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practical **Wireless**

JUNE 1997 £2.20

BUILD A BUDGET SPECTRUM WAVEMETER

REVIEWED: ALINCO DX-701

COMMERCIAL HF TRANSCEIVER

KENWOOD TH-235E 144MHz

HAND-HELD TRANSCEIVER

MFJ 'AUTOTUNER' EXTENDER

PLUS TWO SPECIAL PRIZE COMPETITIONS!

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ON BOARD BORGNY DOLPHIN

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FAX 01702 205843

Part Exchange Welcome

Yaesu FT-50R 2m/70cms



OFFER
W&S £249

- Wideband Rx (AM Airband)
- FM Broadcast receive
- CTCSS & 1750Hz
- 112 Alphanumeric Memories
- Dual Watch - Military rated
- 5W from 12v DC input
- Ni-cads and AC Charger
- One of our top 5 sellers!

Lowest UK Price!

CT-30 Mic Adaptor -----£9.00
CSC-69 Case (FNB-40 batt) --£15.00

ALINCO DR-605 2m & 70cms



W&S £369

- 50W 2m & 35W 70cms
- CTCSS Encode plus 1750Hz tone burst
- 100 Memories, 9800 bps for packet

ALINCO DR-150E 2m FM

£369 Save £90!



W&S £269

- 100 memories
- 1750Hz tone
- 50 / 25 / 10W
- Wideband Rx
- CTCSS encode
- Time out etc.

ALINCO DR-610 2m & 70cms



W&S £475

Lowest UK Price!

- Detachable front head unit.
- 2m & 70cms (50W 2m & 35W 70cms)
- CTCSS Encode, 1750Hz tone
- 120 Memories, 9600 bps for Packet

ALINCO DJ-180EB 2m FM



- 144 - 148MHz
- Rx 130 - 170MHz
- 6 Channel Steps
- 10 Memories
- 1750Hz tone
- 5W on 12V DC
- Rugged design
- Ni-cads
- AC Charger
- Limited stocks of this model

W&S £149

Lowest UK Price!

DJ-G5EY 2m & 70cm



- Up to 5W output
- CTCSS & DTMF
- 1750Hz tone
- Electronic controls
- 100 Memories
- AM airband
- Channel scope
- Programmable steps
- Extended receive
- Full scanning
- Ni-cads and charger

W&S £269

ADI Mobile FM Rigs



FREE CTCSS This month

W&S £249

Both rigs feature:

- 3 Power levels - Wideband receive
- 40 Memories plus call channel
- 7 Programmable steps
- Channel or frequency display
- The best sensitivity in the business
- Keypad mic and mounting kit



FREE CTCSS This month

W&S £269

ADI AT-200 2m FM Handy



W&S £129

Lowest UK Price!

- 2m FM Handy
- 2.5W output
- 5W on 13.8v
- 1750Hz tone
- Illuminated keypad
- Ultra sensitive
- Wideband Rx
- 20 memories
- Keypad entry
- DTMF
- Uses AA cells

This has proved to be our most reliable handheld. It has a very sensitive receiver and is built to professional standards.

ADI AT-600D Dual Bander



Review April Radcom

Just Arrived!

Alpha Numeric Display
W&S £279

- 2m & 70cms tcv.
- 5W on 13.8V
- Full duplex
- AM/FM Rx
- Rx up to 990MHz
- DTMF fitted
- CTCSS fitted
- 1750Hz tone
- Auto power off
- Batt. volt meter
- Illuminated keypad
- Ni-cad & charger

See RSGB Review March. Good power output, 29 programmable features and the backing of the world's 4th largest computer manufacturer.

ADI AT-400 70cm FM Handy



W&S £169

Lowest UK Price!

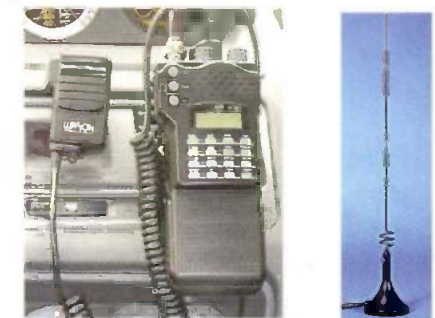
- 70cm FM Handy
- 2W output
- 5W on 13.8v
- 1750Hz tone
- Illuminated keypad
- Ultra sensitive
- Wideband Rx
- 20 memories
- Keypad entry
- DTMF
- Uses AA cells

The Novice Rig
This has become the standard radio for Novice hams. Its sensitive, cost effective and was featured on Anglia TV last month

EXCLUSIVE OFFER 2M Mobile Complete Installation £169

50 units Only HURRY!
5W output - keypad entry
Installs in Seconds
Ideal for Company Car
Everything you need!

Here's an exclusive offer that gives you everything you need to go 2 metre mobile. What's more, it can be put into the car in seconds! The AT-200 offers 5 Watts output, more than enough for most purposes. The mini-magnetic antenna is pretuned with BNC plug to match the rig. A high quality speaker mic, dash grill mount and DC lead complete the installation. And you still have a top quality portable rig with all its standard accessories for when you aren't in the vehicle together with ADI's 24 month warranty.



Package comprises:

- AT-200 5W 2M Transceiver
- Matching Speaker microphone
- Super Magnetic whip antenna
- Dash grill mounting bracket
- Cigar lighter 12v DC lead

OPEN DAY Sunday 1st June, 10am

NEW Band Pass Filters

VHF & UHF Band Pass Filters Digital Communications USA

2m & 70cm

No more break-through from other operators etc.

DCL-145	£89.95	DCL-435	£119.95
Passband: 144 - 146MHz		Passband: 430 - 440MHz	
Loss: Less than 1 dB		Loss: Less than 1 dB	
Selectivity: -68dB at 136MHz		Selectivity: -47dB at 215MHz	
		-50dB at 455MHz	
Power: 200 Watts		Power: 200 Watts	

KENWOOD HF RIGS

NEW TS-570



W&S £1289

Filters SSB & CW £57.95 each.

Kenwood 2m All Mode

Save £300



W&S £699

TM-255E

NEW KENWOOD RIG



W&S £585

TM-V7E

- * 144 & 430MHz 50/35W
- * Dual Rx on same band!
- * 280 Memories
- * Detachable front head
- * CTCSS & 1750Hz Tone
- * Large clear display

W-MM1 Multimode Modem



W&S £69.95

NEW

- * Packet, AMTOR, CW
- * SSTV, Fax, RTTY
- * NAVTEX, SYNOP
- * Transmit and receive
- * Needs PC 286 or better
- * Includes software
- * No external power required
- * Connects to RS-232

Yaesu FT-8000 2m/70cm

The best value today. 50W / 35W at a price that is unbeatable. Phone for leaflet. In stock NOW!



NEW

W&S £399

Yaesu FT-8100 2m/70cm

Yaesu's new FT-8100 features a detachable head unit and builds on the FT-8000 design. Available shortly.



W&S Phone

NEW

Yaesu FT-736DC 2m/70cm



NEW

W&S £1199*

Offers even better value.

Requires 10 Amp supply.

* Price subject to confirmation

"BEST PRICE" FREE ORDER LINE 0500 73 73 88

Open Day 1997 1st June

The Biggest Open Day Yet In Ham Radio History

Crazy Prices on All Products

Sunday 10AM Hockley

Suppliers Stands: ICOM YAESU RSGB

KENWOOD Practical Wirelss & SWM

FREE 4 Raffles for equipment
Food and Soft drinks
Wine and Beer

YAESU PRICES DOWN
Special May OFFERS

NEW Yaesu FT-920



Price Match

W&S £1449

The new FT-920 has been released and offers some great features at a great price. 1.8MHz to 54MHz plus wideband receive, 33 MPS Digital signal processor, Digital IF shift, Auto notch filter, Dual VFOs, 100 Memories, Band Stacking VFO system, Break-in CW with electronic keyer, TNC interfacing, Digital voice recorder, 13.8v DC operation.

Yaesu FT-1000MP



Price Match

W&S £1979

FT-1000MP Technical Overview Manual available for loan 46 - pages - Phone

FT-1000MP	£2849	£2129
FT-1000MPDC	£2599	£1979

Yaesu FT-2500 50W 2m



SAVE £140!

W&S £259

- * 3 Power levels
- * CTCSS & 1750Hz
- * 31 memories
- * Alphanumeric display
- * US Mil. Spec.
- * Mic. and hardware

Yaesu FT-840 HF Rig



W&S £699

PRICE DOWN

We've purchased a quantity at this special price. You won't get a base station rig any cheaper!

AOR-7030 HF Receiver



W&S £699

- * 500kHz - 30MHz
- * SSB/CW/AM/NFM
- * 2.2kHz SSB filter
- * Superb selectivity
- * Amazing dynamic range
- * 10Hz resolution
- * 100 memory channels
- * Built-in whip amplifier

NEW IC-706 Mk II £1195

Free 24 hour delivery



W&S £1049

Price Match!

The new IC-706 has arrived. Now with 25W on 2m and a much improved front end. PLUS, order during May and get one accessory filter for this rig at Half Price!

- * 160 - 2m
- * SSB - CW - FM - AM
- * 100W inc 6m
- * 25W on 2m
- * Improved front-end
- * Superb performance
- * Large LCD display
- * Another winner from Icom

ICOM IC-207H 2m/70cm Mobile



W&S £389.95

- * 2m & 70cm
- * 50W / 30W
- * Detachable head
- * Packet 9600 bps ready
- * 180 Memory channels
- * CTCSS & 1750Hz tone

ICOM IC-756 HF Rig



Price Match

W&S £1849

- * 100W of pure Magic
- * 160 - 6M
- * SSB - CW - AM -FM
- * Spectrum display
- * Auto ATU
- * Superb DSP built-in
- * CW Memory keyer
- * 100% duty cycle
- * Keypad entry option
- * DXers choice in the USA

ICOM IC-821H 2m/70cm



Price Match

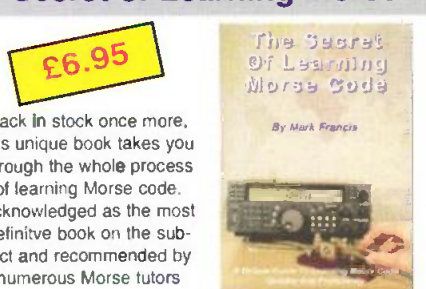
W&S £1349

- * 2m/70cm All Mode
- * 45/40W adjustable
- * Full duplex
- * Satellite features
- * 160 Memories
- * 9600bps capability
- * Electronic keyer
- * IF shift, noise blanker

The Secret of Learning Morse

£6.95

Back In stock once more, this unique book takes you through the whole process of learning Morse code. Acknowledged as the most definitive book on the subject and recommended by numerous Morse tutors



TONNA Antennas - Perform!

Balun matched excellent gain and VSWR. The favourite of the contest groups. Mount horizontal or vertical.

June Offer:
20505 5 EI 50MHz
£86.95 £79 carr. £4
Just a small selection!

2 Metres						
20804	4 EI. 8dB	£45.95	23 cms			
20809	9 EI. 13dB	£68.95	20623	23 EI. 18dB	£51.95	
20811	11 EI. 14dB	£82.95	20635	35 EI. 20dB	£61.95	
20817	17 EI. 15dB	£97.95	20655	55 EI. 21.5dB	£65.95	
70cms			20696	4 x 23 EI. kit	£319.95	
20809	9 EI. 8dB	£45.95	20666	4 x 55 EI. kit	£419.95	
20919	19 EI. 16dB	£53.95		Full range of splitters etc, Phone		

WATSON

OPEN DAY Sunday
1st June, 10am

WATSON Base Mic.



£59.95
Superb audio quality and electronic switching. Can be powered from most modern rigs 8 pin mic plug or use internal battery. Full connection details inc.

WATSON Lapel Talker



£24.95
8 Ohm earpiece with lapel mic. and PTT button. Models for all makes including Motorola.

WATSON QS-110 Speaker Mic.



£14.95
Available in versions to match all models. Just tell us which transceiver you have.

WATSON Belt Case

NEW



Combined quick release spring clip and belt loop. Self adjusting, fits all handys.

£12.95

WATSON QS-400 Mount

NEW



Clip onto dash grill and simply push handheld or GPS in between sprung fingers. Holds rig gently but safely. Another great idea from Watson!

£9.95

WATSON Base Antennas



Fibre Glass casing and pre-tuned. Fit and forget.
W-2000 6m - 70cm **£89.95**
(2/6, 2/8, 4dB 2.5m long)
W-30 2m/70cm **£39.95**
(3/6dB 1.15m long)
W-50 2m/70cm **£54.95**
(4.5/7.2dB 1.8m long)
W-300 2m/70cm **£69.95**
(6.5/9dB 3.1m long)
All aerials have SO-239 sockets, mounting hardware up to 62cm mast and three radials.

WATSON Mobile Whips



Stainless Steel Mobile Whips with hinged base. Pre-tuned.

W-285 2m whip **£15.95**
W-770HB 2m/70cm Whip **£24.95**

WATSON W-3CK Cable Kit



A 5m long mobile cable kit using 5D-BD cable **£18.95**

Matching hatch mount with adjustable angle and thumb wheel **£14.95**

WATSON 2m/70cm Amp.



Dual Band Amplifier for 2m and 70cm handheld radios. Needs 1-6W input for 30W output. Auto sensing and bandswitching. Thru position. SO-239. **£159**

Cushcraft Antennas

Cushcraft R-7000 Vertical

R-7000 7 Band Vertical 40-10 Metres

80M Option Kit Available

£369

What the mags say!

Practical Wireless:
"An excellent DX antenna - Extremely impressed with standard of workmanship and ease of erection"

RadCom:
"Ideally suited to the small garden - an investment which lasts"

- * 7 Bands 40-10m
- * Power 1.5kW PEP
- * Height 7.3m (24ft)
- * 7 x 49 inch radials
- * Self-supporting.

Cushcraft VHF Antennas



13-B2

6 Metres			
A50-3S	3 El. 8dB 1Kw 1.8m Boom	£89.95	
A50-5S	5 El. 10.5dB 3.7m Boom	£149.95	
A50-6S	6 El. 11.6dB 6.1m Boom	£249.95	
AR-6	Vertical 3.75dB 3.1m long	£59.95	
2m/70cm			
A270-6S	3 El. each band 7.8dB 0.85m	£59.95	
A270-10S	5 El. each band 10dB 1.9m	£79.95	
2 Metres			
A148-3S	3 El. 7.8dB 0.85m	£39.95	
A148-10S	10 El. 13.2dB 3.6m	£72.95	
A148-20S	10+10 El. 16.2dB 3.6m	£189.95	
A148-20T	10 El Crossed 11.1dB 3.3m	£105.95	
13-B2	13 El. 15.8dB 4.57m	£119.95	
17-B2	17 El. 18dB 9.45m	£199.95	
26-B2	13+13 El 18.8dB 4.75m	£299.95	
AR-2	Vertical 3.75dB 1.2m long	£39.95	
AR-X2	Vertical 5.5dB 2.8m long	£49.95	
AR-X2B	Vertical 7dB 4.3m long	£59.95	

Cushcraft HF Antennas



A-3S

A3S	3 El. 10, 15, 20m 2Kw Gain 8dB	
F/B 25dB El.	8.45m Boom 4.72m	£389
A4S	4 El 10, 15, 20m 2Kw Gain 8.9dB	
F/B 25dB El.	9.75m Boom 5.48m	£469
A3WS	3 El 12 & 17m 2Kw Gain 8dB	
F/B 25dB El.	7.66m Boom 4.27	£299
10-3CD	3 El 10m 2Kw Gain 8dB F/B 30dB	
El. 5.38m Boom 3.05m		£189
15-3CD	3 El 15m 2Kw Gain 8dB F/B 30dB	
El. 7.08m Boom 4.27m		£249
20-3CD	3 El. 20m 2Kw Gain 8dB F/B 30dB	
El 10.96m Boom 6.1m		£369
20-4CD	4 El. 20m 2Kw Gain 10dB F/B 30dB	
El 11m Boom 9.75m		£499
40-2CD	2 El. 40m 2Kw Gain 5.5dB F/B 20dB	
El. 12.9m Boom 6.9m		£499

Mast-Head Duplexer

NEW

Split-1: 1.8-225MHz
Split 2: 350-540MHz
Power 300W
Loss 0.2dB
Socket SO-239



Save on coax cable! Accepts masts up to 2.25" diam. Includes water-proof plug shrouds. Ideal for 2m/70cm.

WATSON SP-150 Speaker

£9.95



- * Slimline 8 Ohm design
- * 2m lead with 3.5mm plug
- * Max Power - 5 Watts
- * 28 x 75 x 65mm
- * Ideal mobile or base.

WATSON WSM-270 Mag Ant.

£24.95



- * Dual; Band 2m/70cms
- * Mini Magnetic design
- * Super strong magnet
- * Base just 29mm diameter
- * Pre-tuned for 2m & 70cm UK
- * Low Profile whip
- * 2.75m of mini coax - BNC
- * Power rating 50W max.

WATSON WC-128 Counter

£79.95



- * 1MHz - 2.8GHz
- * LCD Display
- * BNC Whip Antenna
- * Very sensitive "off air"
- * Ni-cads and Charger

WATSON WHX-7000 2m/70cm

£19.95



- * Dual band "Gainer" whip 2m / 70cm
- * 21cms long fitted BNC connector.

Diamond Products



SX-100 Price Down!

£99.95

- * 1.6 - 60MHz
- * 30W, 300W, 3kW
- * Avge, PEP, VSWR
- * 3W sensitivity
- * Accuracy to 10%
- * 155 x 63 x 103mm



SX-200 Price Down!

£69.95

- * 1.8 - 200MHz
- * 5W, 20W, 200W
- * Avge, PEP, VSWR
- * 1W sensitivity
- * Accuracy to 7.5%
- * 155 x 63 x 103mm



SX-400 Price Down!

£79.95

- * 140 - 525MHz
- * 5W, 20W, 200W
- * Avge, PEP, VSWR
- * 4W sensitivity
- * Accuracy to 10%
- * 155 x 63 x 103mm

CP-5 HF All-bander

Price Down! £199

3.5MHz - 30MHz

- * 5 Band vertical
- * 200W PEP
- * 4.6m high
- * 5 x 1.8m radials
- * Self supporting
- * Weight 4.5kg
- * Mast size 30-62mm

STOP PRESS

CP-6
80-6m vertical
Now **£229.95**

V-2000
6m/2m/70cm
Now **£99.95**



Free - Phone 0500
Fast Order 73 73 88
Line

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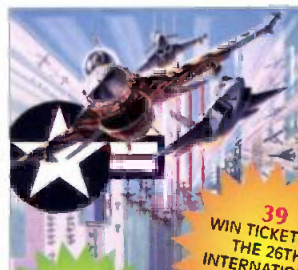
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While stocks last

only £795  **save £200**

160-10m + 6m 100W 2m 10W HF general coverage receiver

★ Now in stock IC-706 Mk2 £1059 ★

ANTENNA ROTATORS

AR303	Light duty	£49.95	D
G-450XL	New medium duty model	£269.00	D
G-650XL	New H/D version of G-450XL	£369.00	D



G-800SDX	450° deluxe model	£429.00	D
G-1000SDX	H/D version of G-800SDX	£499.00	D
G-2800SDX	H/D rotator 450°	£1129.00	D
G-500A	Elevation rotator	£289.00	D
G-5400B	AZ/EL rotator	£529.00	D
G-5600B	AZ/EL rotator H/D	£629.00	D
RC5-1	Medium duty create	£329.00	D
RC5-3	Medium duty + preset	£439.00	D
RC5A-3	H/D v/speed + preset	£659.00	D
RC5B-3	V H/D v/speed + preset	£989.00	D
ERC5A	Heavy duty elevation	£1095.00	D
GC038b	Lower clamp G-400, 800, 1000	£25.00	B
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EDITOR'S Keylines

Rob Mannion's viewpoint on the World of Amateur Radio



Occasionally we have space enough in *PW* to provide readers with the traditional April Fool 'Spoof' article. And in this year's April issue I'm very pleased to say that our spoof article (did you spot it?) was read and enjoyed by many of you.

Judging by the response (and by several humorous telephoned threats from readers) many of you enjoyed the article - after realising it was a spoof (we did make an exception and mark the page with April 1 1997). The article by the way, was the excellent 'tongue-in-cheek' effort written by **John Cunningham GM3JCC**.

I had the job of sub-editing the article and was working quite late one night at home when I came to prepare the article. The vision of the church tower, the baffled bats and the idea of a laser beam as an 'end fed antenna' had me in hysterics. I was still laughing when a very sober and sensible John GM3JCC answered my telephone call. Obviously used to receiving late night calls from gibbering idiots, John and I quickly agreed on the way to present his article.

I take this opportunity to thank John for his original idea and to the many readers who wrote in reply. Some of your letters were so cleverly worded that the Editorial team weren't so sure that **our legs weren't being pulled!**

But the reader I feel sorry for was the gentleman (he'll remain anonymous so as not to increase his embarrassment!) who wrote in to ask for John's address so he could get further details. And my oh my...you should have seen the invective in his reply to my letter telling him **it was a joke!** (if it had been an audio tape it would have been full of 'bleeps'!).

Mind you...he was more upset that he had been fooled than anything else, especially as he is very wary. Fortunately he has forgiven me for the very successful - but thought provoking joke.

In Consolation

To pacify those readers who have jokingly (I hope) threatened to 'Super Glue' my artificial arm to my walking stick - and in consolation we published Brian Dance's 'Lasers - Leading Lights In Communications' in the May issue. The team hope you enjoyed it, as lasers are a truly fascinating subject.

In fact, I cannot think of any reason - with safety considerations provided for - why Radio Amateurs cannot use lasers within the hobby. I already use a laser pointer when I'm lecturing with my 'medical hat' on - but their versatility goes much further.

Licence regulations apart, it would surely be possible to locate (particularly v.h.f. and u.h.f. stations) on good site, while the operator controlled and operated the station from below. And I've no doubt this idea would appeal to those unfortunate enthusiasts who just happen to live on the **bottom floor** of 'high rise' buildings!

So, if you've got any ideas on how to incorporate laser technology into our hobby (after all laser light is part of the electromagnetic spectrum) let me know. So, there's your chance to drive me 'batty' with practical suggestions (please!). We've got some interesting ideas and no doubt readers will come up with some other suggestions. Get writing!

Saved For The Nation

One of the best bits of news I've

heard for a long time came when we heard that the impending sale of the Marconi Company's early archives and relics was called off. Like other publications, *PW* was kept fully informed of the situation and everyone was very concerned that such a valuable and complete collection could be broken up.

The original sale was scheduled for April 24 and 25th. Fortunately, common sense prevailed and following a large number of protests from many people, the sale was cancelled. It had been expected that the two-day auction could have raised in excess of £1 million. It had been intended that the money would have been employed to fund an education initiative to train up to 1000 teachers a year.

However, in my opinion, no matter how well-intentioned the sale was meant to be - to split up such an important collection of archives (from 1896 to the end of the Second World War) would be akin to a criminal action.

Fortunately, as I've already mentioned, the sale was called off and the collection will be in the hands of the Science Museum. Hopefully, bearing mind that the Science Museum thought little enough of Amateur Radio to close the GB2SM exhibition station several years ago, they will make the most of the archives and place them on display where they can be seen to best advantage and at a reasonable cost.

Too many items of historic interest (radio and otherwise) disappear from view because the 'official' museums don't have the

space, time or funding to display them. So, perhaps there's an opportunity here for the example shown by the National Railway Museum at York (I just had to get railways mentioned didn't I?) - where locomotives and other preserved items are loaned to other museums or working preserved railways.

Everyone benefits from 'loan' exhibits including people who live a long way from the 'home' museum. So, I urge the Science Museum to consider 'loaning' items out or perhaps even forming a travelling exhibition. It could even have a mobile Amateur Radio station supporting it - if the Science Museum approved!

Paul Collins Now M1BFW

Readers who have been following the debate in 'Receiving You' on the RAE will no doubt remember **Paul Collins'** letter in the February issue of *PW* that started it all. Well, I'm pleased to report that Paul is now **M1BFW**.

Paul has written in to give me the news so I could pass it on to readers. He's already noted the improving situation regarding **C&G** charges and notes the many comments from other readers.

Congratulations Paul...from everyone on the Editorial team. And don't forget that your opinions and concerns are read by many others and judging by the feedback and reactions - other people do care - including the **Radiocommunications Agency** staff and **Department of Trade & Industry**. They take care to see what we say and think by closely reading all the Amateur Radio publications - including (of course!) *Practical Wireless* itself.

Rob Mannion
G3XFD

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.

RECEIVING You

Letters Received Via The 'Internet'
Many letters intended for 'Receiving You' now arrive via the 'Internet'. And although there's no problem in general with E-Mail, many correspondents are forgetting to provide their postal address. I have to remind readers that although we will not publish a full postal address (unless we are asked to do so), we require it if the letter is to be considered. So, please don't forget to include your full postal address and call sign along with your E-Mail hieroglyphics! Editor

PW's Postbag. If your letter is published you'll win a prize.

Morse/No Morse

Dear Sir

I realise that you have had a number of letters concerning 'Morse/No Morse', but I hope you will consider my contribution useful. I believe one of the major necessities of the hobby is activity on the bands, for as we know, commercial thirst for spectrum seems to be unquenchable.

Therefore, I suggest that along with Novice licensees, 'B' licence holders are given limited access to the h.f. bands. The limitations would be twofold - power (say 10W p.e.p.) and bands. (say 3.5, 7 and 14, perhaps 18MHz could also be included).

For this privilege, the applicant would pay a small fee of £5 for the issue of an appropriate addendum to their existing licence. This would explain the terms, conditions, etc.

Subsequent renewals would include the extension

automatically, unless the licence holder specified otherwise. The initial admin. fee would ensure that the licence issuer who is, I believe, a private organisation, will not be put to 'non-contractual' expense.

If my suggestion was adopted I would hope that in the fullness of time, the initiate to the h.f. bands will be given the taste of the truly exotic and wish to progress to full 'A' licence facilities, and in the meantime, amateur activity will increase.

R. G. Johnston GW7RDV
Flintshire

Credit Where Credit Due!

Dear Sir

I have never written to a magazine before and I have been reading *Practical Wireless* since the mid 1950s! However, I feel compelled to give credit where it is due and so I wish to praise the staff at

the **Short Wave Shop** in Christchurch, Dorset.

I suppose I might be thought of as 'poor looking', not being a follower of fashion and I am fairly cautious in parting with my cash. In fact, I must be a nightmare to most salesmen with my multitude of questions about what does this and what does that!

I have often walked out of a shop with all my cash intact, simply because of misguided attitudes of the staff! Not so, though, at the **Short Wave Shop!**

Nothing seems too much trouble for them and they genuinely seem to want to make sure that the customer gets the right equipment for his needs. The staff were all very friendly and in spite of being busy, still found time to cope with my questions.

I have now visited the shop several times and brought several radios, test gear and bits and pieces. When I told my 16-year old son how pleased I was, he wanted to

come along on my next visit and he ended up buying two receivers himself!

Because we had travelled from Southampton, we were given cups of tea and coffee. So, to **Bob G6DUN**, **Colin G3XAS** and **John G0SKR** (who, incidentally teaches Novices in his spare time) I offer a great big thank you! You give excellent service and I am very pleased with your assistance. You are what a radio shop ought to be about and you have saved me money. I am very impressed!
Mel Fisher G4WYW
Hants

Difficult Exam?

Dear Sir

With reference to the article of March '97 'RAE Results...Could Do Better'? I must admit that I think December's exam paper was difficult and, sometimes, out of syllabus. The paper really

was 'nerve wrecking', questions too long with tricky multiple choice answers (sometimes the words used made it difficult to determine which answer was correct, especially for us foreigners), and questions like 'what should be the polarisation of an antenna for a satellite?' really were 'head scratching' jobs!

George Benbow G3HB's RAE Manual and How To Pass The RAE books should be revised if the City & Guilds intend to continue with such questions. However, unlike some unfortunate failures who I know really studied hard for this exam, I managed to pass! So my gratitude still goes to Mr Benbow because it was his book that I studied after all.

But most of all, sincere thanks go to my class tutor **Mr Carmelo Fenech 9HIAQ** who is Malta's most dedicated and (probably the only one) best instructor we will ever have. In the meantime, I am here in my shack waiting

This Month's Star Letter

GM3JCC's 'Wireless Antenna'

Dear Sir

As experimenters ourselves in both amateur antennas and laser technology, I was delighted to read GM3JCC's article 'Wireless' Antenna in your April magazine. However, the set-up here is a little similar to **John Cunningham's**, though I prefer the QRO approach.

Namely, the transceivers are fed into home-brew (valve) linear amplifiers before being connected (via an a.t.u. of course) to the laser director. In fact, despite being a little long in the tooth, my friends and I have found the old Scott-Taggart valves to be ideal in this application.

Using UR-67 coaxial cable, the output (of around 600W) is fed into

an aluminium searchlight mirror (diameter 19in) via a balun. We have not been able to locate a commercial 175,000:1 balun, though we have had great success in making them.

They are filled with blue magnetic lamp-oil, as supplied by our trusty hardware/grocery store. Should the supply of surplus searchlight mirrors frizzle out, the XYLs Chinese cookery Wok makes a good substitute, though only the Ken Hom (non stick Wok) version is recommended.

Our laser source uses a slightly higher frequency than GM3JCCs, namely 678nm. We are very much in favour of 'invisible' antennas and the red light at this frequency is less bright. For the technically minded, the angular divergence is 0.75 minutes with a beam divergence of 0.3 rad. Neither bats nor indeed any creatures have ever been spotted in

the vicinity of the beam.

Although not mathematicians, we calculate a gain in the region of 830dB emanating from the director. We do not have an elevated clock face in Knock, though we do have an international airport.

Despite the problems associated with tracking laser reflectors moving at several hundred miles an hour, we have found that an astronomical telescope tripod fitted with alt-azimuth drive can be utilised. However, the gearing mechanism needs to be changed to increase movement speed by a factor of 400. This is a straightforward job for any Radio Amateur with a small workshop and a penchant for large cogs.

Results so far have been promising, though lumps of smouldering aircraft aluminium dropping into the surrounding fields have unfairly attributed to our

experiments. Once my colleague Assumpta has been released from the Mayo Eye Hospital, we hope to be back on air and working many G stations with our laser atmospheric ioniser antenna.

Dr Mannion O'Heys (E1E1O)
Dunbeaming
Knock
County Mayo

Editor's comment: We have strong evidence that **Dr. O'Heys E1E1O** is actually a pseudonym for **Clive Ellis G4NVX**. But I've no doubt that our EI friends won't take offence at his 'pirated' call sign and address as he joins in the joke regarding GM3JCC's article! (Please see 'Keylines' for further comment on the 'Batty' April article).

anxiously for those first contacts to come in, so to anyone hearing my call, I will be more than happy to have my first QSO with them. **Stephen Camilleri 9H5SC Malta GC**

Editor's comment:
Congratulations Stephen and let's hope your call sign will soon appear in the DX worked by contributors to 'HF Far & Wide' and 'VHF Report'!

Unfair To John Scott-Taggart?

Dear Sir

It was nice to meet the Editor and Editorial team again at Picketts Lock in early March. I thought that the attendance did seem to be up on the equivalent day to last year, but I expect we will have to await the official figures in due course.

I have a few comments regarding items in *PW* April issue. The first concerning the very interesting articles in 'Valve & Vintage' by Charles Miller about the activities of John Scott-Taggart. However, although far be it for me to accuse Charles of sour grapes, but I thought that he was unduly critical of 'ST' as he was known to his large following of home-constructors.

Scott-Taggart designed a number of 'sets' for home construction and he always said that his sets **DID** require about 10% more intelligence than normal! to operate. Having said that, the result was effective programme reception from many stations that it was impossible to even hear on similar priced commercial receivers.

I built two Scott-Taggart designs, the ST700 and the ST800. These were equipped with the 'spot on' dial, which made it possible to tune in any station precisely, without switching the set on.

As regards Charles's comment that 'ST' never designed a superhet, I know for a fact that he designed at least two - the ST Super and The Super Gram De Luxe. The first named was a five or six valved model with a separately tuned oscillator and literally knocked spots of all

the contemporary superhets, simply because in those days, it was very difficult to mass-produce tuning arrangements with oscillators that 'kept in gang' throughout the whole wave range.

I have photographs of both the superhets mentioned. The Super Gram De Luxe was a massive beast constructed in separate units, some of which had their own power supply. I have personally seen one example of this design, which used a Wearite four stage coil unit tuned with a four-gang capacitor, this model used a slide rule type of dial.

The audio output was 12W, quite phenomenal for those early days. I believe 'ST' also designed another superhet which was mainly for local station listening, but I have not seen one of this model. Charles rather ridicules the use of plug-in coils in the ST900, but this was again for the '10%' crowd! (Incidentally, both my 'ST' sets are in the Arreton Manor Wireless Museum on the Isle of Wight as are also quite a number of contemporary components).

One of the 'S-T' sets, which I would have liked to build, was the ST600 (which was also designed as a mains model). The battery version used a pentode as an h.f. amplifier and another similar valve as a detector giving positive feed back to the tuned circuit, the h.f. valves also provided positive feed back (reaction) in those days.

The set also used, if required, a tunable rejector coil unit in the aerial circuit to eliminate breakthrough if the user was very close to a powerful local transmitter, which often made it impossible to receive distant stations. Charles also mentioned that 'ST' designed a short wave converter, also with plug-in coils, this was known as the 'Hexoverter' because of the type of valve which was employed, unfortunately, I was unable to build one of these.

Another s.w. converter design which was popular was known as a 'Kelsey' adapter after its inventor who did not patent the design. This was built in a cigar box, used plug-in coils and also had a unique dial in the form of a helix traversed by the pointer which progressively disappeared

under the Helix as the tuning knob was turned.

All these sets featured in *Popular Wireless*, which went QRT in September 1938. All my copies of this magazine, which costs 3p, are also in the IOW museum archives.

I seem to have rabbitied on a bit about the old days, but I think that a little background noise gives a certain spice to modern developments. I myself used to be an 'unofficial service engineer' in our village, for many battery valve sets were use then in rural localities and quite a few amusing anecdotes come to mind!

My main 'Service Aids' in those days were, in order of importance, 1) a bicycle, 2) a bicycle pump to blow the dust out of the wireless sets and 3) a screwdriver to dismantle and adjust if necessary. Although the bicycle pump very often made further investigation unnecessary, apart from cleaning the accumulator terminals!

Peter Neave G4DAN Essex

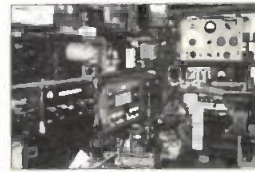
Editor's comment: I have spoken to Peter ('DAN always makes a point of coming to chat to us at the Picketts Lock show) suggesting that he prepare an article for us based on his experiences. I feel sure they would make fascinating reading!

Built For Ever?

Dear Sir

The Ultimate - Built For Ever Machine? This is the slogan used to advertise one well known h.f. transceiver. And my recent discovery of a photograph taken 20 years ago (1977) might just bring a little perspective to such a claim. The photograph shows the magnificent station of Jack Hurst G3AKW, who is alas now long since a Silent Key.

On the centre shelf of the photograph is a state-of-the-art Marconi receiver, which had been upgraded with product detection for s.s.b. and had filtering from 50Hz to over 5kHz. The transmitter, in the centre, is an all band 150W s.s.b. exciter using double lattice crystal filters, it fed to the legal limit G2DAF linear amplifier which sits alongside.



Just visible at desk level is an ex US Navy BC348, receiver which was used as a tunable i.f. for a series of state-of-the-art Nuvistor v.h.f. converters built to *RSGB Handbook* designs. Also secreted at this level is an OZ9BO electronic keyer and audio speech processor.

On the top layer is an LM14 frequency meter and a panoramic adaptor, which enabled the activity on an entire v.h.f. band to be monitored continuously. Extending along the shelf, behind the clock, are the v.h.f. transmitters for 70, 144 and 432MHz.

The meter in the centre of the photograph is a 'cross pointer' s.w.r. indicator which operated with numerous remote sense heads, which has been optimised and calibrated for the specified frequency at which they were being used.

The u.h.f. and v.h.f. heads are visible just by the window alongside the Elizabethan Transmitter, which had become redundant by this time. The units on the shelf below are a 144MHz s.s.b. transverter and 4 x 250 linear amplifier.

The station in the photograph was regarded as being the 'ultimate' in flexibility, mode capability and frequency coverage. It was the 'all singing all dancing' station of its day. It had been built to last using the highest grade items available by a professional radio engineer.

One can only wonder how historically interesting photographs of today's 'ultimate, built for ever machines' will be in 20 years time and if any of them will actually be still in use.

John A. Share G3OKA Wirral

Andrew's Antique Activities

Dear Sir

Sixteen years certainly feels like a long time. I have more or less continuously offered my voluntary service over that time as friend and leader to the

young teenage Members and sometimes even younger children, of what we call **The Thanet Electronics Club, G3SRE**.

Most of the time we plod along in the Clubroom on Margate sea front with the kids struggling with enthusiasm through learning how to solder, making their Multivibrator 'light flashers', 555 Timer Morse practice oscillators and Crystal Set, etc. And we carry out the Novice Scheme Courses - of course!

Getting out on bike tours to visit Power Stations or places of Scientific history is a lot of fun too, talk about 'alternative education'! But funny and unusual things occasionally happen to give a little jolt of surprise.

