practical

Wireless

FEBRUARY 1994 £1.90

THE UK'S BEST-SELLING MAGAZINE FOR AMATEUR RADIO ENTHUSIASTS

Valve & Vintage Issue

Featuring The Eddystone Radio Story

Early Wireless Keying

Build - A Valved 3.5MHz CW Transmitter

Special Edition Of Ron Ham's 'Valve & Vintage' Column

REVIEWS

The Alinco DJ-G1E 144MHz Hand-Held Transceiver

The Icom IC-707 HF Transceiver

Plus

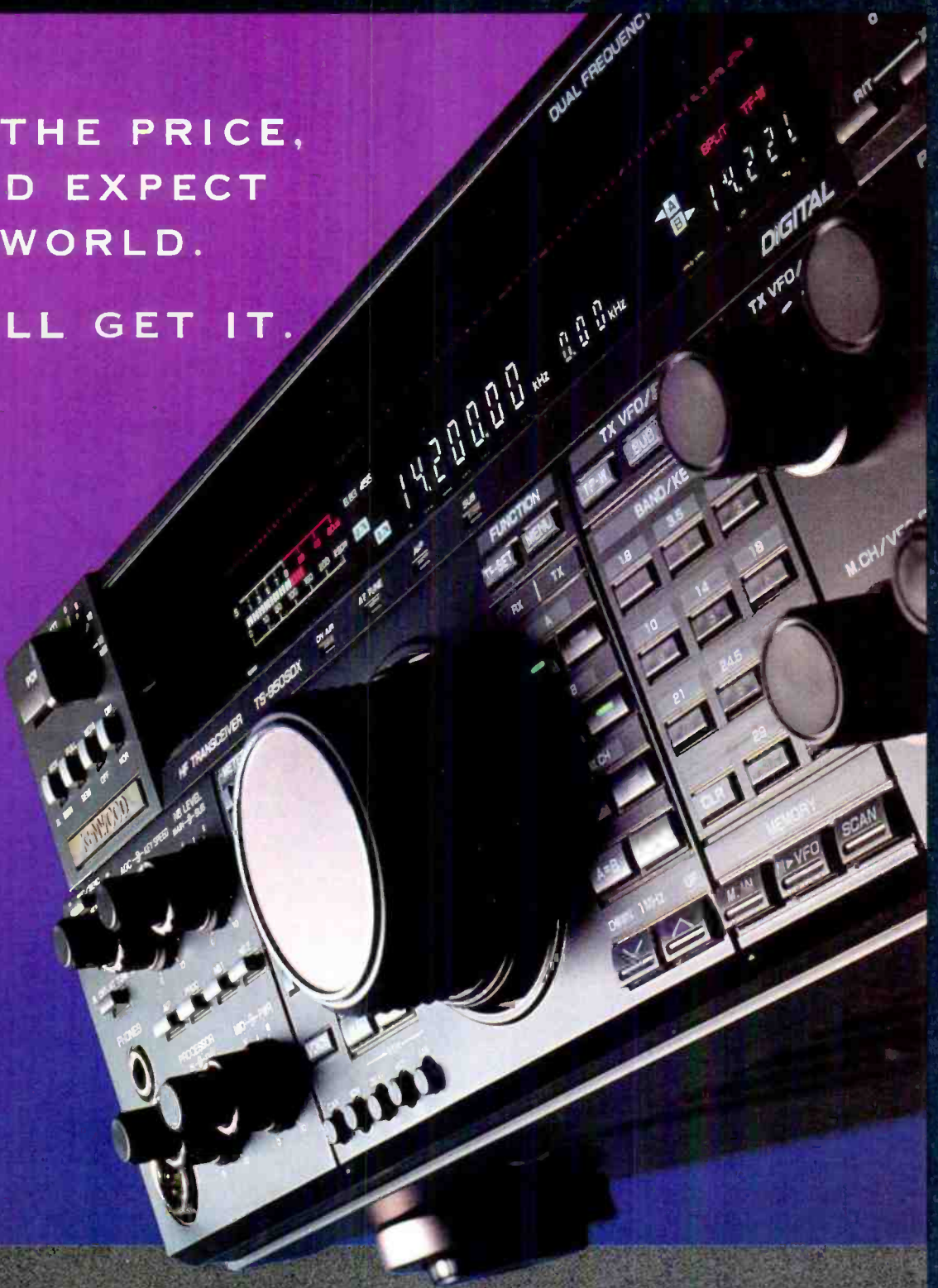
Novice Natter - Special Prize Competition - Bits & Bytes - Focal Point And Much More!

02
9 770141 085020

THE THREE POINTS OF THE KENWOOD TRIANGLE REPRESENT ADVANCED TECHNOLOGY, QUALITY AND STYLE

FOR THE PRICE, YOU'D EXPECT THE WORLD.

YOU'LL GET IT.



The TS-950SDX is at the very pinnacle of the Kenwood HF transceiver range. And when you look at its specification, that's not surprising.

It boasts a number of highly advanced features like built-in digital signal processing, 50 Volt MOSFET finals, AIP (advanced intercept point), built-in sub-receiver and built-in automatic antenna tuner. To name but some of its world-leading technical tours-de-force.

Just as important, it's made with Kenwood's traditional attention to detail and reliability, to stand up to a lifetime's use.

The TS-950SDX is part of a range of HF transceivers priced from around £1000 to £3500. And although quality is never cheap, it's still a small price to pay to have the world of radio communications at your command.

KENWOOD

HOME AUDIO, CAR AUDIO, COMMUNICATIONS EQUIPMENT, TEST AND MEASURING INSTRUMENTS, TELECOMMUNICATIONS

practical Wireless

FEBRUARY 1994 (ON SALE JANUARY 13)
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NEXT ISSUE (MARCH)
ON SALE FEBRUARY 10

FEBRUARY 1994 CONTENTS

Other Regular Features

FRONT COVER ACKNOWLEDGEMENT

Our thanks go to Eddystone Radio (A GEC Marconi Communications Limited Company) for the photographs of the vintage Eddystone receivers. We also thank The Marconi Company Ltd., for the photograph of G. Marconi, in his radio room of his yacht *Elettra*.

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COMING NEXT MONTH

Practical Wireless goes mobile with a look at amateur radio on the move. Plus the PW guide to the 1994 London Amateur Radio Show and free copy of the new Mainline Electronics Catalogue.

DON'T MISS IT!

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NEW IMAGE SMC & ARE COMMUNICATIONS

UPGRADE YOUR OLD TRANSCEIVER WITHOUT A MAJOR CAPITAL COMMITMENT.

FT-990
List **£2199**
Carr E

For example your FT101ZDMK3 could be worth as much as **£350** against the purchase of a new FT990 or FT890 transceiver and you could pay the balance off over 10 months interest free. This would mean you could obtain your dream radio now for **NO CASH DEPOSIT**. For example FT890 list **£1299**, less **£350** balance **£949**, 10 monthly payments of **£94.90** what could be simpler.

FT-890
List **£1299**
Carr D

Similarly your:

FT902DM	up to **£400**	**FT102**	up to **£375**	**IC751A**	up to **£775**
FT757GX	up to **£500**	**TS430S**	up to **£425**	**IC745**	up to **£475**
FT747GX	up to **£400**	**TS440S**	up to **£775**	**IC740**	up to **£375**
FT767GX	up to **£850**	**TS140**	up to **£485**	**TS830S**	up to **£435**

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Offer valid on clean good working order equipment only, we may be able to offer similar deals on other models not listed above. Credit facilities offered are subject to status, offers subject to availability.

£150 MINIMUM FOR YOUR OLD MOBILE 2M OR 70CM

When you purchase a new FT5100 144/430MHz dual band mobile:

YOU PAY ONLY £449

Or, just pay **£74.84** per month for 6 months INTEREST FREE. **No cash deposit required.**

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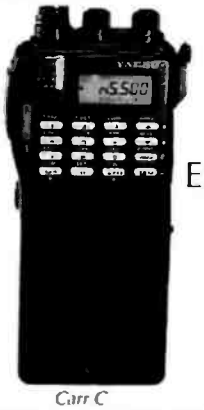

Carr C

£100 MINIMUM FOR YOUR OLD HANDI 2M OR 70CM

When you purchase a new FT530 144/430MHz dual band handi: Extended receive capability 110-180MHz, 300-500MHz 800-950MHz.

YOU PAY ONLY £399

Or, just pay **£66.50** for 6 months INTEREST FREE. **No cash deposit required.**

Note: Trade-in is for amateur radio equipment only. Credit is subject to status.

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WATERS & STANTON
UK'S LARGEST SELECTION OF

Ten-Tec Scout £479

SSB/CW 1.8MHz-30MHz Capability!

- ★ 5-50Watts Output SSB/CW
- ★ Plug-in Band Modules (40m included.)
- ★ Variable Xtal Filter 500Hz-2.4kHz
- ★ VSWR, Power & S-meter
- ★ Full Break-in Built-in Speaker
- ★ 100Hz resolution 12 Volt operation

Just arrived from USA. It's the cheapest HF rig with the famous Ten-Tec Pedigree. Just pay for the bands you want. Extra band modules £39.95. Measuring 2.5" x 7.25" x 9.75" it is ideal for mobile, base or portable. Only available direct from us. Plus a full 12 month UK backed warranty.

Special Yupiteru Purchase.

MVT-5000 Scanner

£229.95

25MHz - 550MHz
800Mhz - 1300MHz
AM - FM

We've managed to purchase the last production run of this receiver at a special price. Full coverage of all the popular channels including the full aircraft, marine and ham bands etc. Compare the cost of its competitors! This is a fully specified scanner that comes from the most respected name, Yupiteru. 100 memories and a highly sensitive receiver.

Includes ni-cads
AC charger
12v Cigar lead, softcase,
Antenna, Earpiece

2m 30W Mobile for £59!

P335

This amplifier converts your 2m FM handheld into a 30W output mobile or base system.

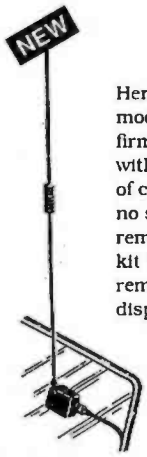
- ★ RF sensing
- ★ 1.6W Input
- ★ Ideal for FM
- ★ 12dB power gain
- ★ SO-239/BNC plug
- ★ 12-14V DC
- ★ 74 x 50 x 24mm

This is a well made unit which we have purchased at a silly price. We have limited stocks at this price and you have a full 12 months UK warranty. Ask us nicely and we'll send it post free!

On Glass Antennas

Models for:
2 metres
Dual Band
Scanners 30-1300MHz

NEW



Here's just what you want for the modern car. These antennas mount firmly on the glass surface and come with internal matching box and 17ft of coax cable. You get low VSWR and no scratches on the car. Want to remove it? Just purchase the optional kit that enables the aerial to be safely removed and re-mounted with new disposable parts.

GM-144 2m	**£29.95**
GM-270 2m/70cm	**£39.95**
TGSP Scanner	**£32.95**

New! AOR-3030 Receiver £689

30kHz–30MHz

The latest receiver from AOR is amazing value using Collins filters it boasts 7 different modes and frequency steps down to 5Hz. You get 100 memory channels and a lovely silky smooth tuning drive. We've tried it and it really is a beauty. Not the plastic gloss finish of many Japanese receivers, but a good looking professional job that really looks the business. Phone or write for information. And remember, you get a good solid deal from us and a meaningful warranty.

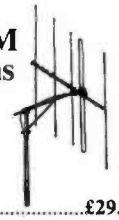
W9GR DSP Audio Filter £299

Cuts out almost all noise including power lines, static, ignition, hetrodynes, etc. Pass bands down to 30Hz and bands to suit. Packet RTTY and Amtor etc. Brings the wanted audio up and reduces the noise by several S-points! It can make an SSB signal with band noise sound just like a local FM signal!
Amazing device that has rocked the USA. It's not cheap at £299 but when you hear it you'll realise how much it can cut down listening fatigue.

MASPRO

The only ones you can mount vertically without loss!

for FM Beams



144-WH5, 5 el, 2m	**£29.95**
144-WH8, 8 el, 2m	**£41.95**
144-WH10, 10 el, 2m	**£49.95**
435-WH8, 8 el, 70cms	**£29.95**
435-WH12, 12 el, 70cms	**£39.95**
435-WM15, 15 el, 70cms	**£44.95**
KSB-50, Vertical mounting kit	**£9.95**
KSB-80, Heavy duty offset boom	**£24.95**

Price Crusher!

- ★ 20 Memories
- ★ 2 Watts Output
- ★ Wide-band Rx
- ★ Key-pad entry
- ★ Full scanning

ADI - 2m & 70cms Hand-helds

£199 (2m Version)

We've cut the price to the bone on these rigs. You get great value, guaranteed reliability and superb performance. Fully featured, these rigs are well recommended for the beginner or experienced user. You get two dry packs, one taking 4 AA cells, the other 6 x AA cells. The 70cms model is ideal for the NOVICE operator. By direct selling these we have been able to offer you the very best value. Includes aerial and belt clip. Ni-cads and chargers extra.

