by areas, it makes finding your kind of sounds easy. 52 pages. £2.95

### VHF/UHF AIRBAND FREQUENCY GUIDE 4th Edition

A complete guide to civil & military airband frequencies including how to receive the signals, the frequencies and services. VOLMET, receiver requirements, aerials and much more about the interesting subject of airband radio are included. 123 pages. £6.95

### WORLD RADIO TV HANDBOOK 1993

Country-by-country listing of l.w., m.w. & s.w. broadcast and TV stations. Receiver test reports, English language broadcasts. The s.w.l.s 'bible'. £15.95.

## ANTENNAS (AERIALS)

### AERIAL PROJECTS BP105

Practical designs including active, loop and ferrite antennas plus accessory units. 96 pages. £2.50

### ANTENNA EXPERIMENTER'S GUIDE (THE)

**Peter Dodd G3LDO**  
Although written for radio amateurs, this book will be of interest to anyone who enjoys experimenting with antennas. You only need a very basic knowledge of radio & electronics to get the most from this book. Chapters include details on measuring resonance, impedance, field strength and performance, mats and materials and experimental antennas. 200 pages. £8.90

### ANTENNA IMPEDANCE MATCHING

**Wilfred N. Caron**  
Proper impedance matching of an antenna to a transmission line is of concern to antenna engineers and to every radio amateur. A properly matched antenna as the termination for a line minimises feed-line losses. Power can be fed to such a line without the need for a matching network at the line input. There is no

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### ARRL ANTENNA COMPENDIUM (THE) Volume One

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Because antennas are a topic of great interest among radio amateurs, ARRL HQ continues to receive many more papers on the subject than can possibly be published in *QST*. Those papers are collected in this volume. 208 pages. £9.50

### BEAM ANTENNA HANDBOOK

**W. I. Orr W6SAI & S. D. Cowan W2LX**  
Design, construction, adjustment and installation of h.f. beam antennas. The information this book contains has been compiled from the data obtained in experiments conducted by the authors, and from information provided by scientists and engineers working on commercial and military antenna ranges. 268 pages. £7.50

### G-QRP CLUB ANTENNA HANDBOOK (THE)

**Compiled and edited by P. Linsley G3PDL & T. Nicholson KASWRI/GWLNQ.**  
This book is a collection of antenna and related circuits taken from *Spratt*, the G-QRP Club's journal. Although most of the circuits are aimed at the low-power fraternity, many of the interesting projects are also useful for general use. Not intended as a text book, but offers practical and proven circuits. 155 pages. £5.00

### HF ANTENNA COLLECTION (RSGB)

**Edited by Erwin David G4LOJ**  
This book contains a collection of useful, and interesting h.f. antenna articles, first published in the RSGB's *Radio Communication* magazine, between 1968 and 1989, along with other useful information on ancillary topics such as feeders, tuners, baluns, testing and mechanics for the antenna builder. 233 pages. £9.50.

### INTRODUCTION TO ANTENNA THEORY (AN) BP198

**H. C. Wright**  
This book deals with the basic concepts relevant to receiving and transmitting antennas, with emphasis on the mechanics and minimal use of mathematics. Lots of diagrams help with the understanding of the subjects dealt with. Chapters include information on efficiency, impedance, parasitic elements and a variety of different antennas. 86 pages. £2.95

### NOVICE ANTENNA NOTEBOOK

**Doug DeMaw W1FB**  
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### PRACTICAL ANTENNA HANDBOOK

**Joseph J. Carr**  
As the name suggests, this book offers a practical guide at everything to do with antennas, from h.f. to microwaves. It also has sections on propagation, transmission lines, antenna fundamentals and a helpful introduction to radio broadcasting and communication. The book neatly balances a practical approach with the minimum of mathematics, good diagrams and a lively text. 437 pages. £19.95

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### W1FB'S ANTENNA NOTEBOOK

**Doug DeMaw W1FB**  
This book provides lots of designs, in simple and easy to read terms, for simple wire and tubing antennas. All drawings are large and clear making construction much easier. There is no high-level mathematics in this book, just simple equations only when necessary to calculate the length of an antenna element or its matching section. 123 pages. £6.95

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### YAGI ANTENNA DESIGN

**Dr James. L. Lawson W2PVP**  
This book is a polished and expanded version of a series of articles first published in *Ham Radio* following on from a series of lectures by the author, who was well-known as the expert on Yagi design. Chapters include simple Yagi antennas, loop antennas, effect of ground, stacking and practical antenna design. 210 pages. £10.95

### 25 SIMPLE AMATEUR BAND AERIALS BP125

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# BOOKS

useful reference book covering all aspects of solid-state design. Topics include transmitter design, power amplifiers and matching networks, receiver design, test equipment and portable gear. 256 pages. £10.95

## RANSMISSION LINE TRANSFORMERS

**Jerry Seveck W2FMI**  
This is the second edition of this book, which covers a most intriguing and confusing area of the hobby. It should enable anyone with a modicum of skill to make a balun, etc. Topics include analysis, characterisation, transformer parameters, baluns, mismatch transformers and simple test equipment. 270 pages. £13.50

## RADIO

### AIR & METEO CODE MANUAL

**12th Edition**  
**Joerg Klingenfuss**  
Detailed descriptions of the World Meteorological Organisation Global Telecommunication System operating FAX and RTTY meteo stations, and its message format with decoding examples. Also detailed description of the Aeronautical Fixed Telecommunication Network amongst others. 358 pages. £18.00

### HIGH POWER WIRELESS EQUIPMENT

**Articles from Practical Electricity 1910-11**  
**Edited by Henry Walter Young**  
A reprint of interesting practical articles from the very early days of radio, when materials and methods described are from another era. Subjects covered ranges from aerials through detectors to things like Tesla and his wireless age. 99 pages. £7.70

### PASSPORT TO WORLD BAND RADIO

**1993**  
This book gives you the information to explore and enjoy the world of broadcast band listening. It includes features on different international radio stations, receiver reviews and advice as well as the hours and language of broadcast stations by frequency. The 'blue pages' provide a channel-to-channel guide to world band schedules. 416 pages. £14.50.

### RADIOTELETYPE CODE MANUAL 12th Edition

**Joerg Klingenfuss**  
This book gives detailed descriptions of the characteristics of telegraph transmission on short waves, with all commercial modulation types including voice frequency telegraphy and comprehensive information on all RTTY systems and c.w. alphabets. 96 pages. £11.00

### SCANNERS (Third Edition)

**Peter Rouse GU1DKD**  
A guide for users of scanning receivers, covering hardware, antennas, accessories, frequency allocations and operating procedures. 245 pages. 0/P

### SCANNERS 2

**Peter Rouse GU1DKD**  
The companion to *Scanners*, this provides even more information on the use of the v.h.f. and u.h.f. communications band and gives constructional details for accessories to improve the performance of scanning equipment. 261 pages. £10.95

### SHORT WAVE COMMUNICATIONS

**Peter Rouse GU1DKD**  
Covers a very wide area and so provides an ideal introduction to the hobby of radio communications. International frequency listings for

aviation, marine, military, space launches, search and rescue, etc. Chapters on basic radio propagation, how to work your radio and what the controls do, antennas and band plans. 187 pages. £8.95

### SHORT WAVE RADIO LISTENERS' HANDBOOK

**Arthur Miller**  
In easy-to-read, non-technical language, the author guides the reader through the mysteries of amateur, broadcast and CB transmissions. Topics cover equipment needed, identification of stations heard & the peculiarities of the various bands. 207 pages. £7.99

### WORLDWIDE HF RADIO HANDBOOK

**Martyn R. Cooke**  
This book lists high frequencies used by aircraft and aeronautical ground stations. Divided into sections, Military, Civil, etc. The book should be easy to use. 124 pages. £6.95

### WRTH EQUIPMENT BUYERS GUIDE

**1993 Edition**  
**Willem Bos & Jonathan Marks**  
A complete and objective buyer's guide to the current short wave receiver market. For the novice and the experienced listener, this guide explains how to make sense of the specifications and select the right radio for your listening needs. 270 pages. £15.95

### 1934 OFFICIAL SHORT WAVE RADIO MANUAL

**Edited by Hugo Gernsback**  
A fascinating reprint from a bygone age with a directory of all the 1934 s.w. receivers, servicing information, constructional projects, circuits and ideas on building vintage radio sets with modern parts. 260 pages. £11.60

## BEGINNERS

### BEGINNER'S GUIDE TO RADIO 9th Edition

**Gordon J. King**  
The book takes you in logical steps from the theory of electricity and magnetism to the sound you hear from the loudspeaker. Radio signals, transmitters, receivers, antennas, components, valves & semiconductor, CB & amateur radio are all dealt with. 266 pages. £14.95

### ELECTRONICS SIMPLIFIED - CRYSTAL SET CONSTRUCTION BP32

**F. A. Wilson**  
Especially written for those who wish to take part in basic radio building. All the sets in the book are old designs updated with modern components. It is designed for all ages upwards from the day when one can read intelligently and handle simple tools. 72 pages. £1.75

### SIMPLE ELECTRONICS CIRCUIT AND COMPONENTS Book One (THE) BP62

The aim of this book is to provide an in-expensive but comprehensive introduction to modern electronics. 209 pages. £3.50

## INTERFERENCE

### INTERFERENCE HANDBOOK (USA)

**William R. Nelson WA6FGG**  
How to locate & cure r.f.i. for radio amateurs, CBers, TV & stereo owners. Types of interference covered are spark discharge, electrostatic, power line 'many' cures' are suggested. 250 pages. £9.50

## DATA REFERENCE

### INTERNATIONAL TRANSISTOR EQUIVALENTS GUIDE BP85

**A. Michaels**  
Possible substitutes for a popular selection of European, American and Japanese transistors and includes devices produced by over 100 manufacturers. 299 pages. £3.95

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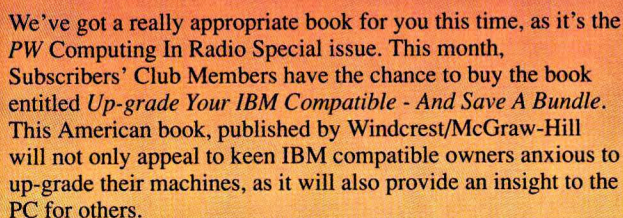
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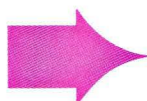
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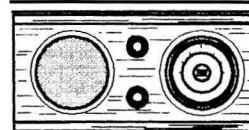
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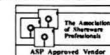
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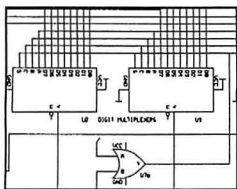
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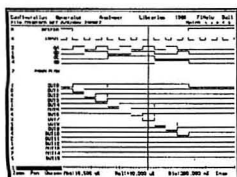
# Electronic Designs Right First Time?

## Schematic Design and Capture

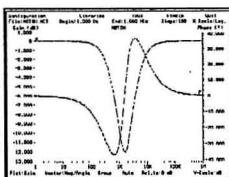


Create your schematics quickly and efficiently using EASY-PC Professional. Areas of the circuit can be highlighted on screen and simulated automatically using PULSAR, ANALYSER III and Z-MATCH II our simulation programs.

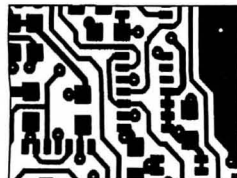
## Digital and Analogue Simulation



Modify the configuration and change component values until the required performance is achieved.



## PCB Design



The design, complete with connectivity, can then be translated into the PCB. The connectivity and design rules can be checked automatically to ensure that the PCB matches the schematic.

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# Computer Control of the FRG-8800

Many Yaesu radios support a facility for the external control via a computer of most of the functions, which can be both useful and entertaining, says Norman Dilley G8YBT.



I used the BBC micro, as I had one laying around, although any computer that has the facility of a serial port that has a capability of running at 4800 bauds could be used to control the FRG-8800.

The optional Yaesu FIF232 interface unit was used in conjunction with the FRG-8800 as it is necessary to isolate the computer from the radio and provide the correct timing of the data bits sent. For the benefit of those using a BBC micro the following diagram, **Fig. 1**, of the pin connections may help. Note the link between CTS and RTS, this will prevent the computer from waiting for a ready signal to send data from the serial port as there is no handshake with the radio.