One new boy this month came along out of the blue - nice lad, quiet for a time, then when I got round to ask him, "Hi, what would you like to do? How about the Multivibrator Project with BC109s"

He answered, 'That's interesting, but may I do my valve radio? - I've bought one to try and repair!'

Out came a Dansette - in a bit of a state - but Andrew went on "I've got a dozen or so of different ones. I have a Saturday job and buy them when I can. I love them, they're so interesting! I know these radios have valves called triodes and pentodes in them and I've got a box full of valves, but can't find anyone to tell me how they work? I've got a terrific little book all about it, which I treasure. A Mr Camm wrote it...."

Well, from a 13 year-old, I found this experience most unusual, and in a way off-beat. However, all the other boys somehow caught the fever. Within minutes an eager wide eyed lot were listening to me going on about Edison, filaments, thermionic emission, De Forrest and triodes.

One lad said as we were packing up, "Cor, that's one of the best evenings we've had"! (You live and learn don't you?). A hoary old story about modern Youth's attitude after 16 years, but I never dreamt of experiencing that enthusiasm, about the subject coming from them!

Ken Smith G3JIX Kent

NEWS

1997

Compiled by Donna Vincent G7TZB

PLEASE
SEND YOUR
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AT THE
EDITORIAL
ADDRESS

Experimenting With Computers

Peter Brunning of Brunning Software has always felt that technology is often presented from too much of a mathematical point of view particularly when it comes to computers. Computer programming is rather like trying to teach a child grammar before allowing them to speak. So, with that in mind Peter set about writing a book using techniques similar to those used when a child learns about verbs and nouns by listening to normal conversations.

Experimenting with PC Computers takes you through 50 experiments (which can be run on any IBM compatible PC) and gradually teaches you how to programme in assembly language, how to design simple electronic circuits and how to interface these to a PC Computer. There is also a kit of parts to go with the book which contains a special solderless plug board for building circuits, a

set of components for the 50 experiments, three lead assemblies and an assembler programme that is aimed at the beginner.

Experimenting With PC Computers is available from the *PW Book Store* for £24 and the associated kit for £46. To order or for more information please contact **Michael Hurst** in the *PW Book Store* on (01202) 659930. Look out for the review in next month's *Practical Wireless*.

Can You Help?

Brian Williamson has written in with a query regarding his AR77 communications receiver. Brian says his AR77's tuned r.f. amp (preselector) attenuates rather than amplifies above 6MHz. He says he's tried everything to cure it without any luck and wants to know is this common to all AR77s?

If you have any suggestions or ideas to help Brian out he'd like to hear from you. Please write to 61

Air Communications

The **Air Training Corps (ATC)** or **Air Cadets** is a uniformed youth organisation whose aim is to encourage, amongst young people, a practical interest in aviation and the Royal Air Force, to provide training which will be useful in later life whether it be civilian or services. Cadets are aged between 13 and 20 and by joining are not obligated to join the RAF.

Air Cadets are encouraged to take part in adventurous training and sporting activities. They are also trained in map reading, principles of flight, propulsion and advanced radio and satellite communications with examinations being held several times a year to test their knowledge.

Ever since the ATC's formation in 1941 Cadets have been operating on radio frequencies allocated to them by the RAF. Over the years operations have progressed along with the development of equipment and changes in band plans.

In the 1996 a new Air Cadet Radio Training document was launched to allow cadets to follow a 30 hour course including military style operating procedures, safety, basic electronics and hands-on h.f. and v.h.f. operating. Following on from this an agreement has now been reached for Cadets who successfully complete the course to wear a specially designed Communicators' badge on their uniforms.

If you're interested in joining the Air Training Corps organisation or in helping out with their numerous activities please contact **Sgn Ldr G. A. King, Headquarters Air Cadets, RAF College Cranwell, Near Sleaford, Lincs NG34 8HB. Tel: (01400) 261201 Ext. 7619** for more information.



Yaesu High Performer Arriving Soon!

First shown in prototype form at the London Amateur Radio Show at Picketts Lock in March 1997, Yaesu have announced that their new **FT-920** h.f. and 50MHz transceiver will soon be available in the United Kingdom. Yaesu have also announced that the transceiver, which features 33 MIPS (Millions Instruction Per Second) digital signal processing, increased average power output and voice patterning contouring will be on sale during April.

Yaesu also report that additional features on the FT-920 include auto-seeking DSP notch filtering and noise reduction. The manufacturer mentions that a high speed automatic antenna tuning unit (a.a.t.u.) state is incorporated along with "User friendly DSP bandwidth controls for enhanced interference reduction and exclusive 'shuttle jog' tuning controls for fine and rapid tuning".

The many features highlighted by the Yaesu press release include details on the full h.f. coverage plus 50MHz with full 100W on all bands, new design MOSFET p.a. stage, auto a.t.u. operation on h.f. and 50MHz, 'Omni Glow' display with twin tuning controls and a digital voice memory system.

A particularly interesting feature on the FT-920 is the provision of a separate f.e.t. radio frequency amplifier with 'high' and 'low' bands.

The transceiver also incorporates a 'Quick Memory Bank' memory system which the manufacturer states provides an 'instant' frequency memory system, along with a total of 127 Memory Channels, each provided with 7-character alpha-numeric name tags.

Yaesu state that the retail price of the FT-920 will be announced late in April. For further information on this transceiver, contact **Barry Cooper G4RKO** at Yaesu (UK), Unit 2, Maple Grove Business Centre, Lawrence Road, Hounslow, Middlesex TW4 6DR. Tel: 0181-814 20001, FAX: 0181-814 2002.

Editorial note: Practical Wireless hope to review the FT-920 transceiver as soon as it's available in the UK. Additionally, Barry Cooper G4RKO from Yaesu (UK) Ltd., has confirmed that contrary to information circulating, that the Yaesu FT-900AT h.f. transceiver (reviewed in the March 1995 PW) is still a current Yaesu product and continues to be available. G3XFD.



Sundale Avenue, Selsdon, South Croydon, Surrey CR2 8RR. Tel: 0181-651 5345.

Young Radio Amateur Of The Year Award

If you're thinking of nominating a Young Amateur for this year's Young Amateur Of The Year Award you'll need to bear in mind the

following guidelines:

The award is given for the most outstanding radio achievement between 1 August 1996 and 31 July 1997 and is open to anyone under 18 who has an interest in radio and is a resident in the UK, Channel Islands or the Isle of Man. Entrants must be nominated by an adult sponsor although there is no requirement for entrants or

Alinco News

Mr Tsunemi Export Manager for Alinco (right) is pictured with Mike Devereux G3SED Managing Director of Nevada during his recent visit to complete the signing of an exclusive distribution agreement between Alinco and Nevada. During his visit Mr Tsunemi took the opportunity to



demonstrate the DJ-C1 and DJ-CF which are the latest v.h.f. and u.h.f. transceivers to come from the Alinco factory.

The DJ-C1 and C4 are being described as being 'wafer thin' as at just 10.6mm deep they really are thin and will fit easily into a shirt pocket. Both transceivers offer 340mW of r.f. output, feature a wide-band receive capability and the selling price is expected to be £189.95.

For more information on the DJ-C1 or C4 or

involved, has been running annually since 1988 and each year the award is presented for the most outstanding achievement by a young amateur radio enthusiast. All applications and nominations should be sent to **Young Amateur of the Year Award, Radio Society of Great Britain, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE. Tel: (01707) 659015.** The closing date for entries is 31 July 1997

Microwaves Are Back!

Microwave Modules, who have been running on the 'back burner' for several months are now back in full swing after relocating to new premises. They are one of the oldest British Manufacturers of amateur radio products and the range includes high performance transverters and linear amplifiers.

Products to look out for include the new MMT144-28HP, which allows most h.f. transceivers to operate on 144MHz and retails at £299.95. There's also the MML144-100-10 linear amplifier which offers 10W in, 100W out, is aimed at the IC-706 user and retails for £199.95.

The sole distributor for Microwave Modules products for

the UK market has been appointed as **Martin Lynch & Son of 140-142 Northfield Avenue, Ealing, London W13 9SB.** So, why not contact Martin for details on the full range of products either by telephoning him on 0181-566 1120, FAXing on 0181-566 1207 or E-mailing on sales@martin-lynch.co.uk

Open Day No 7

Jeff Stanton G6XYU has informed the Newsdesk that the 7th **Waters & Stanton Electronics Open Day** will take place on **Sunday 1 June 1997** from 10am. Jeff says this year's event promises to be the biggest yet with three marquees housing many of major manufacturers and personalities from the Amateur Radio world.

There will be deals to be made on many of the leading brand names together with the chance to pick-up a bargain at the Open Day auction which starts at 2pm - the advice is don't miss it! Several raffles will be also be taking place throughout the day and free food and drink will also be available.

So, what are you waiting for? Make it a date in **your** diary today!

'Private' 144MHz Repeater Switched Off

The **Radiocommunications Agency** recently carried out a successful prosecution in respect of an unlicensed 144MHz Amateur Radio repeater in Dukinfield, Manchester.

In their press statement dated 14th of April 1997, the RA report that "At Dukinfield Magistrates Court on 10th March 1997, a licensed Radio Amateur was found guilty of using apparatus for wireless telegraphy on 16th September 1996 except under and in accordance with a licence issued on that behalf by the Secretary of State. He was given a conditional discharge and ordered to pay a contribution of £150 towards costs". On this occasion the defendant did not forfeit the equipment.

Following a telephone enquiry from the **PW** office for further details, an RA spokesman confirmed that the Radio Amateur concerned allowed access only to associates, by providing them with the necessary tone codes. In effect, offering a 'private access' through the unlicensed repeater.

Editor



indeed any of the products in the Alinco range contact Nevada direct on (01705) 662145.

nominees to hold an Amateur Radio Licence.

The following areas of activity will be considered when the applications are assessed. Radio construction (d.i.y.), operation of radio, community service, encouraging others and school projects. The first prize of £300

together with an invitation to visit the **Radiocommunication Agency's** Monitoring station at Baldock will be awarded at the **Radio Society of Great Britain's** HF Convention in September 1997.

The competition, which is aimed at generating interest in amateur radio and encouraging people to get

Extended Magnification

If you are an avid constructor, model maker or just enjoy 'tinkering' then the new **SAM 75 Swing Arm Magnifying Lamp** could be just the thing for you. Manufactured by **Clarke Power Products** this new magnifying lamp has a 3-diopter precision lens for high resolution viewing and is described as being ideal for all applications which require illuminated magnification.

The lens of the SAM 75 is protected by an integral sliding cover and a 60W SES candle type bulb is all that is needed to provide adequate lighting. Other features include an adjustable spring balanced extension arm and a swivel shade.

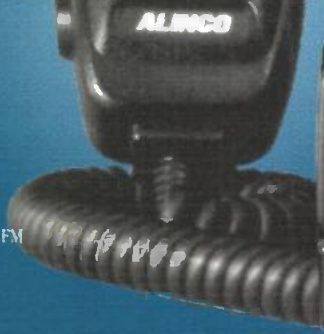
For more information on the SAM 97 which is priced at around £23 contact **Ross Burnard** at **Clarke International** on (01992) 565300.



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Zoë says:
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CLUB Spotlight

Compiled by Zoë Crabb

Aberporth's AGM

The Aberporth Amateur Radio Club recently held its AGM. The current Chairman **Don Kirby GW0PLP** stood down and handed over to incoming Chairman **Dave Pitkin GW0PNI**. Re-elected as Secretary and Treasurer respectively were **Steve Evans GW7WGO** and **Tim Vismas GW0TMV**.

Other officers elected were Deputy Chairman **Johnathon Tamlin GW7WLM** and ordinary member **Andy Smith GW0TXP**. All the members expressed their thanks to **Graham Beck** who takes the RAE classes every Wednesday evening and to **Bob Kentish GW4JRK** who is the organiser of the Novice Examination class.

During the year, four members were successful with the RAE examinations, all four of whom now hold a

Class B licence. This is a good record and the club hope for more success this year.

Activities include the provision of a 70cm (430MHz) repeater. Morse classes and a DXpedition to take part in the IOTA weekend, which is held on 25/26 July. Meetings for the club are held on the 1st and 3rd Thursdays of the month.

Further information can be obtained from **Dave Pitkin GW0PNI** on (01239) 810382 or from **Steve Evans GW7WGO**.

Ripon's Rally

The Ripon & District Amateur Radio Society (RADARS) will once again be presenting the Northern Mobile Amateur Radio Rally this year on December 7th, so now's the time to write it in your diary! (Please note this new date, as the rally has

Wincanton's New Repeater

After three years of frustration and struggle, the Wincanton Amateur Radio Club has announced that **GB3TC**, their new 70cm (430MHz) repeater is now on the air on channel **RB1**. Members hope that this repeater will be a source of joy to those amateurs in the counties of Somerset, Wiltshire and Dorset, who will be able to reach further than they have in the past.

Mobile operators will have communication over the whole of 'The Blackmore Vale' including the east/west main roads of **A303** and **A30**. The **A303** from just east of the Sparkford Roundabout to Stonehenge on high ground. The **A30** coverage will be just east of Sherbourne to just west of Salisbury.

Constructive comments from users of this new repeater are welcome, either by 'phone to **Jim Hatch G300I**, on (01963) 370352 or by FAX on (01963) 370833. If you have Packet, through **GB7BNM**.

been held in May in the past!).

This year, the 40th anniversary of the Rally, which has taken place annually since the late 1950s, will see it return to its familiar venue of the Flower Show Hall on the Great Yorkshire Showground in Harrogate, after its excursion to Ripon in 1996.

The Rally doors open at

10.30am and access is from the **A661** Wetherby Road in Harrogate. There is considerable parking space available within the Showground, all on hard standing, and there are special parking facilities for disabled visitors close to the hall.

Drinks and refreshments will be available all day, and the Society hope to see a good turn out from the

regular traders. As ever, there will be a large Bring & Buy.

Anyone requiring more information should contact the Rally Manager, **Gerald Brady** on (01765) 640229 or **Andrew Woodthorpe GIUXP**, Rally Publicity Manager, on Packet through **GIUXP@GB7CYM** or E-mail to **woody@tangon.demon.co.uk**

Official Opening Of GB3HJ

The Harrogate Community Repeater **GB3HJ**, was officially opened on Friday 7 March by a greetings message sent from **Norman Lamont MP** to **Stuart G4AYP**, the Harrogate amateur who first suggested that Harrogate Ladies' College would make a good site for the repeater.

The repeater is operated by the Harrogate Ladies' College Repeater Group, which consists of licensed staff and students of the school plus amateurs in the Harrogate district. It is situated on the tower at the top of the main school building, and is believed to be the first repeater in the country to be operated by a school group.

The purpose of the repeater is to serve the community of Harrogate and its surrounding villages, in particular Nidderdale, in the region towards Pateley Bridge. As well as having a significant resident amateur



population. Harrogate also attracts a considerable number of conference and holiday visitors each year and it is hoped that **GB3HJ** will prove popular with all these potential operators.

Mr Lamont then toured the school, accompanied by the Headmistress, **Dr Margaret Hustler**, after which they then joined the members of the repeater group, consisting of 17 students (8 licensed plus 9 sitting the RAE/NRAE this year), as well as 3 members of staff and a local businessman, **Simon G4KCR**, who has been a long time supporter of the amateur radio work at the school.

Mr Lamont in the shack of **GX0HCA**, the club station of Harrogate Ladies' College. Club/Repeater Group members on the picture are (l to r) **Mimi (NRAE student)**, **Elizabeth M0AQH**, **Katie (RAE student)**, **Jill G7PGA (staff)**, **Ruchika (RAE student)**, **Susanna (NRAE student)**, **Laura G7WCZ**, **Stephanie (RAE student)**, **Fiona G7WDA**, **Rebecca M1ATQ**, **Angela M1BDE** and **Evon M1BBO**.

Back row (l to r) **Evon M1BBO**, **Laura G7WCZ**, **Ruchika (RAE student)**, **Lee G7WCW**, **Olivia G7UDB**, **Elizabeth M0AQH**, **Nevine (RAE student)**. Middle row (l to r) **Rebecca M1ATQ**, **Katie (RAE student)**, **Stephanie (RAE student)**, **Lynne (RAE student)**, **Angela M1BDE**, **Mimi (NRAE student)**, **Susanna (NRAE student)**, **Fiona G7WDA**, **Kathryn (NRAE student)**, **Claire (NRAE student)**. Front row (l to r) **Simon G4KCR** - Repeater Treasurer, **Jill G7PGA** - Membership Secretary, **Norman Lamont MP**, **Dr Margaret Hustler** - Headmistress, **Richard G3XWH** - Repeater Keeper, **David G4CWB** - Director of Music.



Stourbridge & DARS

The Stourbridge & District Amateur Radio Society have written into 'Club Spotlight' with news that they are fast approaching their 60th year and that **Helen Taylor G0WRD** is the new President Elect - only the second woman to hold this position in the Society's history!

The Society welcomes all radio amateurs and short wave listeners and have within the current membership, people with an interest and knowledge of a wide range of subjects that makes up amateur radio.

The Society meet on the 1st and 3rd Monday in the month (except Bank Holidays) at **The Robin Woods Centre, Scotts Road, Stourbridge** at 8pm. Visitors and prospective members are always welcomed.

Further information is available from **Gordon Bryant G0TZV** (Club Sec.) on (01384) 395206.

New Project For LARS

John Alexander G7GCK, Chairman of the **Leicester Radio Society (LRS)** has recently E-mailed 'Club Spotlight' with news that during April the Society are releasing Associate Membership cards at a nominal charge of £10 per card. The cost is being kept down so that Associate Members can benefit in a very short time period from a wide range of discounts being made available to all members/Associate members of LRS.

The Society have signed up with Stakis Hotels to have members entitled to a 10% discount from Stakis normal rates at their excellent hotels. The Consort hotels group have also come on board with the same discount.

These discounts are for pre-booked accommodation. Golf courses, tourist attractions, amateur radio suppliers and other hotels will follow very shortly.

After informing the RSGB, the Society have also set out to target American and then Japanese Radio

Amateurs (over 2 million in all) of whom a reasonable number may wish to visit the UK in any one year. If they have one of the cards, then they can obtain a valuable range of discounts.

In fact, all of the discounts so far discussed will be available to any members of LRS. So, if you live in the remote islands of Scotland, but occasionally stay with Stakis Hotels for instance, then membership may be very worthwhile to you. Anyone who makes even the occasional use of the listed sites will more than cover their membership costs by making cash savings.

The Leicester Radio Society would like to stress that this is not a private, commercial money making scheme. The LRS is seeking new premises to replace those they have been in since 1965!

The Society want better training and operating rooms, refreshment and toilet facilities and the very best in the way of equipment for members to use on site. They are currently working with Leicester City Council and looking for premises within the 'City Challenge' area of Leicester.

Besides that, **John G7GCK** as been invited to represent LRS with 'Champions of Leicester', which is a City Council initiative to raise the profile of Leicester as place to live and work. Exciting times!

If LRS does well from this project, then more people can be trained in Novice, RAE and in Morse classes, and in better conditions. People of all ages and physical abilities are catered for, something that at the moment is difficult at the Society's present site.

Raising the profile of Amateur Radio is very important to LRS and once new premises and facilities are funded, then consideration can be made to assist other clubs and groups with an Amateur Radio link. **John G7GCK** believes that Amateur Radio in general should benefit from any success that LRS may have!

Hastings Club

The **Hastings & Electronics & Radio Club** meet at

7.30pm on the 3rd Wednesday of the month at West Hill Community Centre, Croft Road, Hastings. The club runs courses for the RAE and Novices and is approved as an examination centre for the City & Guilds exams.

Further details from **Doug Mepham G4ERA**, QTHR on (01424) 812350.

First AGM

The **Ynys Mon Amateur Radio Group** held its first AGM in March and was well attended. The main topic was to retire the old committee and vote in a new one for the next coming year.

This was done as the first order of business, the new committee was then voted in, there was no change from last year. It was then decided by the membership that there should be an increase in the annual fees from £1 to £2.50, but the entrance fee was to stay the same, 50p.

The group gives RAE lessons at the club hall, usually on Friday nights, and will be covering the December '97 exam. They will also be able to hold the RAE/Novice exams at the hall and any person wishing to take lessons needs to contact Tony at the address below.

The group held two events, covering the JOTA and the Thinking on the Air. Both events went well and were well attended. The group is to hold the 13th Jamboree Cymru in July/August 97, it will be a week's event, and it is to be held with the North Wales Rally Club and the Marford Club Wrexham.

Geoff GW7OIX is to talk about the upgrading of the power supply, which he demonstrated earlier in the year, and he will also be demonstrating cheap and cheerful antennas. **Brian GW4KAZ** gave a talk on the Arfon Repeater, and he explained the ins and outs of how it works.

More events are to be run throughout the year and the use of the club callsign MWOAER will be used at the weekends by the membership. **Tony Anziani GW4ZWN** can be reached on (01407) 832197.

Edgeware's 60th Anniversary

The year 1997 is the 60th anniversary of the **Edgeware & District Radio Society**. To celebrate the rare Diamond anniversary, the club will be holding a special dinner with a guest speaker at a local hostelry on Saturday 25 October.

Any amateurs and their families are welcome to join existing members at this 'ticket only' event, and in particular, the club would like to hear from any past Edgeware members who may have lost touch with their former colleagues over the years. For more details, contact the Secretary, **David Wilkins G5HY**, QTHR.

Congratulations Jessica!

For 12 years **Mike Soars G4TCI** and his wife **Alison G0ALI** have helped Scouts and Guides by running Communications Badge courses. For some years they have helped their son **Iain G3HGI** (he inherited the callsign).

A few years ago, they helped **Jessica Hyde** get her Brownies Communications Badge. Unfortunately, Jessica is profoundly deaf, so Mike and Alison arranged for a Special Event callsign **GBOJES** and Jessica worked the required stations using the packet mode.

Jessica is now aged 13 and is described as a 'winner' at everything she strives for. In order to get her Guides Comms Badge, it was necessary for her to do the same as her friends - work and communicate on air.

In February of this year, five girls from the 5th Wordsley Guides took their course with Mike and Alison. The other four always help Jessica who can lip read and also use sign language. But, the question was, how was Jessica to take a practical element - the answer was to be Morse with the vibrations of the speaker brought into play.

Jessica had a loan of the oscillator and details of the code, and then she wanted to try it out for real. The callsign **GBOJES** was resurrected at the QTH of **G4TCI** and family in Kingswinford, West Midlands, on Wednesday 26 March 1997. She had a full QSO with **David Barlow G3PLE**, who operated from the Poldhu Amateur Radio Club station **GB2GM**, 250 miles away in SW Cornwall.

Jessica sent a full QSO with callsigns and procedural signs and did not make a mistake. She received all that was sent to her.

Roy Clayton G4SSH, the RSGB Chief Morse Examiner listened in and confirmed the QSO. Jessica was thrilled that she had communicated with someone all those miles away without lip reading or visible sign language.

It is thought that Jessica, with her disability, was the first Brownie to get a Communications Badge, and perhaps this is the first time that a Guide has passed all the requirements for her communications badge using A1A transmissions. Everybody concerned should be congratulated on this fine achievement, especially Jessica.



Don't forget to send in two of your most recent club magazines to me, to be entered into the Spotlight Club Magazine Competition. Closing date is 25 July 1997, so you'd better get a move on!

Zoë

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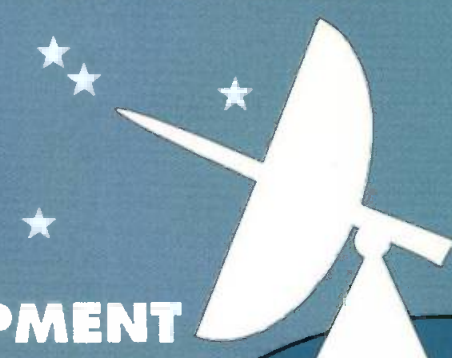
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15th

Annual Practical 144MHz QRP Co

0900-1600UTC, Sunday 15 June 1997

*Contest Adjudicator
Neill Taylor G4HLX
reminds us all it's
time to prepare the
picnic basket, find the
insect repellent,
prepare the
sandwiches and get
the antennas and rig
ready as it's 'fun'
contest time soon!*

It's that time of year again, when v.h.f. enthusiasts will take to their favourite hill-top for a day of QRP operation that promises to bring the 144MHz band alive. Whether you are a complete newcomer to v.h.f. contests, or part of a well-established group, or maybe just a QRP operator who'd like the chance to work some long distances, the PW 144MHz QRP Contest has something to offer you.

The 3W output power limit makes it easy to compete effectively. And year after year operators are amazed by the distances they achieve with low power.

The contest follows the familiar format that has proved popular for the last 14 years. The simple scoring system makes it easy to prepare your log for submission after the event. But **please do make sure** that you have provided **all the information required**, particularly the covering information listed in Rule No. 6.

You can make up your own log sheets, following the sample headings shown here. Or, if you have Internet access, you can download a blank log sheet and cover sheet from our contest Web page, at <http://www.rmplc.co.uk/eduweb/sites/ntaylor/pwqrp.html>, which also has other contest information including an archive of full results of each annual event since 1991.

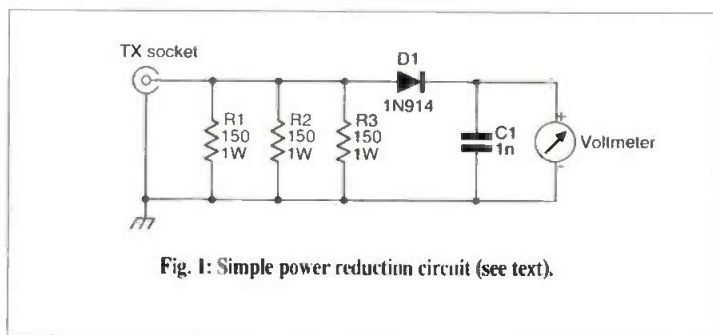


Fig. 1: Simple power reduction circuit (see text).

Trial Popular

Last year's trial of reducing the contest duration to seven hours was popular, and comments received from entrants were overwhelmingly in favour of retaining the new times. So this year, the contest again runs from 0900 to 1600UTC. And again the second session of the RSGB Backpacker's Contest is co-ordinated with the first four hours.

For most operators, the reward of entering the PW QRP Contest is the fun had on the day. For those who achieve particularly good performance, however, there are certificates, trophies and prizes to be won.

We award certificates to **leading stations in a number of different categories**, including the highest scoring station in each locator square. So, even if you don't think you can quite manage the number one position, you might like to try to beat the other contestants in your area.

The overall winners will receive the Winner's Cup, as well as the special prize of an **Alinco DJ-190** hand-held transceiver, kindly donated this year by **Mike Devereux G3SED** of **Nevada Communications**. The runners-up will also have a special prize, this year as usual it comes as a special Solar Panel pack kindly donated by **Bob Keyes GW4IED** of **Key Solar Products**.

For Scottish stations, there is the Tennamast Trophy "In Memoriam to Frank Hall GM8BZX", which will be awarded to the leading GM or MM station presented and sponsored by **Tennamast (Scotland) Ltd.**

And this year we are very pleased to introduce a new trophy for entrants in the Republic of Ireland and Northern Ireland. This is the **PW EI/GI Trophy Clock**, donated by G3XFD which will be awarded to the leading EI, GI or MI station.

Editorial note: Because of

Fig. 2: Sample log sheet for PW 144MHz QRP Contest (see text).

Practical Wireless 144MHz QRP Contest 1997				
Date	Callsign	Locator	Sheet No Of	
Time UTC	Callsign	Report & Serial No		Locator
		Sent	Received	

Wireless Contest

G4HLX's work commitments abroad during 1997, this year's results will not be published in the November magazine as usual, but will appear in the December issue of PW instead. I also take this opportunity to thank Dr Taylor for his tremendous dedication and enthusiasm for the contest. Without his work we could not run the event. Thank you Neill! Rob Mannion G3XFD, Editor.

Study Carefully

Whether or not you have entered the contest before, please **study the rules carefully** in your preparations for this year's event. Be careful about the accuracy of your logging, as errors will cost you points during adjudication.

And please take care to present your entry exactly as specified in the rules. Entrants who fail to provide the list of squares worked, and to highlight in the log the first contact in each square, will be heavily penalised.

Because it can be straightforward to enter, the QRP Contest has always attracted newcomers having their first taste of v.h.f. contest operation. If this is **YOU**, then don't hesitate to come on in and enjoy the fun!

You'll find that the other operators are friendly and helpful. Of course, you'll get better results if you can set your station up on a good portable site, and getting together with some friends to share equipment and operating rota is always a good idea.

Whatever you choose to do, let's hope that we all enjoy the customary good weather, and good propagation conditions, too. I look forward to receiving your logs. **So...good luck in the 15th contest!**

Neill Taylor G4HLX

Contest Rules

1. General: The contest is open to all licensed radio amateurs, fixed stations or portable, using s.s.b., c.w. or f.m. in the 144MHz (Two metre) band. Entries may be from individuals or from groups, clubs, etc. The duration will be from 0900 to 1600UTC on 15th June 1997.

All stations must operate within the terms of the licence. Entrants must observe the band plan and must keep clear of normal calling frequencies (144.300 and 145.500MHz) even for CQ calls. Avoid frequencies used by GB2RS during the morning (144.250 and 145.525MHz) and any other frequency that is obviously in use for non-contest purposes. Contest stations must allow other users of the band to carry out their activities without hindrance.

The station must use the same callsign throughout the contest and may not change its location. Special event callsigns may not be used.

2. Contacts: Contacts will consist of the exchange of the following minimum information:

- (i) callsigns of both stations
- (ii) signal report, standard RS(T) system
- (iii) serial number: a 3-digit number incremented by one for each contact, starting at 001 for the first
- (iv) locator (i.e. full 6-character IARU Universal Locator for the location of the station).

Information must be sent to, and received from, each station individually, and contact may not be established with more than one station at a time. Simultaneous operation on more than one frequency is not permitted.

If a non-competing station is worked and is unable to send their full universal locator, their location may be logged instead. However, for a square to count as a multiplier (see Rule 4), a full 6-character IARU universal locator must have been received in at least one contact with a station in the square.

Contacts via repeaters or satellites are not permitted.

3. Power: The output power of the transmitter final stage shall not exceed 3W p.e.p. If the equipment in use is usually capable of a higher power, the power shall be reduced and measured by satisfactory means. The simplest way is often to apply a (variable) negative voltage to the transmitter a.l.c. line, reached via the accessory socket. The output power can be accurately measured using the simple circuit in Fig. 1. Connect this to the 50Ω output of the transmitter and adjust the power so that the voltmeter does not exceed 16.7V on a good whistle into the microphone.

4. Scoring: Each contact will score one point. The total number of points gained in the eight-hour period will then be multiplied by the number of different locator squares in which contacts were made (a 'square' here is the area defined by the first four characters of a universal locator). Example: 52 stations worked in IO81, IO90, IO91, IO92 and JO01 squares; final score = 5 x 52 = 260 points

Only one contact with a given station will count as a scoring contact, even if it has changed its location, e.g. gone /M or /P. If a duplicate contact is inadvertently made, it must still be recorded in the log, and clearly marked as a duplicate.

5. Log: The log submitted as an entry must be clearly written on one side only of A4 sized paper (210mm width x 297mm height), ruled into columns showing:

- (i) time GMT
- (ii) callsign of station worked
- (iii) report and serial number sent
- (iv) report and serial number received
- (v) locator received (or location).

Underline or highlight the first contact in each of the locator squares worked. At the top of each sheet, write:

- (a) callsign of your station
- (b) your locator as sent
- (c) sheet number and total number of sheets (e.g. 'sheet no. 3 of 5').

The sample shown, Fig. 2, illustrates how each sheet should be headed.

6. Entries: Accompanying each entry must be a separate sheet of A4 sized paper bearing the following information:

- (a) name of entrant (or of club etc. in a group entry) as it is to appear in the results table.
- (b) callsign used during contest (including any suffix)
- (c) name and address for correspondence
- (d) details of location of station during contest; for portable stations, a national grid reference is preferred
- (e) locator as sent
- (f) whether single- or multi-operator (a single-operator is an individual who received no assistance from any person in operating the station, which is either his/her permanent home station or a portable station established solely by him/herself; if multi-operator, include a list of operators' names and callsigns)
- (g) total number of contacts and locator squares worked
- (h) list of the locator squares worked
- (i) a full description of the equipment used including TX p.e.p. output power
- (j) if the transmitting equipment is capable of more than 3W p.e.p. output, a description of the methods used (i) to reduce and (ii) to measure the output power
- (k) antenna used and approximate station height a.s.l.

Failure to supply the previous information may lead to loss of points or disqualification. The following declaration must then be written and signed by the entrant (by one responsible person in the case of a group entry): "I confirm that the station was operated within the rules and spirit of the event, and that the above information is correct".

The declaration concludes the entry, which should be sent, with the log sheets, to: **Practical Wireless Contest, c/o Dr. N. P. Taylor G4HLX, 46 Hunters Field, Stanford in the Vale, Faringdon, Oxfordshire SN7 8LX.** (A large s.a.e. should be enclosed if a full set of contest results is required).

Entries must be postmarked no later than 30th June 1997. Late entries will incur a heavy points penalty or may be disallowed.

Comments Welcome

Any other general comments about the station, the contest and conditions during it are welcome, but should be written on a separate sheet of paper. Photographs of the station are also invited (but please note that these cannot be returned); if these are not available by the time the entry is submitted they may be sent later, directly to the PW editorial offices at Broadstone (see page 1), to arrive by 11th August 1997.

7. Miscellaneous: When operating portable, obtain permission from the owner of the land before using a site. Always leave the site clean and tidy, removing all litter. **Observe the Country Code.**

Take reasonable precautions to avoid choosing a site which another group is also planning to use. It's wise to have an alternative site available in case this problem does arise.

Make sure your transmitter is properly adjusted and is not radiating a broad or poor-quality signal, e.g. by over-driving or excessive speech compression. On the other hand, be aware that your receiver may experience problems due to the numerous very strong signals it will have to handle, and that this may lead you to believe that another station is radiating a poor signal. Before reaching this conclusion, try heavy attenuation at the receiver input. The use of a high-gain r.f. pre-amplifier is likely to worsen strong-signal problems, so if you do use one, it is best to be able to switch it off when necessary.

8. Adjudication: Points will be deducted for errors in the information sent or received as shown by the logs. Unmarked duplicate contacts will carry a heavy points penalty. Failure to supply the complete information required by Rule 6 may also lead to deduction of points.

A breach of these rules may lead to disqualification. In the case of any dispute, the decision of the adjudicator will be final.

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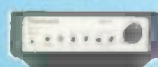


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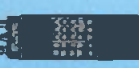
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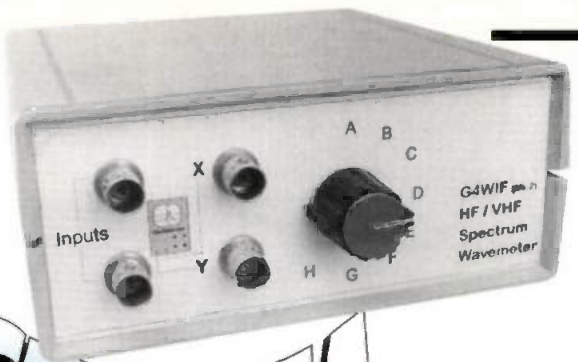
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SPECTRUM WAVEMETER

By Tony Fishpool G4WIF

Tony Fishpool G4WIF wanted a spectrum analyser - but couldn't afford one. Here's his effective answer to the problem.

I imagine that many constructor's cherished wish is one day to own a spectrum analyser. Unfortunately, (though not if you are selling) even second-hand they hold their price well. So, we tend to fall back on the humble absorption wave meter for spotting rogue emissions ('sprogies') from our transmitter.

Finding 'sprogies' with only the use of an absorption wavemeter is unfortunately difficult. It often takes much knob (twiddling and waving!) around the sensing antenna and coil to find a usable signal. And even then it can only 'display' one frequency at a time.

I felt that something had to be done to make the sometimes onerous task easier. And the resultant project is basically a posh absorption wave meter. (An absorption wavemeter in its most simple form is just a parallel tuned circuit with a diode detector across it - rather like a crystal set in fact).

The Spectrum Wavemeter uses the same principles as the standard absorption wavemeter, which is a tuned circuit that is adjusted to the same resonant frequency as the circuit or signal source under test. But instead of using a conventional variable capacitor as the tuning component, I've used a variable capacitance (varicap) diode instead.

(A varicap diode is operated in the reverse biased mode. It's a type of diode where the junction is made with an abrupt change from the P to the N type material. Because of this abrupt change in the depletion layer, the cathode and anode form a capacitor with a very small distance between the 'plates'. When the reverse

voltage, across the diode junction is changed, (changing the width of the depletion layer) the capacitance value also changes. The change of capacitance value can often be as much as 20:1 over the working voltage range. A range of varicap diodes is available, with values of

several hundred picofarads to only a few picofarads, so they are useful for l.f. to u.h.f. frequencies. Editor).

Using a varicap diode is not a new idea, as I have seen at least one article previously that used this principle. What I believe is novel about my analyser circuit, is the use of a timebase independent of that contained within the oscilloscope and the wide frequency coverage of the design.

Voltage Sweep

To tune the wavemeter, using a varicap diode, a steadily rising voltage sweep is needed. The higher the voltage rises, the lower the capacitance of the diode, and consequently the higher the resonant frequency of the tuned circuit. The general capacitance versus voltage curve of a typical varicap diode is shown in Fig. 1.