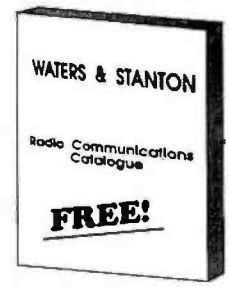
AD-145
2m model £199

AD-450
70cms model £219

All accessories now in stock

Ham Radio Catalogue

From the Super Store with all the stock, good prices and friendly staff.



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. . . on most models.

Kenwood Icom Yaesu

We can give you a good deal. One that is fair to you, competitive, yet allows us to give you an honest warranty backed up by our own service department. We could shave another 5% off the price, send your rig back to the suppliers when it goes wrong and make all kinds of excuses why it is taking so long. That's not our way. We are here to serve you before, during and after your purchase. Call us old fashioned if you like. Better still call us on 0702 206835!

MFJ-1278 Data Controller

10 Modes World Leader **£339**

The most advanced and best value product of its kind on the market. Ideal for TX or just receive, you will be enthralled for days with the capabilities of this item. All you need to add is an IBM PC, receiver or transceiver and software. Most modes can be operated using shareware or MFJ-1284 pack at £29.95. For Fax & SSTV you need the 1289 software pack for £69.95. Come and see our demo unit in action. There's lots of activity (14.065-14.080) and data comes through at speeds faster than you can type! Even when signals are weak. All in a narrow bandwidth that even 250Hz filters can pass!

REVEX Power Checker

NEW!

LED display Power 0.3-5 Watts
BNC connector
20MHz - 1300MHz
Just like Rubber Duck

£34.95
PC-705

Amazing device. Just plug into any handheld, CB or cellular phone to read the power. Levels are 0.3/0.5/1/2/3/5W.

DIAMOND VSWR Meters

The Best!

SX-100	1.6 - 60MHz 3kW	**£132.95**
SX-200	1.8 - 200MHz 200W	**£92.95**
SX-400	140 - 525MHz 200W	**£109.95**
SX-600	1.8 - 525MHz 200W	**£134.95**

For details of the full range including the automatic models, send for our catalogue.

ELECTRONICS
HAM RADIO PRODUCTS

0702 206835 or 204965

ALINCO – factory fresh from the importers!

ONLY £349 NEW

DJ-G1E
2m Tx Dual-Band Rx With Spectrum Display

80 memories, 2 Watts on nicads. 5 Watts on 12V. But the unique feature is the Spectrum Display. The bargraph shows the strength of the signal you are receiving plus the strength of signals on the 3 channels either side. Watch a Spectrum Display of the activity as you tune the band. It's the most amazing handheld we have seen!

NOW AVAILABLE DJ-480E 70cms £259

DJ-180EB
2m Budget Class Rig
10 memories (Expandable)
Auto Power Off
Scanning & wide-band Rx
Rotary Control
Ni-cads & Charger

You won't purchase a better quality rig at this price. Derived from their commercial design, this rig is tough and reliable. Ideal as a second rig or/and appealing to those who don't want all the frills (and the expense). Get the adaptor and you can make it into a 5 Watt mobile! And if 2 metres gets boring or goes quiet, you can always listen between 130MHz and 174MHz to pass the time. Get the full details now.

DJ-580E
2M/70cms

Wide-Band Rx
42 Memories
Full Duplex

The DJ-580E is the latest feature-packed handheld from ALINCO. You get ALINCO tough engineering and excellent reliability. You even get AM airband receive. No corners have been cut with the DJ-580E and to add to its pedigree, it has been selected by many groups for RAYNET operation. No doubt because of its auto repeater mode. Get the facts today and find out more about this lovely rig.

DR-130E 2m Mobile

£359

50 Watts Output
20 Memories
CTCSS Encoder
Time Out Feature
Channel or Freq. Display
Compact size

This is the newest mobile rig to come from ALINCO and with 50 Watts output it really does pack a punch. Its simple front panel belies its many features yet making operation safer. You can switch between frequency display or channel numbers; nice for "on the move" operation. Frequency control is by rotary control or up/down buttons on the mic. Repeater access is taken care of by the 1750Hz tone with reverse repeater in an instant. And if you get tired of 2 metres you can always listen to the segment 130MHz-174MHz. Everything you need to mount and operate the rig is supplied. Just connect 13.8V.

LED's are OUT!

Opto-3300
1MHz–2.8GHz
£169.95

The problem with LED counters is that you can't see them in daylight and they consume massive amounts of current. The new M-3300 counter has LCD readout and is super sensitive.

- ★ 6 gate times
- ★ Hold switch
- ★ Pocket size 10MHz standard
- ★ 50 Ohm BNC
- ★ Highly sensitive
- ★ Ni-cads and charger
- ★ Serial etc.

Sangean ATS-803A

Special Offer
£118.95 inc free delivery!

This well respected budget class receiver offers excellent short wave performance and is ideal for use at home or out portable. You get AM and SSB capability and a clear LCD frequency read-out. The large speaker provides good fidelity and there's 10 memories to store your favourite stations. For domestic use you also get Long and Medium Wave coverage plus FM stereo on headphones. For bedside use there is a built in clock and alarm. Now you can sit at home or go away on holiday and keep in touch with ham radio, aircraft, marine and broadcast transmissions. Then look at our price and remember you get the after sales service of the biggest name in ham radio business.

UK SCANNING DIRECTORY
We've got the new 3rd edition in stock. Is it legal or is it not? Get your copy before the whole lot get taken off the market! As a service to our many mail order customers we are offering this post free. **£16.95**

NEW

MFJ-203 Dip Meter £119.95

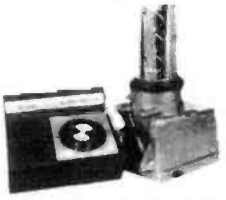
- ★ 1.8–30MHz
- ★ No coil sets
- ★ No spurious responses
- ★ No frequency pulling

The '203' is a brand new idea in dip meters. It uses a single probe for complete coverage of 1.8–30MHz. None of the old vices of dip meters! Handbook tells you how to measure resonance, velocity factors, capacitance, inductance, circuit Q and other parameters.

ROTATOR AR-300XL
Bargains £59.95

240V AC/12V control
3-core cable control.
Direct Bearings. Ideal for VHF and TV.

SAVE EVEN MORE!
Order an AR-300XL plus any Tonna or Maspro aerial and get a further £10 reduction on this price!



A FULL FEATURED ATU £71.95
1.8–30MHz.
End fed.
Coax.
Balanced.

MODEL NO: MFJ-901B
If it doesn't work with your antenna we'll take it back within 10 days! That's confidence.

HB-400 Amazing! £14.95!
P&P $2.00

Hand-held mount
The easy way to mount your hand-held or scanner in the car. Fits any hand-held using the belt clip. Gives firm mounting for safe driving.

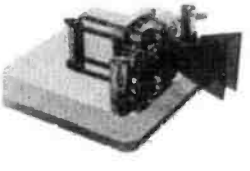
HF Mobile Aerials
Low – Low – Prices!
From Pro-Am in the USA

NEW

These single-band fibre-glass antennas are imported direct by us from the USA. They have a fibre-glass bottom section and stainless steel top adjustable whip. Highly efficient and with 3/8" stud thread. We can supply matching bases or PL-259 adaptor.

PHF-10/15 or 20m Antenna	£19.95
PHF-40m Antenna	£22.95
PHF-80m Antenna	£24.95
PHF-160m Antenna	£54.95
PL-259 Adaptor	£4.95
3401 3 section magnetic mount	£39.95
AB5-10, 15, 20, 40 & 80 5 bander £79.95	£79.95

SPECIAL PURCHASE SAVE £40!



It's a copy of the famous Bencher keyer from USA. But this one comes from Taiwan. It's superb quality, heavy chromed and a great investment. We can sell you the Bencher for £99.95 or this one for £59.95.

MFJ-564 £59.95

Station Clocks
Your shack needs one!

108 **£24.95** 112 **£29.95**

Model 108B, finished in brush aluminium, gives you dual display. You get a 24 hour clock for world time and a local 12 hour clock. Model 112 gives you a world map display with changing times across the globe. It also gives you day, month and year. Both are superbly made and come with full twelve month warranty.

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SAT 29th JAN - 10AM-6PM

COME & CELEBRATE 94 WITH US.
HUGE SAVINGS ON THE DAY!
FREE FOOD & DRINK!
POP ALONG IF YOU CAN

HANDHELD SAVERS

ALINCO DJ-580 2m/70cm + Ext Rx ~~£479~~ **£429**
FREE ★ XTRA NICAD ★ with 580/180

YAESU FT-530R 2m/70cms +Ext Rx ~~£499~~ **£399** SAVE £100
INCL'S CHGR

KENWOOD TH-78E 2m/70cms +Ext Rx ~~£499~~ **£429**

DJ-180EB 2m FM ~~£229~~ **£209**

FT-416 2m FM incl's Nicad/Chgr ~~£319~~ **£249**

NEW **TH-22E** 2m HANDY ~~£239~~ **£209**

★ NEW:- ALINCO DJ-G1E - 2m + SPECTRUM DISPLAY £349 £299 ★

MOBILE BARGAINS

TM-732E 2m/70cms Mobile ~~£689~~ **£599**

FT-290RII 2m All Mode ~~£499~~ **£429**

ALINCO ~~£359~~ **DR-130** 2m FM **£309**

TM-241E 2m FM 50W ~~£369~~ **£329**

TR-751E 2m All mode ~~£759~~ **£675**

TM-742E Triband (2m/70cms FTTD) ~~£829~~ **£729**

HF SPECIALS

NB:- MFS-249 DIGITAL ANALYSER ~~£229~~ £209 FREE P&P

ICOM IC-707 NEW SAVE £100 ~~£899~~ **£799**

KENWOOD TS-50S ~~£999~~ **£869** SAVE £130

YAESU FT-840 NEW SAVE £90 ~~£879~~ **£789**

★ ***SPECIAL BUY*** ★ ***SAVE £250!*** **FT-7476xII HF-100W** ~~£949~~ **£699** + free Mic

SCANNERS @ "TRADE PRICES"

MVT-7100 "Best Seller" ~~£449~~ **£379** Incl's SSB INCL'S · FREE LONG WIRE

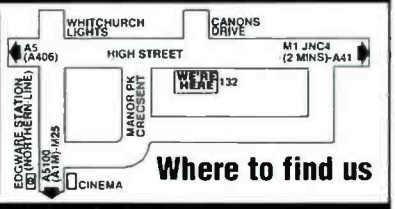
AOR AR-1500ex 0.5→1300MHz All mode ~~£349~~ **£315** Incl's SSB INCL'S · FREE LONG WIRE

AOR AR-2000 0.5→130 0Mhz ~~£309~~ **£269**

DJ-X10 Incl's Nicads Chgr ~~£349~~ **£309**

Sat 29th Jan – Save £'S on all brands. Special Discounts on the day – including books/Accs & 2nd Hand – *See You There.*

FINANCE AVAILABLE
DELIVERY: 24HR £10
48HR £7.50
HURRY - LIMITED STOCKS
@ REDUCED PRICES



Where to find us

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Sales:- (Phone/Fax) – **081-951 5782**
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Close to Edgware underground station (Northern Line). Close to M1, M25, A406.
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S.R.P. TRADING

MVT 7000 Handheld 8-1300 MHz 100kHz-1300MHz 200 Memory Channels

VT 225 The Worlds first dedicated civil/military Receiver 108-142MHz 222-391MHz 1495-160MHz

VT125 UK Civil AIRBAND Receiver 108-142 MHz

SONY ICF 2001D 0.1-30MHz All mode Incl. SSB+FM+AM

ROBERTS RG818 Multimode Cassette Radio Receiver 87.5-108 MHz 150-519KHz 1.621-29.999MHz

PRO-39 200 Channel Scanner 66-88, 108-136.975(AM) 137-174, 380-512x806-960MHz

PRO-43 200 Channel Scanner 10 Monitor Channels

PRO-44 50 Channel Scanner 66-88, 108-136-975(AM) 137-174, 380-512MHz

PRO-46 100 Channel Scanner 66-88, 108-136.975(AM)

AOR 3000A Multimode Scanner 100KHz-2036MHz USB, LSB,C.W, AM, FM,WFM

AOR AR1500EX New Enhanced Model 500KHz-1300MHz NFM, WFM, AM + SSB.

RING FOR FEBRUARY'S BIG DISCOUNTS

Specifications **MVT 7100**
• NFM / WFM / AM / LSB / USB • 530 KHz – 1650 MHz
• 1000 memory channels • 500 search pass frequencies
• 10 search bands • 30 channels per sec. scan speed
• 12v d.c. or 4 x AA power supply • Back-lit l.c.d. & buttons
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Rednall
Birmingham
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Tel: 021 460 1581

GUEST keylines

Oh good! Rob's gone to take his dog for a walk. So, now I can sneak in and write a few words in his place.