There is also a facility provided for monitoring the automatic gain control (a.g.c.) level of the received signal. This will provide an on screen display of signal strength or for use in station selection within the program. This data can be fed to the analogue/digital converter port, but care should be taken not to exceed the maximum working voltage of the converter.

running the program.

External control on

Power on

Frequency set to 7MHz

Mode set to LSB.

Any changes made under computer control could be logged and displayed accurately. It was found that when a series of commands are entered from within a program, the computer's speed in executing the commands confused the radio's processor and an artificial delay of 30ms between each command had to be included. The other very confusing problem is the frequency control. The handbook for radio clearly states the format that is required in order that the command can be executed, but it is not such a simple matter in practice to perform the operation.

First, it is necessary to break the

case letters are variables. The colon signifies the end of the statement.

$f = \text{freq}/10$  :  $m = \text{INT}(f)$  :  $k = f - m$  :  $d = k * 100$  :  $k = \text{INT}(d)$  :  $d = d - k$  :  $h = d * 100$  :  $d = \text{INT}(h)$  :  $h = h - d$  :  $h = h * 100$

The frequency is now broken down into the required elements as m, k, d, h.

$m = m/10$  :  $k1 = (m - \text{INT}(m)) * 10$  :  $m = (\text{INT}(m) * 16) + k1$   
 $k = k/10$  :  $k1 = (k - \text{INT}(k)) * 10$  :  $k = (\text{INT}(k) * 16) + k1$   
 $d = d/10$  :  $k1 = (d - \text{INT}(d)) * 10$  :  $d = (\text{INT}(d) * 16) + k1$   
 $h = h/10$  :  $k1 = (h - \text{INT}(h)) * 10$  :  $h = (\text{INT}(h) * 16) + k1$

The element numbers are converted to their decimal equivalents.

$\text{freq\$} = \text{CHR\$}(h) + \text{CHR\$}(d) + \text{CHR\$}(k) + \text{CHR\$}(m) + \text{CHR\$}(01)$

The string freq\$ can now be sent to the radio in the correct format. Whilst this may not be the most economical way of working out the routine, it is hoped that it may be easily understood and it does work.

## Applications

Finally, it is really a matter of what you wish to do with the radio and how complex you want to make your program. The possibilities are endless, but here are a few suggestions to kindle your thoughts.

Auto scanning, station selection dependant upon real time, station selection dependant upon signal strength, almost unlimited memory channels, beacon monitoring and propagation studies, etc.

I hope that this short article might inspire those of you with any of the Yaesu CAT control equipment to sit down and have a go. Good luck!

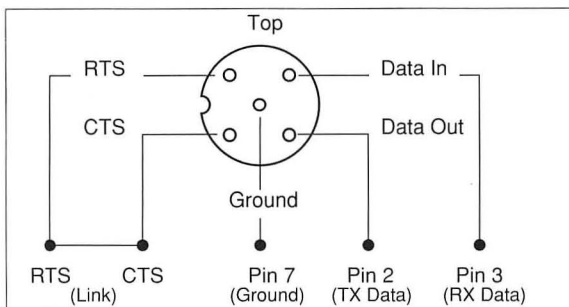


Fig.1: View looking at the RS423 port on computer.

## The Software

The basic essentials required in software to control Yaesu equipment is fairly straightforward with a couple of exceptions.

As no information is sent back to the computer as to the status of the equipment under control, care should be taken to first initialise the radio so that the computer has a starting point for reference. In my simple program, I set up the following series of commands that were executed upon

decimal number entered into four parts and then convert those numbers into their decimal equivalent as if they were Hexadecimal. The resulting numbers can then be entered as a string in the order required, which all sounds double-dutch on paper! The following sub routine may be helpful in explaining the problem. Frequency entered is freq. All lower

COMPUTING  
IN RADIO



# Build Your Own Computer

**Since the first 'Bits & Bytes' appeared in *PW*, several readers have written to Peter Hunter GOGSZ asking if he would publish a list of parts needed to build a computer, with some instructions on how to put it all together.**

Rather than spoil the text of this article with lots of abbreviations in brackets, you'll find a full explanation of all such abbreviations in the 'Jargon Box' elsewhere on these pages.

I am going to build a computer that will be ideal for the beginner and the seasoned user alike. It will be simple enough for the novice to put together, as well as easy and economical to upgrade at a later date. This system will be usable in the shack, and be capable of running amateur radio software and hardware. The price that it will cost to put together will depend largely upon your own requirements.

All of the items used for this project were loaned to me by Mike Harper of 3TH Ltd., but can be purchased from a number of places, see the equipment showcase for alternative suggestions.

## Buy a Kit or Bit by Bit

It doesn't matter whether you buy all the bits in one go, as in a kit, or one or two items at a time over a period of months. The main reason for building your own computer is not only (or necessarily) to save money, it is so that you can learn the functions of the various parts, and how they all fit together. All this knowledge will be invaluable

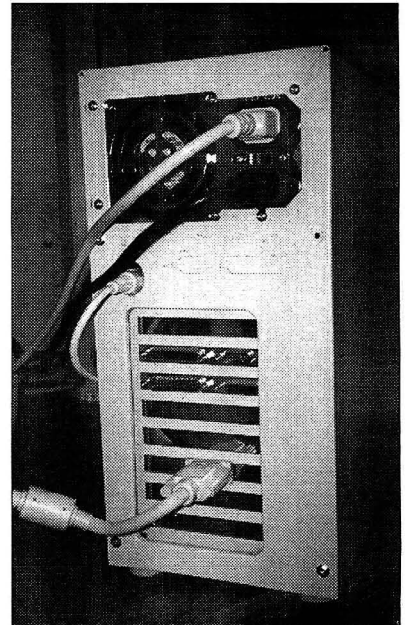
if anything goes wrong, or when you want to upgrade, or expand, the computer system at a later date.

The other benefit of building your own computer is that you can decide on the quality of your system. You can build a very good, reliable computer, by only using top quality items. Or you can build a much cheaper computer by using the very low cost parts. You can, if you wish, buy all the parts second-hand from magazine adverts or at your favourite rally. Or, of course, you can mix 'n' match! The choice is yours.

Please beware though if buying at a rally or auction. That 'unbelievable bargain' may turn out to be money down the drain. If you are not sure of what you are doing try to take a friend with you, someone who knows what to look for, or buy from some of the reputable firms who can be found at the rallies. When buying second-hand be cautious. If possible, ask to see it working before parting with your money. Also, even when buying new from a well-known company, remember that you won't get gold for the price of brass! If you want quality you'll have to pay for it. With these points in mind, GO FOR IT! Building your own computer is great fun, and gives a terrific sense of achievement.

## Where to Start

This is the time to stop worrying, there is absolutely NO soldering to do. In fact, all you should need in the way of tools is a Philips (cross point) screwdriver, and maybe a pair of long nose pliers.



*Here, all cables are fitted, the cover is on & all is done.*

The first thing to do is take the lid off the case. Most cases have one or more screws at the rear. Remove these and the outer case lifts off. (Some cases have covers that slide off. One or two of the 'economy priced' cases have 'flip-top' lids that just lift up like a car bonnet!) As you can see from the photographs, I used a case that is extremely well made and not in the least bit 'flimsy', unlike some you can buy.

Inside, I found a package containing all the screws, etc., for fixing the motherboard and drives in place, (though if you bought the case second-hand you may well have to find these from elsewhere). Also included was a set of rubber stick-on (or push-on) feet. Fix these to the bottom of the case now, this will avoid scratching your work-top as you build.

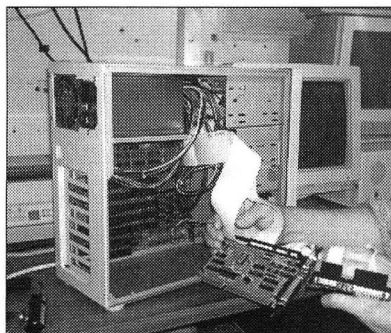
It's a good idea at this stage to make sure of a good earthing point, so as to remove the static from your body.

**COMPUTING**  
IN RADIO



## Fit the Power Supply First

If you bought the case and power supply separately, it's a good idea to fit the power supply first. As there are so many different types, it's impossible to explain exactly how to do this. However, with the case flat on the table, and the front facing you, the p.s.u. normally fits at the back of the case in the right-hand corner, with the fan to the rear. If you are worried about continuing, don't! Most of the time people buy a case with the power supply already fitted. This is by far the best method to go for, and often the cheapest. Again, if buying second-hand, remember that not all p.s.u.s fit all cases!



*It is best to fit cables to the multi I/O card first.*

The motherboard is the next item to be fitted. This was supported in the case by several plastics pillars, and one or two brass threaded supports. First, I laid the board inside the case and decide which holes the pillars line up with. (The expansion slots on the board had to line up with the 'covered' openings on the rear of the case. The socket for the keyboard, and the power connector strip on the motherboard, are usually close to the power supply).

After securing the motherboard in place, I plugged in the power supply leads. These

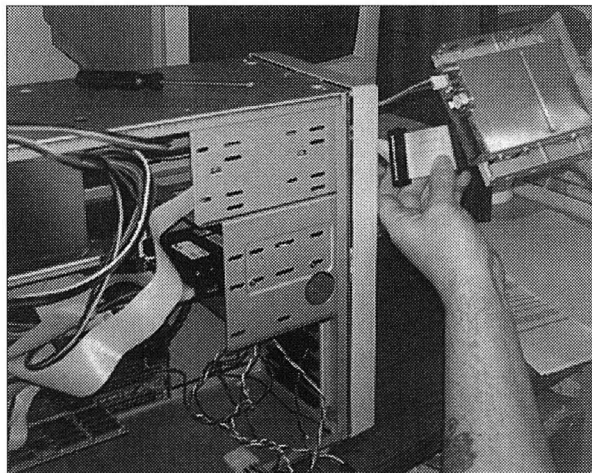
were two flat plugs with six coloured wires on each, they were marked P8 & P9, and just pushed on to the long connector on the motherboard. If you can't work out which goes where, just remember that all the **black** wires must be together.

Then plug the Video Adaptor into one of the expansion slots.

It doesn't matter which slot you use, though it's best to leave those nearest the power supply free for the drive controller, so as to avoid straining any cables. You may need to remove one of the blanking plates from the rear of the case. These are secured with just one screw at the top of the plate. Keep the screw handy as you'll need it to secure the adaptor card in place. The gold-fingered edge-connector at the bottom of the card pushed into the expansion slot on the motherboard, with the metal supporting bracket towards the rear of the case.

Plug the monitor video lead (that's the one with a 'D' plug on the end) into the socket on the rear of the video card. Plug the monitor mains lead into the computer's power supply (or a mains socket, depending upon your set-up). Plug the lead from the computer into a mains socket (if you haven't already done so). Then, I switched on at the mains and at the computer on/off switch. This didn't make the computer work properly of course, but it did display several error messages on the

screen, as the drives and keyboard are not yet fitted. The whole idea of this is to make sure the power supply, motherboard, video card and monitor, are all working OK before going any further. If everything seems alright then switch off the computer, and switch off at the mains as well.



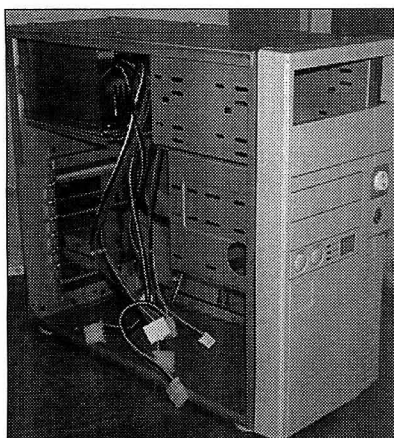
*When fitting the floppy drives, it may be easier to feed cables through the opening first*

## Now for the Drives

I then fitted the drives in place. It doesn't matter which drive goes in first, this will depend on the type of case you are using, how many drives you have and where they are going to live in the case. I fitted the hard disk first. This was a 3.5in drive and was best located in a 3.5in slot. You can, if you wish, fit this in a 5.25in slot with the use of an adaptor kit. The manner in which you fit this drive will depend on the case you've bought, but these are easy to fit. Each drive will (normally) be held in place by two to four small threaded screws. It's a good idea though, to fit the cables first. With modern drives there are only two cables to each. One cable is from the power supply, a four wire lead, which terminates in one of the four pin connectors, and just plugs into the appropriate socket on the



rear of the drive. These are designed to fit one way only. The other lead is the drive 'data' cable. This is a multi-wire ribbon cable that connects the drive to the controller or interface card on the motherboard. The one to the floppy drive has 34 wires, the one to the IDE hard drive has 40 wires. The red, or blue, stripe **must** go to pin 1 on the drive and on the controller.