If the sweep voltage is also taken to the 'X' axis of an oscilloscope that has its internal timebase disabled, the dot will travel from left to right (ie. from low frequency to high). The diode detector, D3 will rectify any voltage that is developed across the coil, giving an output that varies over frequency.

If the output is connected to the 'Y' input of the oscilloscope, it will produce a 'bump' somewhere along the trace. The magnitude of the bump will depend on the degree of coupling between the signal source and the coil, as well as the actual level of signal.

Why have I gone and designed my own timebase for the oscilloscope? - you may ask. Well, that's because one of my oscilloscopes doesn't have an external output from its timebase and the other presents a waveform that I found unsuitable. So, I designed my own waveform generator.

The waveform generator is based around the ever popular '555' timer

chip, often found at rallies for pennies. I found I needed two i.c.s so, to keep the chip count down, I used a '556' type, which contains two 555 i.c.s in one package.

Describing the many applications for the 555 would be a series of articles in itself so, I'll concentrate only on the principal aspects of the design. The first timer (see Fig. 2) provides a continuous square wave output the frequency of which about 135Hz with the components shown.

The simple squarewave voltages would be enough to move the spot from left to right on the oscilloscope, but it would spend very little time between the two extremes edges. I wanted a smooth change of frequency over the width of the screen so that any 'bump' could appear separated from other 'bumps'. So I used the second timer to produce a ramp or sawtooth waveform.

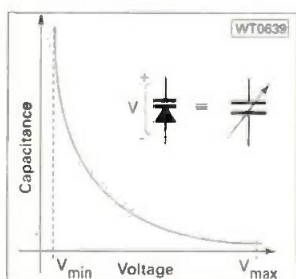
Each time a pulse from the squarewave generator arrives it triggers the timer, and capacitor C5 is charged via Tr1 in a linear manner. The resultant sawtooth waveform is fed to both the varicap diode and the 'X' axis of the scope simultaneously.

The overall circuit diagram, Fig. 2, shows the ramp generator on the left side of the diagram with the wave meter circuit on the right. The coil L1 was constructed using a 35mm plastic film canister as a former and the coil was close wound with 44 turns of 0.45mm (26s.w.g.) enamelled copper wire and tapped as shown in Fig. 3.

If your junk box doesn't contain an empty 35mm film canister, they are usually obtainable from film processing shops free, and I've found them very useful for all sorts of things. For the construction of L2, I used a 65mm length of 1.2 or 2mm diameter copper wire bent into the shape shown in Fig. 4. The 10mm 'leg' is horizontal, and the 15mm 'leg' drops vertically down to a land on the p.c.b.

I've also dabbled, over the years, with printed circuit boards and given it up as a time consuming, messy job. While a p.c.b. is a boon for the kit

Fig. 1: A general voltage versus capacitance plot for a typical varicap diode.



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4.7kΩ	1	R3
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33kΩ	1	R7
220kΩ	1	R9
3.3MΩ	1	R8

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10nF	1	C3
22nF	1	C2
47nF	1	C4
100nF	2	C5, 6
200nF	1	C1 (a 220nF capacitor may be substituted)

Polystyrene

220pF	1	C10
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1N4148	1	D1

MISCELLANEOUS

A 35mm film canister, a length of 1.5mm copper wire, a length of 0.5mm enamelled copper wire, a small reed (linear) relay, sockets to suit, a single pole 8-way switch, a suitable box, a piece of single-sided p.c.b. material, interconnecting wire, short lengths of coaxial cable.

A kit for the G4WIF Spectrum Wavemeter is available from **Kanga Products** at a cost of £24.95 +£1.50 P&P from **SeaView House, Crete Road East, Folkestone CT18 7EG. Tel: (01303) 891106.**

constructor, I feel that for one-off production there are better, quicker methods. I generally use single sided copper clad board and mount the components with the copper side up.

Simply Soldered

Leads that have to be grounded are simply soldered to the board, while other components are linked

underneath, either by their own leads or short pieces of wire. Of course, it is necessary to ensure that components are not inadvertently grounded on their way through the board to the other side and this is accomplished by removing the copper around the hole. I use a Veroboard strip cutter (but a small drill of about 3-4mm diameter will do).

I use a small piece of perforated matrix board to provide a template for drilling the holes for i.c.s which are then cleared with the Vero cutter. A small blob of glue holds the i.c. socket in place.

Whenever possible, I lay out the components in the same position as they appear in the circuit diagram. I've found this works very well although on more complex circuits, I use a computer p.c.b. design package to work out a layout that produces the least number of leads that cross underneath the board.

The layout, in the photograph of Fig. 5, shows the overall layout of my original project. I've followed the layout of the circuit diagram, as far as I could. So, you should be able to visualise the component numbers by comparing the two together.

Of course this could be used as a basis for a circuit board if you should wish. This method has been successful with r.f. circuits as well. Where components need to be soldered to a

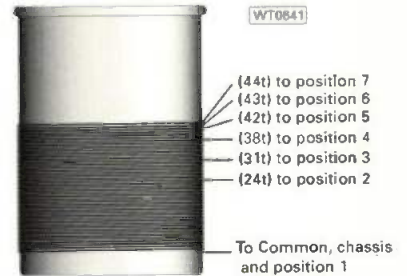


Fig. 3: The 35mm film canister coil is wound with 0.45/0.5mm enamelled copper wire with links at the points shown.

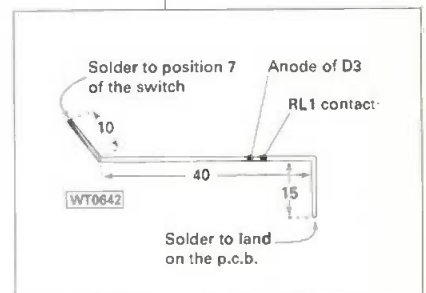


Fig. 4: The shape of inductor L2. (See text for more detail).

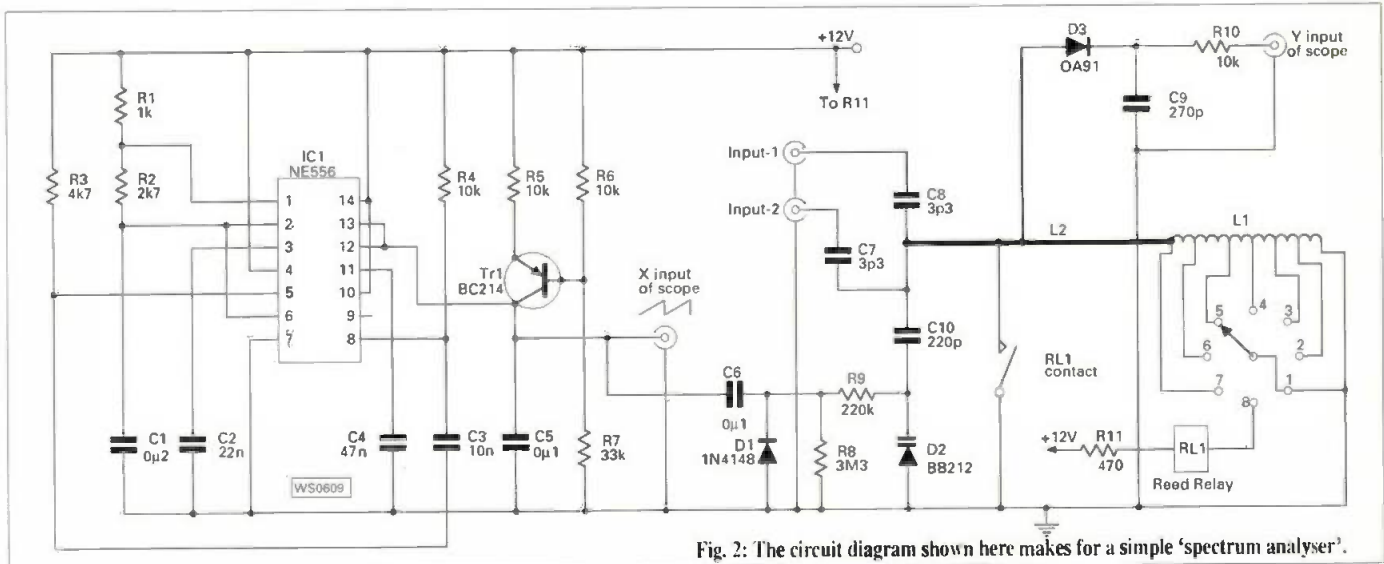
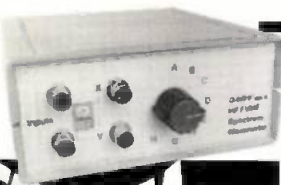


Fig. 2: The circuit diagram shown here makes for a simple 'spectrum analyser'.

Continued on page 26

A SPECTRUM WAVEMETER



non-grounded point on the copper side, a pad may be easily cut using a modified wood drilling bit.

The principle of modifying a wood drilling bit to make a 'land-cutting' tool was originally shown in an article in the Spring 1993 issue of *Sprat* (The G-QRP club journal) by G4FQQ. Thanks Roy! By following the original article and using a grindstone, I removed one of the outer cutting edges of the drill bit to make the tool.

To use the tool start by drilling a small pilot hole in the copper board and then twirling the modified bit around in the hole (by hand) an island is formed onto which components may be fixed or a pin soldered so that components or leads may be attached. I buy the pins that are used to make up RS232 plugs, they are available quite cheaply in packets of 100 and provide convenient test points in circuits.

Dual Diode

The varicap used is a dual diode type (BB212) and was chosen solely because I had one in the junkbox.

Other varicap diodes may be tried and will no doubt work providing they have a similar capacitance swing. The BB212 is a double varicap, only half of which is used with the other lead bent out of the way or cut off.

The cathode of the varicap is connected via C10 to the end of inductor L2 which is actually just a piece of wire that becomes a significant part of the tuned circuit at higher frequencies. The cathode is also fed with the sawtooth wave which is coupled to the oscilloscope 'Y' axis, the anode is taken directly to ground.

While in circuit, L1 allows the coverage of approximately 1.75 to 66.3MHz. With L1 virtually out of circuit (by being grounded by S1 in position 7) L2 allows the analyser to cover roughly 41 to 82.5MHz.

If higher coverage is required, a means of grounding L2 further along is needed, and this is accomplished by soldering a small reed relay between a tap

on L2 and ground. The position of the tap for RL1 changes the frequency coverage of the unit in operation. This point should be adjusted on testing to suit, keeping all wires to the minimum length.

The common contact to ground connection should be as short as possible using a thick wire. On my prototype with S1 in position 7 the unit has a coverage of 64 to 150MHz, and should be achievable in all cases.

I've shown a list of approximate frequency coverage in Table 1, although each range may not be exactly the same as component variances will inevitably have an effect. There is considerable overlap on each of the band positions. This is not a bad thing as the frequency response is not linear across the trace and neither is the Q which is better at the high end where there is a higher L/C ratio, affording a narrower bandwidth.

So, we have a classic spectrum analyser trace on the oscilloscope. But how do we know what frequency we are seeing? For owners of a signal generator, this is not a problem. If the signal source is presented at socket SK1 and the signal generator is connected to SK2, it can be tuned until the generator signal overlays that of the unknown source.

A simulated screenshot is shown in Fig. 6 and shows a signal generator

input being used to check the frequencies of the transmitter output. At that point, the two signals beat together and the frequency can then be read off the generator scale.

Alternatively, perhaps the station transmitter (and a dummy load) could be pressed into use instead. If the oscilloscope's controls were always returned to the same setting, a removable scale could provide calibration marks.

The capacitors C7 and C8 provide enough coupling to inject a signal into the analyser without damping the tuned circuit too much. Although measuring amplitude and bandwidth of a signal is the job for a real spectrum analyser they can cost many hundreds of pounds. But this simple instrument, which cost me around £15 to build is surprisingly effective.

PW

Fig. 5: Inside G4WIF's prototype Spectrum Wavemeter. The layout closely followed the circuit diagram in Fig. 2.

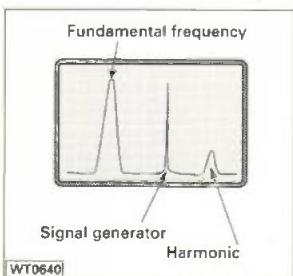


Fig. 6: A simulated screen shot of the output of a typical transmitter. Note the signal generator has a very much narrower band signal as it is unmodulated.

Table 1

Range	From	To
1	1.75	3.5
2	3.5	6.9
3	6.2	10.6
4	10.5	20.1
5	18.1	33.5
6	32.0	68.0
7	55.0	90.5
8	90.0	155.0



POINT CONTACT DIODE?

This time Ian Poole G3YWX answers the question What Is A ... Point Contact Diode?

The point contact diode is the earliest form of semiconductor device. In its original form as a 'cat's whisker' it was used as a cheap and effective method of detecting radio waves.

Other forms of detector, including valves were very much more expensive, and as a result of this, the point contact cat's whisker was used for many broadcast wireless receivers. It was very simple and was constructed around a crystal of a substance such as galena, zincite or carborundum all of which are semiconductors. A thin wire or cat's whisker was made to touch it as shown in Fig. 1.

The cat's whisker was not nearly as reliable as we expect modern semiconductors to be. The 'whisker' had to be manually positioned on the crystal, and then after a few hours use the efficiency would fall and a new position would need to be found.

Despite its shortcomings, the whisker was the first semiconductor to be used in radio or electronics. In those early days of wireless people had no idea of how it operated, but despite this, it worked comparatively well and above all its price was within the reach of most wireless enthusiasts.

Germanium Diodes

Today's point contact diodes are far more reliable. They are manufactured from a piece of *N* type germanium onto which a thin tungsten or gold wire (taking the place of the whisker) is placed as shown in Fig. 2.

Where the wire touches the germanium, some migration of the metal occurs into the semiconductor. This acts as an impurity and forms a small *P* type area and it creates a *PN* junction.

The *PN* junction is very small, and this means that it cannot withstand large values of current. A few milliamps (mA) is usually the maximum.

Another feature about the point contact diode is that the reverse current is higher than that of a good silicon diode. Values of around five to ten microamps are typical.

Fig. 1: A Cat's Whisker using Galena (lead sulphide, the commonest form of lead ore).

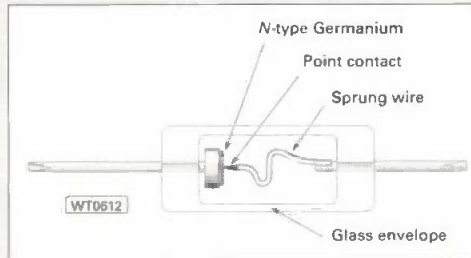
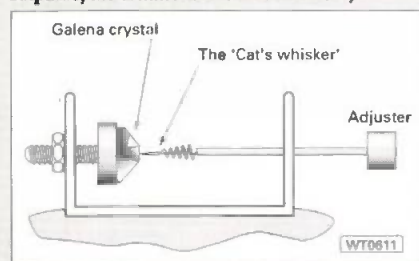


Fig. 2: A point contact diode.

Also, the reverse voltage which the diode can withstand is not as high as many other silicon types. The value is usually measured as the peak inverse voltage (p.i.v.), i.e. the peak value of reverse voltage which the diode can withstand. For one of these point contact diodes values of around 70V are typical.

Advantage Point

Whilst the point contact diode is elementary in many respects it does have a number of advantages. The first is that it is easy to manufacture.

Diffusion or epitaxial growth processes are needed to make a more conventional *PN* junction and these are not required. It's simply enough for the manufacturer to cut up pieces of *N* type germanium, mount them and place a wire onto them. It is for this reason that these diodes were widely used in the early days of semiconductor technology.

Another advantage also lies in the point contact diode's simplicity. As the junction is very small it has a very small value of capacitance. Although standard silicon diodes like the famous 1N914 and 1N916 have values of only a few picofarads (pF), those of the point contact diodes are even smaller, making them ideal for radio frequency applications.

Finally, the fact that the diode is made from germanium means that it has a low forward voltage drop. This makes it ideal for use as a detector.

This means a much lower voltage is needed for the device to conduct. The normal voltage is only 0.2V against 0.6V for a silicon diode.

Make A Crystal Set

Anyone wanting to make a crystal set should use a germanium diode as the detector. I have tried silicon diodes before now and they just do not work!

A more likely use for these diodes within amateur radio circles is within r.f. probes using a simple circuit like that shown in Fig. 3. Here the

low forward voltage drop means that the circuit will detect much lower signal levels. Whilst it's possible to determine the actual voltage by adding 0.2V, the meter will almost give a direct reading in most cases.

The germanium type of point contact diodes are not as common as they used to be. They are relatively old technology, but for the radio shack they still perform well and can be used in a variety of detecting roles where a low capacitance and a low voltage drop are essential.

There are many more types of diode which are available to the amateur constructor. Many of the more common types are freely available for the constructor, whilst others are slightly more complicated and less widely used. Nevertheless they are still an essential part of electronic and radio technology.

PW

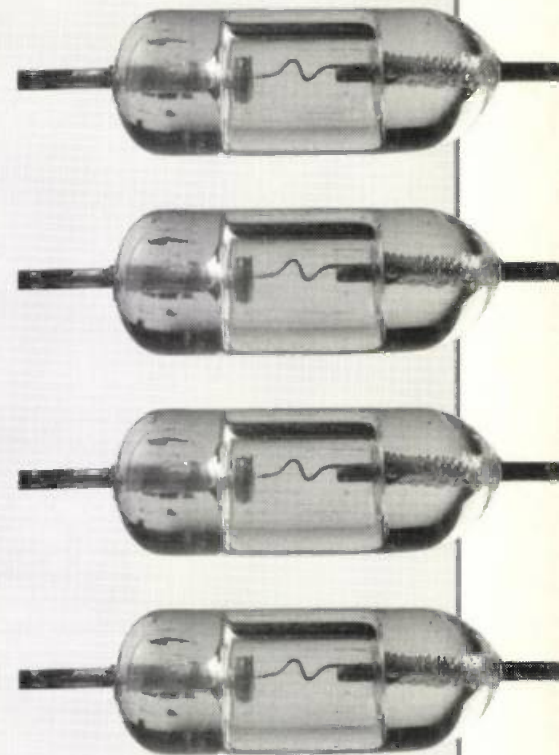
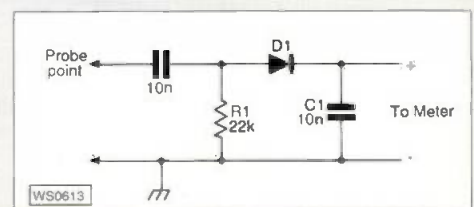


Fig. 3: A circuit for a r.f. probe using a point contact diode.



Next time I'll be looking at the Schottky diode.

The ALINCO DX-701 HF TRANSCEIVER

By Rob Mannion G3XFD

As he's a keen Alinco DX-70 owner, Rob Mannion G3XFD was given the job of trying out its new cousin - the DX-701 'Commercial' h.f. transceiver. Rob thinks it has something to offer for the first time buyer, or mobile operator looking for a 'budget' priced full 100W transceiver.

Personally, I think the Alinco DX-70 h.f. (and 50MHz) transceiver is greatly under-rated. I've found that it's a superb little performer on the bands and a truly versatile main station, portable and mobile rig.

In my opinion, the DX-70's only handicap is the fact that the manufacturers were only previously known for v.h.f. and u.h.f. products. If you haven't tried one...I can honestly say you don't know what you're missing!

Because I own a DX-70, I was offered the chance of trying out the recently-introduced 'Commercial' version - the DX-701 h.f. s.s.b. and a.m. transceiver. The offer came from Mike Devereux G3SED of Nevada Communications, whose company has recently been appointed as the importers and main distributors for Alinco in the UK.

What's The Difference?

So, what's the difference between the DX-70 and the DX-701? Well, in reply to the question there are several main differences between the two transceivers, and the first is the difference in price.

And because of the lower price of the DX-701 it could offer a budget-conscious h.f. operator a cheaper way of getting on the air...but there is a **forfeit to pay**. The disadvantage in buying a DX-701 is the fact that it's a channelised transceiver rather than a continuous tuning type, plus the fact that it only comes fitted for s.s.b. and a.m. operation (c.w. is an optional extra, please see comments at end of the review).

Of course, the DX-701 is aimed specifically at the commercial h.f. user. Or to put in more obvious terms - it's an h.f. p.m.r. rig. It's designed for use (let's say in Africa or any location where v.h.f. operation is

impractical) by the local friendly Game Warden or Safari organiser.

In its designed role the channels to be used on the DX-701 used are programmed in by the dealer - or by the 'technical operator' at base. However, in the case of Amateur Radio use, programming any of the 101 memory channels available, is simply done by the operator.

As **Tex Swann G1TEX**, *PW's* Technical Projects Sub-editor programmed the model we had on review...I've asked him to write a short section which follows later. (See 'Programming The DX-701').

What's On Offer

So, what's on offer with the DX-701? And in answer to this second question I can tell you that the receiver section covers from 500kHz to 30MHz, and any section of this coverage can be programmed into any of the 101 memory channels.

Transmission is possible anywhere between 1.6 and 30MHz, on s.s.b. and a.m. modes. And again, the coverage is provided by loading the required frequencies into any of the available memories.

Transmitter output power on s.s.b. is a maximum 100W and output power on a.m. is rated at 40W. As supplied, the transceiver operates only on these two modes.

Selection of any of the memories is by the rotary 'tuning knob' style channel control mounted on the front panel. This is of course a 'switch' and is best regarded as the familiar multi channel rotary switch provided on synthesised CB transceivers.

The receiver is a double superhet configuration, with a first i.f. of 71.75MHz. The second i.f. is on 455kHz.

Audio output power is quoted at

more the 2W. The receiver has an Receiver Incremental Tuning range (RIT) of ± 1.4 kHz.

Other main differences from the better known DX-70 are that the DX-701 does not have the narrow filters as are fitted on the Amateur Band transceiver. Additionally, the squelch control is a push-button type (pre-set levels selected by the operator).

The chosen mode for the pre-programmed channel frequencies is automatically selected when that channel is selected. This can be either a.m. or upper or lower sideband.

On The Air

Following the programming of a selection of frequencies into the memory, I took the transceiver home and set to work on the air. And first, I listened around the bands while I worked on my computer preparing other *PW* articles.

To carry out the tests I removed my own DX-70 from the operating position directly beside my home Apple Macintosh computer. (The two transceivers are inter-changeable regarding antenna sockets and power leads).

However, it's at this point where I really noticed the main difference between by DX-70 and the DX-701: I couldn't tune around the bands as I worked...only the programmed frequencies were available. It really did seem strange at first when instead of tuning up and down the bands the DX-





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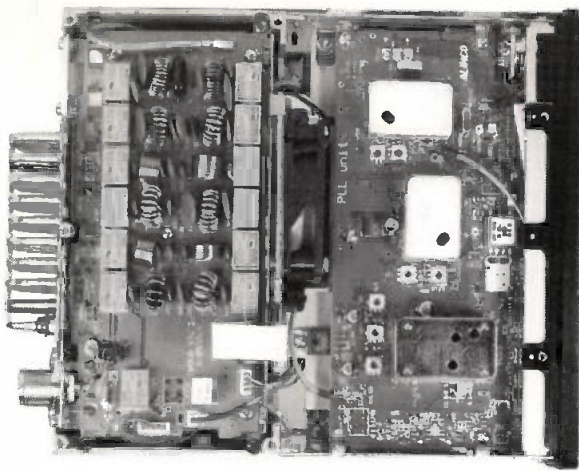


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701 'switched' to the various frequencies.

But on the other hand as I worked on the computer I realised that despite not being fitted with the narrow filters provided on my transceiver, the DX-701 was coping very well. It was sensitive and selective.

Tex had programmed in 648kHz on the medium wave for me so I could try and listen to the European Service of the BBC World Service. It's a struggle to receive it down here in Dorset and provides a good test on medium wave adjacent channel performance. It did well and I was able to listen and enjoy the programmes as I worked.

The performance on the short wave broadcast bands was good. Several of the h.f. broadcast band frequencies I had chosen were of my favourite stations - and again the receiver coped extremely well with adjacent channel interference.

The RIT enabled me to adjust the receiver tuned frequency slightly for best reception. So, in this case the 'channelised' mode was not too much 'bother'.

On the amateur bands I found that my favourite frequencies on 3.5 and 7MHz were adequate...except when stations I wanted to work were just out of reach of the RIT! And during the week I had the transceiver on review, it coped very well indeed on '80' and '40' metres - particularly so with a Polish contest!

In general, I found that the receive side worked extremely well, apart from the fact that I could not compare the DX-701 with the DX-70 on c.w. as the review unit was not fitted with the optional module. But just listening to c.w. the transceiver coped well although without the narrow filtering I have no doubt it could have caused problems on the busy bands if I was in a c.w. QSO.

I worked several stations who knew my voice from previous QSOs on my DX-70. On swapping transceivers - they could not tell the difference between the two transceivers. So, all in all, I was pleased with the DX-701's performance on the air.

Programming The DX-701

Programming the Alinco DX-701 is

very simple, with several steps to program each of the 101 memories. As the transceiver has no free tune mode each memory cell must be set up totally individually.

Before you can begin,

you must first get the set into the programming mode. This is simply done: On switch-on simply press and hold the **CALL** button then the **POWER** switch. The message 'no Freq' appears on the seven-segment liquid crystal display (l.c.d.) clearing after several seconds.

Now on the l.c.d. appears the word 'Memo', the memory number (with a small downwards pointing arrowhead), the frequency, mode and signal meter. Rotating the main control causes the memory number to increase or decrease and the stored frequency to be displayed. If a memory has no active frequency stored in it, then the legend 'Memo' flashes. Next, turn to the required memory location.

Now press the **Dim** button and the arrowhead jumps across to the left hand digit. (The digit '0' isn't displayed in this location). Rotate the main control and the number '0' (but blanked), '1', and '2' appear in rotation.

When the tens of megahertz is set, hit the **Dim** button and the megahertz digit flashes. Rotating the main control cycles round from '0' to '9'. Again press the **Dim** button and repeat the settings. When you come to the last digit, pressing **Dim** causes the mode to flash. This too cycles, through 'AM', 'USB' and 'LSB' in turn.

When you're satisfied with the chosen memory, frequency and mode, press the **CALL** button, an inverse 'T' appears to the left of the mode. Now you're ready for the storage action - and you should press the **Lock** button whilst the 'T' in evidence. To change another memory cell press the **CALL** button again, whereupon the 'T' disappears and a new memory location may be called up and set.

To activate the new memories, switch the set off and on again. Now you have the channels set, and the transceiver can now 'clone' the memory channels into another DX-701 to become a pair (most useful in its h.f. 'p.m.r.' role).

G1TEX

Viable Alternative?

After trying the DX-701 out on the bands, I had to decide whether or not I could consider it to be a viable purchase

for prospective h.f. operators. And even though I have a DX-70 I think the 701 would come into its own for mobile working and I would certainly consider buying one to permanently mount in my car for this purpose.

Working mobile, the channelised control becomes much less of a restriction because of the relatively narrow bandwidth of mobile antennas. So, for mobile working you could

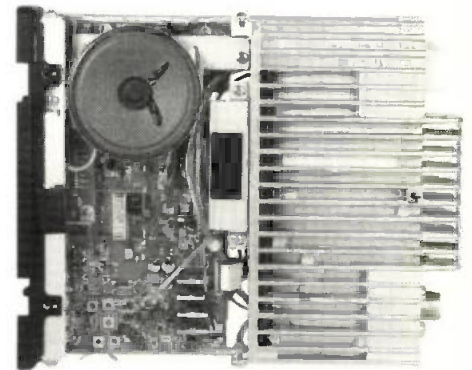
programme in your favourite channels and you're ready to go! And in my case I'd also programme in BBC World service frequencies so that I've only got to select the channel - a much safer option than tuning on the move.

Following my review of the DX-701 and discussions with Mike G3SED I really do think the transceiver could prove useful - especially as Nevada plan to make the transceiver available for £499 retail.

Mike also confirmed that the c.w. option can be installed for £59. And although I am biased because I already own a DX-70, I think a 100W mobile transceiver for that price takes some beating!

My thanks go to Nevada Communications of 189 London Road, North End, Portsmouth, Hampshire PO2 9AE. Tel: (01705) 662145, FAX: (01705) 690626. The Alinco DX-701 will be available from Nevada and their Alinco dealers throughout the UK.

PW



Manufacturer's Specifications

GENERAL	
Frequency coverage:	(Receiver) 500kHz to 29.9999MHz Transmitter) 1.6 to 29.9999MHz
Modes:	J3E (l.s.b., u.s.b.) and A3E (a.m.) see text reference c.w.).
Usable temp. range:	-10 to +6°C
Frequency stability:	±0.5ppm
Antenna impedance:	50Ω unbalanced
Power supply:	13.8V ±15%
Current consumption:	Receive 1.2A Transmission (max) 20A
Number of memories:	101
Dimensions:	178x58x228mm
Weight:	Approximately 2.7kg
RECEIVER	
Type:	Double conversion 1st i.f. 71.75MHz, 2nd 455kHz (s.s.b.) 1.8 to 30MHz 1µV (12dB SINAD) (a.m.) 1.8 to 30MHz 4µV (12dB SINAD) (a.m.) 500kHz to 1.8MHz 10µV (12dB SINAD)
Sensitivity:	(s.s.b.) 2.4kHz/-6dB, 4.5kHz/-60dB (a.m.) 6kHz/-6dB, 18kHz/-60dB
Selectivity:	(s.s.b.) 2.4kHz/-6dB, 4.5kHz/-60dB (a.m.) 6kHz/-6dB, 18kHz/-60dB
Spurious & image rejection ratio	>70dB
Audio output: distortion	>2W (into 8Ω at 210%
RIT range:	±1.4kHz
TRANSMITTER	
Output power	(s.s.b.) 1.6 to 29.999MHz 100W (a.m.) 1.6 to 29.999MHz 40W
Spurious emissions	better than -40dB
Carrier suppression (s.s.b.)	>40dB
Unwanted sideband	>50dB (at 1kHz)
Modulation: (a.m.)	balanced (s.s.b.), low level
Microphone impedance	2kΩ

OVER THE ATLANTIC ON 2m

By Godfrey Hands PA3EUS

Godfrey Hands PA3EUS says despite the article title he's not claiming the 'Brendan Trophy' for a direct 144MHz transatlantic QSO! Instead he's describing his experiences working on '2' while on a combined holiday and business trip in the USA.

Heading photograph: Godfrey Hands PA3EUS found that he was made very welcome by American radio amateurs. He was made specially welcome at the club station of W3HZU. The station is complete with a 170ft mast with a vertical antenna for the 144MHz repeater mounted at the top (beam antennas for 144 and 430MHz are mounted just below).

No, despite the title I haven't made a 144MHz contact from Europe to America! But I have been there on holiday and I took my 144MHz rig with me. This article is written to help other radio amateurs planning to visit the USA to get the most out of their trip.

Some time before I left for America, I saw a Packet radio bulletin in my local BBS entitled 'ARRL E-mail Addresses', so I printed this out. It shows E-mail addresses of the different HQ staff and officers at ARRL HQ in Newington, Connecticut.

One of the officers was Lisa Kustosik KA1UFZ (E-mail lkustosik@arrl.org) the Regulatory Information Administrative Assistant, who deals with regulatory questions and reciprocal operating information.

Lisa sent me an application form to apply for a reciprocal operating permit by return of mail. Armed with this information I decided then to apply for a reciprocal permit.

Mailing Address

To apply for a permit, you must have a US mailing address, so if you are going to visit friends, then you have no problems. (A hotel address may be a little more difficult, but I don't know and you should check this for yourself).

I applied for my permit on the simple-to-fill-in single sided application form. Then I enclosed a photocopy of my licence and posted this off to the address given on the form (no fee required).

The guiding notes from the ARRL suggest that I should apply at least 60 days before I needed my permit to allow time for processing the application. Unfortunately for me I did not have 60 days, only 30 days before departure when I received my application form.

I enclosed a brief letter explaining the situation and heard from my friend in the USA that the permit had arrived at the mailing address given in the USA. All within 14 days of my applying!

Copy Of Rules

The application form also said that I should obtain a current copy of 'Part 97 of the FCC Rules'. It provided an address (United States Government Printing Office, Washington, DC 20402) where I could obtain these rules.

I posted a letter to the given address requesting a set of these rules and asking if it would be possible to expedite this quickly for me. But they sent me a letter back some six and a half weeks after my letter, advising me that I have to buy these at \$32.50 each, and please allow an additional \$11.95 for estimated air mail postage!

So, unfortunately, I was not able to obtain the rules before leaving and decided to use common sense anyway. It would be relatively easy to tie up with local amateurs in the USA for details of any special regulations.

One regulation given in the ARRL notes sent with the licence application said that I should identify my station with 'The representative prefix of the call area where I was located plus '/' and my home call. This means (for example) W1/PA3EUS when in the 'W1' call area.

Incidentally, The rule book is available from The Circulation Department of ARRL HQ at 225 Main Street, Newington, Connecticut 06111, USA for \$10.00 by surface mail.

Mobile Rig

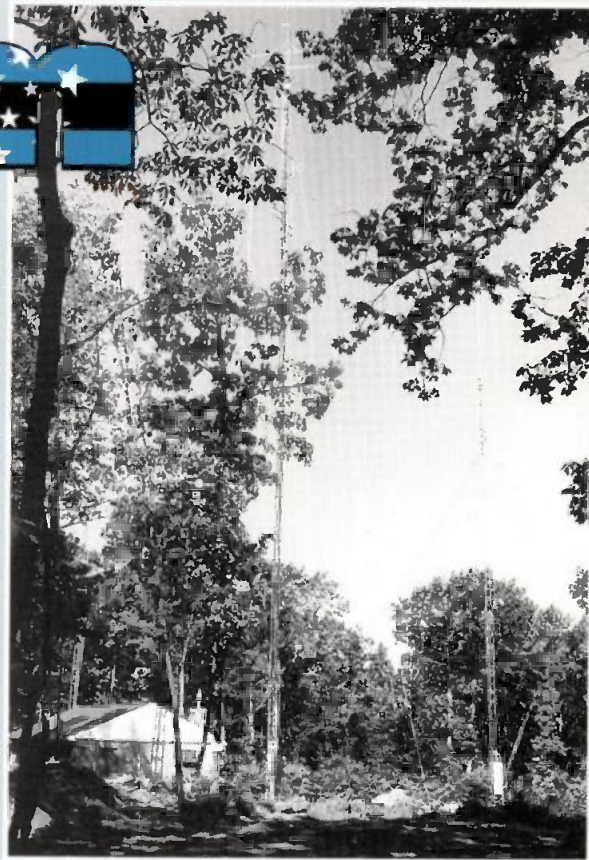
Not having a 144MHz hand-held transceiver, I decided to use my f.m. mobile rig. The manual provided the details on the changes required and I modified it to give me 144.0 to 147.995 coverage.

My mobile rig is an old one and doesn't have a sub-audible tone squelch (CTCSS known as a PL in the US). But that did not deter me from taking the rig with me, as I heard that many repeaters operate without this (PL) there.

I made sure that I had a copy of the receipt for the purchase of the rig for customs (both there and back in Europe). This was to make sure that I did not have to pay import duty when coming home.

Holiday & Business

The trip was a combination of a holiday and business trip and I had my family



along, so that operating was at a very low priority (and only mobile as I had no power supply to give me the 12V I needed). Despite this I operated from many different areas of the US, in the South West and in the North East.

From my experience channel spacing appears to be 25kHz in the South West and 20kHz in the North East. Other areas could be different, so you must find which is relevant to your area.

So, let's now look at some of my experiences on the air, starting off with Southern Pennsylvania (W3). This primarily rural area has a surprisingly high population as well as high amateur radio population. Perhaps it has something to do with the numerous smaller (and not so small) industrial towns in the area.

The Southern Pennsylvania countryside is mostly agricultural, with both flat and hilly areas. These hills make an ideal site for repeaters, so that the v.h.f. activity is high in the area. From my Motel bedroom, I could open more than 20 repeaters on 144MHz (each on separate channels).

Repeater occupancy tends to be high in some of the more popular repeaters, and almost non-existent on others. Channel spacing seems a bit of a mix up in this area, with sometimes 10kHz, sometimes 12.5kHz and sometimes 20kHz.

The amateurs are very friendly, hospitable and helpful, and as many of them do not have a licence for the h.f.

bands, they are very pleased to work a 'strange call'. Most repeaters don't even need a 1750Hz tone to access them.

Club Sites

Having some spare time on Saturday morning, I was invited to visit one of the club sites. This was the **Keystone VHF Radio Club W3HZU**, located in York Pennsylvania (PA). The club shack is located at the top of a high hill and amongst others, sports a 170ft high mast.

In the club they have a 'digipeater' (W3HZU-8) on 145.09 and repeaters on 146.970, 447.275 (-5MHz shift) and 53.970 (-1MHz shift) as well as an ATV repeater (439.25MHz input and 426.25 plus 923, 25MHz outputs). The club members are mostly keen v.h.f. operators with some keen ATV enthusiasts amongst them.

The 144MHz repeater (like many of the more popular repeaters in the area) links up with other 2m repeaters overnight (22.30 to 06.00), giving a vastly extended coverage of up to several hundred miles. My thanks go especially to **Bill W3HLD** for turning out and showing me the club house in his free time.

Western Central Virginia (W4): This is an area with a relatively low population density (and amateur radio activity). I visited the edge of the Blue Ridge Mountains near to Lynchburg. Repeaters are very difficult to locate both in this area and along the route north to Washington DC.