Firstly, I had better introduce myself. I'm 'Tex' Swann G1TEX, the Technical Projects Sub Editor on *Practical Wireless*. I'm an ex-pongo (ex-Army to you non-military types) who worked on electronics and radar during 22 years of service in the Royal Electrical And Mechanical Engineers.

My responsibility on *PW*, is to verify and prepare the various technical articles and projects we publish. So, if something technical goes wrong in the magazine the buck doesn't have far to travel.

Rob G3XFD tells me that although we share any blame for problems, his is the ultimate responsibility as he's the Editor. However, I'm the one who feels really guilty when errors creep in! Mistakes do occur, in spite of the vast amount of care we take in producing the magazine, and we try to correct any that do occur as soon as possible.

Over the last two years I've also been helping out with the technical illustration and photography. Because of the pressure of this work, some projects have been delayed in *PW*. But times change and we've now got another technical artist/draughtsman helping us out. So, things can only look up on the projects and 'practical' aspect of the magazine.

Like many radio and electronics enthusiasts, I plan more projects than I build. One of the things I would like to see, are more projects that are at present not tackled by commercial gear.

We (the *PW* team) like to see your projects and ideas. Let's not become totally overrun by commercial gear, excellent though it may be. Can it really be 'amateur radio' to pay £2500 for a rig?

Members of the G-QRP club seem to do extremely well with simple h.f. systems. But where are the simple systems for the B Novice licensee on v.h.f./u.h.f.? Where are all those low power v.h.f., u.h.f. or microwave rigs? Who will tackle those areas? We will!

We publish **your** ideas and **your** projects. Projects often start off with an idea from a reader, which is then developed. So, we, and more especially amateur radio, need you.

If money is the only investment that you and your bank manager put in to radio, he'll be happy. He'll get much more out of your hobby. But will you be pleased to find that you have less and less of a return on your hobby?

We all use commercial gear for the main rig, but it shouldn't stop us building a 'fun-station' now and then. If you have built an unusual rig, why don't you share it with other *PW* readers? Let them see what you've achieved. Not only will you get the satisfaction of seeing your work published, but we pay for it as well!

Oh heck! Someone's coming upstairs. I hope it's Rob G3XFD. He's an easy-going team leader, but knowing my luck it'll be Donna 'Toad' Vincent (The 'real boss'!). If it's her, I'm in for a real 'Toad' flippering for not keeping to publishing schedules. So, I'd better creep back to my desk again.

I've enjoyed my chance to talk to you all. Carry on enjoying *PW*. I look forward to meeting you at some rally, come and swap ideas, you'll find it can make life interesting again and let's see some more of your projects - especially on v.h.f./u.h.f.

Tex G1TEX

COMPETITION CORNER WordSearch

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

Words To Find

Alinco
Birmingham
Eddystone
Focal
Marconi
Natter
Novice
Point
Stratton
Valve
Vintage
Wireless

Name .....

Address .....

.....

.....

.....

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

In keeping with our Valve & Vintage Theme we have some extra prizes for this month's competition. **Shire Publications Ltd., Cromwell House, Church Street, Princes Risborough, Aylesbury, Bucks HP17 9AJ** have kindly donated six copies of *Old Radio Sets* by Jonathan Hill (as featured on page 13 December 1993 *PW*).

FIRST PRIZE: A year's subscription to *Practical Wireless* or a £20 book voucher and a copy of *Old Radio Sets* by Jonathan Hill.

SECOND PRIZE: A six month subscription to *Practical Wireless* or £10 book voucher and a copy of *Old Radio Sets* by Jonathan Hill.

Four Runner-Up prizes of a copy of *Old Radio Sets* by Jonathan Hill.

❒ **SUBSCRIPTION** ❒ **VOUCHER**

Entries to reach us by Friday 25 February 1994.

COMPETITION CORNER February 1994

RECEIVING you

STAR LETTER

Morse Key Design

Dear Sir
Concerning the designs for a Morse key given in the June and July issues of *PW*, as it may be of interest, and possibly encourage some of your readers to 'have a go' at building one, I am enclosing a photograph of what the finished key looks like.

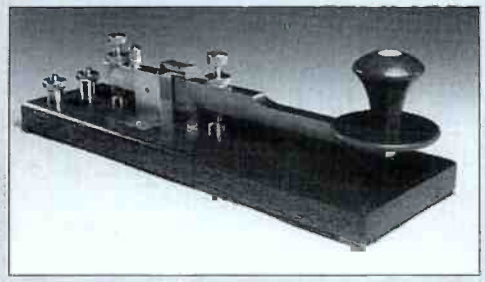
I hasten to add that I cannot take any credit for its production. To award credit where it is due, the following is the story behind it.

Some time ago I showed the designs to a friend, Jim Hedger who is a keen model maker, and mentioned that I intended to have a shot at making a key, but as my workshop facilities were somewhat limited, I asked him if he would help me with some of the precision parts. He asked to borrow the copies of *PW*, so that he could see what was involved, and said that he would let me know.

Last week I happened to run into him at a function we were both attending, and he handed me a package saying "Perhaps this will be of use to you". When I opened it, it was the completed key!

The key handles as good as it looks, and furthermore, it is to Jim's credit that he had made every component part, except the ball bearings, from solid bar material.

Before concluding, I would like to take this opportunity to congratulate the designer, and *PW* for publishing details of a very practical, and at the same time an aesthetically pleasing piece of equipment.
E. T. Wadsworth G0SPD
Bucks



Editor's reply: Thank you for the comments and sending the key to us to photograph Mr Wadsworth. The *PW* team can confirm that is as good as it looks in the picture. Congratulations to Jim Hedger for building it and to Dr. Jim Lycett G0MSZ for the original design.

Send your letters to the editorial offices in Broadstone. They must be original, and not duplicated in any other magazine. We reserve the right to edit or shorten any letter. The views expressed in letters are not necessarily those of *Practical Wireless*. The Star Letter will receive a voucher worth £10 to spend on items from our Book or other services offered by *Practical Wireless*. All other letters will receive a £5 voucher.

Reader Survey

Dear Sir
I have recently filled in the 1993 readers survey and welcome the opportunity to have some input into what I consider the best amateur radio magazine currently produced.

However, I would like to know why in the question relaying to newspapers, your surveyors have omitted any of the Scottish national papers? Before going any further, I wish to point out that I am not a Scottish Nationalist! I firmly believe in the union of Great Britain. But, I do think that there is a general ignorance of matters Scottish by some quarters in England. This is reflected in a number of ways in the English media.

We in Scotland, have a number of high quality national newspapers including: *The Scotsman*, *The Herald* and *Daily Record* to name a few. Might I suggest that in any further survey, you include Scottish titles in the form, and not upset your Scottish readers?

One further point, I would like to make, re the availability and distribution of *PW*. In Scotland, the distribution of most popular magazines is by the John Menzies group. My own newsagent, in common with many others, encounters difficulties with this company in their distribution of a number of titles, *PW* included. You may be interested to know that I have written to the company concerned, but with no improvement in the matter. In your own interest it might be worth your own investigation into this.

Please accept this as no criticism of your excellent publication, just an observation on two matters raised in your survey.
Colin Topping GM6HGW
Fife
Scotland

Editor's reply: No offence was meant at leaving off the Scottish newspapers from the survey Colin. However, I can tell you that both Dick Ganderton G8VFH, Editor of *Short Wave Magazine* and I both thought it was of importance (see *SWM* for G8VFH's comments!) but we were outvoted by the non-journalistic opinion organising and overseeing surveys in both magazines!

The Radio Amateur's Examination

Dear Sir
As a keen enthusiast and purchaser of *PW* for many years, I feel that I must put pen to paper and reply to Ed Chicken G3BIK's remarks on the RAE, December issue. About time someone else has spoken up about the exam - well done!

Last year, after reading George Benbows *RAE Manual* and other books, I felt confident from the syllabus I would sit the RAE exam, but to my disappointment, I failed both papers. Needless to say, I felt that I had been cheated out of a lot of money, what with buying books and college fees. Nothing in the book had any relationship to the questions in the exam. I really wanted to be a radio amateur, but am not that desperate if it means throwing away more money.

PS: I Love the *PW* magazine, lost of interesting items and projects, keep up the good work.
W. Jones, Worcester

Another Personality

Dear Sir
Amongst the kings, politicians and bishops who are avid amateur radio enthusiasts, there is also another personality. He is Errol 2I1AXH from Lisburn in County Antrim, Northern Ireland.

Several years ago on behalf of a Multiple Sclerosis Charity, Errol yodled non-stop for 26 hours, thereby becoming world champion. He has since appeared on the TV show 'Record Breakers' and has also travelled to France, Austria and the USA, as a guest of the Guinness Book of Records.

Errol is quite active on the Belfast Repeater (433.050MHz) and is presently studying for the RAE. Errol modestly states that he is 'world champion' for quantity, not for quality.
Victor E. Best 2I1BMX
N. Ireland

Editor's comment: Well done Errol. Keep up the good work and best of luck with the RAE.

1993 PW 144MHz Contest

Dear Sir

I am writing to you following the recently published results of the 1993 QRP Contest. My enquiry concerns the leading stations listed by country. These are listed as Leading English Station, Welsh Station, Scottish Station and Irish Station. Whilst the first three are countries, the second is of course an island. Surely the list should be by country: G, GW, GM, GI and EI (+ GD, GJ etc.??).

In the contest, I worked 62 stations in 20 squares. Of these, only one station was a GI station! I think that the feeling here generally, is that the scoring system is weighted against those on the periphery. Surely the lack of acknowledgement of the leading GI station, whether by accidental omission or intent, further discourages such entrants.

Noel Moore GI7CMC
Belfast

Editor's comment: No slight intended Noel. Please enter again in 1994 and with a little luck you might do better. In the meantime I shall confer with Dr Neill Taylor G4HLX to see what we can do to encourage entries from GI!

Dear Sir

Many congratulations to your adjudicator Dr. Neill Taylor G4HLX in compiling the results of the 1993 PW QRP Contest. I noticed that there were fewer EI/GI than in the previous years.

Despite hearing several EI/GI stations on during the contest who had a good number of contacts, many did not enter their contest logs. Upon enquiring why they did not enter, I was told, what chance do we really have against all of the UK? With the amount of activity from some local squares and as G land in some places is local to the continent of Europe, EI/GI has no chance of getting anywhere.

While many stations take part as a first experience in contesting or for an enjoyable day out, perhaps *PW* could have a section similar to the GM Tennamast Trophy to encourage EI/GI entries.

John O'Sullivan EI6ARB, Dublin

Editor's reply: Obviously we wish to encourage everyone to have a go in the contest John. Again, I shall talk to Dr. Neill Taylor G4HLX on the subject. In the meantime, I hope many more EI and GI stations enter the 1994 contest. Perhaps I might even get a trip to EI and GI land to present the special prize!

Move To Broadstone

Dear Sir

Congratulations on your move to Broadstone (although it is not what it is used to be!). I cannot place Arrowsmith Court in Station Approach, so I assume it is a recent development, but you cannot be far, as the signal flies, from the house where my particular 'Elmer' lived.

He was the late G5OH and the date was the middle 1930s. He lived in a bungalow which I believe used to be called 'The Sheil' on the corner of Tudor Road and Dunnyeats Road (Middle Church Road and Wimborne Road in those days) and I lived in the house on the corner of Kirkway and Macaulay Road (Church Road and East Road then).

Just into my teens and starting with wireless, I had built my first receiver (O-V-1) with a couple of PM1LF or similar valves and on switching on for the first time heard his callsign. Dropping everything, I rushed up the 100 yards or so to his house to report. Hardly DX!

But with the patience and kindness which characterised **all** radio amateurs in those days, he asked me in, listened to my excited account of how I had heard him and showed me his equipment.

He put out a 'test call, on 20 metres (no CQ calls for G stations in those days) and I listened to the QSO with another G who replied. This decided me to get my 'ticket'!

I started to learn Morse the same day and the fact that it was nearly another 50 years before I took the RAE, and I still haven't got my A licence does not mean that I have admitted final defeat.

All s.w.l.s in those days liked to have a decent printed card to send their reports on. So I saved up to get 250 printed (six and sixpence including postage as far as I can recall, but quite a lot when pocket money was nine pence a week).

It was fairly easy to get replies to reports in those days and over the next few years I collected many good QSL cards but most were lost over the war years when I was away from home. Two I regretted were VR6AY (Andrew Young on Pitcairn Island) and a famous American YL operator (Dorothy Hall W2IXY I think).

I still have a few from 1938 from commercial broadcast stations, OLR2A in Czechoslovakia, W8XK in Pittsburgh and W2XE in New York in front of me as I write.

Another that I remember from the long lost ones was from EA1DD a 'rebel' station in the Spanish Civil War who sent a card and a letter thanking me for my 'support in our just cause'.