*The mini tower case with cover removed. A well built & sturdy case.*

The Floppy drive is fitted in much the same way as the hard drive. I fitted a 3.5in 1.44Mb drive. I placed this drive in one of the 5.25in slots by using the adaptor kit supplied. Floppy drives are normally inserted through the FRONT of the case. This means that it is sometimes much easier to feed the cables through the hole in the front of the case, and fix these to the drive first, then you can insert the drive and secure it in place.

## The Drive Controller

I found it best to fit all the cables to the controller card before putting the card into the computer. I used what's known as a 'MULTI I/O CARD'. This card has a controller for up to two floppy drives, an Interface for up to two IDE hard drives, two serial ports, one parallel

port, and a games (joystick) port. All on one small card!

I plugged the cables onto the various sockets, observing the 'RED WIRE/PIN 1' rule. (Most of the time pin 1 will be towards the FRONT of the computer, BUT NOT ALWAYS!). All connectors should be marked, so you shouldn't have any problems.

The I fitted this into the computer in the same way that I installed the video card.

## Finishing Touches

I took the lead from the keyboard, that had a five pin round plug on the end of it, this went round the back of the case and plugged into the socket on the rear of the motherboard. Again, this was designed to only fit one way. AND THAT WAS IT!

Well, it was almost done, really. That was the physical work finished. All I had to do now was check to make sure everything looked secure. It's a good idea at this stage to leave the cover off of the case until you have proved the computer works OK.

## Formatting the Hard Disk

If you purchased your Hard drive from 3TH Ltd and bought a copy of MS-DOS at the same time, then the drive will have been formatted and the operating system already installed for you. So all you need to do now is make sure all the cables are properly connected, and power up the computer.

If, for whatever reason, your hard drive has not been formatted then you have a few more things to do. First, you **must** have a copy of DOS. This

may be MS-DOS, PC-DOS, or DR-DOS. Put the START-UP disk in the Floppy drive, (or drive 'A' if you have more than one), and press a key (if you have switched on, if not, then switch the computer on now).

When the A:\> prompt appears on the screen, type FDISK and press the ENTER key. This will ask you questions, normally pressing the ENTER key three times will be all that is needed. This will, of course, depend on the version of DOS you are using and the capacity of the hard disk. So read the manual about FDISK (formatting a hard disk). What FDISK does, is to make one or more partitions on the hard disk, so that you can load DOS onto it.

When that's done (only takes a few seconds) you then have to



*The complete system up and running successfully.*

FORMAT the hard drive and make it 'bootable' (make the computer start up from the built in drive, rather than from a floppy drive). Just type FORMAT C: /s - the command 'format' can be in capitals or small letters, it doesn't matter, the C: tells DOS that you want to format the hard drive, this is the letter designated to the drive by DOS. The '/s' tells DOS to transfer the SYSTEM files to the drive after formatting has finished. Some versions of DOS do all this in one go.

There are too many possible alternatives to print them all



here, so PLEASE, read your manual, or get a friend to help. When this is all done, switch off the computer, remove any floppy disks from the drive(s), and switch the computer back on. If you have done everything right the computer will start-up from the built-in drive. However, there is one other thing you will have to do, and that is to tell the computers built in memory what configuration you have. At this stage it has no way of knowing what floppy drives, hard drives, RAM, etc., that you have.

When you switch the computer on it will likely report errors and tell you to press a combination of keys to run SETUP (sometimes just F2). This key combination will depend on the make of BIOS on your motherboard. What happens is that you tell SETUP what the date and time is, what drives, monitor, RAM etc you have. When this is done, all of this information is then saved to the CMOS, and kept there when the computer is switched off, by means of the built in battery. And that really is IT!

## Final Word

As a final word, I must thank Mike Harper of 3TH Ltd for loaning these items to me. I have been extremely impressed with the superb quality of all of the various parts. These items are from the middle of their range. The thing that impressed me the most was the amount of r.f. screening on everything. The motherboard was of a high standard and caused no interference. The case is so well built it should last a life time. The leads from the monitor and keyboard to the computer both have suppressors at each end. The monitor, a Goldstar 14in SVGA Low Radiation colour monitor, is flicker free, has an

## Jargon Box

**XT** = eXtra Technology. A trade mark of IBM, the XT was a vast improvement on the original PC.

**AT** = Advanced Technology. A trade mark of IBM, the AT was an incredible improvement over the XT, and the doorway to better things.

**IBM** = International Business Machines.

**IDE** = Integrated Drive Electronics. As the name might suggest, an IDE drive has its controller INTEGRATED within the electronics circuit board attached to the drive. Therefore it only needs an 'INTERFACE' either plugged into one of the expansion slots, or actually included on the motherboard itself.

**MOTHERBOARD** = This is the name of the main circuit board. The motherboard holds all the main controller chips, the system RAM, the BIOS chips, the CPU and co-processor if fitted. All of the expansion slots are also (normally) on the motherboard. These boards come in various sizes, therefore the number of slots on them also varies.

**RAM** = Random Access Memory

**ROM** = Read Only Memory

**CMOS** = Complementary Metal Oxide Semiconductor

**CPU** = Central Processor Unit. This is the main processor that the system is often named after. For instance a 286 machine has an 80286 CPU. The XT has either an 8088 or 8086 CPU. An AT has an 80286. The term AT is often used to describe a 386 or 486 machine. The order, in terms of power, is: 8088, 8086, 80286, 80386SX, 80386DX, 80486SX, 80486DX.

**Mb** = Megabyte, a term used to describe the amount of storage space on a (hard or floppy) disk. Roughly speaking 1 Megabyte will hold one million characters, therefore, a 40 Megabyte hard drive will have storage space for (approximately) 40 million characters (or bytes).

**SERIAL PORT** = Often called an RS232, or a COM port. This is where you connect such things as a TNC when you want to COMMUNICATE with other computers. Can also be used for a serial printer.

**VGA** = Video Graphics Array. A trade mark of IBM, used to describe the standard of graphics a monitor and display adaptor is capable of. VGA is very much the 'standard' now, being taken over by **SVGA** (SUPER VGA). Other standards are MDA, CGA, EGA. BIOS = Basic Input/Output System.

excellent colour display, and comes with a built in tilt and swivel base. The hard disk drive, a 40Mb IDE drive, made by IBM, was very quiet and extremely fast.

As I wrote this article on the computer I built, I know it works OK! Also, I have used it next to my h.f./v.h.f./u.h.f. equipment, it has been running v.h.f. packet, and h.f. PACTOR and it caused no interference what so ever. All in all a first class system, ideal for any shack.

If you would like to know more. Please contact **3TH Ltd.**  
**48, Hutchcomb Road, Oxford**  
**OX2 9HL. Tel: (0865) 791452.**  
**FAX: (0865) 794267.**

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## Parts & Price List

This is a list of the parts I have used for this project, and the price of those parts as per the current price list supplied by 3TH Ltd.

**Case** = Mini Tower case, with r.f. shielding, plus 200W power supply unit fitted. £90.00 or Desktop case, with 200W p.s.u. fitted £75.00

**Motherboard** = 12MHz 80286, six slots, AMI BIOS, built-in clock/calendar. Compact size with 1Mb Ram £85.00 or 33MHz 80386SX, seven 16 bit slots, AMI BIOS, clock/calendar, up to 16Mb RAM on board £110.00

**Keyboard** = High quality Fujitsu £45.00  
**VGA controller** = This one was a standard VGA card, with 256K RAM on board £35.00

**Monitor** = 14in Non-Interlaced Low radiation Super VGA Colour, up to 1024x768 resolution £290.00

**Hard drive** = IBM 40Mb IDE drive £120.00

**Floppy drive** = 3.5in 1.44Mb Citizen drive £37.00

**Multi I/O card** = 2FD/2HD/2S/1P/1G with cables £22.00

All prices are exclusive of VAT. This is just an example of the prices from 3TH Ltd.



# Computers and the Lond

**With the excellent London Amateur Radio & Computer Show at Picketts Lock coinciding with publishing deadlines, Mike Richards G4WNC has included a short report of his computer findings.**

If you're not confident about going to rallies and buying computer purchases alone, then make sure you take a friend who's had experience in buying and/or building computers.



*Lots of i.c.s. were available from Oasis Computer Systems.*

## Packaging

You should be very wary of any computer boards that are not properly packed. This is particularly true of complex motherboards and the like. If they are just left laying around, with no protection, they may well be damaged. Not only are they likely to be physically damaged but, more seriously, static damage may have occurred. I've seen people shrug-off this risk as being unimportant, but I can assure you it's deadly serious.

The reason it's often overlooked is because the damage is rarely terminal at the time of handling. This leads people to think they've got away with it. However, static damage more often causes either

impaired performance or premature failure.

As an example of the seriousness of static protection, you will find that all quality registered suppliers

use static protection at all points where boards are at risk. In fact, many manufacturers won't buy from suppliers unless they can demonstrate that they have effective static protection systems.

So before you build up the bits you've just bought, I would personally recommend you invest in a static

protection kit. This would typically contain a wristband and grounding lead.

## Back to the Rally

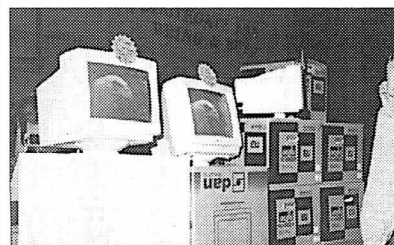
When looking around rallies, it's not a bad idea to ask if the company has a catalogue of computer goods. If they do, there's a good chance they've been around a while and are not just off-loading some surplus kit. I don't want to overstate the dangers, but it's important to be aware of the pitfalls. On the brighter side, you do find some very good prices at rallies.

Anyone wanting to build a PC would have found a distinct lack of motherboards at the London



*Ready-built computers on display from Trident Systems.*

Show. Most of the bargains were with peripheral devices, such as disk drives and video monitors. You could also have been very tempted to buy one of the many ready-built systems that were in abundance. There were many different types available with compact tower systems providing a very neat and compact option. Most of the computer stands featured very impressive SVGA graphic demos that made good use of the power of the 386 and 486 processors.



*Lots of monitors were available from Loutronics.*

## Storage Devices

Probably the most common peripheral at the show was disk drives of all shapes and forms. As an example, Display



# on Amateur Radio Show



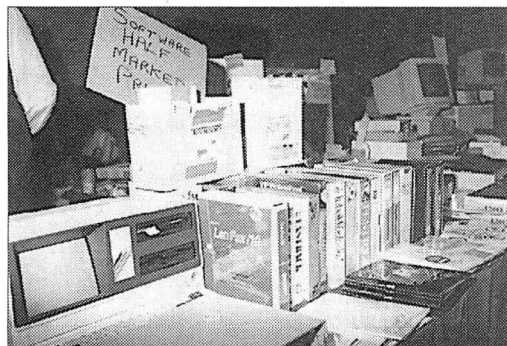
Electronics were offering 3.5in 1.44Mb drives at £29.95 each. They also had 40Mb hard drives at a very good £99 each.

Whilst looking around, I also picked-up a copy of the Loutronics catalogue. This

were a little higher than the rally specials. However, there were still some very good deals available. Just by way of icing on the cake, most of the Loutronics



Software & systems from Oasis Computer Systems.



A wide variety of software on show with Trident Systems.

contained lots of goodies ranging from complete tailor-made systems down to simple cables and adaptors. As you would expect, the catalogue prices

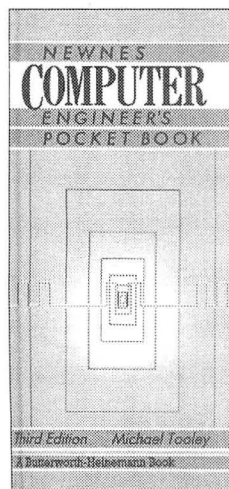
products are supported with at least a three month warranty. One particular bargain that caught my eye was the range of Samsung 14in monitors. These were ex-demonstration examples featuring SVGA compatibility and 0.28 dot pitch (1024 x 768 interlaced). The price was a remarkable £199 inclusive of VAT. There were also some very good system cases in the catalogue. A typical example was an XT/AT mini high-rise case

complete with 200W p.s.u. and turbo/reset/speed l.e.d.s for £70 inclusive.