There was very little activity and when a repeater was located, it appeared to need a 'PL' sub-audible tone to get access. Not knowing the required PL tone meant only local amateurs (or amateurs in possession of a repeater directory) could have QSOs on these repeaters. No successful contacts were made in this call district.

New Mexico (W5), Northern Arizona (W7) and SW Colorado (W0). These areas are similar in terrain, consisting of desert, mountains and plains, with not many trees. Repeaters are widely spread, but with excellent coverage (100+ miles with 1W if you are in a good take-off), mostly operating without PLs.

Repeater occupation is very low in W5, W7 and W0, perhaps with one station calling in each hour. If you call in on a repeater in this area, then give the frequency of the repeater output when you call CQ, as most (fixed) stations scan through 5 or more repeaters continuously and by the time they get back to their rigs to see which repeater you were on, the rig has scanner further.

Connecticut (W2): This is a state that is largely hilly away from the coast. The hills are gentle, rolling and wooded. Repeaters are many, but the coverage tends to be restricted in range (typically to 10-20 miles), except for some that are better located. Access to a repeater without a PL is almost always possible, no matter where you are in Connecticut (CT).

Repeater occupancy in CT is low, and on the less well occupied repeaters, there

is somebody calling in every 20 to 30 minutes.

New York City (W1): I only tried to 'get in' to one repeater in NYC, that was the repeater at Kennedy Airport. This is moderately occupied (1 station every 10 minutes), but the people I heard when I was monitoring were all occupied with their own business and did not have time to contact a visitor to the area. This could be because I was only monitoring this repeater at midday and most stations heard were on short business runs, contacting their friends only.

General Impression

My general impression of the use of 2m repeaters in the USA is that the operators are very friendly. They're very willing to give you advice and information if you ask for it, and very polite. During the whole stay, I only heard one 'squeaky voice' repeater abuser who was ignored and soon went away.

Events organised by the local amateurs were open to any visiting amateurs. Unfortunately however, we did not have time to attend any of these friendly 'open' gatherings.

If you're planning a trip to the USA there are several ways to find repeaters. And the simplest is to scan through 144 to 148MHz until you hear a signal and then to listen.

If the station you've located is a repeater, it will probably be working with an input 600kHz low (although about 30% have inputs 600kHz high, but please remember the band edges) and it may have a PL, so you can't get in on the input.

When you can get access to the repeater I suggest that you ask local amateurs for information about repeaters in the area. From my experience I know they will be only too pleased to advise.

On the occasions you can't get access (because of PL) but the stations heard are audible on the input, call on the output when they've finished their QSO and try and arrange a simplex QSO for information.

If you have a radio amateur friend in the USA that you'll be visiting, obviously they'll be able to help. Your friend will be able to get you information about the repeaters in the area where you will be staying and perhaps even the surrounding areas.

Repeater Directory

Another way of getting information on the repeaters is to buy a repeater directory (US and Canada) from the ARRL at \$10.00. This information is not always 100% up-to-date, but will certainly give you information about some repeaters in your area. But bear in mind that PL information is not always available in this directory.

Following my suggestion that you consider buying a repeater directory, brings me to the idea of buying gear in the USA. This is because prices tend to be lower in the USA for some Amateur Radio equipment than here in Europe so it can be tempting to buy some gear over

there and bring it back with you.

If you are considering buying equipment in the USA, please remember the following points. Firstly, you may not be able to get gear repaired under guarantee if anything goes wrong with it when you get back to Europe.

Secondly you have to get the gear back into Europe. Think about customs duty on such equipment. For example, will the value be under the duty free allowance, or over it? Don't forget import duty, customs charges and VAT (You can



have to pay 'Tax on Tax' which can make your purchase very expensive. So please check what the import duty price level is for your particular country).

Thirdly, if you buy a hand-held transceiver with charger or rig with mains supply, the input is 110V, 60Hz in the USA.

Inside the well equipped headquarters of the Keystone Amateur Radio Club, W3HZU.



If you do decide to buy over in the USA, then you can get information about suppliers from advertisements from American magazines. And for PC owners with a FAX modem or dedicated FAX machine, it's very easy to FAX a supplier for availability and price of any item.

You can also order by FAX for delivery to a USA address if you have a credit card. A credit card is a necessity in the USA for almost everything for staying in a hotel to renting a car, so that the gear is waiting for you when you arrive.

Thank You ARRL

My thanks go to all the contacts I made in the USA for the enjoyable time we had there. I'm also grateful to the staff at ARRL Headquarters in Newington, Connecticut for their help and advice.

If you are also visiting USA, then enjoy your stay. My family and I certainly did!

PW

EXTENDING VERSATILITY.....

Review: The MFJ-914 'Autotuner Extender'

By John Heys G3BDQ

Regular 'Antenna Workshop' author John Heys G3BDQ has been taking a look at the latest offering from the MFJ 'ideas factory' in deepest Mississippi. This time it's a device aimed at making an automatic antenna tuning unit even more versatile.

The well-known MFJ Enterprises company from the USA specialises in the manufacture of amateur radio accessories. Antenna tuning units, s.w.r. and power meters, s.w.r. analysers, dip meters, vertical multi-band antennas, keyers, data controllers and packet TNCs are just a small sample of the MFJ equipment output.

The October 1996 issue of *QST* magazine carried seven pages of advertising from MFJ and included for the first time a description of their newest item, the MFJ-914. This is described as an 'Autotuner Extender' and is designed to connect between an antenna and the internal automatic antenna tuner of amateur band transceivers.

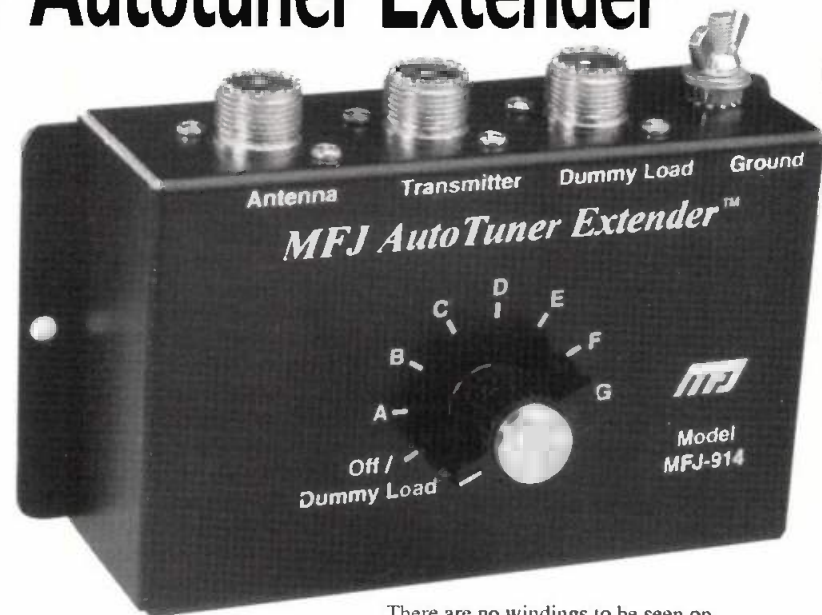
Automatic Antenna Tuning

Those who use modern h.f. transceivers, which have an automatic antenna tuning facility ('autotuners') will have discovered that there's often one or more bands that the internal tuner cannot handle. This is most likely when using end-fed wires or beams and dipoles driven outside their resonant frequency, ie. on another band.

'Autotuners' are designed to operate within a fairly narrow range of input impedance/reactance and are most effective when the input impedances lie between about 25 and 500 Ω . Outside this range performance falls off and if the mismatch is really severe, they refuse to tune.

Autotuners are primarily designed for use with low impedance feeds from beams, dipoles or verticals. End-fed wires may tune on some bands, but on others there may be unwanted reactances or impedances, which are right outside the autotuner's range.

The new MFJ autotuner extender has been designed to overcome such autotuner limitations. Home-brew or commercially made a.t.u.s can have similar matching problems and the MFJ tuner may be used in front of such units.



When an a.t.u. displays really sharp critical tuning, this often indicates a matching problem and a tuner extended will usually overcome this and allow a better power transfer. I once used a long wire antenna which although connected to an a.t.u., was still impossible to match to my transceiver on 1.8MHz!

I had to make an additional 'outboard' tuner connecting between the antenna and the regular a.t.u. This then allowed a perfect match and gave me unity s.w.r.

Passive Device

The autotuner extender is a passive device and is housed in a smart black metal box measuring 130 x 80 x 41 mm. It has a rotary switch with seven positions marked from A to G and another marked **Off/Dummy Load**.

There are three sockets to take standard PL259 plugs. These are identified as **Antenna**, **Transmitter** and **Dummy Load**.

There's also an earth terminal with a 'wingnut' for connection. Inside the box is the rotary switch, made up from a good quality two bank component, a small fibreglass circuit board and a 'secret ingredient'.

The 'secret ingredient' is a stack of three ferrite rings each measuring 25 x 7mm, as can be seen in Fig. 1.

There are no windings to be seen on the outside so I can only guess where the six wires connect inside the stack. I think it must be a broad band multi-ratio r.f. transformer (MFJ claim an impedance transformation of up to ten times either up or down).

The two page instruction manual claims that the extender can be used with any transceiver operating from 1.8 to 28MHz (160 to 10m) with up to 300W of power. However, I did not use more than 100W output when testing the unit. This is because I feel that the physical size of the ferrite transformer and the rotary switch that expecting it to handle power levels of 300W without signs of stress might be rather optimistic.

When the rotary switch is set to **Off/Dummy Load**, the dummy load is connected to the transceiver and the antenna is earthed for safety.

Setting Up

Setting up and using the autotuner extender could not be simpler. When connected into circuit and with the ground stud connected to the station, earth tuning can begin.

Initially, the transceiver internal a.t.u. is switched out and the rotary switch on the extender can then be adjusted for minimum s.w.r. at the receiver. This will normally show an s.w.r. better than 4:1 and often as low as 1.2:1. The transceiver

Table 1

Band	SWR (no a.t.u.)	SWR (MFJ alone)
1.9MHz		5:1
3.7		3:1
7.05	4:1	2.6:1
10.1	3.5:1	2.5:1
14.2	3.5:1	1.3:1
18.1	4:1	1.9:1
21.2		2.2:1
24.9	3:1	1.7:1
28.5		1.5:1
29.6	3:1	1.4:1

(All measurements taken using an end-fed 50m wire antenna).

autotuner is then switched on and the s.w.r. will then fall to 1:1 or close to this figure.

I'm fortunate enough to use a modern transceiver and find that its autotuner will give a unity match on most bands and with most of my antennas. But there remains certain combinations of antenna and frequency which defy a good match.

When testing the extender, I used a 3-band Chelcom Windom (see review in the October 1996 issue of *PW*) and a 50m end-fed wire. I also used a small doublet in my loft cut as a half wave on 18MHz and fed with 5m of 300Ω ribbon feeder having both legs strapped together.

The Chelcom Windom is designed for use on 7, 14 and 28MHz and on these bands can be used without any a.t.u. Any attempt to use it on 3.7, 10, 18, 21 and 24MHz results in very high s.w.r. readings.

The autotuner of my Kenwood TS-870 (without any help from the MFJ extender) gave me s.w.r. readings of 1:1 on all bands except

29.6 and 10MHz. (Here they were around 1.5:1 and not really a problem).

With the extender in use, the transceiver's autotuner matched every band to 1:1 s.w.r.

Without the autotuner a 50m end-fed wire could be tuned satisfactorily on most bands, except 29.6, 18 and 1.9MHz. The s.w.r.s were so high that the autotuner refused to operate.

When the MFJ extender was then switched in, all was well and unity s.w.r.s were obtained on all bands. The indoor doublet with its feeders strapped could be tuned to unity on most bands with the transceiver tuner.

Once again 29.6MHz was a problem, which was resolved when the extender was in circuit. It however proved impossible to tune the doublet up with or without the MFJ-914 on 1.9MHz. This one failure is not surprising for such a small antenna presents a very high impedance to an a.t.u. on 1.9MHz.

I discovered that the extender alone, without the transceiver autotuner in use, would allow operation on several bands. (s.w.r.s of 3:1 and better were realised). Table 1 shows the improvement in matching when just the extender was used as an a.t.u. with the 50m end-fed wire antenna. Although not

an ideal arrangement, the extender would allow operation on several bands without using any other a.t.u.

Overcomes Mismatch

The MFJ Autotuner Extender is a well made piece of ancillary equipment that will help to overcome mismatch problems when using end fed antennas or coaxial cable fed systems that are to be used on other than their design frequencies. A beam or dipole cut for 18MHz could be easily matched to the transceiver when used on 14 or 21MHz.

Many amateurs worry unduly about s.w.r. measurements and panic sets in, should the indicated s.w.r. rise above 1.5:1. But it may come as a surprise that an s.w.r. of 3:1 indicates a power loss of only 0.35 of a dB. This represents just 0.06 of an S unit!

Even when the s.w.r. climbs to 5:1 the power loss is no more than 0.8dB. Unfortunately, many solid state transceivers abhor high s.w.r.s and start to shut down power when they rise above 3:1

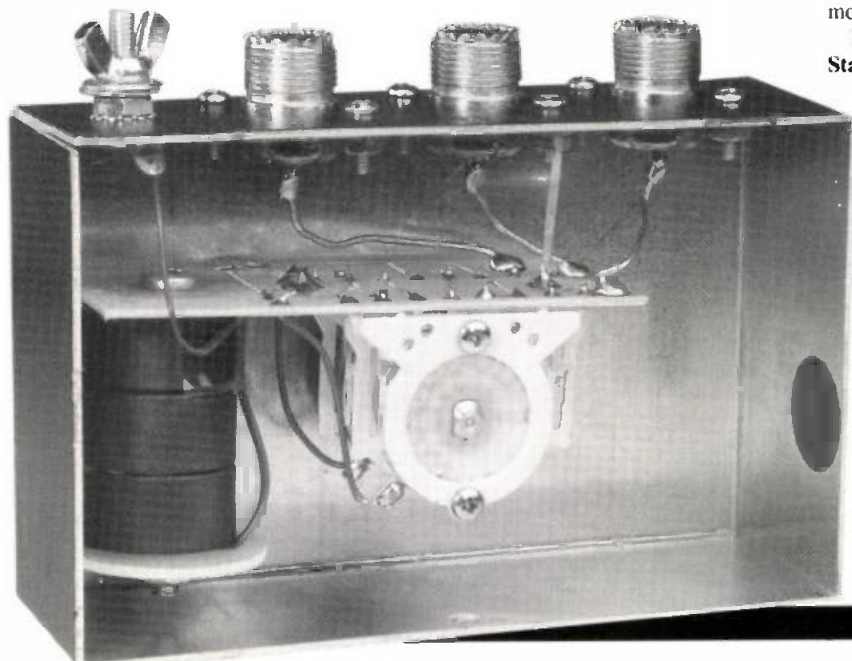
The MFJ literature does not mention the use of balanced feed lines. I can only suggest that a good 1:1 balun is connected between the feeder and the extender.

And don't forget that all a.t.u.s and antenna matchers have an inherent power loss. Good units have very little, but I have known poorly designed a.t.u.s which had such high internal losses that the wasted watts heated and melted internal soldered connections!

The MFJ Autotuner Extender displayed no heating symptoms when used with 100W of transmitter power. Simple measurements indicated that the power loss was small, being no more than 1dB.

I would like to thank Waters & Stanton of 22 Main Road, Hockely, Essex SS5 4QS. Tel: (01702) 206835. FAX: (01702) 205843 for the loan of the MFJ-914 Autotuner Extender which is priced at £59.95 plus £5 P&P.

PW



“THE MFJ

AUTOTUNER

EXTENDER IS A

WELL MADE

PIECE OF

ANCILLARY

EQUIPMENT...”

Fig. 1: An inside view of the MFJ-914. Spot the 'secret ingredient!' (See text).

We're well into the Rally Season now, so here's a bumper Radio Diary for you to look at and decide which one's you'll be attending this year.

RADIO Diary

Compiled by Zoë Crabb

1997

If you wish to have your Rally featured in Radio Diary, all you have to do is send in as much information about the Rally as possible, ie. date, location, time, who to contact, etc., and send it to Zoë Crabb at the *PW* Editorial Office.

May 11: The Midland Amateur Radio Society (MARS) are holding their Drayton Rally at Drayton Manor Park, Tamworth, Staffs. Doors open 10.30 to 4.30pm. There will be trade stands, Bring & Buy, Flea Market, local clubs, children's entertainment, side show, a licensed bar and a zoo, etc. A day out for all the family. For more information 'phone Peter Haylor G6DRN on 0121-443 1189 or Mike Nyman G4OMP on 0121-486 1634.

***May 16/17/18:** The Dayton HamVention, the largest amateur radio show in the world, is taking place at the Hara Convention Centre in Ohio, USA. Doors open at 12pm on the 16th, and the event runs until early afternoon on the 18th. For the early risers, the Flea Market is open from 6am on the 16th. You will be able to visit many trade stands, attend lectures and meet amateurs from all over the world.

May 18: Yeovil ARC are holding their 13th QRP Convention at Digby Hall, Hound St, Sherborne, Dorset. Doors open 0900 to 1700. There will be lectures, trade stands, refreshments, talk-in on S22. Entry is £2, which includes prize draw ticket. Peter G3CQR, QTHR on (01935) 813054.

May 18: The Dunstable Downs Radio Club are holding their 14th Annual National Amateur Radio and Car Boot Sale at Stockwood Country Park, Luton, nr junction 10, M1. Doors open 10am to 4pm. Talk-in on 144MHz. Free entry to Mossman collection of Horse drawn vehicles, craft museum, plus much, much more. Plot details on (01582) 613899, pre-bookings for plots until May 14th. Plots can be purchased on the day.

May 18: The Mid-Ulster Amateur Radio Club is holding their Annual Radio Rally and Bring & Buy at the Silverwood Hotel, Lurgan (1/2 mile from M1 motorway). Doors open from 12 noon. There will be a buffet, bar and car parking facilities available in the Hotel. Contact Mr R. Todd G10STS on (01762) 324383.

May 25: The Plymouth Radio Club is holding its rally at the College of Further Education, Kings Road, Devonport, Plymouth. Admission is £1. Doors open at 10am for disabled visitors and 10.30am for others. Anyone wanting further information, contact Stephen Ramsden G7UXL on (01752) 662051 during office hours or before 9pm on (01752) 777189.

May 25: The 21st East Suffolk Wireless Revival, Ipswich, is to be held at Stoke High School, SSE main rail station, map ref. TM164435. Radio & Computer Rally open from 10am (9.30am for disabled visitors) until 4pm. Talk-in on S22. Dave Johnson G7SMX on (01394) 285600, johnsod6@boat.bt.com

May 25: The Maidstone Mobile Rally is to be held at the YMCA Sportscentre, Just off Crippie St., Loose, A229 South of Maidstone. There will be amateur radio, CB & computing. Doors open at 10.30am (free entry for severely disabled visitors at 10am). Entry is £1.50 per adult. There will be a snack bar, all day video and free sweets and drinks for juniors, do your own Bring & Buy - outdoor tables for hire, free camping and caravan facilities - YMCA desk on (01622) 743317. Amateur Radio exhibition station GX3TRF. Bob Wolk (Trade) (01634) 717426.

***June 8:** The Elvaston Castle National Radio Rally is being held at the usual venue, which is the Showground of the Elvaston Castle Country Park. Keith Ellis G1ZLQ on (01332) 662896.

June 8: The Aldershot Amateur Radio Rally will be held at the Mytchett Community Centre, Mytchett Road, Nr. Camberley, Surrey, easy access from J4/M3. Talk-in on S22. Doors open to

the public at 10.30am. Entrance fee is only £1, this includes a free raffle entry ticket, there is also easy access for any disabled visitors. All enquiries to Roland Brade G3VIR, Tel/FAX: (01252) 837860, E-mail: rally@venuswww.demon.co.uk

June 21: The Royal Navy Amateur Radio Society are holding their Annual Mobile Rally at HMS Collingwood, Fareham, in conjunction with The Royal Navy Brickwoods Field Gun Competition and HMS Collingwood Open Day. This year's rally will have a similar format to last year, plenty of action for all the family including the Free Fall Parachute team and the Hampshire Police Motor Cycle Team, plus all the usual Amateur Radio content for the remainder. (01705) 365503.

June 22: BDARS Amateur Radio Rally will take place at Clandeboye Lodge Hotel, Bangor, Co. Down, N. Ireland. There are many attractions - Official Morse Test for aspiring A licensees, demonstrations, packet radio, amateur television, Bring & Buy, local and mainland traders, something for all the family, so don't miss it! Further details from Stewart G14OCK on (01247) 454049 or Norman G13YMY on (01247) 466557.

***June 27-29:** Ham Radio '97 - Europe's largest Hamfest will take place in Friedrichsafen, Germany. The Barnsley & DARC in conjunction with the RSGB will again be organising a coach trip to this Hamfest. More information from Ernie G4LUE on (01226) 16339 or mobile on (0836) 748958.

***June 29:** The 40th Longleat Amateur Radio Rally. Doors open at 10am. Further details from the bookings manager Gordon Lindsay on 0117-940 2950.

July 6: The 8th York Radio Rally will be held in the new Knavesmire Building, York Racecourse, York. Doors open at 10.30am and admission is £1.50. Children accompanied with an adult go free! There will be ample free parking, amateur radio, electronics and computers, Morse tests and repeater groups, refreshments and a licensed bar. Talk-in on S22. Further details from Pat Trask G0DRF on (01904) 628036.

***July 12:** Cornish Radio Rally. More information from Ken G0FIC on (01209) 821073.

July 13: The Three Counties Radio & Computer Rally is to be held at a new venue, the Perdiswell Leisure Centre, Bilford Road, Worcester. Features include amateur radio, computer and electronic component traders, Bring & Buy stall along with RSGB Morse tests (please book on arrival and remember two passport photos will be required), refreshments and a licensed bar. Free car parking. Doors open 10.30am to 5pm and admission is £1.50. Eddie G4PQZ on (01905) 773181.

July 27: The Colchester Radio & Computer Rally with a hobbies and leisure fair is to be held at St Helena School at 10am. This is a family event. Further info. from Frank Howe G3FJ on (01206) 851189.

July 27: The Rugby Amateur Transmitting Society are holding their 9th Amateur Radio Rally at the BP Truckstop on the A5, three miles east of Rugby, 24 miles NW from junction 18 on the M1 Motorway. Doors open from 10am and admission is £1 per car. Facilities include a cafe and toilets. Talk-in on S22 by G88RRR. Pitches are £7 pre-booked before 14 July or £10 on the day. Arthur M0ASD on (01788) 550778.

***July 27:** The Scarborough Amateur Radio Society is holding its

annual Radio, Electronics and Computer Rally in The Spa, South Foreshore. Doors open at 11am. The rally features all the usual traders, radio, electronics, components, computer hardware and software. Morse tests are available on demand, but please remember the fee and two passport type photographs. Further details from the Rally Manager/Secretary Ross Neilson on (01377) 257074 after 6pm.

***August 3:** The RSGB Woburn Rally is to be held at Woburn Abbey, Bedfordshire. Norman Miller G3MVV on (01227) 225563

***August 10:** Flight Refuelling ARS Hamfest '97 will take place at the Flight Refuelling Sports Ground, Merley, Wimborne, Dorset. The event will run from 10am to 5pm and will include the usual mix of traders, Bring & Buy, craft exhibitors, car boot sale and field events. Talk-in will be on S22. Richard Hogan G4VCQ on (01202) 691021.

August 10: The Derby & District Amateur Radio Society are holding their 40th Derby Mobile Rally at the Littleover Community School, Derby. More information on (01332) 556875.

August 15: The Cockenzie & Port Seton Amateur Radio Club are holding their 4th Annual Radio Junk Night at the Cockenzie & Port Seton Community Centre, South Seton Park, Port Seton. Doors open 18.30 to 21.30. Bring along your own junk and sell it yourself. Tables will be provided on a first come first served basis (no charge for the table). Raffle at approx. 2100. Refreshments will be available. Disabled persons access. Entrance fee is £1 for all persons. All money raised is donated to the British Heart Foundation. Further details from Bob Glasgow GM4UYZ on (01875) 811723.

August 17: The Kings Lynn Amateur Radio Club are holding their 8th Great Eastern Computer & Radio Rally at a new venue, this is at Wallington Hall, between Kings Lynn and Downham Market. Features include a spacious indoor area with major exhibitors, outdoor car boot area (unlimited space available), Bring & Buy, free parking, talk-in on S22, refreshments available and easy access for disabled persons. For booking or more information call Ian G0BMS on (01553) 765614 or @G870PC Packet BBS or E-mail Ian on g0bms.demon.co.uk

August 17: The 2nd Cardiff Amateur Radio & Computer Fair will be held at The Star Sports Centre and Recreation Centre, Splott, Cardiff. Open from 10.30 to 3pm. Further details from Stuart Robinson G0W0WMT on (01222) 613070.

August 24: The Torbay ARS are holding their rally at the Torbay Leisure Centre, Paignton. Doors open at 10am. Talk-in on S22 by G8NJA/P. Further details can be obtained from Alan G7UEK on (01803) 214445.

August 30: The Wight Wireless and Computer Rally will be held at the National Wireless Museum, Arretton Manor, Nr. Newport, Isle of Wight. Free entry and plenty of free parking. Free stalls for both private and business use. There will be refreshments, exhibitions and collections for RAIBC. Douglas Byrne G3KPD on (01983) 567665.

September 6: The 3rd Northampton Radio rally & Car Boot Sale is to be held at the heart of the Shires Shopping Village Showground on the A5, just two miles north of Weedon. There will be a Bring & Buy, organised by the Northampton Repeater Group. Bring the family as they can spend the day in the 'olde worlde' shopping village. Refreshments and toilets are also on site. Car parking only 50p. All enquiries on (01604) 32478.

*Practical Wireless & SWM in attendance

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

The Editorial staff of *PW* cannot be held responsible for information on Rallies, as this is supplied by the organisers and is published in good faith as a service to readers.

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

Editor

UK's Premier Service Centre

Castle Electronics was formed in 1990 by Geoff Wainhouse and John Taylor, when they realised that there was a need for an independent service facility for the Amateur Radio enthusiast. Both are qualified Engineers in Radio Communications and Microprocessor Technology. They are proud to have had Castle Electronics appointed as the authorised service agents and dealers of Kenwood, ICOM and Yaesu equipment. Castle Electronics is the primary sub-contractor for Kenwood service requirements.

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TS-570

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YAESU



FT-736

Dual Band Base
very popular



FT-920



FT-1000MP



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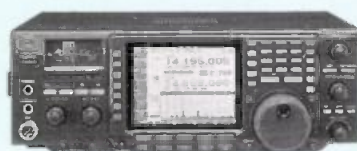
ICOM



IC-706 MKII



T-7E



IC-756

GEOFF G4AQU - JOHN G6VJC



Castle Electronics

Unit 3, Baird House, Dudley Innovation Centre
Pensnett Trading Estate
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Telephone 01384 298616, Fax 01384 270224



PHONE 01384 298616 OR VISIT US TODAY



Icom To The Island - Remembering Marconi



By Rob Mannion G3XFD

Rob Mannion G3XFD reports on an interesting development on the Isle of Wight where a permanent Amateur Radio station commemorating the pioneering work of Marconi is to be set up - in one of the most scenic parts of the Island.

David Cramp G7RSD (centre) the WWRs's Technical Director accepts the IC-756 h.f. transceiver, which along with an IC-821H v.h.f./u.h.f. base station, were presented by Icom's Dave Stockley G4ELP and Dennis Goodwin G4SOT on Wednesday 26 March.



As I have family connections and many friends on the Isle of Wight I was delighted when Dennis Goodwin G4SOT of Icom (UK) Ltd. invited PW to attend the presentation of Icom equipment for use in a special Marconi Commemorative station on the Island. The initiative was started by the West Wight Radio Society and Icom's support was requested and was met by an immediate response...in time for International Marconi Day on April 19.

The West Wight Radio Society plan to preserve the site of the world's first permanent radio station, Established by Guglielmo Marconi in 1897. The site is of national historical importance and forms part of the national heritage of the United Kingdom and will provide benefit for the local community and the many visitors to the Island.

Overlooking Cliffs

Located literally at the far end of the Island (not far from the famous 'Needles' rocks and lighthouse), the West Wight Society's headquarters in 'Hatherly Cottage' are located overlooking the cliffs of Alum Bay with superb views over the western arm of the Solent. This is where Marconi carried out his early experiments and was where the first transmissions were made to a ship at sea - in this case a tug hove to three miles off the Needles.

Since 1994 the West Wight Radio Society (WWRs) has been given exclusive use of the bungalow, its gardens and facilities by the owners of The Needles Pleasure Park Operated by Leisure Great Britain PLC. And recently, Robert Clegg G7RER, Hon. Sec. of the WWRs contacted Icom UK for help. The society's elderly transceiver needed replacing with equipment they required to promote

the Marconi 100th year celebrations from Alum Bay using the Special Event callsigns GB01MD and GB2GMN.

Dennis Goodwin G4SOT, Sales Manager of Icom UK was keen on the idea and along with the Chairman of the company, travelled to the Island on Wednesday 26 March to make the formal presentation of the equipment.



Dave Stockley G4ELP (right) has been involved in the Amateur Radio business for over 25 years, being one of the founders of Thanet Electronics, now Icom (UK) Ltd. Since the retirement of Paul Nicholson G3VJF Dave has been Chairman of the company and his friendly personality is being increasingly appreciated and seen in action at shows and other events. From the Thanet area of Kent himself, Dave is married and has three children, two of them working in the company - Bob the Sales & Marketing Manager and Andy G8ELP (who has dad's original callsign!) who looks after the packing and despatching side of the business. Amongst his many interests and past activities Dave Stockley lists piloting light aircraft - particularly Cessna 172s but he states he's now firmly grounded...on the golf course where he enjoys a good 'round'! Dennis Goodwin G4SOT (left) who also hails from the Thanet area has been with Icom (UK) for 12 years becoming a very familiar friendly face because he attends so many of the major shows and rallies throughout the UK. Married with three children (Tim 18, Kevin 16 and Vicky 11) Dennis proudly announces that Tim, his eldest, is training to be a chef and even suggests he might become another 'Gary Rhodes'! Working in electronics servicing since 1980 Dennis says he owes his introduction to Amateur Radio to his own personal 'Elmer' - the late (appropriately named) Dennis G3MDO. Dennis, like many other 'Elmers' helped his protégé into the hobby and a notable career.

Heritage Centre

In a formal introduction to those present including Charlie Reynard representing Leisure Great Britain PLC and many guests representing organisations on the Island and the media, the WWRs's Chairman Mark Davies G0ZGN said that they hoped to create a Heritage Centre possibly housing some of Marconi's early equipment. The centre would aim to be of interest to general visitors and radio enthusiast alike, providing as many innovative features as possible.

Dennis Goodwin then formally introduced Dave Stockley G4ELP, who then presented the latest Icom IC-756 h.f. transceiver and an IC-821H v.h.f./u.h.f. base station to David Cramp G7RSD, the WWRs's Technical Director.

The WWRs plans to be active on the 1997 IMD and to contact other Special Event Stations this year and in coming years...thanks to the support from Icom UK.

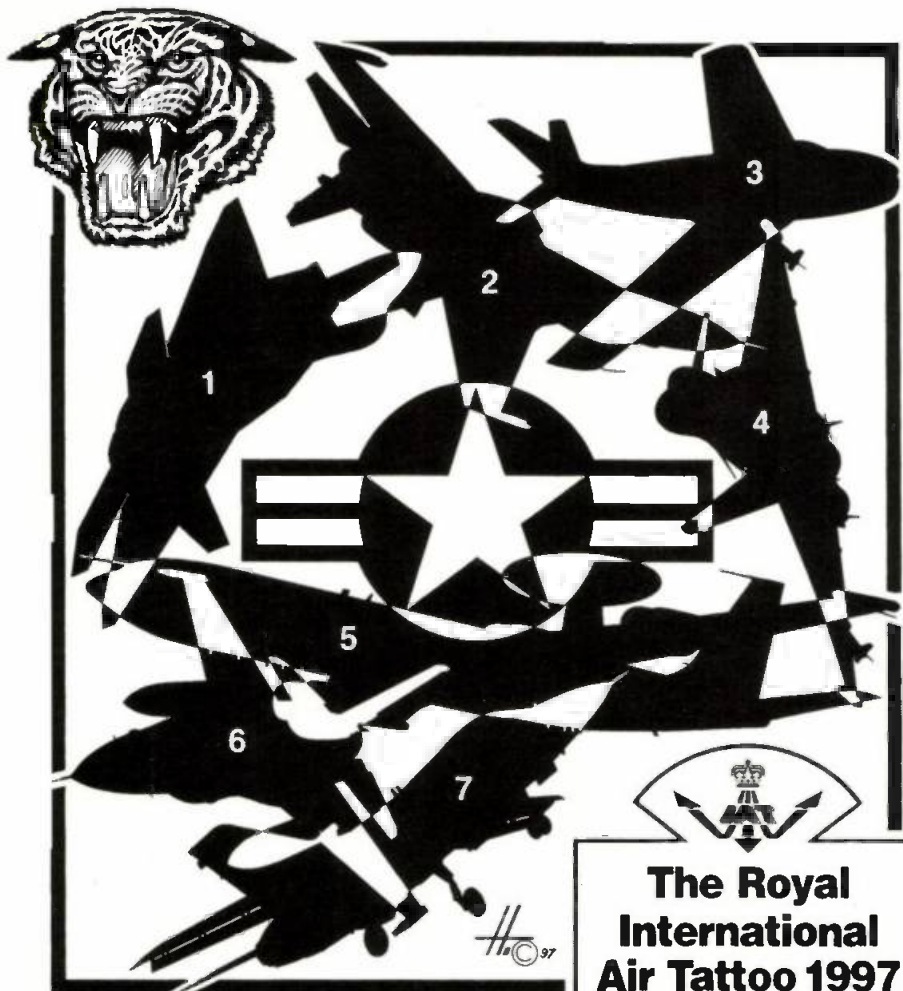
So, if you're planning a holiday to the Isle of Wight, when you go to Alum Bay to collect your coloured sand or ride on the pleasure park rides...you'll be able to see a very special part of our heritage remembered in a practical fashion - thanks to joint co-operation between two groups of special people, both determined that Marconi will be remembered by everyone.

PW

ICOM ICOM ICOM ICOM ICOM ICOM ICOM

ROYAL INTERNATIONAL AIR TATTOO

1997



**The Royal
International
Air Tattoo 1997
RAF FAIRFORD GLOS
19-20 JULY**

The Royal International Air Tattoo (IAT) is now in its 26th year and this year takes place over the weekend of 19 & 20th July at RAF Fairford, Gloucestershire. The IAT is run annually to raise much needed revenue for the charitable works of the Royal Air Force Benevolent Fund and over the years three million pounds has been raised.

This year's IAT will offer visitors the chance to see over 400 aircraft from 35 nations, many taking part in breathtaking aerial routines, together with vintage planes and modern jets all coming together to provide a blend of exciting entertainment. Ballooning is also featured in the programme of events in the Sunset Festival, at which it's hoped up to 40 hot air balloons will be released.

There gates to the event open at 6.30am and the flying programme runs from 10.30am to 6.15pm and there will be plenty of attractions to fill the day. If you have even the slightest interest in aircraft the IAT is not to be missed so why not take part in our free-to-enter competition and who knows you could be one of over 200,000 spectators attending the world's biggest military event?

How To Enter

To be in with a chance of winning one of 15 pairs of tickets to this spectacular flying event all you have to do is identify the seven silhouetted aircraft pictured on this page and send your completed entry form to **Practical Wireless, IAT Competition, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW** by 30 June 1997. Please remember do not include other correspondence with your entry form.

**15 PAIRS OF TICKETS
TO BE WON WORTH
£6000**



AIR TATTOO COMPETITION 1997

Mark the silhouette number against its correct description as given below:

- E-3 Sentry
- Eurofighter 2000
- F-16
- F-22
- F-86 Sabre
- Su-27
- Tornado F3

Name:

Callsign:

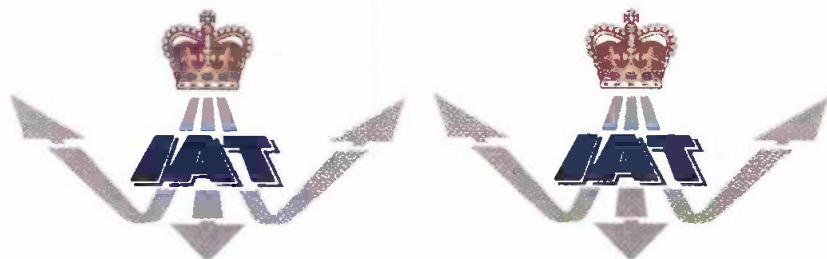
Address:

.....

.....

Telephone Number:

From time to time the RAF Benevolent fund may wish to send you details of other events or services which they feel may be of interest to you. Please tick this box if you do not wish to receive this information.....



WELL ON BOARD THE SEMI-SUBMERSIBLE OILED RADIO



BORGNY DOLPHIN

By Carl White G4VFU & Eddie Calthorpe G0HXL

Carl White G4VFU and Eddie Calthorpe G0HXL share with you what's it's like to operate maritime mobile from the North Sea.

The *Borgny Dolphin* is a semi-submersible oil exploration vessel of some 25 000 tonnes displacement. In design, it's very similar to a catamaran in that it has two hulls (normally referred to as 'pontoon').