I spent a few years in the Royal Signals as an instructor on the Radio Mechanics course at Catterick and have been in and out of radio in industry and schools up to my retirement some years ago. I now teach the RAE locally and include my wife, and brother among my successes! My son is also licensed, so we are fairly thick on the ground.

I can almost claim an earlier and more famous 'Elmer'. In 1926 a friend of my father was staying with us for the weekend and on the Sunday morning I was in our garden with them when a plane flew noisily, very low over the house.

Terrified, I burst into tears and ran to the nearest person who was a friend. He picked me up and explained what the plane was, the first I had seen. I asked him if they could see us and he told me that they could and that when I was as old as he was, I should be able to see all over the world. At the age of five I did not understand but this was remembered and eventually realised many years later that he was forecasting television. The friend? He was Sir Oliver Lodge.

I wish all success to *PW* in the years to come and fondly remember the days of my youth when my mother used to buy 'Practical & Ham' for me each week at threepence a week. (From Higgs the newsagents in the small parade of shops in Wimborne Road, just up from the Post Office).

Vy 73 es FB DX as we used to say.

Don W. Howard
G1AJB
Cornwall

Editor's comment: Thanks for your fascinating letter Don. Our new offices are right opposite the Sports Centre, which now straddles the old tracks and site of the Broadstone station (we were 25 years too late for Somerset & Dorset trains)!

Mobile Rallies

Dear Sir

I refer to a letter in the November issue of *PW* in respect of the costs of attending mobile rallies.

I support as many rallies as I can, mainly to support these events in order to keep them going; but also, it is a day out.

You can see all the rigs first hand, discuss problems or seek information from traders, can look at a host of books on the *PW* stand (if attending), all prior to any purchase.

Also, of course, you can pick up some bits and pieces with a chance to view and also save on postage.

As for cost - well, it's unusual to get many rallies on our doorstep, so it's got to cost something in the way of travel.

For instance: The Leicester rally at Granby Halls cost around £16 for my wife and I. A trip to the Swansea rally set me back about £20 for petrol, bridge toll and rally admission. Sandown Park by coach, about £16 in total for my wife and I. As for food - well, we take our own as we know how much that will cost.

So, it is up to the individual to make the choice to go or not to go, and a good job that these events are held. My wife and I have attended every single Longleat event.

D. Iles G3COP
Bristol

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

NEWS '94

New Frequency Counter Kit

Tim Walford G3PCJ, the designer of the PW 'Tiny TIM' transceiver project has announced a new frequency counter kit. Tim, well known as a designer, trades under the name of Walford Electronics.

The new kit provides a five digit, seven segment display showing kHz and MHz, each working to well over 60MHz. Tim claims that the prototype actually reached 85MHz during lab testing.

The use of CMOS logic with latches and direct drive are used to avoid interference. Additionally, the frequency channels can be read separately or the values added or subtracted, making it suitable as test equipment, or read-out of actual carrier frequency on direct conversion receivers or single conversion superhets.

Two kits are available. The main p.c.b. with control and counting logic costs £37, and the display with matrix board and resistors costs £12. **For further details on these and other products contact Walford Electronics at Upton Bridge Farm, Long Sutton, Langport, Somerset TA10 9NJ. Tel: (0458) 241224.**

Competiton Winners

April 1993 Spot The Difference
Winner: Mr S. Simmonds, Kenilworth, Warwickshire.
Runner-up: E. D. Keeton, East London, South Africa.

May 1993 Spot The Rig
The jumbled up rig was a Ten-Tec Argonaut II
Winner: Mr J. Bourner, Weston Super Mare, Avon.
Runner-up: N Van Gasteren, Ysselstein, Netherlands.

June 1993 Wordsearch
Winner: David Bartlett, Yate, Bristol.
Runner-up: Paul Corkin G0PXN, Wolviston, Cleveland.

July 1993 Spot The Difference
Winner: Fred C Ward, Littleover, Derby.
Runner-up: D. S Brown, Honiton, Devon.

August 1993 Wordsearch
Winner: Mr J. A. Senior, Enderby, Leicester.
Runner-up: Masahiro Ishii, Tokyo, Japan.

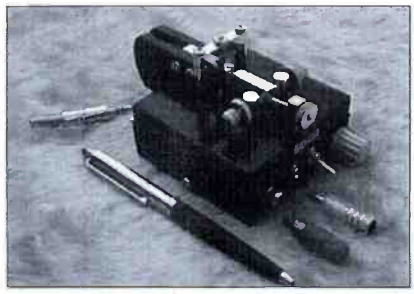
September 1993 Spot The Difference
Winner: Garth Trudgill G7MVX, South Hetton, Durham.
Runner-up: D. J. Smith G1FYX, Poulton-Le-Fylde, Lancashire.

Haydon Day

Haydon Communications are holding an Alinco open day on January 29 1994 between 10am and 6pm. Mike Haydon has informed *PW* that there will be representatives from Alinco Distribution (UK) on hand to offer assistance, up to 20% of all Alinco, Yaesu, Kenwood, AOR, Icom, MFJ, Yupiteru and many other equipment lines, as well as free food and drink!

Why not pop along to **Haydon Communications, 132 High Street, Edgware, London HA8 7EL** and see what bargins you can pick up?

Mike Haydon (right) pictured being presented with his Kenwood dealership by the president of Kenwood.



Single Lever Combo

Lancashire based G4ZPY Paddle Keys International have produced the first commercially made Single Lever Combo Key and are adding it to their range of Morse keys.

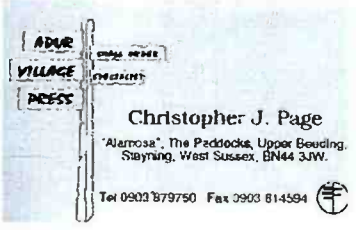
The single lever key has an extra facility in the form of a jack socket. This enables another key to use the same iambic electronic keyer. The Combo Key is available in four different finishes, all with 'key down' switches. This new G4ZPY key will be available from February together with a further 17 models which are to be added to the stock list.

For more information on the Single Lever Combo or any of the G4XZPY Morse keys send a s.a.s.e (UK) or two IRCs to G4ZPY Paddle Keys International, 41 Mill Dam Lane, Burscough, Ormskirk, Lancs L40 7TG. Tel: (0704) 894299. Queries from American readers to K4TWJ, QTHR.

Adur Village Press

Chris Page G4BUE has recently formed Adur Village Press and is specialising in small orders concentrating on the requirements of the radio amateur. The services offered by Adur Village Press include printing QSL cards, business (Eyeball) cards and rubber stamps.

Chris is encouraging his customers to let him design their QSL cards by sending him



their ideas together with the choice of colour card, quantity and an s.a.e. He will then design and print one card and send it to you with full details of the price including VAT and delivery. If you like the card, Chris will then produce the quantity you require, if not, he can alter it or if you are not happy at all you are under no obligaton. Transmitting and s.w.l. cards can also be supplied.

Prices for QSL cards start at £7.95 for 50 for a standard design or £9.95 for individual designs. Full details of all services are available.

Chris Page G4BUE can be contacted at Adur Village Press, Alamosa, The Paddocks, Upper Beeding, Steyning, West Sussex BN44 3JW. Tel: (0903) 879750, FAX: (0903) 814594.

Optoelectronics Mini Counter

Waters & Stanton have announced the introduction of a new mini frequency counter from the USA, to replace their previously best selling Optoelectronics 2300.

The new Optoelectronics Model 3300 mini frequency counter is a hand-held unit that uses a liquid crystal display. The importers consider the new model will be more versatile because together with wider frequency coverage of 1.8MHz to 2.8GHz, the l.c.d. frequency display will greatly extend battery life.

The compact Model 3300 frequency meter has an input impedance of 50Ω, and comes complete with its own antenna. The antenna or other r.f. input is via a BNC socket. Maximum input is quoted at 50mW (+17dBm). The Model 3300 is available for £169 plus £3 P&P, from **Waters & Stanton at 22 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835 or 204965.**

Stafford RadioSport

RadioSport, the organisers of the London Amateur Radio & Computer Show have launched a new Amateur Radio event called HAMfest-UK. The event is to be held at the County Showground, Stafford near to Junction 14 of the M6 on July 2 & 3 1994.

The organisers are aiming to attract many amateur radio and computing exhibitors, ranging from major importers and well known retailers down to one-man outifts. They also hope to incorporate a large Flea Market section to give private individuals the opportunity to sell their own goods, as well as Bring & Buy, Special Interest Groups, local clubs, lectures and on-demand Morse testing.

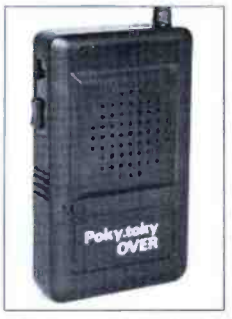
For more details on HAMfest-UK contact RadioSport on (0923) 893929.

South Midlands Three

South Midlands Communications Ltd., have recently informed *Practical Wireless* of two new products they have added to their range, plus one 'special'.

The first of the new products is the latest compact hand-held paging transceiver from Yaesu. The **FT-11R/41R** compact f.m. hand-held transceivers contain the latest in miniaturisation, microprocessor and f.e.t. technology and are designed for use on the 144 and 430MHz bands. Features include 5W output at 11V d.c., dual v.f.o.s, 150 tuneable memories and four step power output selection. There is also a DTMF Message Paging facility which allows the user to send and receive six character messages automatically.

The price for FT-11R/41R range of transceivers is yet to be confirmed.



The second new product is the **Poky-toky**. This is a low power 144MHz transceiver which delivers 10mW output and is single channel crystal controlled on 144.55MHz.

The Poky-toky is a superhet receiver with two audio settings which will operate from a PP3 battery. **SMC are supplying the Poky-toky for £59.95 per pair complete with two antennas.**

The **Yaesu FTC703A** is a commercial hand-held transceiver designed to cover 66-74MHz. The FTC703A is ideal for 70MHz use as a hand-held or for use in conjunction with a TNC for packet radio.

Currently SMC have a quantity of these 3W, 6 channel crystal controlled transceivers available for **£49 including VAT, carriage £5 extra**, without crystals.

For more information on any of these products contact South Midlands Communication Ltd., School Close, Chandlers Ford Industrial Estate, Eastleigh, Hants SO5 3BY

Martin Lynch Is Open On Wednesdays!

Since Martin Lynch and his colleagues moved to their new premises, there has been an increase in opening hours. **The Martin Lynch shop, now at 140-142 Northfield Avenue, Ealing, London W13 9SB, Tel: 081-566-1120, FAX 081-566-1207, is open Monday to Saturday 9.30am to 6.30pm (late night open until 8pm on Thursday).**

The 'Local Dealer' advertisement on page 68 in the January issue of *PW* was incorrect. Our apologies go to Martin and any customers who were misinformed. **Editor.**

New Home For LMW Electronics

Leicestershire-based LMW Electronics has moved to a new home. In a recent press release, Managing Director Chris Smith G8LMW announced that they have recently moved to new premises.

The company is still able to provide a selection of equipment, kits and ready-built items for the v.h.f. and higher bands, including 430 and 1296MHz plus 13 and 9cm. They also stock a wide range of components.

Further information, plus a catalogue (please enclose an A5 size s.a.e.) is available by contacting **LMW Electronics Ltd., LMW House, Leeside, Merrylees Industrial Estate, Desford, Leicester LE9 9FS., Tel: (0530) 231141, FAX (0530) 231143.**

Tracker's First Find

The National Transcommunications Ltd. (NTL) Company's UK television transmission network was behind the first success of the new 'Tracker' system for locating stolen cars. The first stolen vehicle located by 'Tracker' was a Ford Sierra Cosworth in November.

The Tracker system works by activating in-car homing devices using paging type signals transmitted from the NTL's network of broadcasting sites across the UK. The advantages of the Tracker system are provided by the national coverage provided by the broadcast signals, and the 'invisible' effect of the vehicle identifying itself to the police without the thief's knowledge.

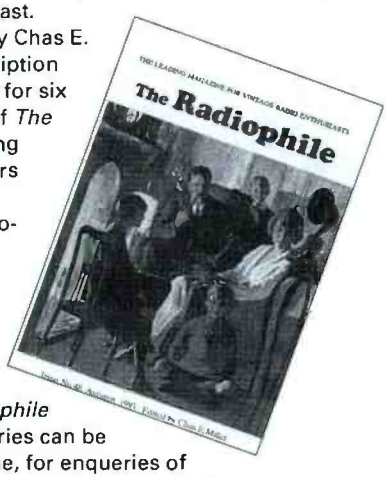
The Ford Sierra Cosworth, the first vehicle to test the system for real, had been broken into and stolen despite being fitted with an alarm and an immoboliser. The Cosworth Sierra was found undamaged, hidden in a lock-up garage in Dagenham, Essex, by a Metropolitan Police patrol car fitted with Tracker equipment.

For further information on NTL's broadcasting and other engineering activities, contact Bruce Randall on (0962) 822582.