## Worth A Visit

As you can see, the London Amateur Radio & Computer Show was certainly well worth a visit and made a good starting point for those looking for computer bits. Why not consider one of the other large rallies in the year?

## Computer Books



**Newnes Computer Engineer's Pocket Book**  
by Michael Tooley  
Price £10.95 plus £1 P&P

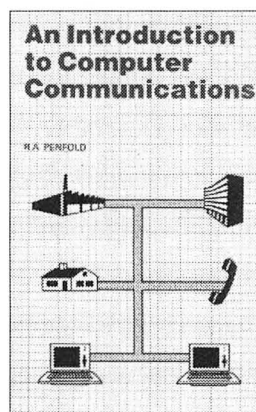
Probably one of the biggest stumbling blocks for the newcomer into the world of computers and programming is the jargon. This book has the first section devoted to abbreviations and 'jargon'.

The next section looks at integrated circuit technology, including a functional cross reference for the 7400, 4000 and 4500 series of logic i.c.s. It also includes the pin-out information of the common packages.

The book covers 8-bit and 16-bit c.p.u.s and has brief descriptions for the 6502, 6809, Z80, 8066 and 6800 devices.

Having covered the basic hardware, the next chapters deal with the software side of computing. A very useful section for those into software, is about the decimal/hexadecimal/octal/binary/ASCII conversion table. This is well laid out and easy to interpret, it covers the best part of five pages in the book.

Also dealt with are high level languages, amongst other topics, really too numerous to list here.



**An Introduction to Computer Communications BP 177**  
by R.A. Penfold  
£2.95 plus £1 P&P

Connecting an ordinary home computer to the telephone system, via a modem, opens up a whole new world of possibilities. Computer enthusiasts can communicate directly between each other, vast data bases of all types of information can easily be accessed and other services, such as ordering by computer, become a reality.

Other types of computer communication like local networking or, for the more adventurous, via radio links, are also possible.

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Kenwood or ICOM radio can be tuned to correct for doppler shift. They will connect directly to the Yaesu 5400B controller but can easily be interfaced to most rotators. The cards are controlled by either Quiktrak or Instantrak.

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We are able to supply a wide range of public domain and shareware software for all aspects of amateur radio. For example we can supply a FAX program which uses just a simple interface to display superb pictures or TX/RX CW and RTTY with a similar interface or even designing your own YAGI antennas. Send for a catalogue today.

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# Equipment Showcase

A Round-up by Peter Hunter G0GSZ

## Computer Books

If you need books on any subject within our hobby, don't forget to have a look through the list in the **Practical Wireless Book Service**. They carry a small range of very suitable computer books for the radio amateur. Give them a ring on (0202) 659930.

**Bernard Babani (publishing) Ltd.** The Grampians, Shepherds Bush Road, London, W6 7NF. Tel: 071-603 2581.

Babani publish books on a wide range of subjects, especially Computer Interfacing and project books. Also on the list are books for all aspects of electronics and amateur radio subjects. These books are normally pocket size, around 100 pages, and cost less than £5. Send an stamped self-addressed envelope to the above address for a catalogue.

## Computer Clubs

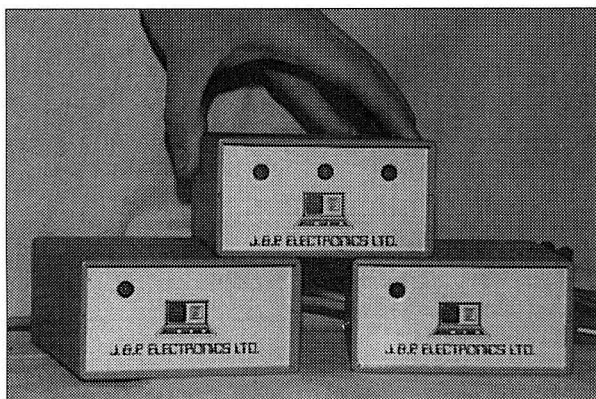
**Amiga Amateur Radio User Group.** Bob Wellbeloved G3LMH, 8 Orchard Close, South Wanston, Winchester, Hants. SO21 3EY. This is a club set up to help Radio Amateurs who are using Commodore Amiga computers. Membership, as well as all other aspects of the club, is FREE. The club library has a very large collection of amateur radio software for its members. Just send the disks and return postage, for all the software you need. Members receive a regular newsletter, called

Amiga Airwaves. It is well worth joining just for a copy of this very informative newsletter. Send an A5 stamped self-addressed envelope (24p stamp) to the above address for full details.

**The Commodore Club 64/128.** Paul M Timmins GONDV, 60 Bramwell Street, Netherthorpe,

dedicated to the MSX computers, has a large PD/Shareware library (which includes programs for c.w. Packet, AMTOR, etc.). Annual fee is £12. Please send an s.s.a.e. to the above address if you need more information.

**UKEUG (Einstein User Group).** If you are using an Einstein computer, then



*J & P Electronics software is available for a wide range of machines.*

Sheffield S3 7PA. The Commodore Club caters for the C64/128 machines, and is probably the best source of amateur radio software for these machines. Membership is free of charge. However, as this is a 100% VOLUNTARY organisation, you MUST enclose return postage (s.s.a.e). For more information write to the above address, or send a packet message to GONDV @ GB7SYP.

**MSX Computer User Group.** David Webb G7JAK, 11 Ayscough Avenue, Spalding PE11 2QB. Tel: (0775) 711108. This user group,

you may find it worth while contacting the UKEUG. The contact address is: Graham Bettany, Upland Centre, 2 Upland Road, Ipswich. IP4 5BT.

**British Amateur Radio Teledata Group (BARTG).** Not strictly a computer club, but, as most people use their 'shack' computer for at least ONE data comms mode, it is well worth joining the ONLY group who cater for these needs. And if that doesn't convince you then the groups journal **DATACOM** should.

Contact: Peter Adams G6LZB, 464 Whippendale Road, Watford, Herts WD1 7PT. Tel: (0923) 220774/

## Computer Supplies, Consumables

**CLP Computer Supplies Ltd.** Unit 7, Holland Way, Blandford, Dorset DT11 7TA. Tel: (0258) 459544.

If you need **anything** for your computer site then CLP are worth a call. Floppy disks, disk boxes, paper, envelopes, continuous (fan-fold) card (ideal for DIY QSL cards or 'calling' cards), address labels, disk labels, label remover sprays, they even sell a range of software. They are one of the only mail order firms I know that will sell you printer ribbons individually (most only sell five or six at a time), and all prices **include** postage. Free samples of paper and card etc available on request, as is their extensive catalogue.

**Inmac UK Ltd.** Stuart Road, Manor Park, Runcorn, Cheshire WA7 1TH. Tel: (0344) 301144 (South) (0928) 579345 (North). Although Inmac are mainly for the 'bulk' buyer, large office supplies, etc., they will quite happily cater for the needs of the small quantity user. Some items are only available in bulk, i.e. printer ribbons are in boxes of five or six, but the money you save on buying this way is well worth the outlay. Inmac are also the suppliers of the highest quality disks I have ever seen. Their PLUS 80 range has a clipping level as high as 80%. Give them a ring and they will send you a catalogue.

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## DATA-CAL Corporation

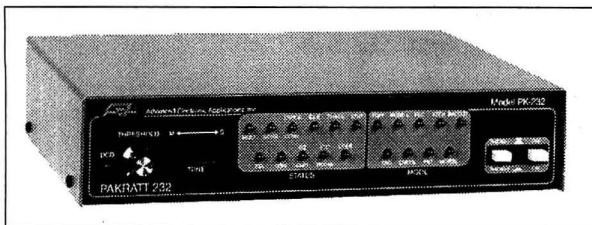
**UK.** Publicity Centre, Hendon Road, Sunderland, Tyne and Wear SR9 9XZ. Tel: (0345) 667766. Data-Cal produce all those niceties that you often wish you had but didn't know they existed. Like keyboard templates for your favourite software, or blank ones that you can fill in yourself. Or like replacement letters that stick on top of the keys, like braille stickers for the top of the keys. There isn't room here to list everything they do, so why not give them a call and ask for a catalogue.

**LINEFEED.** 59A Hilda road, London E16 4NQ. Tel: 071 474 1765. These are suppliers of (blank) computer disks and disk boxes at **very** reasonable prices. Of special interest to Amstrad PCW and CPC owners are their 3in disks at £15.95 for 10.

## Computers & Computer Bits

**3TH Ltd.** PO Box 482, Oxford, OX2 9RP. Tel: (0865) 791452. Not just a supplier of PC Kits, but a supplier of all the bits. Together with lots of technical support and advice. If you want to build your own computer but don't want to buy a kit, then this could be the place. From a simple connecting cable for that extra drive to a complete power user system. Phone for a brochure and price list.

**Advanced Digital Devices (UK) Ltd.** Braehead, Stonehaven, Scotland AB3 2XJ. Tel: (0569) 63003. Add (UK) Ltd can supply anything computer. One of their lines is the Mitsumi internal CD-ROM kit at a



*The AEA PC332 as supplied by Siskin Electronics Ltd.*

current price of just £189.00, which includes the internal interface plus a shareware disk holding some 630Mb of programs. They also have one of the worlds largest BBSs with in excess of 25 Gigabytes on-line. The BBS is on (0569) 64300, why not give them a call and log-on.

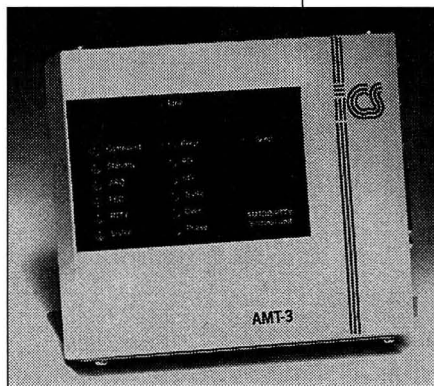
**Suredata.** Unit 5, Stanley House, Stanley Avenue, Wembley, Middlesex HA0 4JB. Tel: 081-902 5218.

If you want a good second-hand Amstrad (PC or PCW). Or some replacement parts, or a repair job by someone you can trust. Then look no further. Suredata can also help with upgrading your tired old XT to a 286 or 386 'flying machine'. Look out for Suredata at all the good rallies.

**First Choice Computer Maintenance Ltd.** 1 The Grove, Houghton Conquest, Bedfordshire MK45 3LA. Tel: (0234) 741540. This is the company to contact if you need a hard disk for your PC. They buy up liquidation stock and sell it to you at a much reduced price. The majority of the drives are either MFM or RLL, though they normally have a range of SCSI and ESDI drives as well. They also stock the controllers and cables for these drives. If you want to upgrade your

XT or AT and you are short of cash, this is the place to go.

**Country Wide Computer Marts.** 19 Ashmore Close, Blandford, Dorset DT11 7UH. Tel: (0258) 453730. Not a computer supplier as such, but an organiser for computer marts/auctions. Phone the above number and they will send you a copy of their latest list of venues. These events are well worth visiting even if you don't want to buy.



*Data Equipment, the AMT-3 unit from ICS Ltd.*

**Matmos Limited Electronics.** Unit 11, Lindfield Enterprise Park, Lewes Road, Lindfield, West Sussex RH16 2LX. Tel: (0444) 482091 FAX: (0444) 484258. Matmos have a constantly changing stock of complete computer systems, as well as all the individual parts needed to build or upgrade your own PC.

Their prices are very competitive. Phone or FAX them for a current stock/price list.

**Hobbykit Ltd.** Unit 19, Capitol Industrial Park, Capitol Way, London NW9 0EQ. Tel: 081-205 7485. This really is one of the cheapest places to buy the bits you need to build, or upgrade, a computer. They will even build the computer for you, to your own specifications.

**C.I.C Office Supplies & Computer Installations.** Copplestone House, 3/4 Sudley Terrace, Sudley Road, Bognor Regis, West Sussex PO21 1EU. Tel: (0243) 824000. CIC are specialists in computer installations. They can supply a wide range of new and second-hand computers. CIC have also produced a very easy to use, yet powerful log-book

program for amateur radio use. This program costs £9.95, but if you mention the 'Bits & Bytes' column in *PW* they will give you a discount on that price.