Extending vertically 130ft from the pontoons are eight large legs and on the top of these rests the platform - which is twice the size of a football pitch! Located in the middle of the platform, and standing at a height of 230ft a drilling derrick is in place.

The vessel has twelve anchors which, when it is in a drilling position, are placed at equal distances throughout 360° all around. This keeps the vessel in a precise location.

Stability is achieved by the vessel's ability to 'semi-submerge' to a depth of 70ft draught - hence the description 'semi-submersible', this ensures that in adverse weather conditions the vessel can continue to operate without the need to disengage the drilling apparatus from the sea bed. (the term used is 'unlatch') usually drilling can continue up to storm Force 10

Fig.1: Carl G4VFU pictured in the well stocked radio room of the *Borgny Dolphin*.



depending on wave height.

In actual fact, when in drilling condition, the *Borgny Dolphin* moves very little - so little in fact that standard satellite television can be received.

Normal movement is in the region of 1.5 to 2.5° pitch and roll for a Force 8 gale. When the vessel is underway and de-ballasted, however, it behaves like any other sea-going ship. It's only then that we're usually thrown about!

Lively Background

The unpredictability of the sea has ensured that the *Borgny Dolphin* has had a lively background of incidents, some pleasant, others not so pleasant. Unprecedented conditions in the ferocious North Sea have on a couple of occasions forced us to abandon - not an activity you enter into lightly! Quite the reverse, in fact.

On one occasion, whilst we were alongside in Norway, the starboard pontoon filled with water and the vessel started to capsize. The full crew abandoned, rapidly, to safety on the quayside, but some unfortunate crew members abandoned in their underclothes and some "wi nowt" but a dish cloth or sugar bag on to preserve dignity.

Another particularly memorable incident happened when we were underway from Stavanger, Norway. We were in position 61 North and about 02 East, when we encountered a freak storm exceeding hurricane Force 12.

Our tow-line was broken and the port propulsion chamber room flooded, rendering us adrift and virtually out of control. The main crew were safely taken off by rescue helicopter, leaving only essential personnel on board.

We then proceeded to drift for three days, just managing to miss a couple of oil platforms on our journey to

nowhere. But help was at hand and at last we managed to secure a line to a tow boat.

Life On Board

Eddie G4HXL and myself G4VFU work equal time - that is to say three weeks on board the vessel and three weeks at home. We are fortunate in that we live close to each other in Lincolnshire and travel to and fro together, which does help with the boredom of the long journey to Aberdeen.

We operate 144MHz mobile while travelling - so I say, "hello" again if we have ever had 2 metre QSO with you. When we arrive in Aberdeen, we either travel onwards by fixed wing aircraft to a foreign destination and then by helicopter, or by helicopter directly to the vessel, depending on where the *Dolphin* happens to be located at the time. These final helicopter flights can last from one to three hours.

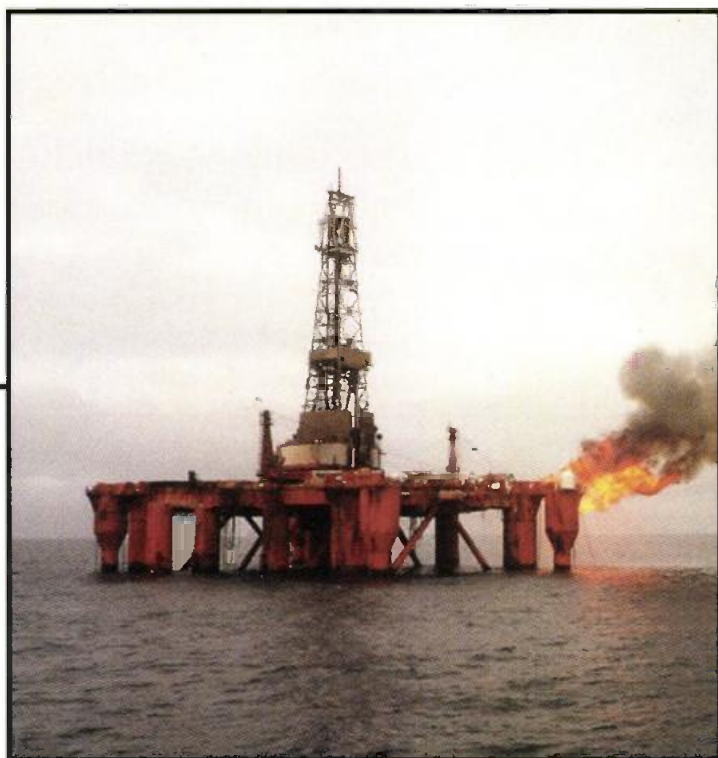
Once on board, we keep 12 hour watches - from 0630 to 1830 or from 1830 to 0630. We work this rotation for the three weeks on board with no days off.

Food on board is excellent and we have laundry and cabin cleaning services at no charge! Spare time facilities are also excellent.

There are two cinemas, a well-equipped gymnasium, computer rooms and mess room. Each cabin is en-suite, well decorated and fitted with 12-channel satellite television.

The Radio Room

The radio room is where all communications to and from the vessel are controlled. Two completely different systems are used for satellite communications, Inmarsat and KU band.



The KU band system handles all day-to-day traffic with company headquarters. It is a direct open line arrangement utilising part of a transponder multiplex system which gives us five direct trunk and data lines to the office.

Two Skanti 8000 series duplex radiotelephones capable of 400W output are the mainstay of our m.f./h.f. commercial communications. One of these is set 'on watch' on our emergency call and reply frequency of 2182kHz. The other we normally have set on a coast station broadcast frequency for reception of traffic list, navigational warning and weather reports.

The two Skantis can be seen in the photograph Fig. 1, situated both left and right at the bottom of the consol. The *Borgny Dolphin* also has auto-alarms, v.h.f. marine, aircraft radios, aircraft beacons, antenna rotator controls and Navtex equipment in the radio consol, which means plenty of knobs and switches to play with - a radio amateur's delight!

Located in the middle of the consol is the main amateur radio set, a JRC-JST135 with a.t.u. and vswr meter. From this we mainly run barefoot and generally never find difficulty in contacting anything we hear.

Our antenna systems are perhaps the dream of most amateurs. As we have a 300ft tower to play with and, of course, sea water for a ground-plane

Scattered Antennas

Antennas are scattered pretty much all over the vessel. In the region of 20 are utilised. All are switchable and can be

hooked into the JRC set in the radio room. Listed below are just a few that may be of interest.

- A quarter-wave vertical, resonant on top band (for transmit only and fed from a remote auto a.t.u. atop the radio room roof.) With some of the antennas located close to metal structures, slight de-tuning can cause problems, but over all the directivity they assume fully compensates for this.
- A quarter-wave sloper, also resonant on 'Top-band' (fed at 300ft above sea level with Andrews Helix 50Ω coaxial against the Derrick).
- One 28MHz inverted V, located at the 400ft above sea level derrick top.
- One 14MHz inverted V, located in the same position as the 28MHz version.
- One 14MHz vertical dipole at 350ft.
- One 7MHz vertical fibreglass whip at 400ft (also works 21MHz as well.)
- One 7MHz sloping dipole at 300ft.

The directivity of the 7MHz sloper is a good example. The slope of the antenna is forward towards the bow, but the directivity is 40° up. For example, when the vessel is heading 320° stations from VK and ZL over the short path are worked with ease, showing directivity up at about 360° plus.

When Eddie first joined the vessel I showed what working 7MHz was like with the sloper in use. His mouth fell open in surprise at the reports we were getting from VK stations. "They're

coming in just like they're next door", was his delighted comment.

Commercial Priority

Our time for working the amateur bands depends on the workload. Naturally, our commercial communications take absolute priority.

When working in the radio room it's part of our responsibility to search the bands. Our watch keeping frequency 2182kHz is always a good indication of propagation conditions on Top Band.

When we start to hear USA coast stations announcing traffic lists, down on 1850kHz (the US 'natter' frequency) sure enough, within a couple of hours we begin to hear amateurs.

Conditions out at sea do have their advantages and on occasions it can be quite embarrassing when putting out a CQ call and what seems like half the world comes back at once! Then at other times, like everyone else, we call and call with no response. But that's the fun of amateur radio!

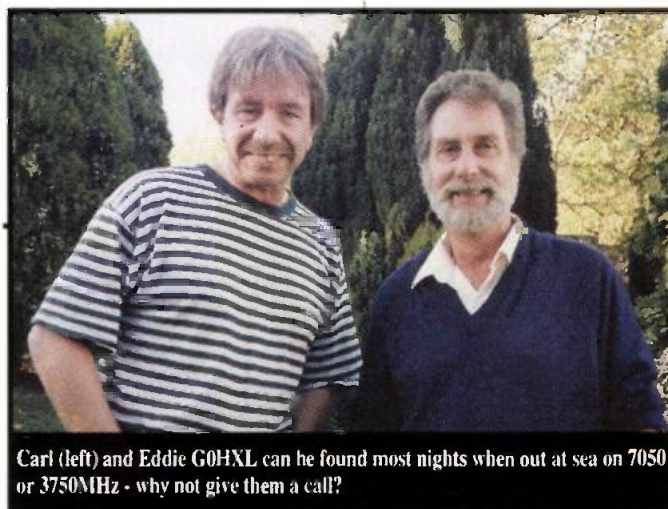
Found Most Nights

Eddie and I can be found most nights when aboard working either on 7050 or 3750MHz or, for our sked frequency at 1972kHz (Top Band) at 1900 hours.

Just recently I had a QSO with Geoff G3NAQ, who told me all about 144MHz DX operation which, I must confess, I had never used until quite recently when operating from Eddie's car. Geoff's comments have interested me and before long we will be QRV on that band.

So, if you hear us, please say 'hello' we look forward to hearing from you.

PW



Carl (left) and Eddie G0HXL can be found most nights when out at sea on 7050 or 3750MHz - why not give them a call?

HF HOT PERFORMANCE

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1 ONLY AT THIS PRICE!!
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The worlds best selling HF DSP
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as left but fitted AC 240V PSU.



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Small rugged
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Latest DualBand full
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Standard C510E

The only Handie with an
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Twin Band
Handie
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CPB510D
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Three credit
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of £100

Alinco

Excellent 27...



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Or
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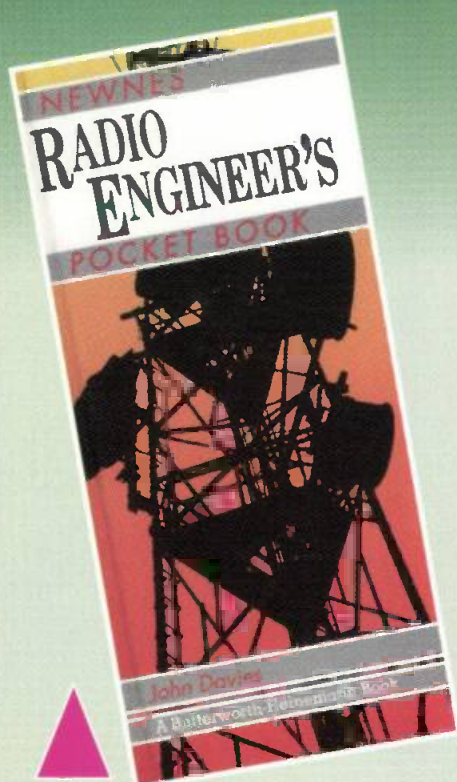
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profile

Over the years Newnes, the well-known publishers (the original publishers of *Practical Wireless!*) have established their excellent range of 'Pocket' books in a very effective manner. If you've got a special interest in any aspect of radio electronics you'll be unlucky if there's not a 'Pocket' book to cover it. So, this Month we're taking a look at just what's on offer from this useful range of 'handy' books which are nowadays published by Butterworth-Heineman.



Radio Engineer's Pocket Book

Edited by **John Davies** this pocket-sized book would prove useful to the practising engineer and student alike. The tall and slim (but it still contains 420 pages) book provides information on radio engineering from very low frequencies (v.l.f.) to microwaves, with an emphasis on mobile telecommunications. Theory, Decibel scales, encryption methods, connections and interfaces are all included.

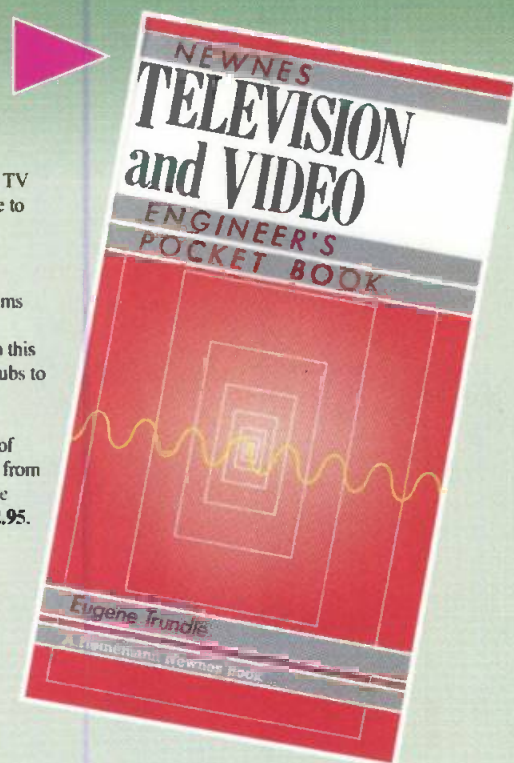
Perhaps primarily intended for the professional radio engineer, the book also provides much information for the radio enthusiast. Connectors, plugs, sockets (and important wiring information) components, types, identification and a comprehensive glossary of symbols and abbreviations, are all included in an extremely useful, clearly laid-out hard-backed form.

The *Radio Engineer's Pocket Book* should prove extremely valuable to anyone involved in radio communications whether they are professional, amateur or students. **Highly recommended** at just £12.95.

Television & Video Engineer's Pocket Book

Although this 'pocket book' is truly aimed at the radio & TV service engineer or engineering student...it will also prove to be of immense interest to the hobby enthusiast. Edited by **Eugene Trundle** the book is packed with information on broadcast radio & TV receiving information as well as containing first rate explanations (along with good diagrams and illustrations on recording techniques).

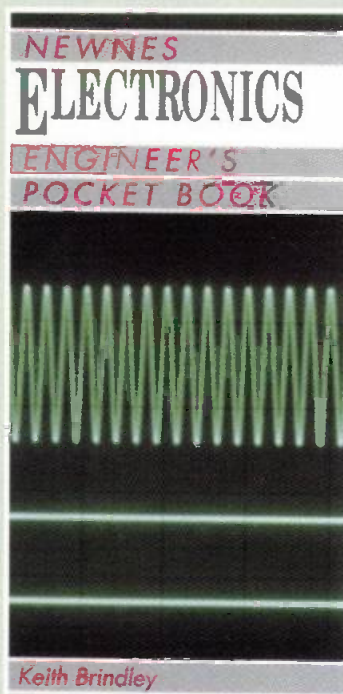
Additionally, there's enough information available in this book of 320 pages to help individual radio amateurs or clubs to learn how modern domestic telequipment works (and to provide background information on servicing) to help minimise EMC problems. It's also likely to provide a lot of help when the inevitable 'can you repair this' plea comes from a member of your family too! **Highly recommended.** The *Television & Video Engineer's Pocket Book* costs just £12.95.



Electronic Engineer's Pocket Book

Edited by **Keith Brindley** this book necessarily concentrates much of its contents on digital electronics. As such it provides a great deal of useful information on devices, pin-outs and applications for integrated circuits (i.c.s).

However, the 'discrete' device has not been forgotten and the book provides much useful information on semiconductors you're likely to come across in radio and electronics. Useful theory and explanations and diagrams make this a handy reference guide and at £12.95 it's nicely priced too! **Recommended.**



TO ORDER ANY OF THE TITLES MENTIONED ON THESE TWO PAGES, PLEASE USE THE ORDER FORM IN THIS ISSUE OR TELEPHONE MICHAEL HURST ON (01202) 659930.

S A Pocketful of Newnes

Audio & Hi-Fi Engineer's Pocket Book

If you are at all interested in hi-fi and good quality radio reception/audio reproduction - this useful book, now in its 3rd Edition, is one to bear in mind. From acoustics to audio amplifiers...you'll find a great deal of information to help you design or achieve the best results.

There are some particularly interesting (and detailed) sections on acoustic theory with good diagrams included. And to reflect the current interest in valves for audio - there's even a section dealing with the associated techniques. A good reference source. The *Audio & Hi-Fi Engineer's Pocket Book* costs £12.95.

Computer Engineer's Pocket Book

This book, Edited by **Michael Tooley** has been extensively revised and brought up-to-date to reflect the ever advancing technology associated with computers, is justly popular. If you're keen on computers and enjoy looking and working on the workings behind the v.d.u. - this book should prove very helpful.

However, even if you're only interested in successful mating of computer peripherals you'll also find it extremely helpful. Terms, technology and 'buzz words' are all explained in a helpful and informative fashion. A good reference source, particularly for the relative beginner in computing especially as it's priced at just £12.95.

Satellite Communications Pocket Book

The recent article in *PW* ('Satellite Radio' by **Simon Spanswick**, October 1996) really brought home just how much can be achieved by satellite communications. Although relatively few radio amateurs are involved in satellite operation - there's no really convincing excuse for anyone not to enjoy the benefits of amateur and professional services.

This new book is aimed at providing a truly pocket-sized reference book on the basic concepts, theory and actual practice of 'TV & Radio' in orbit. It succeeds by providing the information in a simple - but interesting style.

If you want to find out more about low earth orbit (l.e.o.) satellites, 'footprints' and how you can get superb quality radio reception (let alone TV services) this book will prove very helpful. An extremely useful first textbook on satellite broadcasting. The *Satellite Communications Pocket Book* costs £12.95.

CALL NOW!

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FURTHER LISTINGS AVAILABLE ON PAGES 80 & 81 OF THIS ISSUE

THE KENWOOD TH-235E HAND-HELD



144MHz TRANSCEIVER

By Richard Newton G0RSN

Richard Newton G0RSN tests the latest hand-held from Kenwood to find it's an 'honest to goodness back-to-basics' radio.

It seems to me that every review I do is on the ever smaller, ever more complicated hand-held radios - which I often make some remark about. Whatever happened to the good old days when Amateur radios covered Amateur frequencies and you didn't need a qualification in quantum physics and needle sharp fingers to operate them?

Well, I'm pleased to say that Kenwood have just launched a new hand-held, in the form of the TH-235E. The TH-235E is a straight forward, 'honest to goodness' radio. It has a rugged and durable feel and appearance and it covers 144 to 146MHz.

To look at the transceiver it's obviously reminiscent of a commercially used (p.m.r.) radio. And as far as I'm concerned there is one main test to see if a radio is truly of commercial standard, which is to drop it and see if it still works! But for some reason the PW team discouraged me from doing this test! (I can't imagine why).

Having being denied my first test I decided to see how the radio performed. It had certainly passed the appearance test with me. I realise that the uncluttered, sensible layout of well sized controls and the smart all grey matt finish plastic and rubber case, would not be to everyone's liking. But it works for me!

Functions And Features

The TH-235E radio actually offers a wide range of functions and features. It has 60 memories that can be scanned and individually locked out. A CTCSS encoder (the decoder is one of those optional extras), a 'battery save' function and auto power-off to mention but a few.

The less used functions are

changed by a simple to use and easy to understand menu. However, if you do not want to worry about these the radio can be used quite successfully without the user ever having to change any of the factory set parameters.

Functions that would be used frequently, such as power setting, reverse repeater, back light, squelch defeat and VFO/Memory switching are all available at the press of one button.

The unit is supplied with a short helical antenna, wall charger and 7.2V 950mAh battery pack. There's also an easy to understand manual and a wonderful belt clip that can be attached and removed from the radio with ease by a sturdy, low profile clip.

A DTMF keypad is sited on the front of the radio, this gives access to all the radio's functions. The speaker/microphone external power/charging sockets are on the other side panel.

The TH-235E has a display that compliments the radio's design very well. It's simple and straightforward. The frequency read-out is easily seen and the back light is excellent.

The TH-235E is light for its size, the dimensions (not including protrusions) are 58 x 147 x 30mm, this is with the supplied battery pack attached. For me this meant the radio looked like a radio and felt like a radio but with the advantage of also being light and easy to carry on a belt or in a pocket.

Easy To Use

The TH-235E is very easy to use, there are no confusing aspects to the controls, you just turn it on, tune to the frequency you want and off you go. So I did just that!

I tuned to my local repeater frequency, 145.625MHz. (GB3SC) in Bourmemouth. But unfortunately I live on the outskirts of the town, on the wrong side for the repeater.

Some days I cannot hear the repeater, and using my TH-78E dual-band hand-held, I very rarely access the repeater. Unless that is I stand on a chair!

Using the TH-235E however, GB3SC was as large as life. In fact, I have never received 'SC' as well with a hand-held at my house before.

Bob G6DZM was on the air, and I needed to speak to him so I called in using the TH-235E. To my amazement, not only did I get in but I also got a very good report on the audio from Bob.

I wandered round the house, only dropping out of the repeater a few times. This was a huge improvement on not getting in at all! My first QSO was complete and I was very impressed.

The TH-235E lends itself to the more rigorous side of our hobby. The whole design of the radio gives a feeling of sturdy reliability. I can imagine RAYNET volunteers and perhaps walkers and people who go 'pedal cycle mobile' finding the TH-235E a good companion. (Although not Type Approved in this country, a version of this radio is already in p.m.r. service with professional bodies in other parts of the world).

Family Mobile

Having satisfied myself that the TH-235E could hold its own as a hand-held unit I decided to try it mobile. I connected the TH-235E to a quarter-wave antenna for 144MHz on a magnetic mount on the roof of my Vauxhall Astra. This was in preparation for a family trip to Minehead.

The TH-235E accessed GB3WR using high power from the high ground between Dorchester and Yeovil. The required tone burst for repeater access is transmitted by depressing the F key whilst transmitting.



SPECIAL PRIZE COMPETITION

Donated by

MARTIN LYNCH
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THE AMATEUR RADIO EXCHANGE CENTRE



WIN A MyDel Multi-Trap Antenna

In the December 1996 issue of *Practical Wireless* **Eric Gray G3PCS** reviewed the **MyDel Multi-Trap Antenna**. Eric found it to be suitable for use in most suburban gardens and that good results could be achieved even when in use at low heights. Martin Lynch & Son have very kindly donated the antenna as a prize for this month's competition so, all you have to do is complete the wordsearch on this page, send it to us and who knows you could be the lucky winner!

(Please note that the antenna being given away is the actual antenna that was reviewed and not a new one).

**Worth
£69.95**

MyDel Antenna Manufacturer's Specifications

Impedance	52Ω
Power rating	1kW
Weight	2.5kg
Trap Type	Multi-band
Overall Length	20m
Slope of elements	35°
v.s.w.r (max)	1.4:1
Adjustments	3 bands only

Words To Find:

Antenna	Multi
Configuration	MyDel
Contacts	Resonance
Dipole	Small
Elements	Trap
Lynch	Wire

Wordsearch Rules:

Twelve different words have been hidden in the letter grid. They have been printed across (forwards or backwards), up and down, diagonally, but they are always in a straight line without odd letters between. You can use the letters in the grid more than once for different words. Once you have found all 12 words, mark them on the grid (photocopies accepted) and send it (please do not put other correspondence in with your entry) to: **Practical Wireless, MyDel Competition, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW**. The Editor's decision on the winner is final and no correspondence will be entered into.

Name:

Call sign:

Address:

.....

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

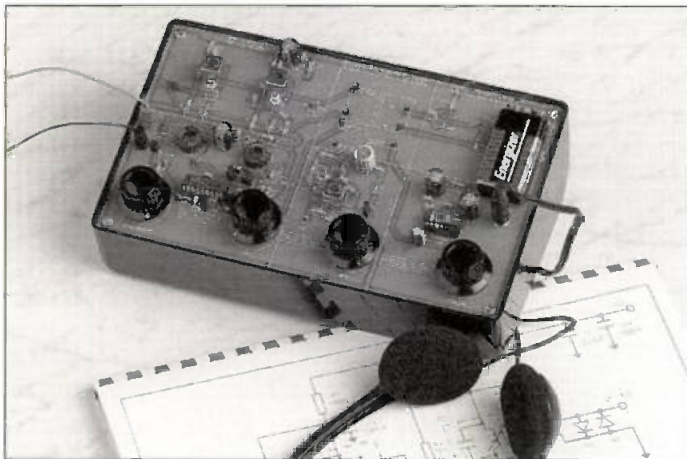
Entries to reach us by **Monday 30th June 1997**.

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



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Leighton Smart said in his
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DUSTING OFF A TALKING ANTIQUE

By Peter Moir

Vintage 'wireless' enthusiast Peter Moir harks back to the early 1930s recounting the time when he restored a vintage HMV valved radio...despite a threat from his wife!

Heading photograph: The restored HMV in its 'art deco' style veneered plywood cabinet.

Fig. 1: Rear view (taken during restoration) showing the electromagnet loudspeaker and output transformer assembly.

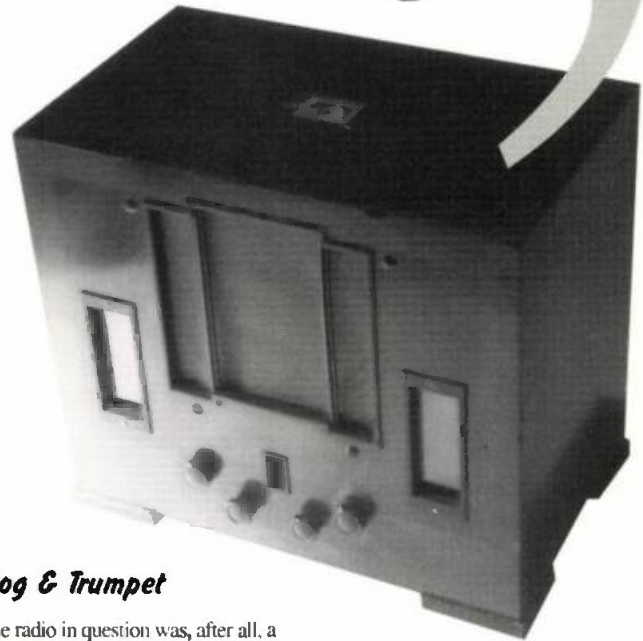
"Buy the thing if you must, but only on the condition it never comes inside the house"! And Looking at Lot 27 in the local School's charity auction, it was easy to see my wife's point!

The once-gleaming dark walnut veneer five-ply wooden cabinet was deeply scored. The control knobs had a much-thumbed appearance; the twin tuning dials were yellow with age and the fabric of the rubber-insulated mains cable looked moth-eaten.

A peep inside the slots of the rear panel showed a small mound of whitish particles, deposited on the vanes of the three-gang variable tuning capacitor. These (fortunately) turned out to be on later inspection, bird seed!

Of course! That explained the score marks on the top of the cabinet—the previous owner had used the radio as a base for the budgie's cage. That bird, meanwhile, had found the optimum method of disposing of the seed husks, namely, jettisoning them through the holes in the back of the cabinet.

Presumably by this time the radio had already stopped working and was used purely as a piece of furniture. However, I was already feeling the pangs of nostalgia so why shouldn't I try to revive Lot 27, and bring back an echo of radio's 'good old days'?



Dog & Trumpet

The radio in question was, after all, a 'His Masters Voice' (Model 442), complete with the famous 'Dog and trumpet' (or 'Dog & Horn') trademark on the top of its cabinet and was almost certainly of 1934 or earlier vintage.

Why 1934? I hear you ask. In reply, it was because the two separate vertical tuning dials were simply marked 'medium waves' and 'long waves'. Station names only started to appear in 1934, when the BBC rationalised its transmitter chain.

A quick glance under the cabinet had revealed no tell-tale bubbles of pitch. (Finding the bubbles could have led to the finding of a burnt-out mains transformer).

Yet another glance through the vent-holes in the back showed five valves still present (if not correct). With this in mind I decided to top a rival bid of £4 and handed over £5 for Lot 27. The deed was done!

Dismantling Work

Some dismantling work with a set of BA spanners released the chassis and loudspeaker unit. An intensive 'hoovering' session to clear away the bird seed then revealed a four-valve plus-rectifier superhet.

The receiver incorporated band-pass tuning of the radio-frequency circuits and (unusually) intermediate-

underneath (rather than on top of) the chassis.

The oscillator circuit inductors, wound on a single bobbin and covered by a screw-top aluminium can, still bore the EMI inspector's circular 'okay' stamp on the windings. They looked as if they had left the Hayes factory yesterday and not 60-plus years ago.

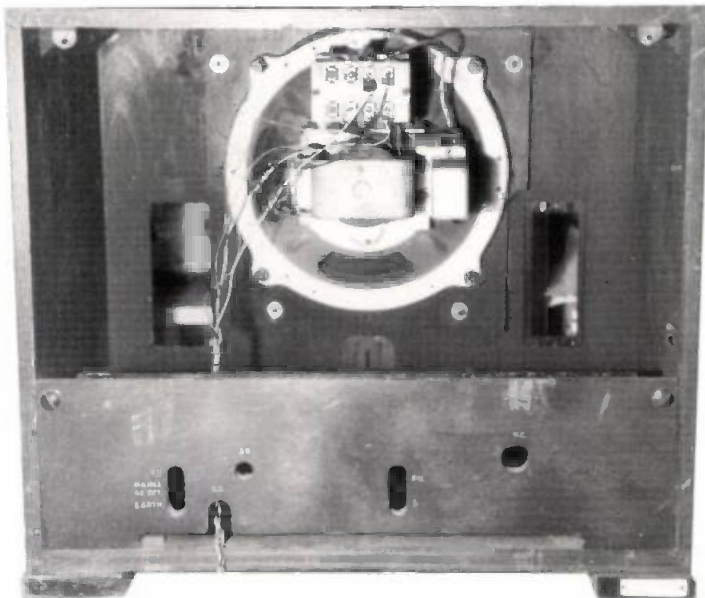
The rest of the extremely heavy pressed-steel receiver chassis was filled with a suitably massive mains power supply transformer. There was also a rotary actuated switch with positions for medium wave, long wave, gram, and off.

Also fitted was an audio-frequency coupling transformer in what appeared to be a Mu-metal casing, and a large metal box, sealed with pitch.

Having 11 wires connecting to various tags on a resistor panel this veritable 'box of mystery' bulged at the sides. The pitch sealing layer had cracked and apart from being an unknown quantity, it seemed to be the only obviously suspicious element in the receiver.

Valve Line-up

The valve line-up consisted of: **Cossor 41MPG** pentagrid frequency changer; **Marconi VMS4B** variable-slope pentode i.f. amplifier; **Mullard TDD4**



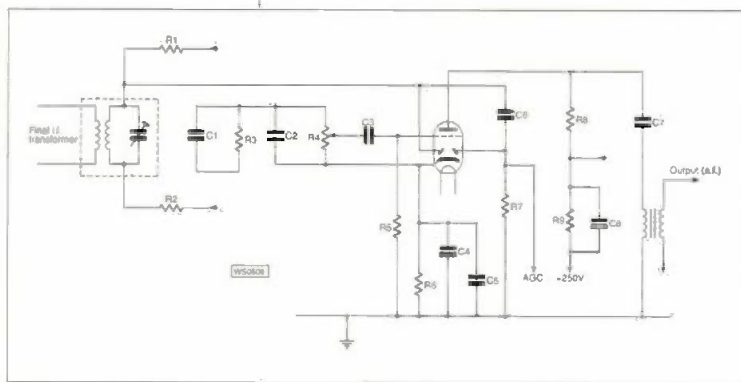
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Dusting Off A Talking Antique

Continued from page 51

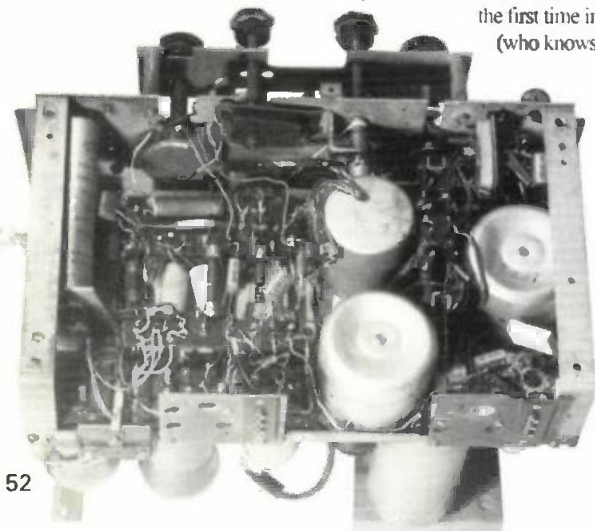
Fig. 3: The restored chassis ready for refitting.

Fig. 4: Circuit of the modified demodulator, a.g.c., and first a.f. stages of the HMV in its restored state. The resistors (R1 and R2) are used to couple the oscilloscope for diagnostics; similarly, R9 is used to monitor the double-diode-triode anode current. Resistor values are: R1, R2, 1M Ω ; R3, 100k Ω ; R4, 500k Ω volume control (original); R5, 1M Ω ; R6, 680 Ω ; R7, 1M Ω ; R8, 47k Ω ; R9, 1k Ω . Capacitor values



are: C1, C2, 100pF; C3, 0.047 μ F; C4, 0.25 μ F; C5, 12 μ F; C6, 10 pF; C7, C8, 0.047 μ F.

Fig. 2: Under-chassis view. The two large aluminium cans house the i.f. transformers, mounted (unusually) below the chassis.



rectifier, and the first a.f. amplifier; a **Cossor 4XP** directly-heated triode power output amplifier; and finally there was a **FW4/350** double-diode full-wave power supply rectifier. All the valves had 4V, 1A heaters.

Apart from the receiver chassis itself, the interior of the cabinet was dominated by the almost equally massive eight-inch electromagnet loudspeaker unit. This also incorporated the audio output transformer and the power supply smoothing arrangements.

Mellow Bellow

The size of the speaker, and the solidity of the wooden cabinet, promised to give the sound of genuine 1930s radio - called by some the 'mellow bellow' - an aural experience almost forgotten today. And for people who have only ever heard transistor radios, it's a totally new experience!

Later investigation showed that the loudspeaker energising coil, which functioned as an i.f. smoothing choke, was actually in the negative h.t. line. Grid bias for the a.f. output stage is obtained from a potential divider between h.t. negative and chassis (ground or zero potential).

Long Odds

Realising that expecting the old HMV to actually work, without restoration, for the first time in (who knows

how many?) years would be like sitting back in expectation of six lucky numbers in the next National Lottery!

Nonetheless, I checked the power circuits with an ohmmeter, plugged into the mains, and switched on. Predictably, but reassuringly, the only result was a gentle 50Hz hum from the speaker!

However, heaters lit up, and 250V positive h.t. was available from the power circuit, and the **On/Off** and wave-change 'switchery' worked (well, almost all the time!). The bad news was that the double-diode triode exhibited a blue glow, and had therefore lost its vacuum ('gone soft' in old-time wireless parlance) and the cathode of the i.f. pentode seemed to have lost most of its emission.

No Information

How could restoration proceed? - no circuit diagram or other technical information was available. Even if it had been, finding exact replacements for failed components might be difficult and expensive.

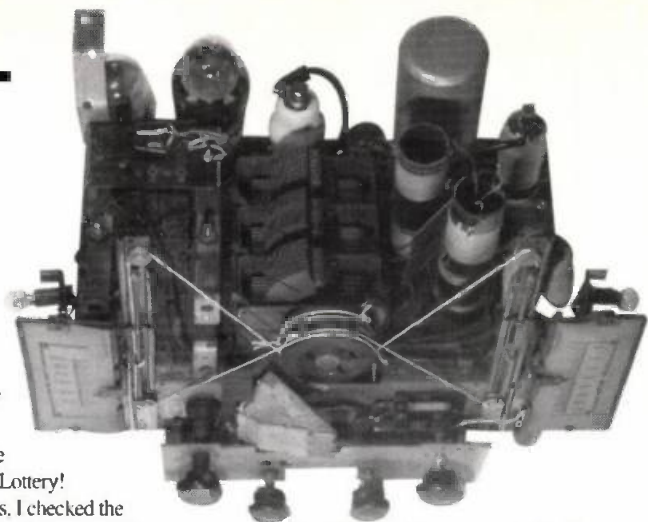
Fortunately, a friendly local electronics store was able to supply capacitors and resistors with adequate specifications. Interestingly, modern 0.25W resistors retailing at two pence or so actually cost less today than their counterparts did 50 years ago. (One shilling, or five pence, was the going rate then).

Shopping around by mail order produced a brand-new plug-in replacement for the double-diode-triode. There was no such luck, however, with the pentode i.f. amplifier, so I decided to use the high-slope SP41 (this is readily available from ex-Service stock as CV1699).

Incidentally, the SP41 is only about half the size of the VMS4B it has replaced. But conveniently it runs on the same V heater supply.

Modified Circuitry

Let's now take a look at the modified circuitry: The restored a.f. stage coupling uses the original transformer and 500pF variable-capacitor 'tone control' in a simpler, but quite effective circuit derived from commercial superhet practice of the late thirties.



Two 1M Ω resistors, connected to the second i.f. transformer, provide for oscilloscope connection during alignment.

Most of the frequency-changer circuitry is original, including the cam-actuated wave-change switch. Where necessary, however, I used modern capacitors to decouple all screen and anode supplies.

Noisy Experience

Switching on the HMV for the first time after its restoration was a heartening, if noisy, experience. Although everything obviously worked, and many stations could be selected on the medium waveband (at dusk on a summer evening) even with no aerial connected there were problems.