NEWS '94

Vintage Wireless

In keeping with *PW*'s Valve & Vintage theme this month readers may be interested to know of other publications that cater specifically for the vintage enthusiast.



The Radiophile edited by Chas E. Miller is available on subscription for £15 (UK), £21 (overseas) for six issues. The article content of *The Radiophile* covers everything from technical topics, readers letters, vintage news and adverts to constructional projects.

All enquires for ***The Radiophile*** to **Larkhill, Newport Road, Woodseaves, Stafford ST20 0NP. Tel/FAX: (0785) 284696.** *The Radiophile* regret that no technical queries can be answered over the telephone, for enqueries of this nature please send a s.a.e. with your question.

Editorial Constultants G. C. Arnold Partners produce *Radio Bygones* and *Morsum Magnificat*. The *Radio Bygones* magazine is an A4 sized bi-monthly publication, edited by Geoff Arnold G3GSR, which is available on subscription only.

The articles in *Radio Bygones* contain plenty for the vintage enthusiast and the sentimentalist who wants to reminisce about days gone by. A subscription to *Radio Bygones* will cost you £17 a year (UK), £18 (rest of the world surface mail). Airmail subscription costs are also available, please apply for more details.

Morsum Magnificat is published six times a year and its aim is to provide international coverage of all aspects of Morse telegraphy, past, present and future.

Morsum Magnificat is an A5 sized publication that caters for all Morse enthusiasts, amateur or professional, active or retired. It brings together material that would otherwise be lost and provides an invaluable source of interest, reference and record relating to the practices of Morse.

Annual subscription costs are: £12 (UK), £12.75 (Europe inc. Eire), £12.75 (surface mail elsewhere) and £15.50 (Airmail elsewhere).

Enquiries for *Radio Bygones* and *Morsum Magnificat* should be sent to 9 Wetherby Close, Broadstone, Dorset BH18 8JB. Tel/FAX: (0202) 658474.

The Bulletin Of The British Vintage Wireless Society is available only by membership of the British Vintage Wireless Society. The bulletin is edited by Robert Hawes and contains a wide range of information for the vintage enthusiast.

Subscription and other details are available from Robert Hawes, 63 Manor Road, Tottenham, London N17 0JH. Tel: 081-808 2838.

NOVICE natter

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

Elaine Richards G4LFM has some more useful information for Novices. This month she starts off with some advice on radio rallies.

It was after attending the Leicester Amateur Radio Rally that I received an interesting letter from **Mike Stott GONEE.** He was discussing the do's and don'ts about rallies.

To the newcomer, a rally can be the great unknown, who tells you which are the best ones to go to, how to get the best bargains and how to get there? Over the next couple of months I'll be passing on some of the various hints and tips from seasoned rally-goers like Mike.

Let's start with which rally to attend. If you're just starting out on the rally trail, I would advise you to pick one of the large two-day rallies (London Amateur Radio Show at Picketts Lock in March or the Leicester Amateur Radio Show in October) to go bargain hunting.

Also I would find out which rally is nearest to your home and go there too. Now on to Mike's advice on how to get the most out of your cash!

1: Make a list of the bits you are looking for before you go. Start this list some weeks before the rally. Take a clip board with a pen on a piece of string with you to make notes as you go around.

2: Look in *Practical Wireless, Short Wave Magazine* and *RadCom* to see which dealers will be attending, so you get an idea of what will be available new and second-hand.

3: Take a bag with you - an old school sachel type is good. Things to keep in it, are your hand-held so you can keep in touch with friends, your cash, your sandwiches, as at some rallies the food can cost a small fortune. Don't forget some cans of drink as rally bargain hunting is hot work.

4: Money. Don't walk around with cash in your pockets, most amateurs you find at rallies are OK, but you could bump into pick-pockets. So, keep your cash in a purse at the bottom of the bag and don't flash the cash around.

5: Doing the deal! Look at the price, is it the price you wish to pay?, (you should know the price and have it down on you clip board list). Can you get it cheaper somewhere else? Is it what you require? Will it do the job? If it's new, ask about the guarantee, and has it got all the leads and connectors you need to make it work (some traders will throw in the interconnecting leads free, but only if you ask!). Has it got a mains lead and a plug, remember if you don't get one free **you** will have to buy one.

6: Haggle! This is a lost art nowadays. If the purchase is new, you don't have too much room for haggling, but **cash** will help. Most dealers will take credit cards, but this will cost them from 3 to 10% of the price, so by offering to pay in cash you may get up to 10% off. One way to do it is to look at the price and knock 10% off, get the cash out and let the dealer see it, if he will not drop in price put the cash back and walk away. It's surprising how many dealers will call you back and meet you part way on the price! At this point it is only experience that will tell you if you can push it further.

We will look at hints 7-9 next month.

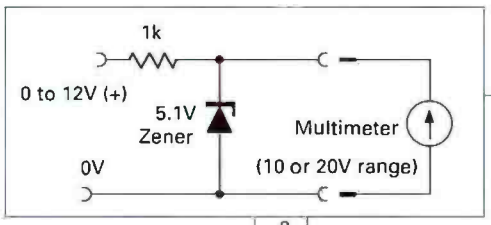


Fig. 2.

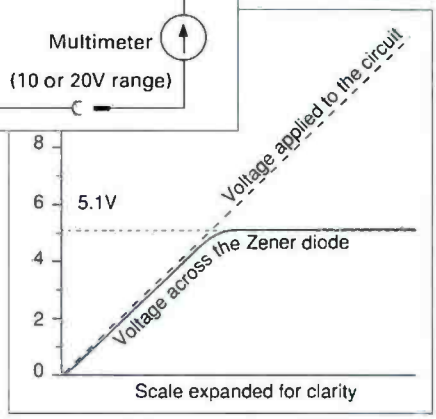


Fig. 2a.

Answers And Freebies

Back in the December 1993 issue, I set a problem with three resistors in parallel. **Stephen Clayton** was the first to drop me a line with the correct answer, which was 161Ω and so a Maplin catalogue should have arrived in time for him to put together his Christmas list for Santa!

Stephen is 12 years old and sports the callsign 2E1CFC. He has a Yaesu FT-73R that he uses to keep in touch with his father G7HZZ whilst out walking. His Dad is looking for a good design of home-base antenna for both of them to use.

They might like to consider a Slim Jim antenna (photocopies available from the Editorial Office for £1). I used one of these for a couple of years whilst living in a ground floor flat at sea level! But I was still able to make many new friends just using an Icom IC-2E hand-held.

Back in December I also offered subscriptions to Novice licensees who sent in photographs and details. The first subs award goes to Jenny 2E0ABC (**Fig. 1**).

Jenny is 14 years old and has been a novice since January 1992 - although she did wait three months to get the callsign of her choice. She's already passed her Morse test at 12 w.p.m. and by the time you read this, she should have passed the RAE.

Let's hope she gets as good a callsign this time. Jenny has done particularly well in contests too. Having entered two RSGB contests, she's come runner-up in both. I do hope that Jenny goes on to greater and greater achievements in the hobby - and that she keeps us posted too.

Fig. 1: Jenny 2E0ABC pictured sending Morse from her shack.

Studying Diodes

My two young friends studying for the RAE hit another stumbling block last week - Diodes. So I thought it was time we looked at them.

By far the most important characteristic of the diode is its ability to pass current in only one direction. This can be used for all sorts of things, but the most common is to convert a.c. to d.c., which is especially useful in mains power supplies.

The type of diode that seems to cause most confusion is the **Zener** diode, named after its American inventor Clarence Zener. The Zener diode spends all its time passing current in the wrong direction! How can this be I hear you say?

One of the important features of any diode is its **reverse breakdown voltage**. This is the voltage when the diode starts conducting in the wrong direction. With a normal diode, manufacturers try to make this breakdown voltage as high as possible.

But Clarence Zener discovered a way to make a diode that would breakdown at very specific voltages. You may think this is a strange thing to want to do, but there is a very important benefit. The Zener provides a very stable reference voltage that can be used to control such things as computer power supplies.

If you want to see the effect for yourself, try connecting a Zener diode in series with a resistor and apply a variable voltage as shown in **Fig. 2**. If you measure the voltage across the diode - using the voltage measurement on a multi-meter - you will find it starts to rise but stops abruptly when the Zener voltage is reached (**Fig. 2a**).

The Zener voltage will depend on the value of diode you have chosen. Common values are ones like 5.1 and 6.3V. One strange thing you may have noticed from the circuit of **Fig. 2**, is that unlike a normal diode layout (where the cathode bar of the diode points to the most negative point) in using a Zener diode, the cathode points towards the positive supply.

Finally

Finally, if you have any Christmas money left over, how about popping into you local Tandy store and have a look at their Electronic Project Kits. These range in price (and therefore complexity) from £9.99 to £39.99 and give you a chance to try out all kinds of little experiements to help with your understanding of electronics.

Don't forget if you have any questions, drop me a line.

CLUB news

Bedfordshire

Bedford & DARC. Tuesdays, 8pm. Club Shack, Church End, Ravensden, Bedford. **M. G. Reeves G6YNW on (0234) 349004.**

Shefford & DARS. Thursdays, 8pm. Church Hall, Ampthill Road, Shefford, Bedfordshire. January 13 - Constructors Contest G8EMJ, 20th - Members Acitivity Night, 27th - Charter Lea Motorcycles, February 3 - Members Activity Night, 10th - Top Band DF by Stewart G3RXQ. **Paul G1GSN on (0462) 700618.**

Berkshire

Newbury & DARS. 4th Wednesdays, 7.30pm. Bucklebury Memorial Hall. January 26 - VHF/UHF Contests by Ian White G3SEK. **Norman on (0635) 863310.**

Buckinghamshire

Aylesbury Vale RS. 1st & 3rd Wednesdays, 8pm. Village Hall at Hardwick. January 19 - Annual Dinner, February 2 - Foreign QSOs by John Fitzgerald. **Martyn G4XZJ on (0296) 81097.**

Cornwall

Poldhu ARC. Tuesdays and Fridays, Wednesdays HF Net, 7.30pm. **(0326) 290638.**

Cumbria

Eden Valley RS. Odd months, 7.30pm. BBC Club, Penrith. January 27 - Packet Radio Demonstration, Bring & Buy Sale, Morse Practice & Construction Evening. **John Pape G0NYQ, 2 Mill Hill, Appleby-in-Westmoreland on (07683) 52106/52148.**

Derbyshire

Buxton Radio Amateurs. Lee Wood Hotel, Buxton, 8pm. January 25 - Video Night, February 8 - Shack Design. **Derek Carson G4IHO on (0298) 25506.**

Devon

Appledore & DARC (Devon). 3rd Mondays, 7.30pm. Appledore Football Clubroom. January 17 - EMC by Les Hawkyard G5HD. **Reg Lyddon G4ETJ, QTHR on (0237) 477301.**

Torbay ARS. Fridays, 7.30pm. ECC Social Club, Highweek, Newton Abbot. January 21 - Construction Night. **W. Hipwell G3HTX on (0803) 526762.**

Dorset

Poole RAS. 2nd Fridays, 7pm. Lady Russell-Coates House, Lower Constitution Hill Site, Bournemouth & Poole College of FE. February 11 - Owen On Oil, a talk about the oil industry by Owen G0SOH. **Vernon Cotton G3BCI on 0202) 760231.**

South Dorset RS. 1st Tuesdays, 7.30pm. Wessex Lounge of Weymouth Football Club. February 1 - Details to be confirmed. **Mike Lenzi G7HNY on (0305) 773860.**

Down

Bangor & DARS. 1st Fridays, 8pm. Bangor Technical College, Room A13. February 4 - Constructional Evening. **Keith GIOSSA on (0247) 883315.**

East Yorkshire

North Ferriby United ARS. Fridays, 8pm. North Ferriby Utd., FC Social Club, Church Road, North Ferriby, East Yorkshire. January 14 - Discussion, 21st - On The Air Night, 28th - Aerial Forum by Frank G3YCC, February 4 - Club Dinner. **Frank Lee G3YCC on (0482) 650410.**

Essex

Braintree & DARS. 1st & 3rd Mondays, 8pm. The Clubhouse, Braintree Hockey Club, Church Street, Bocking. January 17 - Open Evening, 24th - Club Net, 31st - Club Net. **J. F. Button G1WQQ c/o G4JXG, 88 Coldnailhurst Avenue, Braintree, Essex CM7 5PY or Publicity Secretary on (0376) 327431.**

Colchester RA. Colchester Institute, Sheepen Road, Colchester. January 13 - UFOs & UFOlogy by Trevor G7OWC. **Trevor Bradbeer G7OWC on (0206) 764034.**

Vange ARS. Thursdays, 8pm. Barnstaple Community Centre, Long Riding, Basildon, Essex. Janaury 13 - Guns by Bob G3IUC, 20th - Film-The Catch Nobody Wants by Roy G3ASH. **Doris on (0268) 552606.**