**Loutronics,** Micro House, 11 Hercies Road,

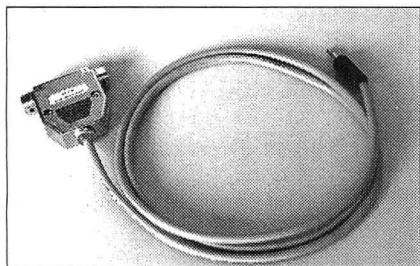
Hillingdon, Uxbridge, Middlesex UB10 9LS. Tel: (0895) 255399. This company has been around for 16 years and can supply many of the bits you may need for your computer, as well as the technical back-up needed to maintain them. They stock both new and used equipment for the PC. Often seen at the larger rallies and have a wide range of stock available.



## Data Communications Equipment

### Siskin Electronics Ltd. 2

South Street, Hythe, Southampton SO4 6EB. Tel: (0703) 207155/207587. If you need **anything** for data communications, then these are the people to contact. Not only PacTor, Packet, AMTOR and RTTY controllers, but all the other bits as well. Like connecting cables, software (often FREE!), books and tapes on how



*j.Com transceiver interface.*

to recognise the tones and use the mode correctly. Their range of multi-modes is second to none (like the AEA PK232 in the photo). Not only that but the computer as well. Siskin can get you up and running on the popular modes regardless of your computer make. If you need advice or information they are glad to help.

**AMDAT.** 4 Northville Road, Northville, Bristol BS7 0RG. Tel: (0272) 699352. AMDAT carry a wide range of data comms equipment, especially packet TNCs on cards that slot inside your PC. They also sell the 'KANSAS CITY Tracker', which (amongst other things) allows you to control your rotator from your computer.

**ICS Electronics Ltd.** Unit V, Rudford Industrial

Estate, Ford, Arundel, West Sussex BN18 0BD. Tel: (0903) 731101. This is the place to go if you want a wide selection of FAX and WEATHER-FAX equipment, especially if you intend operating /MM. But not just FAX of course, all other data modes are catered for as well. The photograph shows their AMT-3 Terminal unit for AMTOR and RTTY. All you need is a computer.

**j.Com.** Box 194, Ben Lomond, CA 95005, USA. Tel: (408) 335 9120. Whilst j.Com is not strictly

a data comms supplier, they do produce a wide range of economically priced transceiver control computer interfaces. They also produce a very interesting range of

amateur radio software, and non computer related add-ons for your shack equipment. Their catalogue is packed with interesting goods.

## Public Domain & Shareware Societies

All Software is for the IBM PC and compatibles, unless otherwise stated.

**Public Domain and Shareware Library (PDSL).** Winscombe House, Beacon Road, Crowborough, East Sussex TN6 1UL. Tel: (0892) 663298. If it is in the Public Domain, either as Shareware or Freeware, and its worth having, then you will find it in this **very** comprehensive catalogue.

PDSL also produce a CD ROM disk called 'LIBRIS BRITANNICA' that has over 2500 disk volumes on, and costs around £85. Whilst all the advertised software is for the PC, they also have the widest range of CP/M software that I know of, and, with over 10 years of service as a Shareware Library, you know they are good.

**ARC Software Ltd. 3** Richlans Road, Hedge End, Southampton, Hants SO3 4HU. Tel: (0489) 782110. Discs are just £2.50 each. ARC have compiled a selection of shareware software titles of special interest to *PW* readers.

**Shareware Marketing.** 3a Queen Street, Seaton, Devon EX12 2NY. Tel: (0297) 24088. One of the leading names in the field of shareware. Disks prices are very competitive at £3.00 + VAT each, service and support is top class.

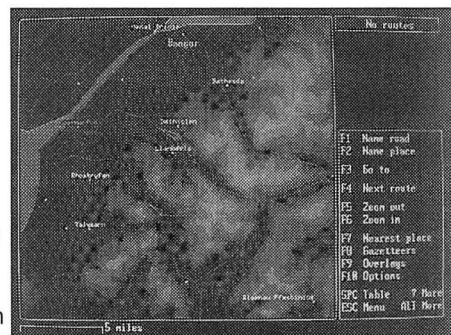
**Softville Computer Supplies.** 35 Market Parade, Havant, Hampshire PO9 1PY. Tel: (0705) 498199. I have been using Softville almost since they started, and have had pleasure watching them grow from strength to strength, and they have done it

by giving good, reliable service. Not only are Softville's prices VERY competitive at £2.00 per disk inclusive of VAT and postage, they are three libraries in one. They cater for the PC, Atari ST, and

Commodore Amiga. The Atari and Amiga catalogues are on disk only, (cost 75p), whereas the PC is in printed form. Phone them for more information and/or a copy of their latest catalogue.

**Norwich City Shareware Library (NCSL).** 6 Gurney Close, Costessey, Norwich, Norfolk NR5 0HB. Tel: (0603) 747782. NCSL is one of the newest libraries for PC Shareware. They have thousands of programs to choose from. Disks are £3.00 each, inclusive of P&P. Catalogues are supplied on disk or printed, at £1.00 each (fully refundable from first order).

**Readycrest Ltd.** Terry Dansey GOBIX. 19 Hill Chase, Walderslade, Kent ME5 9HE. Tel: (0634) 687168. Contact these for 'All things Computer', from Hewlett Packard to WordPerfect and beyond. Their 23 dealerships include: NEC, Borland, Microsoft and Miracom Modems. Readycrest is the UK agent for **all**



*Nextbase Autoroute screen.*

software produced by Joe Kasser W3/G3ZCZ. Always a large quantity of Modems in stock so that you can make use of their BBS (The BIX-BOX) on (0634) 200931.

**AK Shareware.** 54 Sheldrake Road, Mudeford, Dorset BH23 4BP. Send £1.50 for a



'catalogue on disk'. Current stock is in excess of 10 000 files.

#### **Pocketware. 78**

Kimberly Avenue, Newbury Park, Ilford, Essex IG2 7AS. Tel: 081-983 8686. Catalogues are supplied on 3.5in disk.

## **Software**

### **J & P Electronics Ltd.**

Unit 45, Meadowmill Estate, Dixon Street, Kidderminster, Worcestershire DY10 1HH. Tel: (0562) 753893. If you have an IBM PC or clone, and you want to enter the world of data comms but your budget is tight. Or, if you have almost any non IBM computer, then these are the lads to contact. Their packet modem for the PC is just £50! This same price will also get you on packet with an ATARI ST or a Commodore 64. If you have a Spectrum never fear, you can get a Deluxe modem (with FREE software) for £75. Not bad prices compared to the cost of a 'normal' TNC.

#### **Technical Software.**

Richard Wilmot GW3RRI. Fron, Upper Llandwrog, Caernarfon, Gwynedd LL54 7RF. Tel: (0286) 881886. If you need software for your BBC, Commodore 64, VIC 20, or Spectrum. This company has a large choice for you to enjoy. Their prices are very competitive. Ask them about their RX-8 Multimode Receive System.

#### **BOSCAD Ltd.**

16 Aytoun Grove, Balldridgeburn, Dunfermline, Fife KY12 9TA. Tel: (0383) 729584. Boscad have produced a Morse training package for both the PC and Atari ST. Not just practice for receiving CWc.w. but you can attach your key

(straight or paddle) to the supplied interface and practice sending as well. Suitable for anyone learning, or re-learning the code. Price is £30. A free demo version is available. This was reviewed in Short Wave Magazine, July 1991

Super-Duper is a contest logging program. If you want to log stations as fast as you can work

you want a copy of the best Morse code training program available for the Atari, then this is for you. It comes on one disk and is FREE!. Contact **LAPD (Shareware Library)**. 80 Lee Lane, Langley, Heanor, Derbyshire DE75 7HN. Tel: (0773) 761944/605010.

**Clarke Computer Services.** 20 Silverdale



*RX-8 Multimode Receive Software from Technical Software.*

them, then this is for you. The price, just £20, includes a very informative manual. SD is written, and sold, by **Paul O'Kane EI5DI**. 36 Cookill, Sandford, Dublin 18, Republic of Ireland.

Shacklog is a log book program for your shack. It will do everything you could ever want from an 'electronic' logbook. The current price is £27.50 and is available from its creator, **Alan Jubb G3PMR**. 30 West Street, Great Gransden, Sandy, Bedfordshire SG19 3AU. Also available from Alan Jubb, but written by John Linford G3WGV. And distributed on behalf of the Chiltern DX Club, is a program called LOG. This is a Contest Logging Program that allows you to concentrate on making contacts. It comes with a very well written printed manual, and costs £25.00.

**Morse Tutorial.** For the ATARI ST range. This program is written by George Butler G4BXU. If

Crescent, Aldershot, Fordingbridge, Hants SP6 3JZ. They have produced a very good database program for all you scanner enthusiasts. It is called Scanner Database and, as the name suggests, keeps record of all your scanner frequencies, and lets you find any frequency/station very quickly. Scanner Database is available on 3.5in or 5.25in disc and costs £8.50.

#### **NextBase Ltd.**

Headline House, Chaucer Road, Ashford, Middlesex TW15 2QT. Tel: (0784) 421422. If you do a lot of travelling and have to constantly consult a map, then you need a program called *Autoroute*. This will display a map of your route on your PC screen, as well as allowing you to print this map on virtually any printer. It will also compile a complete route plan. And much much more besides. For a demonstration disk write to, or phone, NextBase Ltd.

## **Items/Suppliers**

**MONOLOGUE** is a 'Memory Resident Text-to-Speech Utility'. Monologue will work on any IBM compatible PC with at least 384K of memory (640K recommended) running DOS version 3.0 or later. It will work with any text software (Word Processor, Spreadsheet, etc.) and will convert the text to speech. Works best with a sound card, or the Covex Speech Thing. Price at time of writing is £89. For more information contact. **iANSYST**, United House, North Road, London N7 9DP. Tel: 071-607 0187.

#### **Interconnection Ltd.**

322 Guildford Road, Bisley, Surrey GU24 9AD. Tel: (0483) 797418. For all cables, connectors and accessories for the PC. If these people don't have what you need I will be amazed.

#### **Lightwave.**

Unit 18, Wirral Business Centre, Dock Road, Birkenhead, Merseyside L41 1JW. Tel: 051-630 5003. For quality tested computer cables and accessories. Cables and connectors for any use, not just computers. Minimum order value of £10.

#### **S & S International.**

Berkley Court, Mill Street, Berkhamstead, Herts HP4 2HB. Tel: (0442) 877877. If your computer has caught a virus and you can't shift it, then these are the people to contact. The 'world famous' Dr Solomon's Anti-Virus Toolkit will give you total protection and peace of mind.

This is only a small sample of the items available for the computer that may interest the radio amateur. Sorry if I haven't covered your favourite supplier, I have tried to cover some of everything'.



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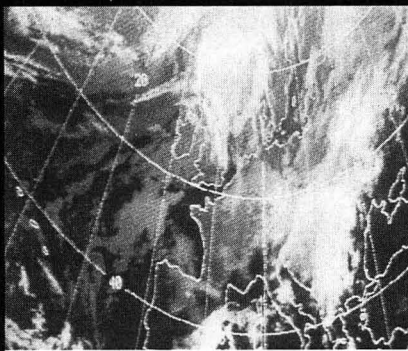
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# A Packet Experience

by John Denton G4USF

**"Four years ago I knew nothing at all about packet radio, although that's not quite true I suppose. I think I knew that those short rasping noises on 144.650MHz were packet stations talking to each other, then again if they were 'talking' to each other how come no microphones! Yes perhaps it is true to say I knew nothing", says John Denton. This short article shows how things changed in just 12 months.**

I remember wondering what the attraction was in having a station where one was able to dispense with the need for a microphone, and even, heaven save the mark, leave the thing to do its own operating in your absence.

Then a friend, who had been operating packet for some considerable time, invited me round to his shack for a demo. Well, he showed me all this stuff going on by nodding a bit. I must say I came away feeling a bit shell shocked.

I must have convinced my friend that I was interested however, because some days later he asked me if I would like to borrow his TNC as he was building another one. Well I thought, 'if you insist then' and duly collected said TNC hoping that I would not be asked what TNC stood for.