I discovered there was a very audible 2Hz 'blip' caused by audio-frequency feedback in the (now super-sensitive) SP41 i.f. stage. A 10 μ F electrolytic capacitor from the i.f. stage cathode to 'ground' cured the problem.

The 125kHz IF transformers needed only slight adjustments. This was to compensate for the differences in input and output capacitance between the SP41 and the original i.f. amplifier valve type.

The original HMV design called for a maximally 'flat' i.f. response curve between 123 and 127kHz, using a 'staggered' alignment technique. I didn't attempt this because my signal generator does not produce the low frequencies required. The quality of the audio output, however, is high enough to suggest that the existing settings are not far out.

A minor, but time-consuming mechanical task was re-stringing the dial cord! The original cord had rotted with age, but luckily a length of childrens' kite-string made a very effective substitute.

So now I can hark back to 'the good old days'. Perhaps Lot 27 wasn't too bad a buy after all!

PW

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Antenna Workshop

By Gerald Stancey G3MCK

Gerald Stancey G3MCK shows you the versatility of the Smith Chart, and its place in the amateur's design toolbox, by showing you how to design an antenna tuning unit with its help.

Before looking at the design of an a.t.u. I think it's worthwhile looking at the process of solving any engineering problem. The solution invariably consists of two parts. Firstly the design of the item in question and then the fiddling that's necessary to make the item actually work.

The better the initial design works the less fiddling you will have to do, but it is very rare that none will be needed. Designing antenna tuning units (a.t.u.s) is a good example of an amateur radio problem that can be solved simply by relying on trial and error to get them to work. However, the effort needed to design an a.t.u. isn't great, but the rewards are high.

To illustrate this principle let's use the Smith Chart to design two types of a.t.u. I'll also use charts to convert reactances to capacity or inductance and to round the answers. This is real life engineering where shouldn't get carried away by the spurious high precision given by calculators. Remember you'll only need to get a rough answer to understand what is going on.

A 10MHz Problem

Let me first give you a 10MHz problem. I'll assume you have erected a dipole for the 10MHz (30m) band to the following specification:
 Design frequency: 10.1MHz ($\lambda = 29.7\text{m}$)
 Height above ground 11.1m (0.375 λ)
 Feeder impedance 50 Ω
 Feeder loss @10MHz 0.5dB/10m
 Feeder length 25m
 Velocity factor of the feeder 0.66
 Electrical length of the feeder 1.3 λ
 You find that you cannot reduce the standing wave ratio (s.w.r.) below 2:1 Do you have a problem?

Let's start by looking at what the s.w.r. should be! The feedpoint impedance is usually quoted as being 72 Ω , but it's often forgotten that it depends on the height of the antenna above ground, and on the nature of the ground too.

From the chart shown in Fig. 1, at a

height of 0.375 λ the feedpoint impedance, over ideal ground, is about 100 Ω . So, when fed by a 50 Ω feeder there is an s.w.r. of 2:1, and no amount of trimming the dipole length will improve it.

You could reduce the s.w.r. to unity by altering the height above ground, but this wouldn't be a good idea. So, would this level of mis-match (shown by the s.w.r.) be a problem? When the level of s.w.r. on a feeder is other than unity, it increases the losses in the feeders. It also means that the transceiver isn't looking into a resistive load, due to the reflected mismatch, leading to loss of output power.

Let's tackle the first point. If the feeder was perfectly matched its loss would be $(25 \times 0.5) / 10 = 1.25\text{dB}$. To this must be added the extra loss due to the s.w.r. Standard

this is the s.w.r. present on the line. You know that the antenna's input is 100 Ω resistive, which is 'normalised' by dividing by 50, giving us point A on the Smith Chart.

Starting at point A, go round the chart in a clockwise direction for 1.3 wavelengths, the electrical length of the feeder. This will bring you to point B. Remembering of course that once round the chart is $\lambda/2$. The co-ordinates of point B are (0.52+j0.14) which when multiplied by 50 provides an actual impedance of (26+j7.0) Ω .

In other words the impedance of the feeder, at the rig end, is 26 Ω resistive in series with an inductive reactance of 7 Ω . The problem is now to design a matching unit which will convert this to 50 Ω resistive. Suitable circuits such as the L, Pi or T-networks may be found in the handbooks.

At this point you may well say that the impedance of the feeder could have been obtained by using a bridge. However, while this is correct, the Smith Chart gives a picture of how the impedance varies on the line. For example, if the line had been a little longer and ended at point C then the input impedance of the feeder would have been (1+j0.72), which is 50 Ω resistive in series with 36 Ω of inductive reactance.

With an input impedance of (50+j36) Ω a series capacitor of 36 Ω reactance, about 430pF, is all that would be needed to match the line to the rig. (Rather than make an a.t.u. you might think this is an easier solution).

There are other line lengths where a resistive input impedance of 50 Ω can be achieved by using either an inductor or a capacitor to tune out the reactive element. For example at point D (D-O-C is a straight line) the Smith Chart shows the impedance of the line to be 33.7 Ω resistive in series with a capacitive reactance of 23.7 Ω .

There are other line lengths where using either series inductance or parallel capacity will give an input impedance of 50 Ω resistive. You may care to amuse yourself by identifying these two points.

Top Band

Now let's try an example on 'Top Band',

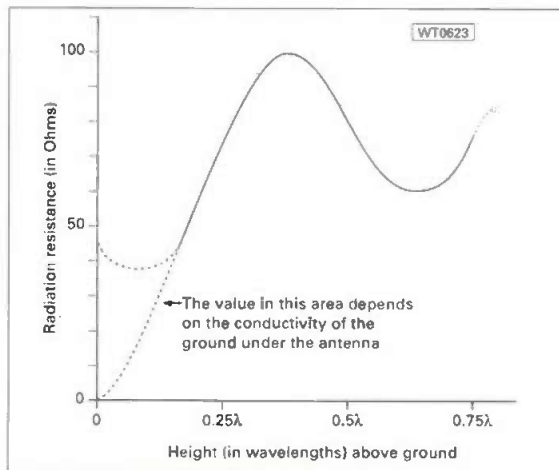


Fig. 1: Feed point impedance variation of antenna above ground.

antenna handbooks give charts for solving this problem and in one case the extra loss is only 0.25dB. This small amount of loss isn't worth worrying about as, in general, losses of less than 1dB are not detectable.

The second aspect is the hardest to evaluate and you will have to read your rig's manual to see what it advises. However, let's assume that you decide that you want the rig to work into an a.t.u. so that it sees a 50 Ω resistive load. The first stage in the design of this a.t.u. is to find the input impedance of the feeder.

On the Smith Chart (Fig. 2) you start by drawing a circle centred on 'O' that passes through point A, (at 2 on the vertical axis). It passes through 2 because

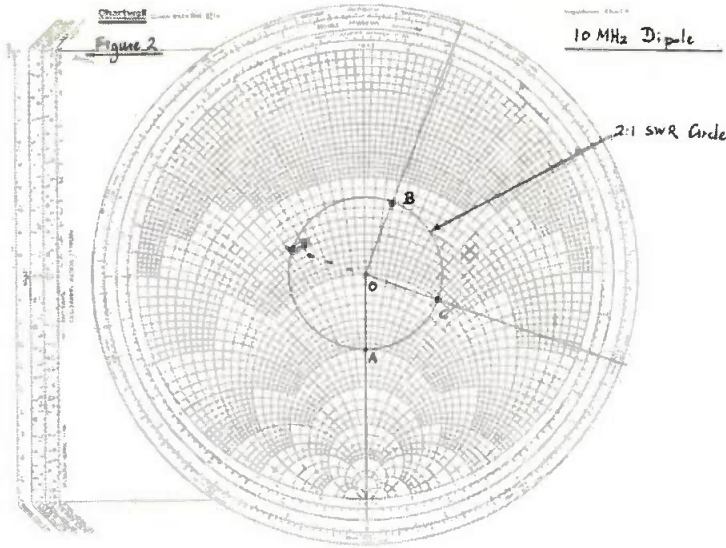


Fig. 2: The 10MHz example (see text).

and let's start by assuming the dipole and feeder have the following characteristics:
 Frequency: 1.85MHz ($\lambda = 162\text{m}$)
 Height above ground: 13m (0.08λ)
 Feeder impedance: 600Ω
 Physical (actual) length of feeder: 20m
 Velocity factor of feeder: 0.975
 Electrical length of feeder: 0.127λ (ie $20 / (162 \times 0.975)$)

As the average radio amateur doesn't have an impedance bridge that can be used on 600Ω open wire lines you'll probably have to look elsewhere to find a method of assessing the input impedance of the feeder. And, surprise surprise, the Smith Chart is the tool to use!

First, estimate the radiation resistance of the dipole. The effect of the ground will influence the value, but from Fig. 1 it's likely to be between 20 and 40Ω . Both these values lie on the vertical axis of the Smith Chart. For 600Ω feeder, 20 and 40Ω normalise to 0.033 and 0.066 respectively (points A and A' on Fig. 3). From here clockwise round the chart 0.08λ brings you to points B and B'. The input of the feeder is now between $(42 + j650)\Omega$ and $(70 + j630)\Omega$ depending on the antenna value we

assumed.

Let's look more closely at this result. The Smith Chart is telling us that over the range of antenna input is between $20\text{-}40\Omega$ the input impedance of the feeder has a reactive component that's virtually constant ($630\text{-}650\Omega$). In practice you only have to consider how to handle one value of inductive reactance (say 640Ω) when designing the a.t.u. So, I'm going to assume that the complex impedance at the input to the feeder is $(55 + j640)\Omega$.

At the moment I'll ignore the reactive component of the input impedance of the feeder. The circuit of the basic a.t.u. is shown in Fig. 4 where R_{Load} is 55Ω . Note that the two capacitors (shown as 2C) are equal in value and are in series. Hence the circuit is effectively tuned by one capacitor of half their value, ie C.

Using standard impedance formula as may be found in text books, the Q of the circuit is defined as $Q = X_C/R$. Acceptable values of Q are considered to lie in the range 3 - 10. So let us assume a mid-point value of 6. Hence:

$$X_C = Q \times R_{\text{Load}} \\ = 6 \times 55 = 330\Omega \text{ or about } 250\text{pF.}$$

At resonance, the combined reactance of L1 and L2 should have the same value as X_C (330Ω). This would give an inductance value of about $30\mu\text{H}$, with the optimum value of L2 having a reactance of 50Ω .

You must now compensate for the reactance (640Ω) in the load by tuning it out with a series capacitance of 640Ω reactance (about 130pF). This is created by using two capacitor twice the value (2C).

I started the discussion by deciding to assume the resistive component at the input impedance shack end of the line was 55Ω . If this assumption is wrong and the value is in fact 70Ω all that happens is that the Q of the circuit will change to $4.7(330/70)$. This will cause no problem as it is still in the range 3-10.

Some older textbooks provide plenty of constructional details for making an a.t.u. of the type shown here. As a guide, if the a.t.u. shown looks as though it will handle lots of power, then it will probably have low losses.

Summary

Both the designs I've shown will need 'tweaking' to make them work properly.

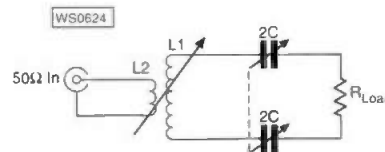


Fig. 4: The skeletal circuit of the 1.8MHz a.t.u. (see text).

However, knowing what the coil and capacitor values should be, will help you to know what to tweak.

With the 'Top Band' a.t.u. the correct set up procedure is to adjust for unity s.w.r. on the 50Ω coaxial cable and maximum feeder current in the open wire line. As a guide I always use the values that give the maximum feeder current, while maintaining a unity s.w.r. on the coaxial cable.

The Top Band a.t.u. design showed me that by making an educated guess for the value of the radiation resistance of the dipole a viable design was derived. The Smith Chart also brought to light interesting facts about the input impedance of the line that are not intuitively obvious.

The 10MHz a.t.u. design using the Smith Chart indicates alternative ways of matching into the antenna by selecting specific feeder lengths. This novel way of creating a solution would not be obvious to those who solved the problem by measuring the input impedance of the feeder directly.

I hope these two examples have shown that the Smith Chart is a really useful design tool and that a little design work can yield great benefits even when making something as simple as an a.t.u. It certainly proved worthwhile for me.

AW

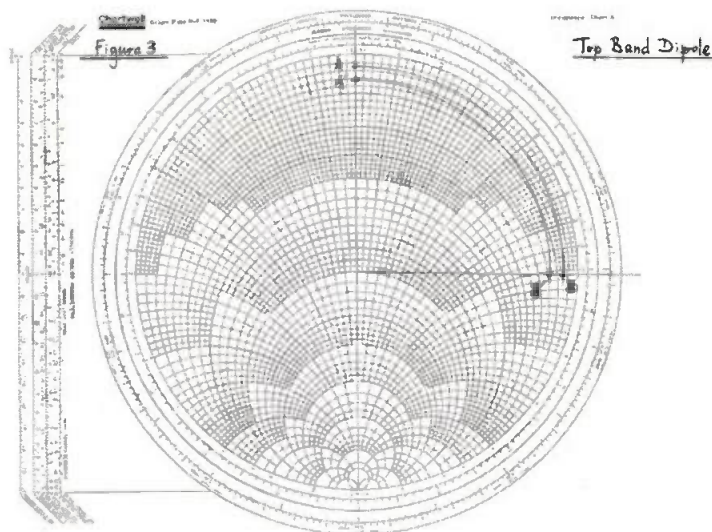


Fig. 3: The 1.8MHz example (see text).

He Who Persists Wins

We build the odd project and feel our confidence grow,
And foolishly try to make a good v.f.o.
To our chargin, good v.f.o.s we have found,
Are just not so easy as one that's rock bound.

They can be made out of all odds and jobs,
But never quite work like our Reverend Dobb's.
Our efforts drift or the transistors smoulder,
But guess who he has looking over his shoulder!

Colpitts, Hartley and others we try,
And discover transistors will silently die.
These with precise layers of silicon, manufacturers fill,
Then with a hot lump of copper we go and kill.

Stability they say, is all in the coil,
And to make one perfect, we constantly toil.
But the frequencies wrong, we can see at a glance,
Due to Gremlins, Murphy and stray capacitance.

Try f.e.t. transistors or hot glowing triodes,
Or tuning the frequency with varicap diodes.
Zeners or capacitors, temperature co-efficient,
You may be tempted to think they are sufficient.
But please be warned, whichever the component,
The signal will drift, after only a moment.

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One last supreme effort you're determined to try.
With 'scope and frequency counter, you're ready,
For a wave form that's good and a count that is steady.
Then it's cast in the bin with the junk and the litter;
Because it looks and sounds, like an old spark transmitter!

Thinks! A voltage i.c. is that what I need?
Closely decoupled by tantalum bead.
Ferrite rings for the choke and the coil,
Losing all track of time, till midnight you toil.
Then sudden inspiration! You feel cock a hoop,
Why not try out this new fangled phase loop.
'Chips' to detect and sort out the phase,
But choosing crystals and pass bands, you're soon in a daze.

A fixed reference signal, must be provided,
Then the output by N must be divided.
Just why is this? We won't have a clue,
But instead of one oscillator, we're now building two!

With integrated circuits, this high tech revolution,
Boffins have given us the ultimate solution.
And with phase angles of 90 or 180 degrees,
Stable oscillators can be accompanied with ease.
But if it refuses to lock, using i.c.s so clever,
Your signal will drift for ever and ever.

There will be a day when in your beer you are crying,
And oscillator building, you're fed up with trying.
Just have one more go, I'm sure you can win,
And it will work perfectly, till it's fixed in a tin!

Gerald Donington
G4LNO, in a poetic
mood, sums up all the
hard work in building
a stable variable
frequency oscillator.



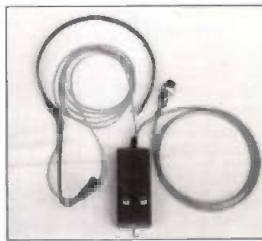
...But never quite work like our Reverend Dobb's,
our efforts drift or the transistors smoulder, but
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Carrying on the Practical Way



By George Dobbs G3RJV

This month the Rev. George Dobbs G3RJV presents 'The FOXX & the Pixie'. But before you get confused...George firmly states it's not a fable...but a continuation of the hunt for "a truly simple transceiver"!

Experience has taught me that the ideal construction project for the radio amateur appears to be one that can be built in an evening or a weekend. It should also cost only a few pounds in parts.

The complex, multi-boarded, projects seem better suited for the armchair constructor, who muses upon them and builds them in his imagination.

Many radio amateurs who fit their hobby into the odd evening and weekend and build equipment alongside operating and other radio pursuits. They enjoy building items that will reach completion (and fruition) with a modest amount of time and money.

Such constraints often mean that these constructors build only small station accessories and little items much may be novel but hardly form a substantial part of the hobby. It's the really dedicated constructor who builds the transceivers.

So, if a design appears for a complete h.f. transceiver which can be built in one evening for around a 'tenner', ears prick up and pupils dilate!

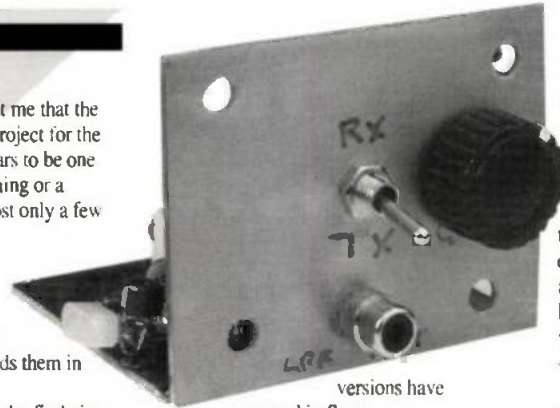
Small Pixie

In recent months, many of the QRP club magazines have been running articles about a small transceiver called the 'Pixie'. The Pixie incidentally, is a very simple transceiver based upon ideas from a circuit by Oleg Borodin RV3GM.

Oleg's circuit, The MICRO-80 appeared in the G-QRP Club journal *Sprat*. It's a very basic variable crystal oscillator (VXO) controlled transmitter with a single bi-polar transistor as the power amplifier.

The transistor is also used as the mixer in a direct conversion receiver driven by the transmitter oscillator. It's a simple and novel transceiver.

The variants on the Pixie are legion. The Northern California QRP Club magazine, *QRPP*, has published many and other



versions have appeared in *Sprat*.

All the different versions gave credit for this simple idea to RV3GM. But his circuit was certainly not the first time I had seen reference to this simple idea.

In the summer 1983 issue of *Sprat*, that master of the simple radio circuit, George Burt GM3OXX, described his 'FOXX' transceiver. It was an elegant little circuit which used the same

to the desired frequency. The capacitor also provides a small amount of frequency shift.

The output is coupled to a power amplifier stage. This stage is unusual in that a *npn* transistor is used with the emitter connected to the positive supply and the output taken from the collector load which goes to ground. A home wound radio frequency choke (r.f.c.) - L1 - provides the load.

The output of the transmitter may be adjusted by a resistor (Rx) in series with the inductive load on Tr1. This is adjusted to around one 1W of output power.

Although the circuit is capable of more, Tr1 could be forced into passing a lot of current and run too hot. Take note that Tr2 should be fitted with a clip-on heatsink.

It is possible to key the transmitter in the supply line, but a more elegant method is to use a series switching transistor (Tr3).

"If ever I was foxed it is now"

Samuel Pepys: 23rd April 1661

transistor for the transmit power amplifier and the receive mixer. It's capable of transceiver operation on several bands and generates around 1W of r.f. power out.

The FOXX

The FOXX was based on a small transmitter circuit called the STX (Simple Transmitter). The circuit of the STX is shown in Fig. 1.

In the circuit Tr1 is a VXO (Variable Crystal Oscillator) stage. The feedback loop formed by the crystal and the trimmer capacitor (C1) tunes the circuit

This transistor, is another *npn* transistor and it allows the transmitter to be keyed with respect to ground. The resistor R2 is a current limiter and C5 provides some shaping to the keying action.

Transistors Tr3 and Tr2 are both 2N2905A *npn* switching types. And although any medium power switching transistor would serve for Tr2 the chosen device will require an F_T of 150 - 200MHz to be usable up to 14MHz.

The STX represents a simple transmitter of the sort that can get a radio amateur on the air for a few pounds and one evening.

Looking for a simple and cheap to

Heading photograph: The 'FOXX & The Pixie' - 'certainly 'ugly' style but it works!

Illustrating the 'ugly' style construction for the final transmitter-receiver built by G3RJV.

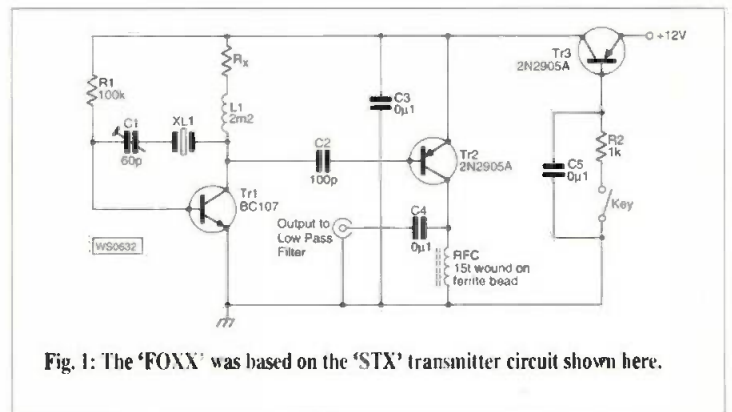
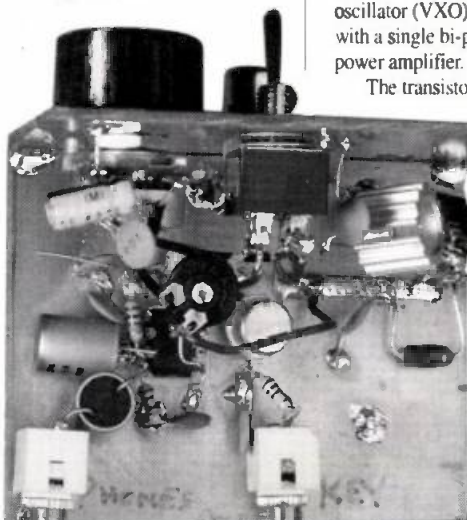


Fig. 1: The 'FOXX' was based on the 'STX' transmitter circuit shown here.

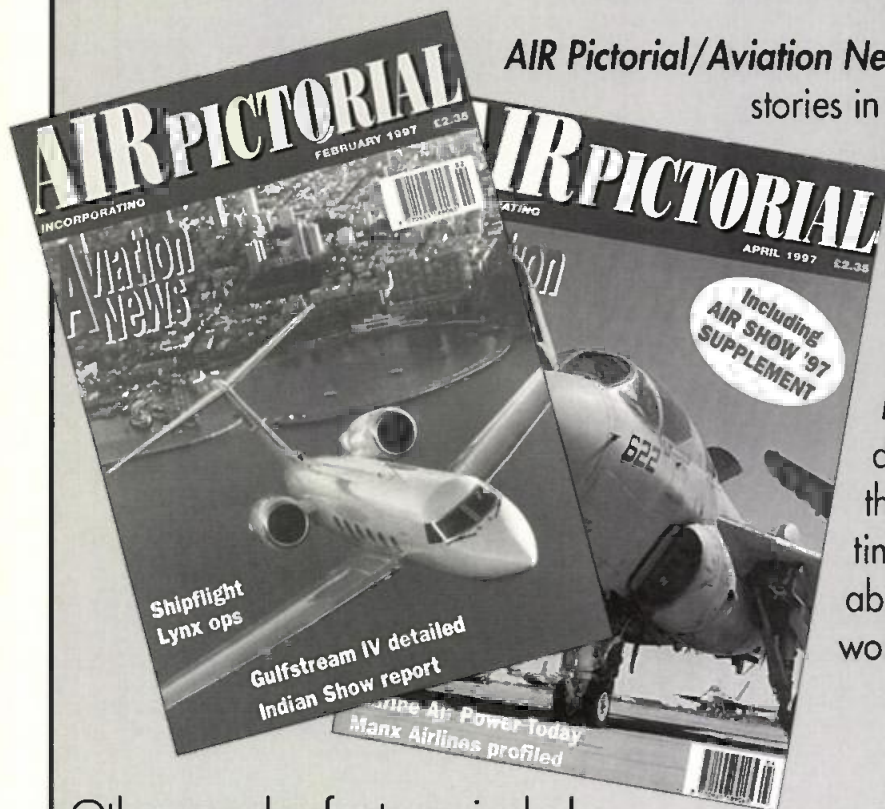
Continued on page 61

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Carrying on the Practical Way

Continued from page 59

build transistor, GM30XX realised that a bi-polar transistor is really two diodes which could be used in a detector circuit. He then added some switching and a two stage transistor audio amplifier to produce a very basic direct conversion receiver

The G3RJV Version

The version of the FOXX attempted here at G3RJV is shown in Fig. 2. In this circuit I used the readily available, and inexpensive LM386 audio amplifier chip.

Although it may not seem very much, Fig. 2, is a complete h.f. radio station. Don't expect it to out perform a £2,000 commercial transceiver...but it does work and has made contacts.

The transmitter section around Tr1 and Tr2 is the same as the STX. The r.f. output is taken from the collector of Tr2 and goes to the antenna via a low pass filter.

The low pass filter, Fig. 3, is a seven element circuit based on the circuit and constants described by W3NQN. This may seem a very complex filter for such a simple circuit. But remember that even the smallest QRP transmitter can emit harmonics.

Bear in mind that Tr2 is being biased by the drive of Tr1 into Class C and this can be a recipe for high harmonic output. Remember also that in this transceiver version it's the low pass filter that provides the only input tuning for the receiver. In effect it is all that stands between the transceiver and the outside world.

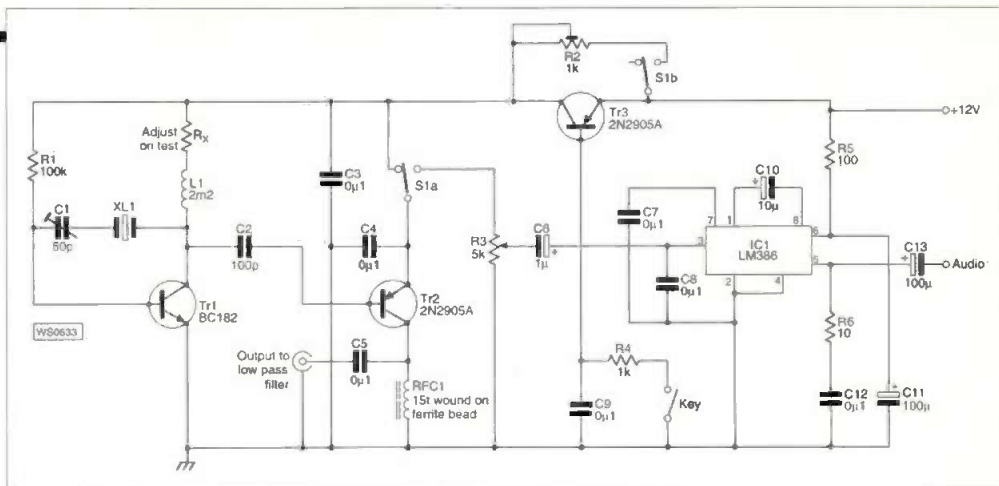
The Switching

The transmit-receive switching is performed by a double-pole, double-throw switch, Sw1 a and b. In the transmit position the circuit functions as the STX transmitter.

The receive position has two functions. It by-passes the keying transistor (Tr3) to ensure that the oscillator Tr1 remains on during the receive position to provide the local oscillator. It also switches the supply line away from the power amplifier, Tr2, and connects Tr2 to the audio amplifier.

In the receive position Tr2 functions as a double diode mixer, mixing the signals from the antenna which appear at the emitter and the signal from Tr1. In true direct conversion receiver style, the audio component of the mixed signals produces a voltage across R3, the gain control for the audio amplifier, IC1. (Note: after further tests I found the value for R3 can be as high as 50kΩ and not as shown on the circuit diagram).

The audio amplifier is an LM386 working in maximum gain mode by inserting C10 between pins 1 and 8. Its output is filtered by R6 and C12 and drives a small speaker or (ideally) a pair of 8Ω headphones. Resistor R5 and the



capacitor C11 decouple the supply to the audio amplifier.

The supply for the LM386 is taken directly from the 12V supply line which means it is on during both transmit and receive functions. This has the advantage of providing a rudimentary sidetone to monitor the keying.

The term 'side tone' in this case is an over statement because all it does is produce clicks in time with the keying. But it is an oddly effective way of monitoring the keying!

Without a counter, it can be done by using another transceiver, fed into a dummy load to monitor the FOXX on receive and listening on the FOXX to the other transceiver on transmit.

Very Simple

So, here we have a very simple h.f. band transceiver! My bench tests showed that it will work on 3.5, 7 and 14MHz with appropriate crystals and low pass filter. Although the overall transceiver is simple (even crude perhaps) it does have a basic form of sidetone and RIT.

I built the circuit up in about an hour on a piece of scrap printed circuit board. It was very much a case of 'ugly' construction.

Starting off with making the STX, I then added the receive circuitry

Fig. 2: The version built by G3RJV incorporating the LM386 audio i.c. And (as G3RJV says) "believe it or not...it is a complete h.f. station"! Please note that the final value of the audio gain variable resistor is 50kΩ and not as shown on the circuit diagram above.

Filters

George G3RJV, described how to 'roll-your-own' low-pass filters in 'Carrying On The Practical Way (on pages 46 and 47) in the March 1997 issue of PW.

The formula shown as Fig. 2: on page 47 is unfortunately wrong and you should use either Formula-1 or Formula-2 shown here. Use Formula-1 if the specific inductance relates to 10 turns, or Formula-2 if it relates to 100 turns.

$$N = 10 \sqrt{\frac{L}{L_{10}}} \quad (\text{Formula -1})$$

$$N = 100 \sqrt{\frac{L}{L_{100}}} \quad (\text{Formula -2})$$

Added Component

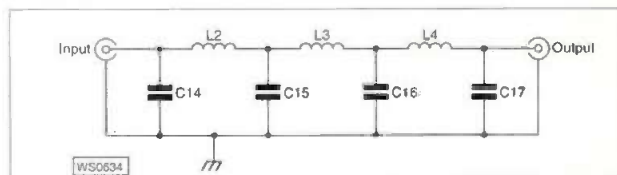
Take note of an added component to the oscillator circuit at Tr1. This component (R2) is a pre-set potentiometer which is added in series with the supply on receive. This is a very simple form of RIT (receiver incremental tuning).

One of the problems with the simpler direct conversion receivers is that since the same oscillator is used for transmit and receive, the receiver is at zero beat to the transmitted signal. So if the other station accurately nets onto the direct conversion transceiver's signal it is received at zero beat or at a very low tone.

The solution is simple. All that's needed is to have the oscillator shift a little between transmit and receive.

If the supply voltage to Tr1 is reduced enough, it shifts the frequency of the oscillations. Assuming the value of Rx to be in the order of a few hundred ohms (just to reduce the drive from Tr1 a little on transmit), a 1kΩ preset at R2 can be set to shift the frequency by around 700-800Hz giving a comfortable off-set for c.w. reception.

The off-set can be adjusted by using a frequency counter to measure the output from Tr1 on transmit and receive.



around the transmitter once it was working. Within minutes of finishing the board I worked a Russian station on 7MHz! His RST549 signal report was more gratifying than earth shattering but it does work!

However, I was surprised how well the receiver held up in the usually difficult conditions on '40' metres. Although I must admit I had an antenna tuning unit between the transceiver and my doublet antenna which helped the receiver input tuning.

The FOXX is a lovely little circuit for the experimenter. And my own experimentation may include adding a smaller series potentiometer in series with R2 to provide front panel RIT adjustment or even a better audio amplifier with some filtering.

The nice thing about this sort of circuit is that it can lead onto lots of simple experiments. So, if YOU build it and improve things - please let me know.

Fig. 3: Even QRP transmitters can radiate harmonics! George G3RJV recommends the 7-element low pass filter based on the circuit and constants described originally by W3NQN (see text).

HF FAR & WIDE

Leighton Smart GWOLBI brings news that Amateur Radio still has an important part to play in emergencies, together with your regular h.f. activity reports.

Two interesting pieces of information came in this month which I think prove that Amateur Radio is still a force to be reckoned with. Important even in these days of 'high-tech' mobile 'phones, satellite and digital transmissions.

The first matter involved Jack **MW0AQD** in the Rhondda valley, south east Wales. Jack was chatting at the upper-end of 3.5MHz when he was called by an American amateur who was in the American Embassy compound in Tirana, Albania, attempting to evacuate American civilians from the fighting which was being waged around them.

It appears that the embassy's extensive communication equipment had been put out of action, so an h.f. Amateur Radio transceiver was put into service, powered by a car battery. Jack was asked by the American amateur to get a telephone message to his family in the USA.

The telephone message was promptly relayed, due to the actions of Jack's daughter **Rebecca** (who's waiting for the results of her Novice RAE (good luck, Rebecca!) who got busy with the computer database and called up the relevant address and number.

The result was that the message was passed to the originator's family, who were extremely relieved that their son was safe and well. Jack was later contacted by the American Embassy in London and asked if he and Rebecca would like to visit the White House to meet President Clinton himself!

Going Underground

Now we're going underground! This is because the very first amateur radio cave-to-surface SSTV contact took place on the 22nd of March on the new 73kHz band (yes...I do realise it's 1.f. and not h.f.!).

John G3TDZ, along with **G4SPR**, **G4AEE**, **G4OKW**, **G3PAI** and others, all keen experimenters (and cavers!) put

together a complete 73kHz cave radio. And along with computer hardware they carried out the feat at the Birkwith Caves in North Yorkshire. I think 73kHz is certainly an interesting band, but adding SSTV and a few hundred metres of rock to the equation makes it even more satisfying eh?

Achievements like those I've mentioned indicate that even though modern technology seems to be making Amateur Radio 'a thing of the past' it just goes to show that when all else fails, Amateur Radio can still be relied upon in an emergency. And secondly it demonstrates the experimental side of the hobby is still alive and well. Well done to all concerned!

Your Reports

Space is extremely limited this month, so it's straight onto your reports. I'm starting with 1.8MHz and a report from **QRPer Eric Masters G0KRT** of Surrey. Eric used 5W of c.w. from a QRP Plus transceiver and a modified W3EDP antenna to work **GM3P0I** in the Orkney Islands and **GW4VEG** in Wales at around midnight.

Next comes **Ted Trowell G2HKU** on the Isle of Sheppey, again using c.w. and an HF 6 vertical antenna to work **K2ZM**, **N2RM**, **W3LPL**, and **W4ZV** (all USA) at around 0700UTC.

Up to Scotland now, and **Mike Eccles GM3PPE**, a right Top Band enthusiast. Mike's c.w. list includes contacts with **9X4WW** (Rwanda) at 2132, **V47KP** (St Kitts & Nevis Islands) at 2300, **9K2MU** (Kuwait) at 2304, **T14CF** (Costa Rica) at 0542, **A92GD** (Bahrain) at 2354, and **VQ9QM** (Chagos Archipelago) at 2336UTC.

All that success makes my mouth water, as **GWOLBI** only managed to hook-up with **HB9ATA** (Switzerland) **DM7DX** (Slovakia), **3A/DJ7RJ** (Monaco) and **UR2FF** (Ukraine) all on 3W c.w. between 2000UTC and midnight.



Sean Gilbert G4UCJ operates to a 'good degree' on 7MHz (he should...as he lives in Milton Keynes where the Open University is based!).

The 7MHz Band

Not much activity has been reported on 3.5MHz this month, so it's straight up to 7MHz and to the report from **Charlie Blake M0AIJ** in Milton Keynes. Charlie's reception log shows s.s.b. reception of **ZL4B0** (New Zealand) at 0700, **V31RG** (Belize) at 0595, **LU7DKU** (Argentina) at 0752, as well as **CO2GG** (Cuba) at 0600, **CP60A** (Bolivia) at 0630, and **V26CW** (Antigua) at 0612UTC.

Also in Milton Keynes is **Sean Gilbert G4UCJ** who says 'the month from February to March has been the best ever for DX as far as I'm concerned'. There speaks a happy man eh?

Sean's log this month includes his c.w. contacts with **ZL2SQ** (New Zealand) at 0700, **E21EJC** (Thailand) at 2047, **ZD7BG** (St Helena Island) at 2257, **R1ANF** (Antarctica) at 0225, **VU2AJ** (India) at 0048, and **3W5FM** (Vietnam) at 1902UTC.

The 14MHz Band

The 14MHz band has been the most used by our reporters this month, as submitted logs clearly show. For example, **Terry Ibbittson G0VTI** of Wakefield is using a new Alinco DX-70 rig with 100W and reports s.s.b. contacts with **VP5/WD5FLK** (Turks & Caicos Islands) at 1841, **VP9ID** (Bermuda) at 1828, **WH0AAV** (Saipan) at 1437, **VE7BYS** (Canada) at 1834, **HQ7AF** (Honduras) at 1637, and **EK7DX** (Armenia) at 1452UTC.

John Heys G3BDQ in Hastings lists contacts with **VU2RAK** on c.w. and **CY1TX**

(Newfoundland) on s.s.b. which was a special event commemorating the discovery of Newfoundland.