Greater London

Acton, Brentford & Chiswick ARC. 3rd Tuesdays, 7.30pm. Chiswick Town Hall, Heathfield Terrace, London W4. January 18 - AGM. **Colm Mulvany G0JRY on 081-749 9972.**

Clifton ARS. 'Earl of Derby' Public House, Dennetts Road, New Cross, London SE14. January 14 - Computer Evening, 28th - How To Tune Up Linears. **Keith Lewis on 081-859 7630.**

Crystal Palace & DRC. 3rd Saturdays, 7.30pm. All Saints Parish Rooms, Beulah Hill, London SE19 (opposite junc. Grange Road). January 15 - QRP Homebuilt Radio Equipment by Wayne Dillion G0JJQ. **Wilf Taylor G3DSC on 081-699 5732 or Bob Burns G3OOU on (0737) 552170.**

Edgware & DRS. Watling Community Centre, 145 Orange Hill Road, Burnt Oak, 8pm. January 13 - AGM. **Rod Bishop G0SQL on 081- 204 1868.**

Loughton & DARS. Room 12 of Loughton Hall, 7.45pm. WWII Lancaster Bomber Pt. 2 by Tom Langley G4PSY, February 4 - Using An Oscilloscope by Jack Atkinson G3OPA. **John Ray G8DZH on 081-508 3434.**

Gwynedd

Dragon ARC. 1st & 3rd Mondays, 7.30pm. Four Crosses Hotel, Menai Bridge. January 17 - Underwater Exploration In The Menai Straits by Cecil Jones, February 7 - Noise Bridges And Their Uses by Stewart Rolfe GW0ETF. **Tony Rees GW0FMQ on (0248) 600963.**

Hampshire

Horndean & DARC. 1st Thursdays, 7.30pm. Horndean Community School, Barton Cross (off Catherington Lane), Horndean, Hants. February 3 - Junk Sale. **Stuart Swain G0FYX on (0705) 472846.**

Itchen Valley RC. 2nd & 4th Fridays, 7.30pm. Scout Hut, Brickfield Lane, Chandlers Ford. January 14 - Radio Scouting & Gilwell Park GB2GP by Frank Heritage G6OLK, 28th - What Packet Can Do For You & The DX Cluster System by Chris Lorek G4HCL. **Les Kennard G3ABA on (0703) 732997.**

Winchester ARC. 3rd Fridays, 7.30pm. Red Cross Centre, Durngate House. January 21 - AGM. **Peter Simpkins G3MCL on (0962) 865814.**

Hereford & Worcester

Bromsgrove & DARC. 2nd Fridays. Avoncroft Arts Centre, South Bromsgrove, Worcester. January 14 - Talk/Slide Show. **Joe Poole G3MRC on (0562) 710010.**

Hertfordshire

Dacorum AR & TS. 1st (informal) & 3rd (formal) Tuesdays, 8pm. The Heath Park, Cotterells, Hemel Hempstead. January 18 - Packet Radio Demonstration by Ken Ashcroft G3MSW. **Nicholas Camp G7KFQ, 48 Northfield Road, Harpenden, Herts AL5 5HZ.**

Hoddesdon RC. Alternate Thursdays, 8pm. Conservative Club, Rye Road, Hoddesdon, Herts. January 20 - Have Fun With QRP by Wayne G0JJQ. **Roy G4UNL on 081-804 5643.**

Stevenage & DARS. Tuesdays, 7.30pm. Stevenage Day Centre, Chells Way, Stevenage. January 18 - Microphones-Mobile & Base by Simon G0EVZ, 25th Big Beams, Big Station To Win Contests, Texas Style Video Evening. **Neil Ravilious 2E1ASZ on (0438) 350882.**

Humberside

Goole R & ES. Fridays, 7.30pm. West Park Pavilion, West Park, Goole, last Fridays at the 'Old George Inn', Market Place, Goole. January 14 - Microwave Video, 21st - PSU Design by Andy Westerman G8ZCS, 28th - Social Evening, February 4 - Night On The Air. **Steve Price G8VHL on (0405) 769130.**

Kent

Bromley & DARS. 3rd Tuesdays, 7.30pm. The Victory Social Club, Kechill Gardens, Hayes, Kent. January 18 - AGM. **Alan G7GBH on 081-777 0420**

Medway AR & TS. Fridays. Tunbury Hall, Catkin Close, Tunbury Avenue, Walderslade, Chatham, Kent. Visitors & new members welcome. January 21 - Icom Amateur Radio. **Mrs Gloria Ackerley G7OVI, 40 Linwood Avenue, Strood, Rochester, Kent ME2 3TR. Tel: (0634) 710023.**

South East Kent ARC. Wednesdays. Duke Of Yorks School, Guston, Nr. Dover. January 19 - Operating Evening, 26th - Tales From The Repair Department by G1HHU. **Paul Turvey G1PJJ on (0304) 214030.**

Lancashire

Fylde ARS. 2nd & 4th Tuesdays, 7.45pm. Blackpool South Shore Lawn Tennis Club, Midgeland Road, South Shore, Blackpool. January 25 - Informal, February 8 - Packet Demo Night On Air. **Eric Fielding G4IHF on (0253) 726685.**

Preston ARS. Thursdays, 8pm. The Lonsdale Sports & Social Club, Fulwood Hall Lane, Fulwood, Preston. **Eric Eastwood G1WCQ on (0772) 686708.**

Leicestershire

Charnwood AR Contest C. 1st & 3rd Sundays. The Albion, Loughborough. January 16 - The Year To Come, February 6 - Antennas For 160. **Phil on (0509) 232927.**

Lincolnshire

Grantham RC. 1st & 3rd Tuesdays, 8pm. Kontak Sports & Social Club, Barrowby Road, Grantham. January 18 - Relief Missions In Africa by Pat G7KFW, February 1 - Sine Waves, Decibels & Falling Off 'Logs' by Mike G3PJR. **John Kirton G8WWJ on (0476) 65743.**

Spalding & DARS. Fridays, 7.30pm. Old Fire Station, Albion Street, Spalding. January 14 - AGM. **G4OO, QTHR on (0775) 750382.**

Merseyside

Liverpool & DARS. Tuesdays, 8pm. Churchill Club, Church Road, Wavertree, Liverpool. January 18 - Experiences Of A Wartime Sparks by G3AVJ, 25th - Surplus Sale, February 1 - Licencing Interpretation Discussion, 8th - GX3AHD On The Air. **Ian Mant G4WWX on 051-722 1178.**

Wirral & DARC. Irby Cricket Club, Mill Hill Road, Irby, Wirral, 8pm. January 19 - D&W The Black Horse, Lower Heswall, 26th - Surplus Equipment & Junk Sale. **Paul Robinson G0JZP on 051-648 5892.**

Norfolk

Fakenham ARC. 1st Tuesdays, 7.30pm. Trinity Church Room, Hempton. February 1 - HF Open Forum/ On The Air Night. **(0485) 528633.**

Norfolk ARC. Wednesdays, 7.30pm. University Arms, South Park Avenue, Norwich. January 19 - Operating Packet by Roger G3LDI and Paul G4VLS, 26th - Committee Meeting, February 2 - NARC Film Archives by Jack G3NJQ, 9th - On The Air Night/Construction. **Dale Simkin on (0603) 37393.**

Nottinghamshire

Nottingham ARC. Thursdays, 7.30pm. Sherwood Community Centre, Mansfield Road, Nottingham. January 13 - Bring Your Gear Night., 20th - Waterproofing & Terminating Coaxial Cables, 27th - Construction/Activity Night, February 3 - Forum/On The Air Night, 10th - 144MHz DF Foxhunt Talk by Ed G0INA. **Simon G0IEG on (0602) 501733,**

Shropshire

Salop ARS. Thursdays, 8pm. Oak Hotel, Shrewsbury. January 13 - EGM at Beauchamp Hotel, Shrewsbury. January 13 - EGM at Beauchamp Hotel, Shrewbury, 27th - RAF Airfields Of Shropshire by Flt. Lt. I. M. Pride MBE. **Sheila Blumfield G0SST on (0743) 361935.**

Somerset

Wincanton ARC. 1st & 3rd Mondays (except Bank Holidays - 2nd & 4th), 7.30pm. The Community Lounge, King Arthur's Community School, Wincanton, Somerset. Janaury 24 - Open Evening, February 7 - Worked All Britain by D. Moore G1THG. **Dave G3ZXX on (0963) 34360 or Andy G1FPW on (0747) 51381.**

Yeovil ARC. Thursdays. Red Cross HQ, Grove Avenue, Yeovil, Somerset. January 13 - Bring & Buy Junk Sale, 20th - Converting The Yeovil Rig To 40m by G3PCJ, 27th - On The Air/Committee Meeting. **Cedric White G4JBL on (0258) 473845.**

South Yorkshire

Barnsley & DARC. Mondays 7pm. Three Horseshoes, Barnsley Road, Brierley, Nr. Barnsley, South Yorkshire. **J. P. Caledon-Scott G4LRS on (0226) 203448.**

Strathclyde

Milton Of Campsie ARS. 2nd Wednesdays, 7.30pm. Milton Of Campsie Community Hall. New members, amateurs, novices and s.w.l.s are all welcomed. **Alan Foulis GM7PGT on 041-779 1444.**

Suffolk

Sudbury & DRA. 1st Tuesdays, 8pm. Wells Hall Old School, Great Conrad, Sudbury, Suffolk. 3rd Tuesdays, 8pm. Five Bells Public House, Bures Road, Great Conrad, Sudbury, Suffolk. January 18 - Natter & Noggin at Five Bells, February 1 - Measurements In The Shack by Frank G3FIJ. **Tony Harman G8LTY on (0787) 313212 or G8LTY @ GB7NNA.**

Surrey

Dorking & DRS. The Friends Meeting House, South Street, Dorking, 7.45pm. January 25 - AGM, February 8 - Informal Evening at the Falkland Arms Dorking. **John Greenwell G3AEZ on (0306) 631236.**

Horsham ARC. Guide Hall, Denne Road, Horsham, West Sussex, 8pm. Amateur Radio 1949 Way. **Peter Stevens G8SUI on 0737) 842150.**

Surrey RCC. 'Terra Nova' The Waldrons, Waddon, Croyden, Surrey. January 17 - Natter Night, February 7 - Home Construction Of Test Equipment by Bob Burns G3OOU. **Berni G8TB on 081-660 7517.**

Sutton & Cheam RS. 3rd Thursdays, 7.30pm. Sutton United Football Club, The Borough Sports Ground, Gander Green Lane, Sutton, Surrey. Natter Nights - 1st Thursdays. Janaury 20 - Antenna Modelling by Derek Atter G3GRD, February 3 - Natter Night. **John Puttock G0BWV, 53 Alexandra Avenue, Sutton SM1 2PA.**

Wimbledon & DARS. 2nd & last Fridays. St. Andrews Church Hall, Herbert Road, Wimbledon SW19. January 28 - Backyard Antennas. **George Cripps G3DWW on 081-540 2120.**

Tayside

Dundee ARC. Tuesdays, 7pm. College of Further Education, Graham Street, Dundee. January 18 - Members Mini Lectures, 25th - Construction Night., February 1 - Oliver Heaviside by Leslie McKenzie GM0TGG, 8th Construction Night. **George Millar GM4FSB, 30 Albert Crescent, Newport-on-Tay, Fife DD6 8DT.**

Warwickshire

Stratford-Upon-Avon & DRS. 2nd & 4th Mondays, 7.30pm. Home Guard Club, Main Road, Tiddington, Stratford-Upon-Avon, Warwickshire. January 24 - European Space Agency by Tony Potter G3ESK. **Alan Beasley G0CXJ on (0608) 82495.**

West Midlands

South Birmingham RS. 1st Wednesdays, 8pm. Club House open on Mondays,Thursdays & Fridays 8pm. Hampstead House, Fairfax Road, West Heath, South Birmingham. January 12 - Holes In The Ground by Dudley Canal Trust. **021-474 3784.**

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

West Sussex

Mid-Sussex ARS. Thursdays, 7.45pm. Marle Place Further Education Centre, Leylands Road, Burgess Hill, West Sussex. January 13 - AGM. **Chris Coward G3YTU on (0444) 458992.**

Worthing & DARC. Wednesdays 7.30pm. Parish Hall , South Street, Lancing, Worthing, West Sussex. February 2 - Discussion Evening, 9th - Packet by G8VEH. **G4GPX on (0903) 753893.**

West Yorkshire

Denby Dale & DARS. Pie Hall, Denby Dale, Nr. Huddersfield, 8pm. January 19 - The Novice Licence by Paul G0LVV, February 2 - A Day In The Life Of The Wakefield Coroner by David Hinchcliff. **Ivan Lee, Clayton Lodge, Sunnyside, Edgerton, Huddersfield HD3 3AD.**

Halifax & DARS. 1st & 3rd Tuesdays, 7.30pm. January 18 - Test Equipment by John G3BBD-H/B. **David Moss G0DLM on (0422) 202306.**

Keighley ARS. The Ingrow Cricket Club, Ingrow, Keighley, 8pm. January 13 - On The Air Night, 20th - Natter Night, 27th - AGM, February 3 - Natter Night, 10th - Navigation by G0BWY. **Kathy Conlon G0RLO on (0274) 496222.**

Wiltshire

Trowbridge & DARC. 1st & 3rd Wednesdays, 8pm. Southwick Village Hall, 8pm. January 19 - AGM, February 2 - Surplus Sale. **Ian G0GRI on (0225) 864698.**

Don't forget to let Donna know all your plans for Club Events in 1994.