All the necessary cables were provided for me to connect the TNC to my Einstein computer and TR-9000 144MHz band transceiver, I switched on and tuned to 144.650MHz f.m., before I could say 'packet radio' all that funny stuff I had seen before was going up my monitor screen.

## Mesmerised

I suppose I sat in some sort of mesmerised state looking at the screen for quite a few days before things began to make some sort of sense. At that stage my thoughts turned to moving from being an s.w.l. (in this case - short wave listener) and began to read the manual with a view to contacting someone, or something, on this new device.

Having spent of a few minutes with the manual, I typed in a destination callsign, in this case the one of a packet mailbox, more commonly known as a BBS. This means bulletin board station.



*The Pac-Comm TNC-220 is a widely used v.h.f./u.h.f. packet TNC.*

I pressed the function key on the computer for 'auto-connect'. Within a few seconds, the bell in the computer rang and 'connected to GB7AAA' appeared on my monitor screen. Even as I sat in amazement, the display changed to 'WELCOME NEW CALLER, PLEASE REGISTER YOUR NAME BY TYPING 'N' FOLLOWED BY YOUR NAME'.

So, of course, I obediently typed 'N JOHN' and pressed the send key, I was then confronted with an invitation to ask the mailbox to do something for me by a single line of command letters ending with 'NEXT JOHN', this means 'what do you want me to do next John?'

I sent 'LL10', which I had read would produce a list of the last 10 messages held on the mailbox. I don't know why 10, I could have asked for any number really. Again, like magic, the mailbox obliged by displaying for me a neat list of 10 message titles complete with information on size, who put it there, who it was to etc., Many messages are available for all to read.

Message number 12345 looked interesting so I sent 'R 12345'. This means 'read message number 12345'. Within a few seconds, the message started to display on the screen. Had I wished I could have saved this either to my printer for one hard copy or to disk so I could make as many copies as I wanted. Of course, I spent some time connecting to various mailboxes, there are lots of them now, and reading messages that interest me.

## Beginning to Bite

The bug was beginning to bite, so the next day I connected to the local mailbox and believe it or not it remembered me!

Yes, it said 'HELLO JOHN' and told me when I last connected. Also it told me that I had unread mail, well really!

This called for a quick reference to my idiot card and I saw that I should send 'RM' meaning 'read mine' in order to see this mysterious unread mail. Well, a few moments after having sent 'RM' I was presented with a message from my friend hoping that I was managing to operate the new set-up, etc. Having remembered to send this message to the printer I sent 'KM' meaning, of course, 'kill mine'. This deletes the message from the BBS, the BBS system operators (Sysops) prefer users to do this so that message numbers are kept to a minimum. The mailbox obliged and my screen read 'THAT'S DONE, NEXT JOHN'.

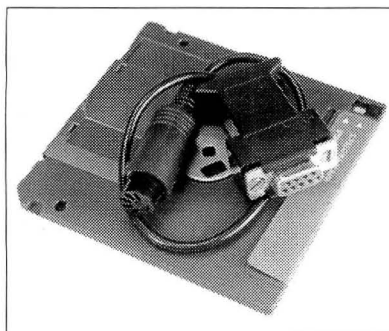
Having read my first message, I was, of course, thinking this must be replied to and consulted my instructions again. My friend's callsign is G4USG, so I sent 'S G4USG' this means 'I want to send a message to G4USG', the mailbox then asked for a title for the message so I sent 'HELLO' (very original!). In a few moments I was invited to send the message and this was done, the instructions were quite simple and only required that I finish with '/EX' on its own on the last line. Everything appeared to have worked OK as the BBS displayed the now familiar 'NEXT JOHN'.

I felt at this stage that I should check to see if this faceless wonder had actually committed my message to G4USG to memory so I sent 'LL 4'. This, I figured, would list the last 4 messages so I hoped to see my message at the top, sure enough there was my message at the top of the list waiting for G4USG to connect and read it.

Having turned on my printer I sent 'R2469' and obtained a copy of my message to my friend, maybe this packet lark was not such a black art after all!

COMPUTING  
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Mini-Pac, this is really a v.h.f. TNC!

## Live Contact

After getting a bit of practice at using the mailboxes, I thought it's time to try something different, so I decided to try to connect to my friend's station. I sent 'C G4USG' and up on the screen came 'connected to G4USG', along with the ding of the bell in the computer. Now it is a bit different to be connected to and ordinary station rather than a BBS and I had done my homework on this. It is important that the correct simple procedure I adopted - it goes like this.

My friend having seen from his screen display that I have connected won't do anything until I send my message and indicate that I have finished. So, I sent my message and showed I had finished by a few chevrons (>>>>) after the last word. It is all very

easy going on packet radio, no need to worry if typing speeds are slow or distraction requires you to stop for a minute.

Now it was my turn to sit and watch the screen while a reply was being sent to my message. Again, I knew I must wait for the chevrons before I replied again. This procedure saves the annoyance of receiving answers to questions that you haven't sent yet!

Of course, as I progressed I learned how to transfer computer programs over the air, and also how to take onto disk any of the many computer programs and interesting document files that have been placed on the BBS by other users.

## Contacts Abroad

Making contacts outside the country is very simple. All you have to know is the local BBS callsign of the station you wish to send to. It works like this - if I wish to send to VK9XXX and his local BBS was VK9ZZZ, I would send 'S VK9XXX @ VK9ZZZ'. The mailbox would go through the same routine as if I was sending a local message as I was typing it in, but probably overnight it would be sent on the start of its journey to VK land.

In my case, the message starts out on the 144MHz band, I can leave it to the BBS system to sort out the route that will probably include a satellite stage. Anyway, in a few days time when I log on to the BBS, it might say 'hello John you have unread mail'.

The bug had got me, I guess, within a day or two of borrowing the TNC, which I learnt later was a terminal node controller. I was by then hoping that my friend having insisted I borrow the thing, would not insist on having it back. He



A pair from Pac Comm. The TNC-320 packet controller sits on top of the Pactor.

didn't and shortly afterwards I owned it.

It is difficult I think, for a person with no experience of packet radio to appreciate what it is all about. It is also difficult perhaps for a person using packet radio to define exactly what is so fascinating about it.

Anyone considering packet radio needs to have a bit of feeling and liking for computers, but they certainly don't need to be an expert. I find it a very interesting mode to run as well as, not instead of, other modes.

That's it then, a short account of my first days on packet radio. I hope it will inspire others to have a go.

# Lucid Morse

## Tutorial Program Review

**Peter G Rayer G-13038 has tested this Morse tutorial package for the Atari ST that is available in the Public Domain.**

This Morse tutor consists of one double-sided disk, available from several public domain libraries, if you register with the author of the program you get a further disk, a lead to connect your own Morse key into the joystick port of the computer and an index sheet to guide you through the tutorial.

The tutor will run on a standard 520STFM, providing it has a double-sided drive and either a colour monitor or television.

My own system was attached to a high-resolution mono monitor, so that was replaced by a 14in portable television. Setting-up was very quick and easy.

The complete program consists of twenty-six independently run files, each with its own clear and concise

documentation, which is well suited to the complete beginner who has no previous knowledge of the code, or the more experienced person trying to improve speed and technique. If you follow the files through in their intended order, you start to learn the code in easy stages. Supported by good graphics, the lessons and tests are graded to meet the test requirements of both Novice and Class A licences.

The ways of teaching will suit most people, it has the 'etching' method, where you have the character sent several times so that your brain records it. You can learn the characters by seeing di dah dit, etc., and guessing the letter or numeral before it is displayed, or you can learn by the EISH TMO method, where you learn the characters by 'association and relation'. That's the way the RAF taught telegraphists in the sixties.

With the Morse test out of the

way, this tutor will help you gain confidence during your first QSOs on c.w. The tutor contains helpful information such as the phonetic alphabet, abbreviations used in the c.w. QSO, specimen 'rubber stamp' contacts, a typical QSO and the Q code.

The lead for the Morse key connects to the joystick port, which to me, seems a better idea than using the serial port as some other tutors do. If you do not have a Morse key at this stage, you can use the right hand button of your mouse, but I found this to be unsatisfactory as the rhythm was not the same as holding a Morse key. Also prolonged use may damage your mouse.

The tutor has 'timed test pieces' for you to send, you can then see how you are progressing and you will know when you are ready to sit your official Morse test.

## Conclusions

I found the tutor easy to use, I was surprised at first to find it would not run on a high resolution monitor, but having used the program, the graphical impact would be lost by not

seeing them in colour.

The tutor was used in both medium and low resolution with no complaint, except that the text in the Read Me files were chopped off at the line ends in low resolution. This, however, does happen to a lot of programs when run in low resolution on a television.

I think this is a great program to use. It can be used at your own pace with a choice of learning style and is definitely to the same standard of other tutors in my collection, some of which cost a great deal more.

It is currently available from four different software libraries and the additional bits are available direct from the author of the program, George Butler, for £7.50.

## Source Addresses

### Software libraries

Goodmans International. 16 Conrad Close, Meir Hay Estate, Longton, Stoke-on-Trent ST3 1SW.  
Floppyshop. PO Box 273, Aberdeen AB8 8SJ.  
ST Club. 2 Broadway, Nottingham NG1 1PS.  
LAPD. 80 Lee Lane, Langley, Heanor, Derbyshire DE75 7HN

### Program author

George Butler. 18 Hobart Road, Ramsgate, Kent CT12 6NW.

**COMPUTING**  
IN RADIO



# Yagi Design on a Computer

**Norman Fitch G3FPK shows you how to design Yagi antennas on an Amstrad PCW computer. His program should be useable with an IBM PC or compatible.**

While many radio amateurs seem to have given up the idea of building their own transmitters and receivers, many still like to experiment with antennas. Books on antennas usually are popular, suggesting that interest in designing and making antennas is far from dead.

## Some Fundamentals

On the v.h.f. and u.h.f. bands the aim is to achieve the highest forward gain for a given boom length. The ultimate horizontal beam design, would result in an antenna with no minor lobes in the vertical (H) plane or in the horizontal (E) plane. Such a goal is not possible with the Yagi principle and, in practice, the more directors there are the more minor lobes there will be.

It used to be a case of 'the more elements the better'. We were led to believe that a 10-element beam would have more gain than one with only seven-elements on the same length of boom. While some manufacturers favoured close-spaced designs others extolled the virtues of wide spacing. Some came up with clever balanced feed systems for the driven element whereas others insisted baluns were unnecessary.

Some manufacturers even claimed 'gains' that exceeded those of an ideal, but impossible, beam with no minor lobes at all. I put gains in quotes because we have to consider the term directivity as well.

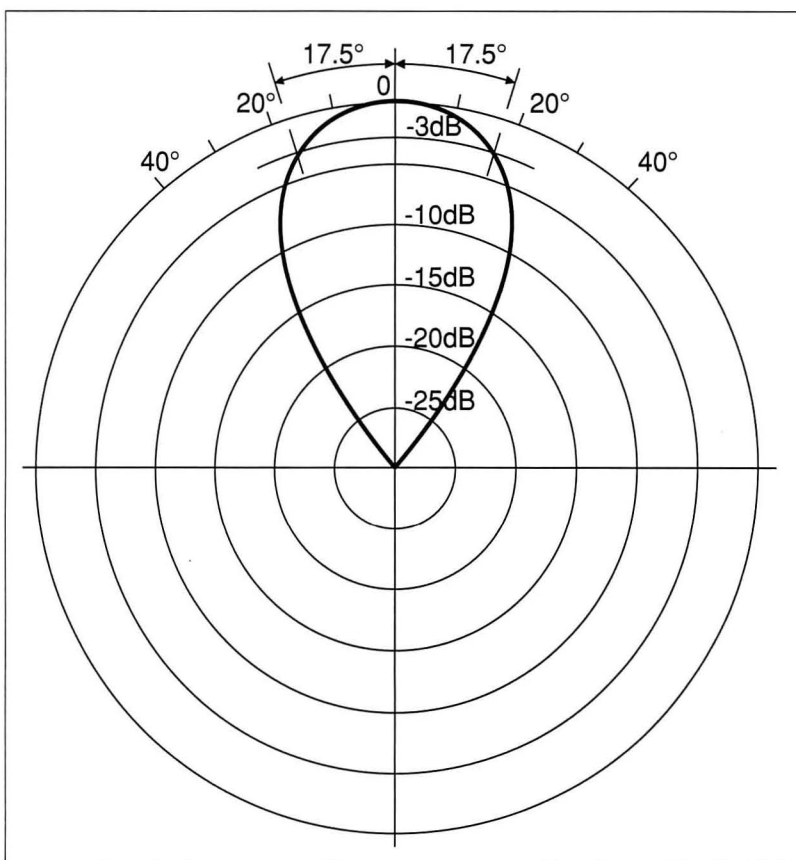
We are all familiar with the polar diagrams of various antennas. The drawing of **Fig. 1**

shows what the polar diagram of the impossible, perfect, Yagi would look like, just one nice clean forward lobe. Let us assume that its E-plane and H-plane patterns are the same and that the beam width between half power points is  $35^\circ$ . If it were completely lossless, its gain

beam. The more usual term **gain** takes into account the inevitable losses in all practical beams.