Meanwhile **John Constance G0VGD/ZEOANZ** in Kent (who says that his Novice callsign is worth at least a couple of 'S' points!) sends a huge log, which includes s.s.b. contacts with **6W1HM** (Senegal) at 1400, **VE2YAK** (Canada) at 1700, **RX3AKM** (Russia) at 1300, **TF3HP** (Iceland) at 1120, and the **IB0/IK0QDB DXpedition** at 0900UTC.

Finally, it's back to Wales to **Carl Mason GW0VSW** in Skewen who hooked up with **FG5FR** (Guadeloupe) at 1947, **A71CW** (Qatar) at 1613, **4Z4DX** (Israel) at 0700, **3V8BB** (Tunisia) at 0900, **LU6EDL** (Argentina) at 2232, **V2/DL2SDS** (Antigua) at 1841, and **JA3MYE** (Japan) at 0842UTC, all on c.w.

Sign-Off

Well, that's all I have space for this month folk and it's time to sign-off! Thanks to all our reporters and their huge logs - only a small part of which I can use unfortunately. But please do keep your fully detailed reports (time, frequency, type of antenna and equipment used) coming in. Thanks for all your support.

Please send your reports (by the 15th of each month) to me: **Leighton Smart GWOLBI**, 33 **Nant Gwyn**, Trelewis, Mid-Glamorgan **CF46 6DB**, Wales. Tel: (01443) 411459/710749 or FAX: (01443) 710789.

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Valve & Vintage

By Phil Cadman G4JCP

It's Phil Cadman G4JCP to look after the PW vintage 'wireless shop' this month and he continues his discussion on power supplies, provides useful contacts about service manuals and looks at a 'bargain' in the 'older test equipment department'.

Welcome to the June edition of 'Valve and Vintage'! Firstly, I've a note about the p.s.u. circuits featured the last time I looked after the shop'. These were not intended as constructional projects, merely as a guide to the types of rectifier and smoothing arrangements typically found in domestic and low-power commercial valve equipment.

Test Equipment

Now that the rally season is in full swing I thought I'd talk about a few useful items of test equipment that can be found at rallies and junk sales. Always remember, a lot of perfectly serviceable test equipment is often thrown out simply because it has been replaced with something new.

Most test equipment found at rallies is relatively inexpensive. However, oscilloscopes, signal generators and Avometers tend to be the exception to this rule. Their broad appeal keeps their asking prices relatively high.

It is unusual to find instruments complete with handbooks. That's not a problem if the operation of the instrument is straightforward. If an operating manual is needed, or if you know or suspect that an instrument requires attention, then consider the cost of a manual in relation to the asking price. And do bear in mind the replacement cost of new valves and faulty components.

Manuals for most pieces of test equipment are available from a few specialist suppliers. Some possible sources are given below.

Sources of Manuals

Two sources of manuals that advertise regularly at the back of *PW* are **Tudor Gwilliam-Rees of Savoy Hill Publications** and **Mauritron Technical Services**.

A less well known company that specialises in test equipment and can supply manuals is: **Hesing Technology, 41 Bushmead Road, Eaton Socon, St. Neots,**

Cambridgeshire PE19 3BT. Tel: (01480) 386156, FAX: (01480) 386157. You can either telephone or write but please remember to send a s.a.e. with postal enquiries.

The Editor also advises me of another supplier, based in Scotland, and previously a regular advertiser in *PW*, who are a very useful source of manuals and service sheets. They are **Infotech & Stree of 76 Church Street, Larkhall, Lanarkshire ML9 1HE, Tel: (01698) 883334 (888343 out of office hours) or FAX: (01698) 884825.** This company also has a useful 'library loan' service for their extensive service. For further details on membership fee and loan charges, please contact Infotech direct.

Valve Voltmeters

In the good old days if you wanted to measure voltage or current then you only had two real choices - a traditional moving-coil meter or a valve voltmeter. For the most part moving-coil meters were, and still are, perfectly adequate.

Unfortunately, wherever you have high impedance circuits or there's high-frequency a.c. to be measured then the moving-coil meter by itself just isn't suitable. Before the d.v.m. came along the solution was to use one or more valves to amplify the voltage being measured.

Actually, rather than amplify in the usual sense, the valves in a valve voltmeter provide a voltage-to-current conversion. The current then drives a conventional moving-coil meter.

Valve voltmeters were frequently known by their American name of vacuum-tube voltmeters, abbreviated to v.t.v.m. Although the basic v.t.v.m. measures only d.c. voltage all the usual techniques can be employed to enable it to measure alternating voltages, a.c. and d.c. current, and resistance.

Diode Probe

If you add a diode probe and the v.t.v.m. can measure r.f. voltages well into the u.h.f. region. The very wide bandwidth is

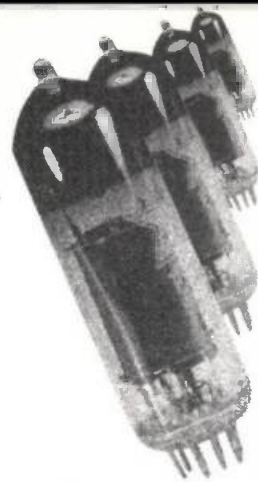


Fig. 2: A vacuum tube voltmeter (VTVM). The probe (illustrated in Fig. 1) is attached to this instrument. The photograph is of a valve voltmeter which I bought at a rally some years ago. It's a Marconi type TF 1041C, manufactured in 1962.

achieved by housing the diode actually within the r.f. probe.

The diagram, **Fig. 1**, shows a close-up view of just such an r.f. probe. The example shown is attached to the v.t.v.m. shown in **Fig. 2**. Inside is a miniature thermionic diode (an EA52) which half-wave rectifies the a.c. Thus, only d.c. flows down the probe's connecting wires back to the v.t.v.m.

Unfortunately, the probe in **Fig. 1** is incomplete as it should have a 'metal clip' around the metal ring. Attached to it would be a short wire with an alligator clip at the end for grounding. For accurate measurements at u.h.f. a circular metal tube would push onto the metal ring completely shielding the probe tip.

Another advantage of the v.t.v.m. is its facility to bias the meter to give a centre-zero reading. The v.t.v.m. can then be used to measure nulls in the same way as those good old moving-coil galvanometers. I wonder how many of you remember those things from school physics classes?

You'll find a polarity reversing switch on most v.t.v.m.s too. This allows the reading of both positive and negative



Fig. 1: A diode r.f. probe (see text).



Fig. 3: An Advance Meters Advac type VM77 audio millivoltmeter, manufactured in 1953. It has a distinctive 'blood red' coloured front casing (see text).

voltages without having to physically reverse the meter probes.

The photograph in Fig. 2, shows a valve voltmeter which I bought at a rally some years ago. It's a Marconi type TF 1041C, manufactured in 1962.

My TF 1041TC has full scale deflections from 300mV to 300V a.c. and d.c. with an additional range of 1000V f.s.d. on the d.c. range. On most ranges the accuracy is 2%. All the d.c. ranges have a centre-zero facility and a polarity reverser.

The input resistance is high at 100M Ω and the diode probe gives 0.2dB accuracy from 50Hz to 500MHz. Even at 1GHz the accuracy is still within 1dB. I was fortunate enough to get this instrument with its manual, although all the loose accessories had been lost.

Audio Millivoltmeters

Audio millivoltmeters were produced by several manufacturers for measuring alternating voltages at frequencies from the low Hertz to beyond 1MHz. These can often be found at rallies for around £20.

An early version of a series of meters manufactured by Advance Components is shown in Fig. 3. This is an Advac valve audio millivoltmeter type VM77 manufactured in 1953. It has full scale deflections from 1mV to 300V and offers an accuracy of 3% over a 15Hz to 2MHz frequency range.

The VM77 model is a rather old design and it has a blood-red front. More numerous are the later types which have a cream front and a blue case. There are also solid-state versions around which are most useful because they are 'earth-free'.

Electronic Multimeters

The precursor to the modern d.v.m. is the electronic multimeter. The example shown in Fig. 4, is a type 1231, solid-state Electronic Multimeter

manufactured by Comark Electronics some time in the 1960s.

The instrument's d.c. specification is similar to the Marconi in Fig. 2, but without the high input resistance. Its a.c. response is almost identical to the Advac but with the addition of current ranges (and it has that all important dB scale).

Rather interestingly, the resistance ranges have a linear scale facility which makes checking resistors easy. This is a very useful meter indeed, and all the more so because being battery-powered, it's earth-free.

By the way, the large 'switch OFF' sticker in the photograph is probably indicative of its previous use in a university or college. Students, of course, are notorious for not switching things off when they have finished with them!

One item which is often overlooked is the humble moving-coil meter. How often have you tied-up an expensive d.v.m. just to keep an eye on something quite trivial? And how often have you wanted to simultaneously measure both voltage and current in a circuit but only had one meter available?

The simple answer is to acquire two or three (or lots of!) surplus ammeters. Try and pick the type on which full-scale deflections are immediately useful (but don't worry if they're not!).

Most ammeters are based on meter movements which have an f.s.d. of just a few milliamperes. Changing the full-scale deflection is easy, just remove the internal shunt and replace it with another. All you need is an accurate meter for calibration and some low-value resistors for the shunt.

You may have to play around with paralleled resistor combinations to get the value of the shunt right but that's all part of the fun. To make life easier, don't forget to put a low value variable resistor in series with the meter to allow a final fine adjustment.

Voltmeters can be made even more simply by adding series resistance although it's obviously better to start out with as sensitive a meter as possible. Try to get meters with a 100 μ A f.s.d. or better. That way you'll get an input resistance of at least 10,000 ohms-per-volt, which is more than adequate for general use.

However, even meters with 1mA f.s.d. or more are perfectly useable as voltmeters. Simply reserve them for measuring battery or power supply voltages and other applications where their relatively high current demands won't be a problem.

Three surplus meters are shown in Fig. 5. The meters on the left and centre of the picture were manufactured in the

1950s. The one on the right is a modern type and so will typically cost you more than an equivalent older type.

Don't be put off by older meters. Many were made to a high specification. Remember, before digital meters took over the accuracy and longevity of a meter was directly related to its mechanical qualities.

When examining a potential purchase check for the free movement of the pointer. If it shows the slightest indication of sticking then either leave well alone



Fig. 4: A Comark electronic multimeter...complete with a reminder for the students who used it in a previous life! (See text).

or ask for a substantial discount!

A continuity check is desirable but usually impractical. Centre-zero types are useful; pick high sensitivity examples if you can. Meters with strange scales (like gallons per minute) and those without scales can be very inexpensive. The only problem is inking in your own scale.



Fig. 5: A selection of useful surplus moving coil milliammeter (see text).

Another advantage of using surplus meters for measuring current is the reduced opportunity they provide to make mistakes. I've only ever once overloaded a surplus meter by putting too much current through the instrument.

In contrast, I've damaged at least three multi-meters by accidentally leaving them on a current range far too

low for the current I was trying to measure. All the meter movements survived but having wafted away the smoke I always found at least one resistor inside had changed its colour bands to black-black-black!

Stabilised Supplies

Although not strictly items of test equipment, stabilised h.t. power supplies are often categorised as such. They fall into two groups, the 'open frame' type, most commonly manufactured by Solartron, or those housed in instrument cases complete with full metering.

Prices reflect the type of supply and, of course, its power rating. Personally, I find the Solartrons are excellent, both in terms of value and performance. However, for bench use I would strongly suggest that all open-frame supplies be housed in a suitable metal case.

Occasionally, you will come across other test equipment of a more specialised nature. Whether it is of any use to will depend on whether you recognise what it is and whether you can actually make use of it!

I hate to suggest this but depending on the cost of such equipment you could buy it for breaking-up. I once came across a piece of test equipment which had no real use any more but which contained a superb precision r.f. attenuator.

The asking price was a bargain for just that attenuator alone. If you wanted such a thing, of course!

Oh dear, I see I've reached the end of the page and 'closing time'. So, until

it's my turn 'in the shop' again, I'll say cheerio and good hunting. Remember to send your letters and E-mails to me either via the PW offices, via E-mail to phil@oldpark.demon.co.uk or direct to: 21 Scotts Green Close, Scotts Green, Dudley, West Midlands DY1 2DX.

VHF REPORT

This month David Butler G4ASR takes a look at recent band conditions and your activity reports. There's also details of a new world record on the 10GHz band and a prediction for Solar Cycle 23

Surprisingly there was no DX activity reported in the UK on the 50MHz band during March. There were no Sporadic-E (Sp-E) openings and the anticipated trans-equatorial propagation (t.e.p.) events failed to materialise. However, further to the south, in the prime t.e.p. zone, the station of IK0FTA (JN61) did hear the V51VHF beacon in Namibia at 1645UTC on March 26.

So, you'll probably have to wait until at least September this year before there's another chance to catch these type of openings on the 50MHz band. During March there were three brief auroral openings but nothing was reported other than the reception of domestic beacons on the 50 and 144MHz bands.

For those keeping records, the openings occurred on March 17 around 1930, March 28 between 1700-2000 and March 29 at 1830UTC. Conditions on the 70MHz band were below par and because of its relatively long wavelength the band was not aided by any enhancement in tropospheric propagation.

However, two contests, on March 9 and 23, did bring a welcome increase in activity. Among the more distant stations noted on the band recently have been G3YJX (I070) in Cornwall, GD4GNH (I074), G1AKSO (I064), G18AYZ (I064), GJ3YHU (IN89) and GW0GZQ (I072).

There's also a fair bit of activity from Scotland with the stations of GM3TAL (I086), GM3W0J (I077), GM4AFF/P (I086), GM40G1 (I085), GM4YNL/P (I074) and GM4ZUK/P (I086) all participating in the recent contests. Interestingly while activity on the other v.h.f. bands seems to be in decline, activity on the 70MHz band appears to be on the up.

On the 144MHz band and above there were some periods of enhanced tropo propagation notably in the period March 7-16. As a generalisation, stations located throughout England and Wales were able to make contacts with stations located in DL, F, ON and PA with relative ease.

On March 7 the station of G3NVO (I091) heard the Spanish (v.h.f. class) station EB1DSD peaking 59 on the 144MHz band. In the evening, around 2245UTC, the

beacon EA1VHF (IN53) was heard at 559.

On March 9 G3NVO made an s.s.b. contact with HB9RDE (JN37). At the QTH of **Andy Cook G4PIQ** (J001) notable contacts on the 144MHz band included SP2FAX (J083) on March 11 and OK1IAS/P (J060) on March 15.

On March 9 at 2215UTC Andy heard the Danish beacon OZ71GY (J055). The photograph, Fig.1, show the antennas at the QTH of G4PIQ. Now you can see why he does so well on the v.h.f. and u.h.f. bands.

Operators on the 430MHz band reported that activity on March 11 was very good into central and eastern Germany. Among the stations being worked on s.s.b. were DG7EAI (J031), DL8QS (J043), DG3LAV (J044), DL8AKI/P (J051), HB9RDE (JN37) and OZ5BAL/P. Conditions must have been good on March 11 as the station of DD3DJ (J031) reported that the f.m. repeaters GB3NW (I091) and GB3SK (J001) were fully quieting at his QTH for long periods during the evening.

Activity on both the 1.3 and 2.3GHz bands was pleasingly high with the station of **G4RGK** (I091), for example, reporting the stations of DG1KJG, DJ3FI, DJ6JJ, DF7JS and DC9YC on the 2.3GHz band during the evening of March 11. On even higher frequencies **Russ Stewart G4PBP** (I082) heard PA0EZ (J022) storming in at 599 on the 10GHz band.

Unfortunately, a two-way contact was not completed as the transmitter at PA0EZ failed during the attempt. However, Russ did make a contact with DJ6JJ (J031) over a 637 kilometre path. The equipment at the station of G4PBP consisted of a G3WDG transverter, a low noise amplifier (0.9dB noise figure) and a mast-head mounted 15W travelling wave tube (t.w.t.) amplifier feeding a 600mm diameter dish antenna.

Conditions on earth-moon-earth (e.m.e.), or moonbounce as it's also called, were much better than normal during March possibly due to the very low geomagnetic activity at this stage of the sunspot cycle. Having said that, it's normally only the 144MHz band that gets affected by ionospheric absorption. Bands

from 430MHz and higher don't normally suffer from this affect.

At the QTH of **John Regnault G4SWX** (J002) a single long Yagi produced c.w. contacts with SM5BSZ and SM5FRH. The station of **Ray GM4CXM** also worked SM5FRH on the 144MHz band. Ray was using a pair of 16-element Yagis with no elevation facility.

At the QTH of G4PBP a group of four 9-element F9FT Yagis enabled the station of EA3ADW to be heard via the moon, signals peaking 519.

Ultimate Contact

Contacts via the moon are technically challenging and those on the 10GHz band even more so. Last year the stations of **Charlie G3WDG** and **Lyle VK2ALU** achieved what many thought was the ultimate contact on this band.

The marvellous two-way c.w. contact was made on August 18 1996 over a (terrestrial) distance of 16993km. (Of course the distance to the moon and back is considerably further than this but curiously e.m.e. contacts are measured in land-based units rather than actual distances). Few thought that this feat would be surpassed quickly but I've just received news that the world record via moonbounce on the 10GHz band has been extended even further.

On March 12 the station of **Joe DJ7FJ** in Germany contacted **Greg ZL1GSG** in New Zealand pushing the record to 18340km. Both stations used 50W t.w.t. amplifiers, with a 4.5m parabolic dish antenna at the QTH of DJ7FJ and a 3m dish at the QTH of ZL1GSG.

The new world record came after a series of unsuccessful attempts and one semi-successful attempt when ZL1GSG was using a 1.8m dish. Echoes from the moon had been very faint but the change to a larger dish made a considerable difference.

On the night of the contact moon echoes were received by ZL1GSG an hour before the sked time. A last-minute technical problem, caused by a short in the cable that switched the waveguide antenna relay, almost put the whole

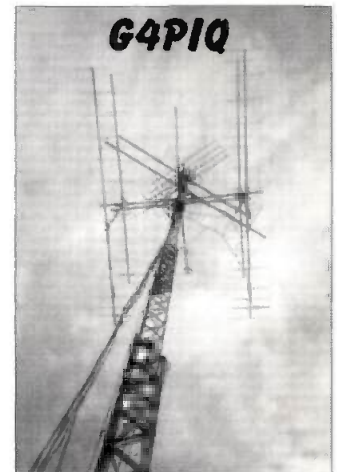


Fig. 1: The v.h.f. and u.h.f. antennas at the QTH of Andy Cook G4PIQ.

project in jeopardy minutes before the QSO began.

However, Greg's policy of having spare cable provided a makeshift solution and contact was established almost immediately after ZL1GSG was QRV again. The signals from DJ7FJ were clearly audible as had been the moon echoes.

Congratulations to Greg ZL1GSG and Joe DJ7FJ for this amazing accomplishment. By the way I reckon that the distance from G to ZL is marginally further so Charlie 'WDG' it's now up to you!

Station Activity

Barry Gibson G0ADU (I083) has recently returned to the 50MHz band after an absence of some eight years. He is using a Yaesu FT-290 transceiver driving an RN Electronics transverter into a vertical dipole or a horizontal HB9CV beam antenna. Barry is particularly interested in experimenting with horizontally polarised f.m. and is looking for stations in the local area with which to make contacts. Give G0ADU a call if you hear him on the band.

Manfred DL8SET passes on the news that the stations of **4L5A** and **4L50** have recently obtained permission for operation on the 50MHz band from Georgia. Omari 4L50 will commence during May and will be active during the Sp-E season. He will use a Trio TS-690 transceiver running 50W into a 5-element Yagi. This is the equipment left behind by the Dutch expedition group, 4L6PA, in 1996.

In a press release from the **UK Six Metre Group (UKSMG)** details have been given of possible Egyptian activity this summer on the 50MHz band. Recently the UKSMG have been in communication with the President of the Radio Amateurs Assembly of the Radio Club of Egypt, **Ezzat Ramadan SU1ER**, on the basis of encouraging 50MHz activity from Egypt.

The UKSMG sent Ezzat much material explaining aspects of operation on the 50MHz band together with several back issues of *Six News* (the journal of the UKSMG). They included a copy that described the 1994 UKSMG DXpedition to Jordan using the call sign JY7SIX. This information has made Ezzat very keen to come on the band during the month of June.

Fortunately, it turned out that SU1ER is already in possession of a Yaesu FT-690, an FL-6020 10W amplifier and a Cushcraft 3-element Yagi. The UKSMG will be encouraging Ezzat to obtain a 100W amplifier to make his signal that much louder.

On top of a 25m high building Ezzat has an 8m Rohn tower on to which he will shortly put the antenna. Although the take-off is good from the SU1ER QTH it should be recognised that there still is Band I television in Egypt and that there is a 48MHz TV transmitter located north-west of Cairo. It's therefore not possible to say how much of a problem this will be.

However, the Six Metre Group will do everything possible to help Ezzat become operational on the 50MHz band this summer. Up-to-date information about this Egyptian activity can be found on the UKSMG web site at www.uksmg.org/egypt.htm

Bert PA3DWD mentions that this year he will spend his holidays in Iceland and promises to be very active on the 50MHz band using the callsign TF/PA3DWD. He has already received a permit from the Icelandic authorities and expects to be QRV between June 26 to July 16.

Bert will use an Icom IC-706 transceiver into either a quarter-wave vertical while in the car or a 4-element Yagi when operating from a fixed site. Look out for him on 50.123 and 28.885MHz (the 50MHz liaison channel).

A station that has recently returned to the v.h.f. and u.h.f. bands is that of the **Nottingham University Amateur Radio Society**. The society secretary **Andy Gillilan G0FVI** reports that the old club callsign's **G3UNU** and **G8FNU** have been resurrected and that they are now active on the 144 and 430MHz bands. During the tropo openings in March members of the club worked into DL, ON and PA on both bands so it looks like the systems are working again.

During the summer Sp-E season (let's hope we get one this year!) it may be worthwhile listening on the

144MHz band for stations from Algeria, North Africa. **Enrique EA5AD** is presently working in Algeria (IM94) and will be active, especially during June, with the callsign 7XOAD.

Enrique prefers to use s.s.b. and can be found around 144.300MHz. He runs 40W into a 9-element Yagi from a QTH at 800m a.s.l.

Another station active on the 144MHz band is **Seghir 7X2DS (JM16)**. Presently he is running 10W into a 15-element DJ9BV Yagi but expects to receive a new 80W p.a. very soon. (Two years ago he made some Sp-E contacts with stations located in G and GW).

Solar Cycle 23 Prediction

In September 1996 an international scientific group was convened at the Space Environment Centre in Boulder Colorado to develop a forecast for the solar and geomagnetic activity during the next Solar Cycle 23. The size of a solar cycle is historically marked by the maximum monthly smooth sunspot number (s.s.n.) for a cycle.

The current cycle, Cycle 22, had a maximum monthly s.s.n. of 159 in July 1989. The largest observed cycle, Cycle 19, had a maximum monthly s.s.n. of 201 in November 1957.

The panel's consensus forecast is that the smoothed monthly s.s.n. will be in the range of 130 to 190, averaging around 160. The scientific group also predicted that the maximum of Solar Cycle 23 could be between January 1999 to 2001, possibly in March 2000. So you've got a year or so to get your 50MHz station optimised before that band is open for world-wide DX again.

Satellite News

Just as last month's column went to press I learned that the launch of the Phase 3D satellite has been re-scheduled from July to a mid-September launch window. Unfortunately, modifications to the Ariane 5 rocket's electrical systems and software will mean another costly delay for the P3D amateur radio satellite.

The AMSAT-NA President **Bill Tynan W3XO** said a complete analysis had not yet been done but that he believed the delay would add "on the order of 100,000 dollars" to the P3D costs. (That's on top of an estimated 200,000 dollars combined funding shortfall that AMSAT-NA and AMSAT-DL were reporting in late February).

So far, AMSAT-DL has invested nearly two million dollars in Phase 3D compared to nearly 1.4 million dollars for AMSAT-NA. At the beginning of the year the AMSAT-UK P3D fund amounted to over £113,000 and that was apart from the cash that has come directly out of the general AMSAT-UK funds over a

three year period.

Fund raising for this exciting satellite still continues and your contributions, no matter how small, will be most welcome. Send any donations to **Ron Broadbent MBE G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ.**

Beacon News

Brian Boyer G3COJ passes on news about the **GB3VHF** beacon and mentions that the future of the unit is uncertain. About 25 years ago the BBC had a requirement for high quality audio radio links on 46, 90 and 141MHz. Nothing was available commercially at a reasonable price so they were designed in-house.

When the development programme was completed the 141MHz prototype was returned to the 144MHz band. The wide-band f.m. source was converted to crystal control and a keyer provided to enable the transmitter to become the **GB3VHF** beacon.

Recently the 10W driver stage for the 40W power amplifier became unstable resulting in hum on the signal. Consequently the beacon has been off the air for some months.

The driver stage consists of plug-in units and requires a special chassis extender when testing. As the radio link equipment is long since obsolete any hope of finding a chassis extender is small. (If any BBC employee knows where such an extender exists then please contact G3COJ). Since the frequency has to be changed to conform with the new band plan the beacon keeper is considering getting a new transmitter.

As you may know a decision was taken at the **International Amateur Radio Union (IARU) Region 1** Conference last year to re-organise the lower 1MHz of the 144MHz band. As a consequence the existing beacon band, 144.850-144.990MHz will move to its new allocation, 144.400-144.490MHz, before July 1 1997.

Proposed frequencies for UK beacons are **GB3NG1 (144.408MHz)**, **GB3VHF (144.433MHz)**, **GB3LER (144.445MHz)**, **GB3ANG (144.453MHz)** and **GB3MCB (144.469MHz)**. Two frequencies, 144.400 and 144.406MHz, have been made available for future transatlantic beacon use.

At present there are difficulties with beacon allocations in the USA as they can only be licensed between 144.275-144.300MHz. It has not been decided whether one of the new transatlantic frequencies will be used for Europe to USA and the other for USA to Europe.

Four beacons on the western edge of Europe most likely to be heard in the USA have been allocated frequencies close to those for transatlantic use. They are **EA8VHF (144.402MHz)**, **OY6VHF**

(144.402MHz), **EI2WRB (144.403MHz)** and **EA1VHF (144.404MHz)**.

Contests

Now I'll turn to news of some contests coming up soon. And the first is the **RSGB 144MHz** event being held between 1400-1400UTC over the weekend of **May 17-18**. This is a very popular contest and you can expect to find much activity from both the UK and other parts of Europe.

On Sunday **June 1** a c.w. contest is being held on the **70MHz** band. This event is quite short lasting only three hours. It commences at 0900UTC.

On the following weekend, Saturday **June 7**, the first **50MHz Backpacker** contest is being held between 1300-1700UTC. The aim of the Backpackers contest is to attract newcomers to the world of contesting.

Simple antennas and low power operation are the name of the game. In a similar vein a **144MHz Backpacker** event is being run on Sunday **June 15** between 0900-1300UTC. Why don't you join them? The weather should be good and there may even be some Sp-E propagation about to liven things up. **(And don't forget the PW Contest on the same day - details in this issue).**

On the following Saturday **June 21**, the UK Six Metre Group are holding their world-wide **50MHz** contest. It's a 24-hour event between 0000-2400UTC.

Finally a **70MHz** 'phone contest has been organised by the Worked All Britain (WAB) group. It's being held between 0900-1500UTC on Sunday **June 22**.

Deadlines

That's it again for another month. I'm a little concerned that no one has provided any input to the annual table. So please send me your list of locator squares, counties and countries worked on any band.

And don't forget that I'm also including satellite contacts as well. Forward any news, views, comments or photographs to reach me no later than **Saturday April 26**. Send them to me at **Yew Tree Cottage, Lower Maescoed, Herefordshire HR2 0HP**. You can also contact me via packet radio @ **GB7MAD**, the UK DX Cluster @ **GB7DXC** or E-mail via **davebu@mdlhr1.agw.bt.co.uk** Alternatively you can telephone me on **(01873) 860679**.

END

Traders' Table

YOUR GUIDE TO SECOND-HAND EQUIPMENT

ARC EARLESTOWN 01925 229881

HF TRANSCIVERS
Yaesu FT-900AT £950
Kenwood TS-450SAT boxed £950
2 x Icom IC-765 + speaker from £1500
JRC JST-135HP deluxe + PSU (opt. units incl.) £Tel
Yaesu FT-102 £475
Kenwood TS-120V + VFO-120/SP-100 £299
Yaesu FT-747GX + FM/CW filters/FP-757GX £Tel
Kenwood TS-940S + w/shop man/mic £950
Kenwood TS-930S £900

MOBILE/BASE VHF/UHF TRANSCIVERS
Kenwood TS-711E + mic £575
Kenwood TS-700 boxed £Tel
Kenwood TS-700S £450
Kenwood TR-751E boxed £Tel
Icom IC-726 boxed £650
Yaesu FT-290R MKI + accessories £225
Navico AMR-1000S £140
Kenwood TM-742 + 10m module as new £625
Icom IC-229 boxed £225
Alinco DR-112 boxed £110
Yaesu FT-290R MKII £350
Kenwood TW-4000 boxed £250

RECEIVERS/SCANNERS
AOR AR-3000A boxed £575
Kenwood R-5000 boxed £699
Yaesu FRG-100 VGC £399
Icom IC-R71E boxed £599
Kenwood R-1000 boxed £299
Regency MDX-7000 £Tel
Yaesu FRG-9600 £350
AR-2500 £275
Drake R-8E £699
Lowe HF-225 £375
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Trident TR-1200 £120
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NRD-525 £599

HANDHELDS
Icom IC-M5 £150
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Icom IC-2SAT + extras £Tel

MISCELLANEOUS
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SDU-5000 spectrum display unit £599
PK-232 boxed £150
AT-230 £175
2 x BP84 filters £30 each
Tokyo HL-37V linear £45
PK-232MBX + Pakrait software 1.6 version £199
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Kenwood R5000 Top of the range shortwave receiver £575.00
Kenwood R5000 c/w VC-20 VHF converter £675.00
Icom IC-R71E Superh shortwave receiver £575.00
Lowe HF-225 Shortwave receiver £329.00
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HF TRANSCIVERS
Yaesu FT-707 100W 80 - 10M HF transceiver c/w desk mic £329.00
Icom IC-735 100W General coverage transceiver c/w mic £599.00
Yaesu FT-102 100W + 160 - 10M HF transceiver £425.00

VHF/UHF TRANSCIVERS
ICOM IC-2350H 2m/70cms 50/35W Transceiver (mint cond) £399.00
Kenwood TM-701E 2M/70cms 25W Transceiver, (mint cond) £329.00
Kenwood TM-251E 50W 2M Mobile (complete and as new) £279.00
Icom IC-28E 25W 2M mobile £169.00
Kenwood TH-75E 2M/70cms Handheld c/w speaker musical pack, charger, box & manual £229.00
(NEW) Kenwood TH-22E 2M Handheld £215.00
(NEW) Kenwood TH-42E 70cms Handheld £239.00
(NEW) Icom IC-W21E 2M/70cms handheld £369.00
Alinco DJ-F1 2M Handheld £159.00
Kenwood TH-28E 2M handheld c/w all accessories + case £149.00
(NEW) Icom IC-P2ET 2M handheld £239.00
(NEW) Alinco DJ-180 2M handheld £179.00
Alinco ALM-203E 2M handheld c/w mobile DC adapter/charger. (No warranty). £75.00

SCANNING RECEIVERS/ACCESSORIES
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Yupiteru VT-225 handheld VHF/UHF airband receiver £149.00
Realistic PRO-39 handheld VHF/UHF scanner £149.00
(NEW) Welz WS-1000 Wideband handheld scanner £299.00
Fairmate HP-200 Wideband handheld scanner £149.00
Yupiteru MVT-8000 Wideband scanner (mobilebase) (DEMO MODEL) £299.00
ANC-4 Noise canceller (DEMO MODEL) Ideal to use with a shortwave receiver where noise is a problem. £169.00
Magellan GPS-38 handheld GPS unit (DEMO MODEL) £179.00

SPECIAL OFFER
Motorola S200 Handheld UHF Transceivers c/w battery packs, aerials, slow charger and belt clip. £175.00
Motorola S240 (as above but also with VOX capability) £195.00
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ICOM IC707 Unused on TX £595
KENWOOD TS940 ATU VGC £995
KENWOOD TS850S Mint £995
YAESU FT1 New PAs fitted £475
YAESU FT757GX2 Mint £525
TEN TEC CORSAIR 2 VGC £495
YAESU FT102 VGC Fm. £350
ICOM IC725 inc PS15 VGC £550
YAESU FT101ZD. VGC £395
TEN TEC ARGOSY 525 ATU+PSU £265
KENWOOD TS120S HF Tcvr £295
KENWOOD TS140S+ PS430 PSU £595

VHF/UHF TRANSCIVERS
KENWOOD TR751E. VHF M/mode £475
KENWOOD TS711E. VHF M/mode £595.
YAESU FT290Mk2. VHF M/mode £325
ICOM 281H VHF FM 70cm RX £345
ICOM IC228H VHF FM Mobile £225
YAESU FT290 Mk2 c/w FL2050 £395
ICOM IC290E VHF M/Mode £325
ICOM IC2E. VHF FM H/Held £85.00
YAESU FT227RB VHF. FM. £95
FDK 750 VHF M/Mode. mint £275

RECEIVERS
LOWE HF125 HF Rx £295
LOWE HF125 Rx. All options £345
YAESU FRG7 HF Rx £135
YAESU FRG7700 HF Rx c/w ATU 2 VHF units + Act Ant Unit £395
YAESU FRG7700 HF Rx £295
KENWOOD R5000 HF/VHF Plus Filters + Voice Chip. £695
KENWOOD R5000 HF Rx £595
KENWOOD R1000 HF Rx £295
ICOM ICR72. HF. Rx £575
JIL SX400. VHF/UHF Rx. PSU £195
ICOM ICR7100 VHF/UHF Rx £895

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PX FC700 Yaesu Man ATU £109
PX FT767GX Yaesu HF 2+6mtr £1099
PX FT102 Yaesu HF 100W £425
PX IC737 Icom HF 100W £1060
LX FTONE Yaesu HF 100W £675
LX FT890AT Yaesu HF 100W £1250
LX IC-706 Icom HF + 2/6m £779
LX FT7B Yaesu HF 50W £235
AX FT990 Yaesu HF 100W £1650
AX IC765 Icom HF 100W £1699
RX FT980 Yaesu HF 100W £625
RX FT101 Yaesu HF Valve £260
RX FT757GX Yaesu HF 100W £495
RX FT747 Yaesu HF Mobile £450
RX FT107M Yaesu HF 100W £275
RX TS520 Kenwood HF 100W £260
RX TS440SAT Kenwood HF 100W £750
RX IC726 Icom HF 100W £850
RX IC761 Icom HF 100W £995

VHF/UHF TRANSCIVERS
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PX FT2700 Yaesu 2mtr/70cm £279
PX FT290R II Yaesu 2mtr port £375
PX FT736R Yaesu 2mtr/70cm £1299
PX FT51R Yaesu 2mtr/70cm £325
PX IC3201E Icom 2mtr/70cm £309
PX CS800 Standard 2mtr m/mode £259
LX DJ580E Alinco 2mtr/70cm £245
LX TH21E Kenwood 2mtr port £100
AX FT790R Yaesu UHF port £310
AX TM-732E Kenwood 2mtr/70cm £525
RX DJ160 Alinco 2mtr/70cm £155
RX DJ560 Alinco 2mtr/70cm £335
RX FT8500R Yaesu 2mtr/70cm £575
RX FT212RH Yaesu 2mtr FM £175

RECEIVERS
PX DX-394 Realistic HF Gen. RX £225
PX R2000 Kenwood HF Gen RX £375
PX FRG7700 Yaesu HF Gen RX £295
PX AR8000 AOR Scanner £299
PX AR2800 AOR RX M/base £359
PX AR1500ex AORScanner £225
PX AR3030 AOR HF RX £399
PX HF150 Lowe HF Gen RX £375
PX FRG100 Yaesu HF Gen RX £395
PX MVT8000 Yupiteru Scanner £269
PX SW-7600 Sony Portable RX £139
PX PRO2032 Realistic B/Scanner £149
LX ICR-72 Icom HF RX £675
LX FRG00 Yaesu HF RX £425
AX PRO-80 Sony S/wave RX £120
AX 2001D Sony S/wave RX £169
RX HF225 Lowe HF Gen RX £385
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RX ICF-7600 Sony Port RX £120
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RX FRG9600 Yaesu Base Scanner £240

PX = Chandlers Ford HQ 01703 - 251549
RX = Reg Ward 01297 - 34918
LX = SMC Leeds 01132 - 350606
AX = ARE London 0181 - 9974476

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PLEASE MENTION TRADERS' TABLE WHEN ENQUIRING ABOUT ANY ITEMS ON THESE PAGES!

BITS & BYTES

Mike Richards G4WNC has the latest news and developments from the computing in radio world.

Hellschreiber! - No, this is not the latest techno swearword, but a revival of a 1930s communication system. And whilst it's all well and good getting all the very latest in communications systems, the end result is starting to get ominously close to a station that runs itself.

I'm sure there are stations out there now automatically receiving and forwarding messages and compiling their own log. As the operator all you have to do is power-up and remember to post the QSL cards whilst on your way to work to earn more cash to buy the latest toy! I know that's a bit of an exaggeration, but it's not difficult for a Packet station to get quite close to this.

As amateur radio is not really about buying the latest kit, but more about self education, I thought I'd spend some time this month taking a look at one of the oldest FAX systems that's still in use today. Whilst the electromechanical drum system and it's computerised derivatives dominate both amateur and commercial weather FAX systems, the old Hellschreiber system is still used by a number of amateurs in Europe and has been used in recent times by Beijing (China) for internal news.