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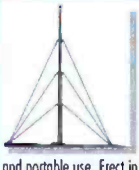

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The Alinco DJ-G1E

Richard Newton G0RSN, always keen to try different rigs, takes a look at a new hand-held transceiver from the Alinco stables.

The Alinco DJ-G1E hand-held transceiver.

I like the chance of playing with small transceivers! The Alinco DJ-G1E is a small 144MHz hand-held. It comes with a helical antenna, wrist strap, belt clip, 7.2V 700mAH NiCad battery pack, sit-in charger and instruction manual.

The DJ-G1E is finished in grey plastics and metal. The top panel of the radio sports the BNC antenna connector, the external speaker and microphone sockets, and two rotary switches.

One of the rotary switches controls the v.f.o. tuning and the moving around of the memories. The other rotary control actually comprises two concentric controls.

The inner rotary switch controls power on/off and volume. The outer controls the squelch level.

In my opinion, the on/off and squelch control is a little too close to the antenna connector for my liking. In particular I found that the squelch control was difficult to use.

The transmit/receive indicator l.e.d. is also on the top panel. The indicator is a dual colour l.e.d. type, showing green when the squelch is 'open' and red when the unit is transmitting.

As the transceiver faces the operator, the right hand side panel houses the d.c. input socket. This socket is covered by a piece of soft rubber, which is not hinged as the same item on many other hand-helds are.

Sensible Fashion

The external power input socket protector is secured in a sensible fashion. It's actually attached to the case in such a way that it rotates to allow access to the socket. If it's used properly, I'm certain this will last longer than its hinged counterparts.

I have a small point, but it's one that demonstrates that some thought went into the unit's aesthetic design. It concerns the side panel where there are four push buttons.

The four push-buttons are the **Function** key, **Press To Talk** key, **Tone Burst** key and the **Squelch Defeat** or **Monitor** key. The latter control also toggles the 'battery save' function on and off when used with the **Function** key.

The front panel has a large window that houses the l.c.d. operational display. And, although some of the function indicators are small, the actual frequency read-out is both bold and large. The display can be back lit with a green light.

The back light is very effective. It can be set to either stay on or to go out about five seconds after the last button has been pressed.

The other transceiver controls are also on the front panel. These controls are in the form of a 16 alpha-numerical key board and four primary function buttons. All of the controls have a second function when used in conjunction with the function key.

Primary Function Keys

The four primary function keys operate the **Call Frequency**, the **Lamp**, the **Scan** facilities and switching between the **Memory Function** and the v.f.o. They are set out in such a way that each is easy to use without the fear of accidentally pressing one of the other controls.

The secondary functions of the four primary keys are also important. For example, the **Scan** key when used with the **Function** key changes the transmitted output power level.

With the supplied battery pack, the options are 200mW, 1 and 1.5W. With 13.8V input, the high power level changes to 5W. The others remain the same.

The **VFO/Memory** key is used to write information into a memory channel when used with the function key. I found writing memories very easy indeed.

The **Call** button when used with the function key, changes the band as the DJ-G1E can receive on 430MHz. On this band it has a frequency coverage of 430 to 439.995MHz.

Using the **Lamp** key together with the **Function** key enables semi-duplex operation. The transmit and receive frequencies can be set anywhere within the transceiver's 144MHz coverage (144 to 145.95MHz). Full duplex, that is receiving audio whilst transmitting, is not possible.

Cross Band Facility

I found the cross band working facility to be very useful. However, I don't think that the rig's receive sensitivity on 430MHz was that good.

Personally, I think that the lack of sensitivity was attributable in part to the supplied antenna. When I changed the antenna to a purpose-built dual bander, the sensitivity improved. The Alinco DJ-G1E's receive sensitivity on v.h.f. was good, in contrast to that on u.h.f.

The keyboard has many functions such as enabling the direct entry of frequency. There are also up/down arrows that can be used instead of the rotary switch on the top panel to move the v.f.o. or memory channels up and down.

The DJ-G1E has 80 memories and these can take v.h.f. or u.h.f. frequencies. There are two further memory channels that are used to set up the **Programmed Scan** feature.

Programmed Scan

The **Programmed Scan** feature is where two frequencies on the same band are entered as the scan limits. This eliminates the need to scan the whole v.f.o. range.

I found one very frustrating problem with the transceiver's memories. It didn't seem to matter how few memories had frequencies entered into them, but when tuning manually I had to view the entire 80 memories. This is laborious to say the least.

When the operator is using the **Scan**, only 'filled' memories are scanned, and any 'filled' memory can be locked out. The transceiver also offers one **Call** frequency that can be retrieved at the single touch of a button.

The channel steps can be changed on the DJ-G1E. The operator can choose either 5, 10, 12.5, 15, 20, 25, 30, or 50kHz step.

Functions Provided

To mention all the functions provided on the DJ-G1E would not really be possible. So I'll just mention a few that I found interesting and a little different.

The first interesting feature is the ability to transfer the contents of a memory straight to the v.f.o. This function I found to useful and very easily to use.

The DJ-G1E also has the ability to transmit DTMF tones and to store them in memories. This enables a paging facility and a facility to keep the radio silent until the correct DTMF tone is received, to open the squelch. These were incredibly easy to set up and operate.

The final function that's worth a mention is what the DJ-G1E instruction manual refers to as **The Channel Scope**. This feature shows by way of vertical l.c.d. bars, the received activity on the six adjacent frequencies. Alternatively, while the transceiver is in memory mode, it displays the six adjacent memory channels (i.e. the three channels on either side).

While the transceiver is in v.f.o. mode, it will monitor by using the preset channel steps. This means, for example, that if you have set the channel steps to 5kHz, the receiver will monitor 5, 10 and 15kHz either side of the centre frequency. I found this an interesting gimmick for which I could find no real practical use.

Summing Up

In summing up, I must say that I found the Alinco DJ-G1E to be a good, solidly built transceiver. Its received audio was crisp and clean and the transmitted audio was of a good quality from all the reports I received.

The transceiver has the appearance of a budget-priced radio. However, I feel that this was perhaps not the manufacturer's intention. Despite this, I think it's a nice little transceiver that works well overall and comes as a well presented package.

The performance of the DJ-G1E was good, but where it really scores is in the 'User Friendly department'. The transceiver's display is large, and the controls are well labelled and thoughtfully set out. I also think the various functions are easy to use and the instruction manual is well written, sensibly laid out, and informative.

My thanks for the loan of the review transceiver go to Waters & Stanton Ltd., of 22 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835, who can supply the DJ-G1E for £349 with free delivery.

Specifications

Manufacturer's Specifications
(The specifications listed are taken from the manufacturer's full specification)

Transmitter	
Frequency coverage	144 to 145.95MHz
Modulation	Frequency Modulation (variable reactance)
Maximum deviation	±5kHz
Transmitter output	High 5W (13.8V d.c.) 1.5W 7(.2V d.c.); Mid Approx 1W; Low Approx 200mW
Microphone impedance	2kΩ
Receiver	
Frequency coverage 144MHz	144 to 145.995MHz
Frequency coverage 430MHz	430 to 439.995MHz
Receiver type	Double conversion superhet
Intermediate frequencies	1st 30.85MHz, 2nd 455kHz
Sensitivity	-16dBμV For 12dB SINAD
Selectivity	Not less than 12kHz at -6dB point
Selectivity	Not more -60dB at 30kHz
Audio output	minimum 200mW into 8Ω
Dimensions	50 x 116 x 37mm
Weight	360g

Fig. 1: The Alinco DJ-1GE transceiver comes complete with a nesting type battery recharging unit and 'rubber duck' type of antenna.

After seeing his copy of the G0RSN review, Jeff Stanton G6XYU of Waters & Stanton sent us the following comments in answer to the points raised by Richard Newton.

Many thanks for letting me see the draft of Richard Newton G0RSN's review of the Alinco DJ-G1E. However, there are one or two points to comment on. Firstly, the main attraction of this transceiver will be the new 'channelscope' feature. This has cost Alinco an awful lot of money and really is a revolutionary feature in amateur radio equipment. It enables the user to monitor frequencies both above and below his chosen frequency to see any sign of activity. This could also be used in memory mode so that for instance, seven local repeaters, mixing both 144 and 430MHz, could all be monitored for activity. Amateurs that have handled the radio have particularly liked this feature. This feature needs much more prominence in the review I feel. Your review in the last paragraph of the **'Functions Provided'** section makes some comments which nobody in our office understands. Obviously the user would only monitor adjacent channels using the correct channel spacing to make full use of the facility.

In the second paragraph of **'Summing Up'**, he says it has the appearance of a 'budget priced radio'. Nobody here, including customers in our shop on Saturday, can go along with this. Tooling up for this radio, especially the large l.c.d. display has cost Alinco millions of Yen and we think it is compact and in the modern rounded style typical of the latest Icom, Kenwood and Yaesu rigs.
Jeff Stanton G6XYU.

Ed Taylor G3SQX has tried the newly-introduced Icom IC-707 which has just arrived in the UK. Ed delivers his verdict on this lower specification h.f. transceiver, explaining its good and bad points.

The Icom IC-707 HF Transceiver

The Icom IC-707, as reviewed by Ed Taylor G3SQX who appreciated the excellent audio quality of the transceiver on transmit and receive.

Review

On the whole, I enjoy reviewing h.f equipment. I go on the air, do tests in my workshop, all the time claiming to be working! I enter contests, invite other amateurs round, all in the cause of a thorough review. Usually, I regret having to give back the rigs.

I thought about this as I unpacked the budget-priced IC-707. This transceiver represents something of a change of direction for Icom, a company generally associated with the upper end of the market.

The IC-707 is marketed as an inexpensive (and lower-specified) h.f transceiver. It's a compact, 12V powered rig.

The transceiver provides a general coverage receiver up to 30MHz. It has transmit capability on the amateur bands between 1.8 and 30MHz.

With the IC-707 an output of 100W of c.w. and s.s.b., with two v.f.o.s, plus 32 memories is available. Other features are **Receiver Incremental Tuning** (RIT), a **Noise Blanker**, a **Pre-amplifier**, and an **Attenuator**.

The IC-707 comes in a fashionable black matt case, with an l.c.d. display which is easy to read. This shows frequency, options selected, and metering with a bargraph-style display.

Designers Discussion

I could imagine the designers' discussion about the IC-707, and ways of re-using circuitry from the Icom range. In deciding what to modify, they would have considered two sorts of features.

The designers would have, in my opinion, considered those features which are implemented with hardware (knobs, buttons, actual circuits). Additionally, those that can be achieved with software (the computer programs driving the internal processes) would have been considered.

Hardware is relatively expensive, and each component costs money. On the other hand, software, once written, can be reproduced at low cost.

So, I think there's an irresistible tendency towards software methodology, with hardware reduced to a minimum. Functionality is omitted and features are combined. In some cases, several buttons are used for what would normally be done with one, letting the software sort things out.

Some of the resulting implementations are quite ingenious, but they can baffle users. On the other hand, all this has left room for a front panel loudspeaker which provides quite good audio which is an unusual feature in lower priced equipment.

The choice of reference number for the rig could not have detained the Icom marketing department very long. Yaesu used the description **707** for one of their h.f transceivers in 1980!

On the Air

I used the IC-707 for c.w. and s.s.b. on the amateur bands, and also as a receiver on short wave broadcasting bands. I wouldn't normally mention the latter, but it was nice to have reasonable loudspeaker quality for broadcast stations. Of course, this is almost a moot issue in amateur radio use, where headphones are generally essential.

As far as s.s.b. transmission is concerned, there were favourable remarks about the IC-707's transmitted speech quality. Manufacturers sometimes imagine that cheaper equipment does not deserve proper audio design. This can result in inadequate filters, incorrect carrier oscillator circuitry, and poor quality microphones. I was impressed that Icom had avoided these problems.

Nevertheless, I think that many users would want a speech processor. On crowded bands, a processor can help by markedly increasing the perceived signal level.

The fact that the audio quality is basically good does not negate the requirement for a speech processor. There's also no VOX, which I think is strange, given the obvious suitability of the rig for s.s.b. 'ragchews'.

Turning to the receiving side, I liked the quality of s.s.b. reception. Icom have obviously emphasised this

mode. If you never use VOX, and your main interests are chatting to friends on a clear band, you will appreciate the IC-707.