## Maximising Gain

Since the original work on parasitic beam antennas by H. Yagi and S. Uda over sixty years



*Fig. 1: This is the polar diagram of an impossibly ideal Yagi-Uda antenna. All the energy is directed forward, with no back or side lobes.*

would be 15.27dBi or 13.12dB over a dipole.

These figures are obtained from a formula found in Dr. J.D. Kraus's classic book entitled *Antennas*.

$G_1$  is the gain (dBi) over an isotropic antenna and E and H are the  $-3\text{dB}$  beamwidths in the E and H planes respectively.

To be more accurate, this is the **directivity** of this hypothetical

ago, many designers have investigated these antennas and refined them. I delved into the history in an earlier article in the June 1983 issue of *Short Wave Magazine*. Before the advent of computers, Yagi antennas could be analysed mathematically, a daunting, long and very tedious process. For example, the NBS Yagi designs took nine man **years** to complete!

Today, there are powerful computer programs that can carry

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out these analyses somewhat quicker. The effects of altering element spacing and diameter, insulating the elements from the boom, etc., can be readily plotted in the quest for the most efficient design.

To back up this theoretical work, antenna measuring range facilities are now available on which reliable gain values can be established. These have both exploded some of the earlier myths and proven some of the new concepts in the design of Yagi antennas.

## Practical Designs

In 1977, Gunter Hoch DL6WU published articles in *VHF Communications* in which he concluded that maximum gain for a given boom length would be achieved by a doubly optimised design approach. This involves optimising both the lengths and spacings of the parasitic elements. In a follow-up article in 1982, he presented designs for extremely long Yagis including a monster for 1296MHz with 47 directors. This had a measured gain of 18.8dBd and the -3dB beam width of 15°.

Anyone who is seriously interested to learn about the design of Yagi antennas should read these articles. They are excellently written and well illustrated with graphs and tables.

## Computer Aided Design

The February 1988 issue of *Amateur Radio* included an article by David Tanner VK3AUU who derived formulae from Hoch's graphs. From these, element lengths and spacings can be determined. Naturally, these enable a computer program to be written to take all the laborious work out of designing doubly optimised Yagis.

I wrote such a program, in

about 1987, in Sinclair BASIC for the little ZX-81 computer and subsequently I translated it into Amstrad PCW8256 and 8512 computers. The monitor screen for this particular computer is set to 31 lines and 90 columns on booting up, so the program can accommodate up to 23 directors before the screen is full. The main attraction of this CAD approach is that you can design an antenna using the materials you either have on hand or can easily acquire.

## Conclusions

There are other proven ways to design high gain Yagi antennas, such as from the NBS and Chen-Cheng data. All of these give predictable results. The DL6WU design requires all the director lengths being different, and up to the 15th director all the spacings vary. Thus it is less attractive to a manufacturer than a uniform Yagi where the directors are equally spaced.

There is also the likelihood that the buyer will not assemble

the elements correctly resulting in an inferior performance, with the inference that the beam is not all that wonderful, after all. However, these are non-considerations for the home brewer to whom this article is primarily directed.

Space does not allow us to print the program here but send a large s.s.a.e. marked 'PCW-YAGI program', to the editorial offices, and we will send you a copy of the listing. Send a **formatted** 3in disk

and £1 to cover p&p and we will supply the program on disk. Send the disk, marked as above, in a well padded envelope to the editorial address.

## Further Reading

*Antennas* by Dr. J.D. Kraus, Ph.D., published by McGraw-Hill Book Company, 1950.

'VHF Antenna Gain or the Numbers Game' by N.A.S. Fitch. *Short Wave Magazine*, June 1983.

'Yagi Antennas - Principle of Operation and Optimum Design Criteria' and 'More Gain with Yagi Antennas' by Gunter Hoch. *VHF Communications* issues 3/1977 and 4/1977.

'Extremely Long Yagi Antennas' by Gunter Hoch. *VHF Communications* issue 3/1982.

'The VK3AUU Yagi Design' by David Tanner. *Amateur Radio*, February 1988, the monthly journal of the Wireless Institute of Australia.

DOUBLY OPTIMISED VHF/UHF YAGI ANTENNA DESIGN AFTER GUNTER HOCH - DL6WU

DIMENSIONS IN MILLIMETRES: GAIN

ELEMENT TYPE:	LENGTH	SPACING	BOOM LENGTH	dBd
Reflector	243			
Driven element	326	187		
Director No. 1	308	59		
" 2	308	126		
" 3	300	149	344	
" 4	237	174	493	
" 5	235	194	655	
" 6	232	208	861	
" 7	230	213	1,069	
" 8	229	223	1,288	
" 9	228	229	1,517	12.62
" 10	228	239	1,756	13.07
" 11	228	250	2,006	13.48
" 12	228	267	2,278	13.86
" 13	228	271	2,564	14.20
" 14	273	274	2,878	14.51
" 15	278	278	3,156	14.80
" 16	277	278	3,434	15.07
" 17	276	278	3,711	15.32
" 18	275	278	4,009	15.55
" 19	274	278	4,467	15.77
" 20	273	278	4,744	15.97
" 21	272	278	5,022	16.16
" 22	271	278	5,300	16.34
" 23	271	278	5,577	16.51

(PRESS (a) FOR ANOTHER GO OR PRESS (e) TO END)

Fig. 2: Screen dump of Yagi design for 432.2MHz.

I like to create programs that are both user friendly and tidy. If you are not so fussy then you can pick out the essential parts of the program from the 'REM' statements and write your own, simpler driver routine. For example, you may not wish to include the introductory notes and/or the design summary.

The listing as churned out by the printer is reproduced. The 'PRINT USING' commands gives neater output, but note that you actually type in the 'hash' (#) symbol between the quotes and **not** the 'Pound' (£) sign. A screen dump of a design for a 25-element DL6WU Yagi for 432.2MHz, where the elements are insulated from the boom, can be seen in **Fig. 2**.



# Educational Software on the IBM PC – *Special Offer*

**Some time ago John Beaumont I. Eng. FIEIE, wrote a suite of programs that ran on the BBC for the 'Educational Software for Basic Electronics' series that ran in *Short Wave Magazine*. He has been hard at work again, making them available for the IBM PC or a compatible.**

I found the BBC computer easy to deal with, unfortunately, the IBM and compatible computers have a totally different system to that of the BBC micro. This has made it necessary to re-write the programs. An example of this, is the fact that the screen size is smaller, and the graphics origin is inverted, and VDU commands are not available.

## Improvements

The great advantage of using a modern computer, is the large amount of memory available (usually 640Kb). I have put this to good use by using full colour on all screens and by the use of 'Data entry validation'. All drawing to the screen is within the boundary of the screen area.

## Garbage In is Garbage Out

If data entered into a computer is to be interpreted correctly and not as rubbish, then data

validation routines are necessary. Incorrect data is often entered by accident when wrong keys are pressed. This phenomena is more usually known as, garbage in garbage out (GIGO)

In all these programs for the PC, only valid data can be entered at the prompts. This has been achieved by avoiding all input commands; every character is checked before being accepted as data input.

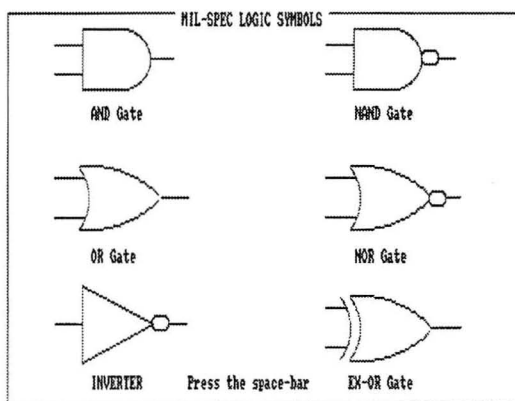
In the program *Oscilloscope Tutor*, 'help screens' and 'quit' option have now been included. In the program *Numbers in Standard Form*, interactive questions are now included. The program *Logic Gates* now includes MIL-SPEC symbols. (City & Guilds now require students to have knowledge of both British and American Logic symbols).

The program *Pythagorus Theorem* now has auto-ranging, so that the triangle is drawn within the boundary of the screen area.

The menu has a completely different format. The program required is selected by a 'bright bar cursor' controlled by the up and down arrow keys, together with the ENTER key. If the computer is fitted with an internal clock, then assuming it is adjusted correctly, the Date and Time is automatically

displayed on the Menu screen. (This is useful to students - they can enter the date on their task-based learning sheets at the start of each session).

The programs can be used in either CGA (Colour Graphics Adaptor) (Amstrad PC1512 or



A 'screen dump' from the Logic module. The logic symbols are shown on screen.

similar), in which case you use 'START-C'.

If you have an EGA (Amstrad PC1640ECD), or VGA (Amstrad 2000 or above series of computers) use 'START'.

From that point on the screens should be self explanatory

## Dumping Screens to Printer

Most IBM compatible microcomputers have their own graphics 'Screen-dump'. At any time, pressing the SHIFT+PRTSCR keys will dump the graphics screen to the printer.

If the printout to the printer doesn't look like the screen, then you may have to do all



'screen-dumping' under CGA mode. If this is the case then start the menu again using 'START-C'.

It is important to point out that computers supporting CGA graphics only, require the special character table to be loaded before running this software. The 'batch file' START-C.BAT. will take care of this providing the file 'COMMAND.COM' is available for calling.

The program containing these special characters is called GRAFTABL, and program character are in the range 128-255.

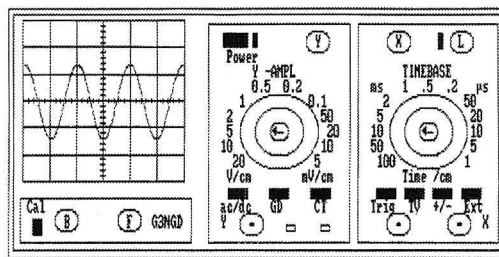
If you have not been able find a hard disk for your machine, and you have only 5.25in disks, then the Programs listed on Menu 1 are all on disk 1. To select any program from Menu 2, Disk 2 will have to be inserted in the disk drive.

## Student-Centred

The programs are currently being used with Student Centred, and Task-based learning packages at North Trafford College Stretford. They can also be used to supplement textbooks and notes for students studying on City & Guilds and BTEC courses.

A great advantage of using computers in schools and colleges is the ability to give every student a different question. There is always a limitation on the number of questions given in the text book, occasionally the answers are wrong.

Using computers, it is possible to give every student a different question, and afterwards an immediate correct answer. In this way students cannot copy from one another,



The Peak to Peak Voltage of the waveform = 56 V or 28 V peak

Frequency of waveform = 500000 Hz. (< 0.5MHz); Period = 2 µs

Do you wish to repeat Y/N --- or press the 'N' key to exit

*In the oscilloscope module, a simple typical scope is shown on screen.*

and also, provision is made for the 'high fliers', and more time can be spent helping those much slower to learn.