The Hellschreiber originates back to 1929 when Bavarian born engineer Dr Rudolf Hell applied for a patent for his new Hell recorder or Hellschreiber. This proved to be both revolutionary and very successful and by the end of the war Dr Hell had built his company to the point where he employed over 1000 people.

The key to the Hellschreiber success during the war was the system's ability to produce readable messages under, what would normally be considered, unusable conditions. In addition to being built in Dr Hell's own factory, Hellschreiber machines were also built by British Intelligence and used to intercept enemy messages during the war.

Fascinating System

Let's now take a look at the operation of this fascinating system.

In the original electromechanical Hellschreiber the text message was entered into the machine using a keyboard which activated a mechanical encoding drum which converted the key press into a series of on and off pulses that aligned with a matrix representation of the character.

The matrix size employed was 14 units vertically (columns) by 7 units horizontally (rows). I've shown an example of how the letter A could be

Row/Col	1	2	3	4	5	6	7
14							
13							
12							
11							
10							
9							
8							
7							
6							
5							
4							
3							
2							
1							

Fig. 1: The Hellschreiber character matrix.

constructed in Fig. 1.

The utilisation of this matrix is restricted so that only units 3 to 12 of the columns were used for the character with the two spares at each end being used to provide separation from the edge of the printing tape. A similar restriction also applies to the rows where only the first five units are used for the character and the remaining units used to provide the inter-character spacing.

Although the Hellschreiber may seem a very crude system, it has proved to be remarkably effective over the years. One of the peculiarities of the original

system was the requirement for the operator to type in exact synchronisation with the rotating encoding drum. By all accounts this skill was soon mastered and the message quality was usually very good. At the receiving end a rapidly rotating, inked, helical thread is struck by a hammer in response to the incoming signal and used to build-up the image on a strip of ticker-tape.

One of the inherent problems with the Hellschreiber system was the lack of synchronisation between the transmitter and receiver. If there was a speed difference between the transmitter and receiver this would cause the text to print at a slant across the tape.

The slanting problem was overcome by always printing the received text twice - one above the other. As a result, one of the lines was always clearly visible so the message wasn't lost. Although a very simple solution, it proved to be extremely effective (like all the best ideas) system.

One of the secrets behind the Hellschreiber's remarkable performance is the way it uses human skills to interpret the results. In this respect it's very similar to Morse because Morse uses the brain's remarkable powers to filter-out audio patterns and decode the message.

With the Hellschreiber the visual pattern recognition skills of the brain are employed to resolve the message. This is significantly different to RTTY where the machine attempts to resolve the message and frequently makes a complete hash of it!

One of the reasons for choosing the Hellschreiber system to talk about is the availability of PC based software to re-create this mode on your computer. The software package is called *Hell Script* by

LA0BX and is available in the public domain at the SARTG software archive and can be accessed via the Internet at: http://www.netup.no/~clank/ck_hell.html and the program names is *hs-v9610.zip*.

The great beauty of the *Hell Script* program is that it has been written to run on a PC and makes use of a standard HAMCOMM/JV FAX interface. This means all you have to do is load the software and you're in business!

Hell Script will run any just about any PC but, if you want to use the simplest comparator interface, you really need a 286 based system. On the video front the program supports just about all the standard systems from CGA upwards!

If you're using a Hamcomm type interface you have very little else to do but, if you want to build your own system, there are a few ideas in the associated text files supplied with the program. As with most amateur comms programs this one needs to be run from DOS and will not operate under Windows.

However, before you run the *Hell Script* program you ought to read the manual (manual.eng) and edit the configuration file to match your system. There were a number of well thought-out facilities built-in to the program including a rather neat software audio filter. This was a great help for dealing with poor conditions and the filter had fully adjustable upper and lower cut-off frequencies.

You could also set the speaker frequency and the transmit tone to be used as well as the c.w. speed for c.w. idents. When set-up to receive, the image gradually builds-up from left to right in rows across the screen.

Having got your system running, the next task is to find someone to talk to! The best places to look are

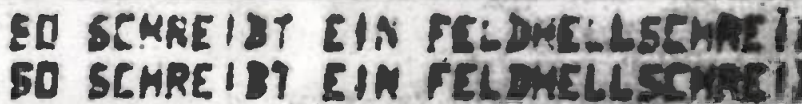


Fig. 2: A sample message received from LA9IHA using the Hellschreiber system.

on Sunday midday at around 7.035MHz and in the evening on 3.58MHz, both the frequencies are in regular use for Hellschreiber Nets.

An alternative is to join in the annual HELL contest that's organised by the DARC. The contest runs on the first full weekend in the month of October and the operating times are: Saturday 3.5MHz band 1400-1600UTC, Sunday 7.0MHz band 0900-1100UTC plus the following Thursday on 144 and 432MHz between 1800 and 2000UTC.

The entry classes for the contest are: h.f. single operator, h.f. short wave listener, v.h.f. single operator, v.h.f. short wave listener. For full details of the rules and entry details contact: **Warner Ludwig DF5BX at Postfach 1270 D-49110 Georgsmarienhuetten, Germany** or visit the Web site at <http://home.sn.no/~janalme/rules/hell.txt>

The other way to get active with this mode is to get a few local people interested via your radio club. You could then help each other to get going and experiment with this novel system - it's low cost and great fun.

Why not start a UK Hellschreiber Net on 7035kHz \pm 5kHz at 1200UTC on Sundays? See you there!

Radio Communications Platform

One of the major developments taking place currently is the more complete utilisation of the potential of the PC as a radio communications platform. Packet users in particular have become used to using external TNCs to carry out most of the processing with just a terminal program sat on the PC.

Admittedly terminal programs have become increasingly sophisticated, but the PC is able to do far more than is currently asked

of it. As with all technological progress, the key to success is the development of a popular standard. FlexNet is one such group and they have been working on a number of modular software programs for the radio amateur with an interest in Packet radio.

The latest addition to the FlexNet range has been reported to me by **Adam M0AMD** and comprises a Packet radio SoundBlaster driver. By loading this onto your PC you can get on the air with just the software and a simple one transistor circuit to handle the transmit to receive switching. Interested?

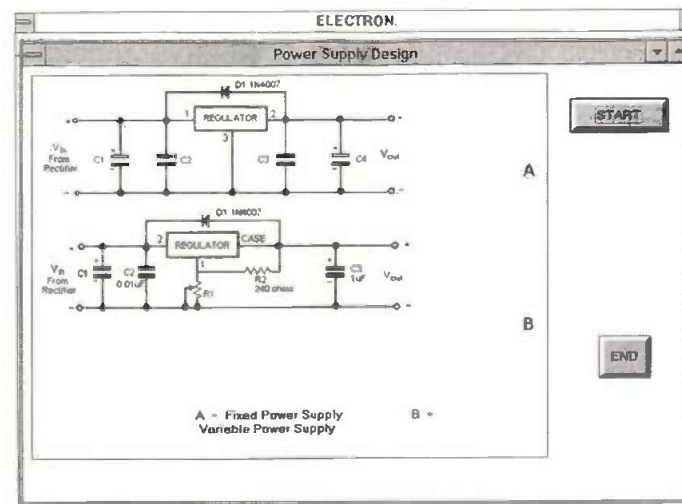
Well the place to find out more is on the Web at <http://www.ife.ee.ethz.ch/~sailer/pcf/> The SoundBlaster driver is still beta and Adam reports occasional crashes, but he has got it to work

electronics. The program is called *Electron* and has been released as shareware and so has got to be worth a try.

The review version of *Electron* (v1.0) was supplied on a single 3.5in floppy and comes with a standard Windows Setup installation routine. *Electron* has been designed to run under Windows 3.0 or 3.1 so any computer that can run these systems should be OK.

Once installed, the program takes-up a modest 850k of hard disk space, so this shouldn't prove a problem. There is no manual as such but there is a standard Windows help file to get you going.

However, the whole program is menu driven and it soon became pretty obvious what you had to do. I've included a screen shot to show you how it looks.



successfully with baycom terminal, TPK and Superpacket.

Electron

Ray Dix has sent me a copy of an ingenious little program designed to help newcomers to radio and

As you can see from the menu options, *Electron* includes packages for Ohms Law, filter design, series/parallel components, colour codes and even a simple power supply design system. I'm sure the program will serve as a useful reminder for those that only do occasional construction and also as a great learning aid for newcomers.

Ray has very kindly offered to supply a shareware copy to readers supplying an IBM formatted 3.5in, 1.44Mb disk and an s.a.e. Please be patient with your order and send them to **Ray Dix, 21 Mendip Way, High Wycombe, Bucks HP13 5TE.**

The full registered version of *Electron* costs **£8.50**. My thanks to Ray for supplying the review copy.

Interference Advice

Unfortunately QRM can be a real problem when it occurs and you can guarantee that it always starts when you least expect it! Getting good advice is not always that easy and it's very easy to be sidetracked into

Special Offers

If you'd like a copy of Hamcomm/JVFX, etc. I've arranged a very special offer with the **Public Domain and Shareware Library (PDSL)**. They have put together a library set of all five disks for just £12, all inclusive.

Using PDSL also makes ordering simpler as they accept all the usual credit cards so you can order by 'phone - you don't even have to write a letter. Please direct all orders and enquiries about this disk set to **PDSL, Winscombe House, Beacon Road, Crowborough, Sussex TN6 1UL** Tel: (01892) 663298 and request library volume: **H008739abcde**.

The software is only available as a set of five disks as follows: IBM PC Software (1.44Mb disks): Disk A - JVFX 7.1, HAMCOMM 3.1 and WAFX 3.2; Disk B - DSP Starter plus Texas device selection software; Disk C - NuMorse 1.3; Disk D - UltraPak 4.0 and Disk E - Mscan 1.3 and 2.0.

an illogical process where you jump from one colleague's suggestion to the next. What you really need is well structured advice that will guide you through a logical sequence of events to gradually home-in on the cause of the interference.

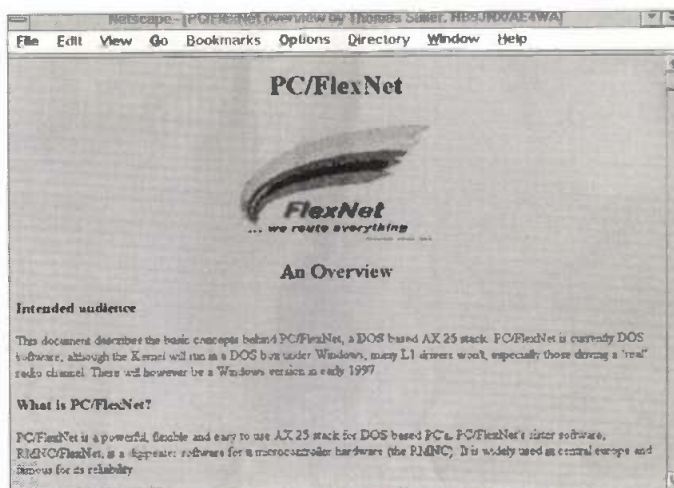
If you have Internet access one answer could be to take advantage of an excellent range of documents supplied by the American Radio Relay League (ARRL). These text files are distributed through the ARRL Infoserver system and can be found at any of the common mirror sites.

A good starting point for many European amateurs is to try: <ftp.funrt.fi/pub/ham/arrl/infoserv/tech> and within this directory you will find a number of articles with names that include the three letters rfi. These are all documents relating to different areas of radio interference.

While all the articles have strong US bias the basic information makes good sense wherever you live. If you know of any other sites please drop me a line with the details.

That's all I've got for you this month so, until next time 'happy computing' and keep your letters coming to me **Mike Richards G4WNC at PO Box 1863, Ringwood, Hants BH24 3ZD** or via E-mail to

mike.richards@dial.pipex.com You can also visit my Web site at <http://dialspace.dial.pipex.com/mik.e.richards/>



BROADCAST

ROUND-UP

Feeling in a travelling mood, then how about a visit behind the scenes at Radio Netherlands? Peter Shore explains all.

The main media event of the month in June happens when Britain hands back its last major overseas possession at midnight on the 30th. Hong Kong will be ablaze, both with residents' and visitors' parties and the lights of the world's television cameras.

Just about every international radio station will cover the event and it will be interesting for the followers of international broadcasting to compare the different treatment given by each station.

The station to tune to must be **China Radio International**. China is, after all, the principal beneficiary of Hong Kong's change in ownership, and I suspect that their propaganda machine will be in full flow across each of the language services the station runs - at my last count up there were 45!

A majority of *PW*'s readers will have to listen to the English service to understand what's being said. In Europe, tune in at: 2000-2100UTC on 6.95, 9.44, 9.92, 11.715 and 15.11; 2100-2200UTC on 6.95 and 9.92; 2200-2230UTC on 3.985 via transmitters in Switzerland and 2200-2300UTC on 7.17MHz

And to compare the mainland view with the ideas of Taiwan's government, listen to the **Voice of Free China** from Taipei. There is a single European transmission at 2200UTC for an hour on 5.81 and 9.985MHz.

Access To Internet

If you have access to the Internet and can listen to audio on your computer, you can hear some of the stations in Hong Kong. You will find the government broadcaster, **Radio TV Hong Kong**, at www.rthk.org.hk and **Commercial Radio Hong Kong** is at www.asiaonline.net/comradio.

Metro Radio, another commercial operation in Hong Kong, also has a site but when I last

visited it I found it was 'under construction' and the RealAudio service was out of action. Still, it might be worth keeping an eye on www.asiaonline.net/metro.

Six Part Series

BBC World Service, which used to run its East Asian relay station from Hong Kong, on a site just a few miles across a sea estuary from the mainland, will be marking the hand-over with a six-part series in the weeks leading up to the event. Hong Kong: Imperial Orphan traces the story of a colonial outpost that was destined to outlive, and in many ways outshine, the two empires which spawned it. The series is presented by former Beijing correspondent **Tim Luard**.

Revamped Service

Back in the more mundane everyday world of international radio, **Deutsche Welle** revamped its English service with the introduction of the summer schedules at the beginning of April. A new programme, **Newslink**, has news and reports from Europe but designed to inform a world-wide audience about what's happening across the continent.

The aim of the changes is to try and distinguish Deutsche Welle from BBC World Service, according to **Peter Behrens**, the head of DW's editorial office and the station claims that no news magazine from any other international broadcaster discusses European issues with such a high degree of topicality. **Newslink** has updated European news every three hours throughout the day.

There are also changes in other parts of DW's English-language output. Regional reports for Africa and Asia and the Pacific are increased in frequency to meet the needs of listeners in those parts of the world. Tune in to DW in English at 2000UTC on 7.17 and 9.615MHz.

Behind The Scenes

Still in Europe, and if you are in travelling mood, this month you have the opportunity to go behind the scenes at **Radio Netherlands**. On **Saturday 7 June**, the Dutch international radio service is throwing its doors open to visitors between 1000 and 1600 local time. Visitors will be able to meet some of the personalities behind the microphones, and see around the studio complex.

Radio Netherlands is based in the 'media town' of Hilversum, about half-an-hour by train to the east of Amsterdam. The headquarters building is at: **Witte Kruislaan 55, 1217AM Hilversum**.

If you're going by train, then get off the train from Amsterdam or Utrecht at Hilversum Noord. If you're coming from the direction of Utrecht, cross the footbridge. You'll see the huge Media Park in front of you. Turn right and follow the road north in the direction of Bussum and the large PTT tower (always visible except in heavy mist).

After a five minute walk, you'll see a set of traffic lights. Radio Netherlands is on the corner. This is a once-in-a-lifetime opportunity and all visitors can be assured of a very warm welcome, with lots to see and do.

Station News

ORF Radio Austria is back on medium wave after a break of around two years. The state broadcaster switched off all its MF senders and decided to rely entirely on f.m.

But now it is back on 1476kHz medium wave using a 60kW transmitter near Vienna, the Austrian capital. It is on the air daily between 1700 and 2300UTC with a variety of radio stations including ORF 1, the national channel, plus Radio 1476 which is open access radio. And there is a relay of **Radio Austria International** in German and English at 2200UTC.

There is continuing unrest in Albania, but on a lower scale than the near-Civil War situation which existed in March. **Radio Tirana** has announced its summer frequency



schedule which includes English at: 0145-0200 on 6.115 and 7.16; 0230-0300 on 6.14 and 7.16; 1845-1900 on 7.27 and 9.57MHz plus 1458kHz medium wave; 2100-2130 on 7.11 and 9.515MHz plus 1395kHz medium wave

Stocks & Shares

Do you want to trade in stocks and shares? If so, tune in to the Investment Channel, a new operation broadcast from transmitters in South Africa. The station was due to start last year, but only came on the air in late March.

It beams on a couple of frequencies at all times of the day. Try the morning broadcasts, for which the schedule appears to be: 0200-0355 on 6.16; 0300-0455 on 7.19; 0400-0555 on 3.23; 0400-0455 on 6.12; 0400-0555 on 9.525; 0500-0655 on 5.955 and 11.82; 0600-0655 on 9.675; 0600-0755 on 15.225; 0700-0755 on 17.77; 0800-0955 on 15.225 and 17.875MHz.

For more information about the Investment Channel, write to **PO Box 1250, FL-9490 Vaduz, Liechtenstein**. I wonder if the QSL cards are in the form of free shares in a leading publicly-quoted company?



All Shades
of Opinion
Radio Netherlands

That's all this month. Keep tuning the bands, and join me for more news in the next edition of *PW*.

END

FOCAL POINT

Graham Hankins G8EMX has the latest amateur television news including a report he received in a rather novel way!

The 'pause' button for continued expansion of the UK 24cm (1270MHz) Amateur Television repeater network might at last be released. In April I reported that the Dartmoor 1.3GHz repeater **GB3WV** was the first new licence for two years. Only a few weeks later, it seems that another 1.3GHz repeater - **GB3AT** in Southampton - has been given the 'go ahead' too.

The **Solent Club for Amateur Radio and Television** (gratifyingly shortened to **SCART!**) is responsible for **GB3AT**. The **SCART** Technical Officer **Mike Sanders G8LES** gives a brief description of this new repeater: "The transmitter feeds four 'flat-plate' antennas; the receiver logic board samples signal strength and selects the most favourable receive antenna for the incoming station".

Sadly, though, as two ATV repeaters come on, one goes off. Due to the recent Band Plan Changes to the 10GHz (3cm) band, the **Sevenside Group** in Bristol have temporarily closed down their 3cm repeater **GB3XG** while they wait for fresh frequency allocations.

Even when new input and output frequencies are decided, the Group will have considerable engineering work to do. The March edition of the Group's newsletter '**P5**' states that 'XG will be off-air "until further notice"'.
The 10GHz band can also be

used to link 1.3GHz ATV repeaters. Several of the Repeater Groups affiliated to the **British Amateur TV Club (BATC)** are willing to trial a 3cm connection to their adjacent repeater; this would be a major step towards an amateur TV 'network'. Incidentally, the 10GHz Band Plan refers to 'transponders' rather than 'repeaters'.

Professional Broadcasts

Amateur Television has very much in common with professional broadcast TV. Amateur TV uses the same picture standards - 625 lines of PAL colour and many ATV activists are using surplus ex-broadcast equipment.

Lots of ATV operators are also employed within the broadcasting organisations. So, it will come as no surprise that some amateur television operators take an active interest in broadcast TV too.

Things sometimes happen on professional TV that must leave the inquisitive brain asking, why? For instance; an interview over a satellite link has been established. The picture from the distant location comes straight on in glorious colour, yet the audio - the bit that radio alone could accomplish without even thinking about it - has been lost.

What **exactly** went wrong? This loss of TV sound from far-away

places happens quite often. Is there anybody out there able to provide a full explanation?

Navel Report

A video tape was the novel ATV report mailed to me from Australia. The **South East Queensland ATV Group** operates two TV repeaters; **VK4-RTV** covering Brisbane and **VK4-RRP** serving Ipswich. Here simplex ATV is alive using 426.25MHz carriers.

After a rather long (more than six minutes) single-shot 'straight to camera' introduction by SE Queensland Group secretary **Steve VK4GY** I was eventually faced with views of his rack full of ATV gear. Steve lives on the wrong side of a hill so needs 30W of transmit power at 440MHz to access his repeater, but has plenty of 'kit' including a mixer, professional titler and three video recorders.

The video continues with Steve taking the camera outside. After a staggeringly beautiful shot of his bungalow in a sunny, wide, quiet, tree-lined street and open space (don't forget this is Australia) we get close-ups of his back-garden antennas for repeater access and simplex.

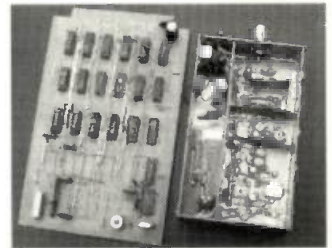
Brisbane TV station **Channel 9** featured Steve and the Group in one of their local programmes and footage of this is included on the tape. Channel 9's commentary here mentions rumours that the Federal government has plans for the ATV frequencies. Now where have I heard that before?

Further into the SE Queensland tape is a feature on a Field Day and the Gold Coast Hamfest (a very big rally) and finally a professional piece entitled 'Australia The Lucky Country'.

I must admit that, even with an inherent interest in ATV, I viewed some of the tape using 'fast forward'. Nice video, lads, bit more editing next time, perhaps?

Hands On

I am trying to make 'Focal Point' a bit



Sync pulse generator (left) and a transmitter built by keen ATV operator Geoff Hill G3DFL, sadly now a 'silent key'.

more 'hands on', because ATV is a very practical branch of amateur radio. Although cameras and video recorders are usually bought, transmitters, receivers and video processing circuits tend to be built by the individual ATV operator.

Whether by assembling a kit or constructing solely from a published design, certain tools and test equipment are essential for ATV work. As the rally season is in 'full swing', here are a few hints when considering that 'bargain'.

The most essential piece of kit for ATV testing is an oscilloscope (often simply called a 'scope'). The front panel should indicate a 'Y' amplifier (that's where your signal usually goes in) frequency response (e.g. 5MHz).

But, the upper limit is where the 'scope's performance has actually started to reduce or 'fall off'. Even though a video waveform is no more than 5.5MHz, a 5MHz bandwidth is not really good enough, look for a 'scope with a 'Y' response of least 10MHz or better.

Have another glance at the oscilloscope's front panel. Find the 'Timebase Triggering'. Is there a switch marked 'TV Line', 'TV Frame' or 'TV + -'?

You will need Line triggering and it's nice to have Frame triggering too. Additionally does the instrument sport a decent screen size? (at least 12cm) with a graticule (transparent plate with centimetre squares?).

I'll have more practical tips for you next time. And keep a look out for simple ATV projects to build in a future columns.

Send any queries and activity reports to me, Graham Hankins **G8EMX**, 11 Cottesbrook Road, Acocks Green, Birmingham B27 6LE or via packet to **G8EMX @ GB7SOL**.

Amateur Television A to Z

Here's the next instalment in my ATV alphabet:

Gallium Arsenide Field Effect Transistor (GasFet): An extremely popular semiconductor giving stable gain at microwave frequencies. Much used in 1.3GHz pre-amplifiers.

Group-Delay: In a wide-bandwidth system (eg. TV) different frequencies travel at different speeds along a transmission path (eg. long cable) or through a network - eg. a filter. This can cause distortion and may need 'equalising' out.

Horizontal polarisation By convention this applies to all ATV antennas used on 2m, 70cm and 24cm.

Interlaced scan: 312.5 even lines interleaved with 312.5 odd lines make up a complete 625 line picture. This reduces 'flicker' and saves bandwidth.

I'll continue with this list next time.

END

Advertisements from traders or for equipment that is illegal to possess, use or which cannot be licensed in the UK, will not be accepted. No responsibility will be taken for errors.

You should state clearly in your advert whether the equipment is professionally built, home-brewed or modified.

The Publishers of *Practical Wireless* also wish to point out that it is the responsibility of the buyer to ascertain the suitability of goods offered for purchase.

BARGAIN

b a s e m e n t

Compiled by Zoë Crabb

FREE ADVERTS

Now's your chance to send in a photograph of your equipment (a good idea if it's really unusual) to accompany your advert. Please note that all photos will only be published at our discretion and are non-returnable.

When sending in your advert, please write clearly in **BLOCK CAPITALS** up to a maximum of 30 words, plus state your contact details. Please use the order form provided.

For Sale

2m (144MHz) linear amplifier. h/brew, using a pair of 4CX350s, part built p.s.u., based on G4FRX design, £150. Also pair unused DX553s (mil spec. 4CX350), £50. Andy, Yorks. Tel: (01535) 652512.

25-30A power supply unit. almost new, £50. Sycron 200W pre-amp, v.h.f.-f.m., 400W s.s.b. unit, £70, almost new. Tel: Oxford (01865) 749374.

50MHz and h.f. rig. Kenwood TS-670 multimode 10W transceiver, 6, 10, 15m and 40m, excellent condition with handbook, mic, and packing, £375. Tel: Colchester (01206) 240700 evenings.

146 magazines, 1949-1977, list available, 1938. Vol 14 No 4, one copy. *T&R Bulletin*, several TV service manuals, model series 320. 1940 second edition, *The Amateur Radio Handbook*, £99 o.n.o. Tel: (01203) 455725.

Alinco DJ-580SP, full CTCSS speaker, microphone, case, three NiCads including battery box, p.s.u. included, extremely rare because Alinco special edition, mint condition, cost well over, £550, bargain at, £295 o.n.o. Matthew on (01926) 887442.

Alinco DJ-X1 wide band receiver, filter mod by Waters & Stanton, case, boxed, excellent condition, £140. Stefan, Rochdale. Tel: (01706) 39803.

Altron tilt-over lattice tower, model D455, electric winch, rotator cage, complete ground post, £350, buyer collects. Andy, Croydon. Tel: (01689) 800725.

Antenna Tonna 144MHz 2 x 9-element crossed Yagi, good condition with reinforced mount bracket, prefer buyer inspect, collect. Complete with data and heavy duty co-ax, £45. Tom G6OEI, Derby. Tel: (01332) 767960.

AOR 3030 h.f. receiver, boxed, manual, p.s.u., unmarked, new cost, £699, will accept, £499. Tel: (01253) 727279.

AOR ARI1000 scanner with gaps, 500-600, 805-1300, good 74

condition with carry case, NiCads and power supply, boxed with manual, £150. Tel: Hants (0850) 552534 (mobile).

AR88L, scruffy but working with manual, some sensible mods, buyer collects, £45. No offers. Tel: Shropshire (01952) 581536.

AR88LF receiver, good condition, manual, £40, buyer collects. Tel: Beds (01767) 627498.

ATU. Magnum Electronics, model MT500DX 250/50/5W out, 10-160 (1.8-18MHz) with WARC bands, output 2 ant. with SO239 and 3rd ant. long wire solid construction, mint condition, £125. Tel: (01253) 727279 or 726685.

Back copies of PW, 1961-present day, some complete, some missing. Mrs V Thompson, 66 Bearton Road, Hitchin, Herts SG5 1UP.

Butternut h.f. vertical. £80. HRO with power supply, £80. Tony G0CZV, South Cave, Nr. Hull. Tel: (01430) 422657.

Drake R8E receiver. 0.15-30MHz, as new, unboxed, including manual, £800 o.v.n.o. JRC NRD535 receiver, 0.1-30MHz, fitted with bandwidth control unit, mint condition, unboxed, including manual, £900 o.v.n.o. Prefer buyer collects. Paul G0TDO, QTHR. Tel: Devon (01803) 858423 after 6pm and weekends.

DX302 receiver, digital Wadley loop, quartz synth, triple conversion, pre-selector, built-in Morse oscillator, boxed, handbook, £140. Vibroplex Morse key, cost £190 with lead, instructions and reviews, £95. Tel: Dorset (01425) 476790.

Eddystone 770R communications receiver, 19 to 165MHz, complete with manual, £115. Also Racal RA17W receiver, 0.5 to 30MHz, £110. Both fully operational and in good condition. Brian Sellers, Newport. Tel: (01633) 264835.

Eddystone 770U a.m./f.m. receiver, 150/500MHz, fair/good condition, £75. Perdio Portarama portable 405

line TV, sensible offers please. Tel: Birmingham 0121-475 8647.

Eddystone 1837/2 professional 5 filters, digital, £350. Racal 1772, v.g.c., £500. Grundig 650, £200. Grundig 700, boxed, £200. Grundig YB500, boxed, £130. Sony SW77, boxed, £200. Sony SW7600, boxed, £100. Sony SW100 miniature Panasonic B65-D, boxed, £110 s.s.b., £100. Racal 17 MkII, £150. 117E, £150. FRG-7 digital, £100. Tel: Middlesex 0181-813 9193.

FIMAC 3-500z tube, unused, boxed, £125. W1200 v.h.f. RX, £20. TS-780 2/70 base, £550. FT-726R 2/70 base, £650. FT-757 MkII, FC757AT, IC-740, Standard C7800. 3 x 10 f.m. radios, 4m radio, some new. Tel: Watton (01953) 884305.

ERA MkII Microreader, unused and still in box, £100 o.n.o. Tel/FAX: (01483) 272372, ask for John.

Fluke type 8050A d.m.m., £150. Tektronix 575 transistor curve tracer, £50. HP power supply, type 6291A (0-40V, 5A, £50. Racal Dana timer counter, type 9906, £150. All with handbooks. Tel: Rickmansworth (01923) 776382.

FT-102, £400. FT-75 mobile, £125. BC221, £20. FT-200, £125. BBC computer text unit, £50. BBC computer musical keyboard, £50 plus shack clearance, list available. G3KJX, 43 Brompton Road, Northallerton DL6 1ED. Tel: (01609) 772702.

FT-250 Sommerkamp h.f. transceiver, 100W, good condition, £125. Also Realistic DX302 0-30MHz receiver, digital display, £90. Tel: Rugby (01788) 578916 evenings.

FT-757GX2, FC-757AT automatic FP-757HO (p.s.u.) with boxes and manuals, excellent condition, £800 o.v.n.o. Tel: (01705) 264587.

FT-901DM h.f. transceiver with WARC bands, handbook, mic., £300. TH3 3-element tri-band Yagi, g.w.o., £150. 3-element 15m TET mono-band Yagi, never used, £75. 6-element 2m (144MHz) Yagi,

g.w.o., £10, buyer inspects and collects. Tel: Kent (01892) 530740.

HF-225 receiver with all options, excellent, boxed, £380. Desktop v.h.f./u.h.f. receiver, 400 channel, mint, boxed, £200. Antenna rotator, complete, £40. All o.n.o. Require Universal M400 or M450 reader. Tel: Bournemouth (01202) 430043.

IC-271E 23cm all-mode transceiver, 10W output plus 2 x 55-element Tonna ants, 2-way power splitter, SSB Electronics masthead pre-amp and sequencer, £750 the lot. Tel: Brighton (01273) 462696.

Icom 725. 100W h.f. mobile, £400 o.v.n.o. (ex G3AJT silent key). 4-element 2m (144MHz) J-Beam quad, £25. AR40 medium duty rotator, £30. Last two items, buyer collect Southampton area. G3ABA, Hants. Tel: (01703) 732997.

Icom 737A h.f. transceiver with auto a.t.u., excellent condition, boxed with manuals, £795 o.n.o. Fran, Coventry. Tel: (01203) 220879.

Icom IC-451E 430MHz multi-mode base station, mains or 12V, 10W output, good condition, complete with microphone, leads and handbook, collect or carriage extra, £375 o.n.o. Bob G8VOI, Waterlooville. Tel: (01705) 250830 after 6pm please.

Icom IC-706, as new, with separation cable and mic. adapter lead, £720 o.n.o. Microset 100W 2m (144MHz) amplifier and pre-amp, £40 o.n.o. Mark GOPYV on (0973) 697743 or evenings on (01279) 722790.

Icom IC-736 h.f. bands plus 6m (50MHz), 100W all bands, hardly used, as new, £1200. 6m 5-element Tonna, free to buyer or IC-736 Cushcraft R7 vert. 10-40m (28-7MHz), good condition, £160. Collect. Tel: Worcester (01386) 792582.

JRC NRD535 h.f. receiver, fitted with bandwidth control unit plus JRC NV88 speaker, all in pristine condition, manual, leads, etc., sell for, £950, no offers. John, Scotland. Tel: (01592) 203279 anytime.

Kenwood 520S h.f. receiver with a.t.u., excellent condition, used as standby, £350. Icom IC-45E 430MHz virtually as new, £195. Might consider p/ex 486 computer. Tel: N. London 0181-360 8467 evenings.

Kenwood R2000 h.f. receiver, 150kHz to 30MHz, u.s.b., l.s.b., a.m., f.m., c.w., ex. condition, boxed with manual, bargain, £275 o.n.o. Tel: Worthing (01903) 262591.

Kenwood R5000 h.f. receiver, all filters fitted, 18 months old from Martin Lynch, as new, £575. Tel: Harlow (01279) 445718.

Kenwood TR751E v.h.f. multi-mode, boxed, in excellent condition, £400. Yaesu FT-790R MkII u.h.f. multi-mode c/w Yaesu FL7025 25W linear, boxed, 'as new' condition, £430, all owned from new by myself. Ian G1HQK on (01354) 660800 or (0468) 092889.

Kenwood TS-450S AT extra filters, good condition, book, box, no offers, £725. Ken, Whitley Bay. Tel: 0191-237 7011 after 6pm please.

Kenwood TS-450SAT, as new, boxed, only used on receive, £800. Lowe HF-125 + keypad a.m./f.m. syncro mod and instructions, £175 o.n.o. 23/24cm ATV antenna, £10. PKO2004, £120 o.n.o. FAX BTDF400, £175. Vic, Stoke-on-Trent. Tel: (0973) 538502 or (01782) 205538.

Kenwood TS-50S boxed with mic., manual and mobile mount, power lead, no faults, no offers, see try before you buy, £550. Bill, Carlisle. Tel: (01228) 49168.

Kenwood TS-50S transceiver. Global AT2000. Lowe AP150. Uniden UBC9000 with p.s.u.s, manuals, leads, boxes, etc., in excellent condition, offers around, £900 or will split some items. Paul, Portsmouth (01705) 755447 work or (01705) 352707 home.

KP-100 remote keypad for Yaesu FRG-100 receiver, giving direct frequency entry, memory and tuning control, as new, £30 (cost, £45). Yaesu

FRT-7700 a.t.u., excellent condition, boxed and instructions. £40. S. Clifton, Llandudno. Tel: (01492) 878107.

KW107 (Decca). £125. KW1000 two new 572Bs, £325. Packet station C64 digicom interface, disk drive, 3 cass., 'Powermon' cartridge, p.s.u.s, 40 games (b&w TV), monitor, £125. Alex G0JZE. Chipping Norton. Tel: (01608) 643585 after 6pm.

KW2000B transceiver, inc. p.s.u. and manual, also d.c. p.s.u., good condition. £190. Arthur G3VIG, Norfolk. Tel: (01263) 761551 evenings or (01263) 514544 daytime.

Linear amp SB220. £450. Atlas 210X mobile, £275. KW 202 204, £300. High power a.t.u., £200. Icom IC2GAT hand-held, £150. Sony 2010D receiver, £200. Yaesu FRG7 receiver, £110. Tel: Lanes (01925) 225067.

Mast, lattice type, free standing 50ft extending to 100ft high, very good condition, best offer secures. Can deliver, N. London at present. Tel: 0171-226 6226 (work) or 0181-441 6861 (home).

Midland Porta/pak CB radio, ideal mobile portable home base, boxed, also Scanmaster home base antenna, 25.00MHz, 1300MHz, offers invited both as new. Bill on (01684) 295770 anytime.

Mil sets available, No. 19. No. 52, GRC-9, BE-201, TCS a.t.u., also wire 1/2 mile roll, £10. Morse key 20 x 50mm, £20. Packard Bell mic. amps, £15. Wanted any military radios, buy or swap. Ben. Worcestershire. Tel: (01562) 743253.

Mosley triband vertical antenna, 10, 15, 20m (14, 21 & 28MHz), offers or pref. exchange h.f. trans match KW EZE match or similar. Tony MOACO, Derby. Tel: (01509) 672758.

Navico 1000 2m (144MHz) rig, good starter, suitable 'phone or packet. £120 o.n.o. David, Warrington. Tel: (01925) 814042.

Network analyser, 2 to 12.4GHz, HP8410A, HP8411A, HP8412A, HP8413A, HP8414A, HP8418A, HP8743A, needs sweep oscillator, £500. G4SJH. Camberley. Tel: (01276) 474981.

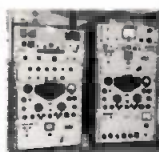
Offers invited for Kenwood TH-79E dual-band hand-held, boxed as new, has extended receive including airband, etc., interested then. Tel: (01684) 295770 anytime.

Over 50,000 boxed, transmitting, receiving radio valves, CRTs, Klystrons, etc., £1500 per thousand, or £1 each to clear all, no lists available. Gerald Levien on 011 708 1157, FAX: 011 794 1938, Gauteng, S. Africa.

Philips PM3267 'scope, 35MHz, good working order, double beam delayed time base, £50. JVC CX-60 portable 12V TV. 5in screen, PAL/SECAM v.h.f. u.h.f. mains power unit, £35. Tel: Kent (01227) 272507.

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Specifications

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- Dual In-Band Receive w/ Separate S-Meters
- Selectable Antenna Jacks
- Collins SSB Mechanical Filter built-in, 500 Hz CW Collins filter plug-in, optional
- Selectable Cascaded Crystal and Mechanical IF Filtering (2nd and 3rd IF Filters)
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