(1)

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# How to Design Inductors

**The following program has been written by R E Barber to enable users of the Amiga or PC type computers to design inductors. It tells the user the total number of turns required for inductors that are close wound, space wound or layer wound. The program is self-explanatory as the notes needed are contained inside the program itself.**

## The Amiga Version

```
start:
pi=3.142
REM COIL DESIGN PROGRAM (Version 2.1)
REM ADAPTED FOR AMIGA
PALETTE 0,0,0,0
PALETTE 3,,73,1,0
PALETTE 2,,93,,2,0
PALETTE 1,,4,,6,1
COLOR 3,0: LOCATE 5,5
PRINT:PRINT:PRINT TAB(18)"G3NEF
Coil Design Program (Version 2.1)"
PRINT:PRINT TAB(30)"For AMIGA by"
PRINT:PRINT TAB(24)"R E Barber Bsc
C Eng MIEE G3NEF"
REM Wire Tables and Equations
PRINT:PRINT:PRINT:PRINT
TAB(17)"This program is self
explanatory but"
PRINT:PRINT TAB(17)"if you would like
a brief description"
PRINT:PRINT TAB(18)"Press (y) else
any key to continue"
LOOP:
A$=INKEY$
IF A$="" THEN GOTO LOOP
A$=UCASE$(A$)
IF A$="Y" THEN GOSUB INS
NOTE:
PALETTE 3,,73,1,0
COLOR 3,0
CLS
PRINT:PRINT:PRINT TAB(35)"NOTES"
PRINT:PRINT" This program will work
for the following design criteria"
PRINT:PRINT"Max Inductance =
10000µH"
PRINT:PRINT"Min Inductance =
0.1µH"
PRINT:PRINT"Max Wire Size = 8
Gauge"
PRINT:PRINT"Min Wire Size = 40
Gauge"
PRINT:PRINT"Diam/Length Ratio =
```

```
0.2 to 8
PRINT:PRINT:COLOR 2,0:PRINT"Press
any key for next page"
LOOP2:
A$=INKEY$
IF A$="" THEN GOTO LOOP2 ELSE
GOTO CONT1
CONT1:
CLS
PRINT:PRINT:COLOR 3,0:PRINT
TAB(8)"Resistors can be used as coil
formers if they have the following "
PRINT TAB(8)"Standard dimensions
and are of the composition type"
PRINT:PRINT TAB(13)"0.5W = .14in
dia and .38in long"
PRINT:PRINT TAB(15)"1W = .22in dia
and .58in long"
PRINT:PRINT TAB(15)"2W = .30in dia
and .70in long"
PRINT:PRINT:PRINT TAB(11)"Or you
may select your own former and
dimensions"
PRINT:PRINT:PRINT:PRINT:COLOR
2,0:PRINT"Press any key to continue"
LOOP3:
A$=INKEY$
IF A$="" THEN GOTO LOOP3 ELSE
GOTO CONT2
CONT2:
CLS:LOCATE 5,5
PRINT:PRINT:COLOR 1,0:PRINT
TAB(28)"Select input data"
PRINT:COLOR 2,0:PRINT TAB(17)"(1)
For input in µH"
PRINT:PRINT TAB(17)"(2) For input in
inductive reactance in Ω"
IP1:
A$=INKEY$
IF A$="1" THEN GOTO MH
IF A$="2" THEN GOTO IR
GOTO IP1
CLS
MH:
PALETTE 3,0,,93,,87
COLOR 3,0
PRINT:PRINT:INPUT"Input the required
value of inductance in µH",L
IF L>10000 OR L<.1 THEN
PRINT:COLOR 2,0:PRINT:PRINT" Value
of (L) outside program criteria": FOR
I=1 TO 2000:next I:GOTO
NOTE
GOTO RST1
IR:
PRINT:PRINT:COLOR 3,0:INPUT"Input
the required value of inductive
reactance in Ω";XL
INPUT"Input frequency of operation in
MHz";F
L=XL/(2*PI*F)
IF L>10000 OR L<.1 THE
```

```
PRINT:COLOR 2,0:PRINT:PRINT" Value
of (L) outside program criteria": FOR
I=1 TO 2000:next I:GOTO NOTE
RST1:
PRINT:COLOR 3,0:PRINT "Which coil
former"
PRINT:PRINT" 1 = 0.5W resistor"
PRINT" 2 = 1W resistor"
PRINT" 3 = 2W resistor"
PRINT" 4 = Your former"
PRINT:PRINT:INPUT"Your selection",A
Z$="" :ZZS=0
LOOP4
IF A=1 THEN D=.14 GOTO CONT3
IF A=2 THEN D=.22 GOTO CONT3
IF A=3 THEN D=.3 GOTO CONT3
IF A=4 THEN GOTO OTHFOR
IF A>4 THEN GOTO RST1
IF A=0 THEN GOTO LOOP4
OTHFOR:
INPUT"Input the coil diameter in
inches";A$
D=VAL(A$)
CONT3:
INPUT"Input the wire gauge you wish
to use:";G
IF G=0 THEN W=.25
IF G=8 THEN W=.162
IF G=9 THEN W=.144
IF G=10 THEN W=.128
IF G=11 THEN W=.116
IF G=12 THEN W=.104
IF G=13 THEN W=.092
IF G=14 THEN W=.080
IF G=15 THEN W=.072
IF G=16 THEN W=.064
IF G=17 THEN W=.056
IF G=18 THEN W=.048
IF G=19 THEN W=.040
IF G=20 THEN W=.036
IF G=21 THEN W=.032
IF G=22 THEN W=.028
IF G=23 THEN W=.024
IF G=24 THEN W=.022
IF G=25 THEN W=.020
IF G=26 THEN W=.018
IF G=27 THEN W=.0164
IF G=28 THEN W=.0148
IF G=29 THEN W=.0136
IF G=30 THEN W=.0124
IF G=31 THEN W=.0116
IF G=32 THEN W=.0108
IF G=33 THEN W=.01
IF G=34 THEN W=.0092
IF G=35 THEN W=.0084
IF G=36 THEN W=.0076
IF G=37 THEN W=.0068
IF G=38 THEN W=.006
IF G=39 THEN W=.0052
IF G=40 THEN W=.0048
IF G>40 OR G<0 THEN COLOR
2,0:PRINT"Wire gauge outside
program criteria":FOR I=1 TO
2000:NEXT I: GOTO NOTE
N1=(40*W*L+SQR((1600*L^2*W^2)
```



```

+(70*D^3*L)))/(2*D^2)
CONT9:
N2=0
IF N1>N2 THEN NT=N1
IF N2>N1 THEN NT=N2
NT= CINT(NT*10)/10
PRINT:PRINT:PRINT:PRINT:PRINT"Wire
size = ";G;"gauge"
PRINT"Number of turns = ";NT
IF Z$="L" OR A$="L" THEN
COLN=CINT(NT/LN*W*10)/10 ELSE
COLN=
CINT(NT*W*10)/10
PRINT"Coil length =";COLN;"inches"
R=D/(COLN):PRINT"D/I ratio
=";R;Z$="";A$="";IF R<.2 OR R>8
THEN GOTO FMSG ELSE GOTO LOOP5
FMSG:
PRINT:COLOR 2,0:PRINT"D/I ratio
outside program criteria"
IF R<.2 AND A=4 THEN PRINT"Use
other former or smaller gauge of wire
(F), a layer coil (L)"
IF R<.2 AND A=4 THEN PRINT"or force
coil length and ignore D/I ratio (D)."
IF R>8 AND A=4 THEN PRINT"Use
other former or larger gauge of wire
(F)"
IF R>8 AND A=4 THEN PRINT"or force
coil length and ignore D/I ratio (D)."
LOOP5:
A$=INKEY$
A$=UCASE$(A$)
IF A$= "F" THEN GOTO RST1
IF A$= "L" THEN GOTO CONT7
IF A$= "D" THEN GOTO CONT6
IF A=1 THEN GOTO MSG1
IF A=2 THEN GOTO MSG1
IF A=3 THEN GOTO MSG1
IF A=4 AND R>.2 AND R<8 THEN
GOTO CONT5
GOTO LOOP5
CONT5:
PRINT:COLOR 2,0:PRINT"Design
another coil (Y/N)"
LOOP6:
A$=INKEY$
A$=UCASE$(A$)
IF A$="Y" THEN GOTO CONT2
IF A$="N", THEN END
GOTO LOOP6
MSG1
IF COLN> .385 AND A=1 THEN COLOR
2,0:PRINT"Coil too long for 0.5W
former"
IF COLN< .385 THEN GOTO CONT5
IF COLN> .58 AND A=2 THEN COLOR
2,0:PRINT"Coil too long for 1W
former"
IF COLN< .579 THEN GOTO CONT5
IF COLN> .7 AND A=3 THEN COLOR
2,0:PRINT"Coil too long for 2W former"
IF COLN< .701 THEN GOTO CONT5
RELFOR:
PRINT:COLOR 3,0:PRINT"Select (S) for
space wound coil on new former"
IF ZZS>0 THEN GOTO
RST1:ZZS=ZZS+1
LOOP7:
INPUT"Select (L) for layer wound

```

```

coil";Z$
Z$=UCASE$(Z$)
IF Z$="S" THEN GOTO RST1
IF Z$="L" THEN GOTO CONT7
GOTO LOOP7
CONT6:
MINL=COLN
PRINT:PRINT"The length must be
greater than";MINL;"inches"
INPUT"Input length of coil you wish to
use";NL
NT=SQR((L*(4.5*D+10*NL))/((D/2)^
2))
NT=CINT(NT*10)/10
PRINT:PRINT:PRINT:PRINT"Wire
size =";G;"gauge"
PRINT"Coil dia =";D;"inches"
PRINT"Coil length =";NL;"inches"
PRINT"Number of turns =";NT
GOTO CONT8
CONT7:
PRINT:PRINT:INPUT"Input number of
layers";LN
N1=(40*W*L+SQR((1600*L^2*W^2)
+(70*D*L*(D^2-
(2.25*D*LN*W)))))/(2*D^2-
(2.25*D*LN*W))
GOTO CONT9
CONT8:
GOTO CONT5
END
INS:
CLS
PRINT:PRINT:PRINT:PRINT
TAB(10)"This program will design
single or multilayer coils on either"
PRINT TAB(10)"Standard resistor
formers or a former of your choice.
PRINT:PRINT TAB(10)"The inductance
formula is from the Radio Handbook
19th Edition."
PRINT:PRINT TAB(10)"The formula is
transposed and then solved as a
quadratic"
PRINT TAB(10) "to give the number of
turns required for the coil."
PRINT:PRINT TAB(10)"In this
programme you select the resistor
former or the dia"
PRINT TAB(10)" of any former you
choose. The program will then
calculate"
PRINT TAB(10)"the total number of
turns required, the length of the coil, "
PRINT TAB(10)"and the length to diam
ratio of the coil."
PRINT:PRINT:PRINT TAB(20)" PRESS
ANY KEY TO CONTINUE!
LOOP8:
A$=INKEY$
IF A$=" " THEN GOTO LOOP8
CLS
PRINT:PRINT:PRINT:PRINT TAB(10)"If
you have selected the own former
option the program will ask"
PRINT TAB(10)"you if you wish the coil
to be space or layer wound. You

```

```

select L
PRINT TAB(10)"or S, then the program
will ask you to input the new length
of"
PRINT TAB(10)"the coil if space
wound or the number of layers if you
have"
PRINT TAB(10)"selected a layer coil."
PRINT:PRINT:PRINT TAB(10)"If the
length of any former is incorrect; for
the wire size,"
PRINT TAB(10)"Inductance, or
diameter to length ratio, then this
program will
PRINT TAB(10)"invite you to try
again."
PRINT:PRINT:PRINT TAB(10)"Finally
you can start from either the inductive
reactance"
PRINT TAB(10)"or the actual
inductance to design your coil."
PRINT:PRINT TAB(20)" Press any key
to continue."
LOOP9:
A$=INKEY$
IF A$=" " THEN GOTO LOOP9
RETURN

```

If you would like this program to run on an IBM PC (or clone), then you can either send an s.a.e to the Editorial Offices in Broadstone for a copy of the listing or you can make the following changes yourself.

Amiga BASIC does not need line numbers but GWBASIC does. Hence all GOTO and GOSUB commands need to be changed and all lines of code in GWBASIC must be numbered.

GWBASIC does not support the PALLETTE command, hence this needs to be deleted in the GWBASIC version. The LOCATE command in GWBASIC has to be on its own line.

GWBASIC does not support the UCASE function that converts all keyboard inputs into upper case. Hence the "L" or "I" commands in the A\$=INKEYS loops. GWBASIC supports more colours (1 to 16) whereas AMIGA BASIC requires the use of the PALETTE command to get more than four colours from a basic screen. Therefore the GWBASIC version has colour numbers that range from 0 to 8 in the PC version of this program.





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