However, a significant omission on the IC-707, is any form of variable selectivity. In my opinion it's essential on occasions to reduce the s.s.b. bandwidth. I realise this will unfortunately cause audio quality to suffer, but there's no real alternative in difficult conditions.

Variable Selectivity

The lack of variable selectivity on the IC-707 was even more noticeable when using c.w. on the air. In the review transceiver, the only filter available was 2.1kHz wide. This would work tolerably well with variable selectivity. However, as supplied, even casual use for c.w. becomes very difficult with the transceiver.

To overcome the selectivity problems, one of the narrow filters could be bought. My own transceiver contains the Icom 250Hz filter, which is very effective.

Keen c.w. users would have another gripe when using the IC-707. This is because getting from **CW-Narrow** to **CW** (wide) involves four pushes of the **Mode** button, cycling through **USB**, **LSB** and **AM**.

On air, the actual c.w. output was well-shaped, quite 'hard', although it was perfectly acceptable. With this rig the only c.w. option is semi-break-in: not my favourite, but reasonable.

While thinking about c.w. operation, In my opinion it would be better if the transmit to receive delay were adjustable without removing the case. The same applies to two other preset controls. Perhaps Icom could be persuaded to drill a couple of holes?

Well Designed

The automatic gain control (a.g.c.) on the IC-707 has been well designed. It switches automatically from slow (for s.s.b.) to fast (for c.w.), with appropriate time constants.

I should also mention that strong signal handling on the transceiver is very good. The IC-707 passes the '40 metres at midnight' test just as well as some of the more expensive equipment.

On the bands, the attenuator deals with any real overloading. Although I found it necessary only at the height of the CQWW contest (a stiff test!).

In common with other solid state transceivers, the IC-707 cuts power when it's connected to a non 50Ω load. The reduction is quite marked, as it reduces power from 100 to 50W at an s.w.r. of 2:1 which is more stringent than many transceivers.

Changing Bands

Changing bands on the IC-707 is a trial. The operator has to press **TS (Tuning Step)** three times, then turn the main knob clockwise to go up the bands, and anti-clockwise to go down. Press TS again.

The band switching procedure defeated some of my most learned fellow-amateurs, until they were told the secret. It would be bad luck if an operator handed over a special event station, asking someone ignorant of this black art to make some QSOs on another band!

However, it's not all bad news. If you can master it, you'll find that the **Band Stacking Register** feature remembers the last frequency and mode on each band. This is a useful operating convenience.

Sadly, I think that the **FUNC (Function)** button is another candidate for criticism. When pressed, the switch alters the operation of other controls, concerned with v.f.o.s and memories.

I won't go into detail, but the use of the memory facilities is not too friendly. You can move frequencies from v.f.o. to memory and vice-versa, but I think it needs too much button pressing leaving possibility for errors.

I'll give one example of button pressing instructions, condensed from the instruction manual: "To move v.f.o. frequency into memory 12, Press **FUNC**, then rotate the main knob until **12** appears in the window. Press **FUNC** again. Press **MW** and hold until the speaker beeps three times. To confirm, press **FUNC** and then **V/M**. To go back to v.f.o., press **FUNC** and then **V/M** again".

It's understandable that Icom want to reduce the

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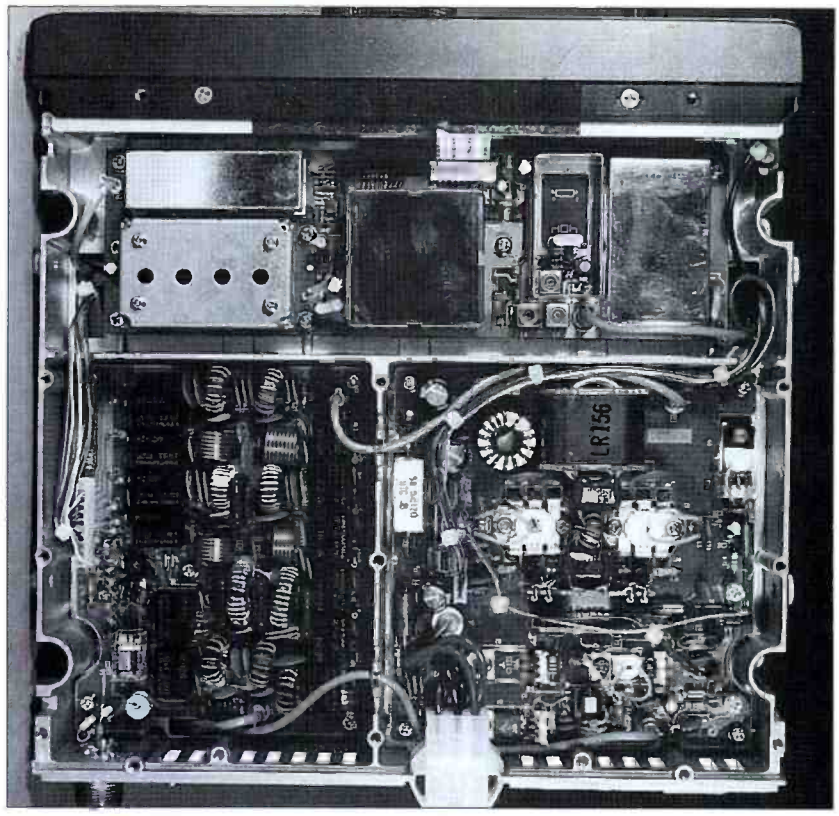

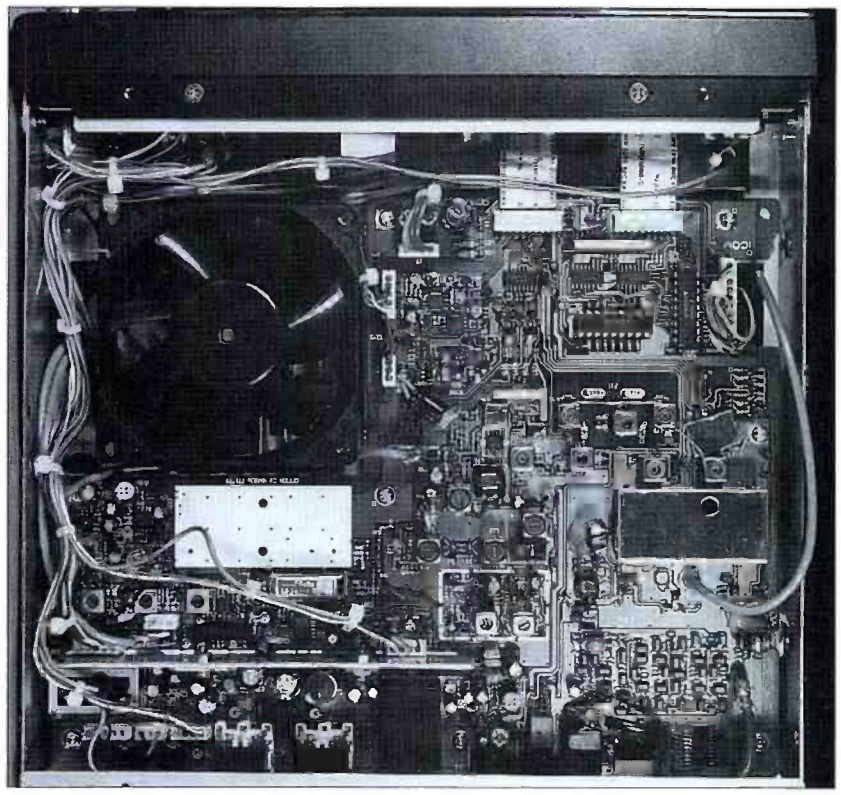

Fig. 1: An underside internal view of the IC-707.

Fig. 2: An internal view of the 100W output IC-707 transceiver, showing the integral cooling fan.

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AKD FM Range Save £10.00!

As reviewed by Radcom, the exciting low cost 25W FM transceivers from AKD are unbeatable in specification and price. Better still we've knocked over £10.00 off the price.

AKD 6001 6M 25W FM transceiver. Price only £179.95 incl. VAT.

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Solid Brass Morse Key £45.95
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From the first of December 1993, George Eddowes G3NOH, (as featured on BBC TV), will be holding Morse Classes every Thursday evening from 19:00. Spaces are strictly limited, so get your names down early. There will be 10% discount on that new H.F. rig for those of you who pass first time after George's tuition!

Packet Demonstration in new shop!

See the full range of DECODERS and PACKET terminals on demo at Northfields. For those of you who want a budget system or a full spec computer based set up, give us a ring. Better still, pop in and see us!

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Buy a brand new FT990 100W HF base station and we'll throw in a matching MD1-C8 BASE MICROPHONE! - and let you pay for it OVER A WHOLE EIGHTEEN MONTHS, FREE OF INTEREST!

Deposit only £468.00, with eighteen payments of £79.50, total £1899. ZERO APR.

Kenwood TS-850S

With or without Auto ATU and three years after it's introduction, read Rob Mannion's report in this issue to see why the men at KENWOOD are pleased with themselves. Similar spec. to the Yaesu FT990, the choice is yours - they're both excellent! Add £149 for the auto atu.

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The latest HF all band transceiver from Yaesu. Looks like an FT890, without a few of the trimmings. *free Yaesu microphone included in this one!* Include a good 13.8V supply and a VCI antenna tuner plus a 1/2 size G5RV antenna and you are away!

Deposit only £325, with only twelve payments of £66.25. Total £1120.00 ZERO APR.

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Icom IC737

I said it was good before Peter Hart & Rob Mannion did. If you want names, I've got plenty. Satisfaction comes guaranteed with this one. 100W of pure HF power and a synthesiser that's smoother than Roger Halls head! With a free matching SP21 speaker worth £65 !!

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Kenwood TS-690S

Either with or without six metres, the TS450/TS690 is the ideal mid-ship package. Offered with a 13.8V 20A power supply, you can have one in your shack soon!

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It broke all records when it was introduced and it still has no competitors. The TS-50S really does push out a cool 100W, covers 500khz-30mhz and operates on all modes. Buy one during December & January and we'll include the carriage - free!

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Yes, you're right, Yaesu did have a 707. But that was 11 years ago and that was an FT. For simple operation on H.F. with Icom's unrivalled performance, try the NEW IC707 for size.

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Yaesu FT530R

The very best in Dual Band Handie operation. The only thing to change on this one is the price. YAESU U.K. have bought it DOWN!! So have I... Dual RX, extended receive, auto repeat, it's got it all including CTCSS. Buy one on FREE FINANCE and claim your FREE YAESU EXTRA ACCESSORY worth loadsa money!!!

Deposit £99.00 with twelve payments of only £33.33. total £499.00 Zero APR

ICOM IC-W21ET

For those of you that don't like all the buttons, then maybe the IC-W21E, (without KeyPad), is the one for you. Lots of trick functions and easy to operate. Excellent value for money.

Deposit £49.00 with twelve payments of only £33.33. Total £449.00 Zero APR.

Kenwood TH78E

Still one of the best selling Dual banders, the TH78E comes complete with nicads, charger & antenna. The only Handie with "Alpha-Tag" for memories.

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Setting the standard for dual-banders, Alinco have helped keep the prices down and given you more features at the same time! Free case and INTEREST FREE?

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SINGLE BANDERS

NEW!!

Yaesu FT-11R & FT41R

The very latest on the single band scene, Yaesu have introduced two new Handies for either 2M or 70CM. These include full "paging" facilities, extended range, (with AM AirBand RX for the FT-11R) and a host of other features. Truly palm size, these two will set the standards for other one banders.

Deposit £39.00 with twelve payments of only £22.50. Total £309.00 (FT-11R)

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Alinco DJ-180

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Deposit £38.00 with twelve payments of only £16.75. Total £239.00 Zero APR.

Icom IC-2IE/4IE

Still the smallest single bander on the market next to the TH-22, this machine really is the size of a packet of cigarettes!

Deposit £48.00 with twelve payments of only £16.75. Total £249.00 (IC-2IE)

Kenwood TH-22/44

The very latest in "pocket" two way. Remember the TH-217 this is the nineties version. No fiddle bits, just 100% FM Communication.

Deposit £38.00 with twelve payments of only £16.75. Total £239.00 (TH-22)

DUAL BAND MOBILES

Yaesu FT5200

The only Dual bander with a quick release front panel. Down in price and up in spec! All FT5200's sold in January will have wide band receive and a free remote mounting kit! Plus Interest Free!

Deposit £148.00 with twelve payments of only £41.75. Total £649.00 Zero APR.

Kenwood TM-732E

Sells faster than Brenda used to hand out her coffee! A Dual Bander with everything, including remote panel facility. Free wide band RX. (If you talk to Chris or Tony nicely)

Deposit £158.00 with twelve payments of only £44.25. Total £689.00 Zero APR.

VHF MULTI-MODES

Yaesu FT-736R

We sold hundreds last year and that's no wind up. With or without muTek, I'll offer you a deal on this one that will make your BNC's drop off! You thought the mob down south were giving you a deal - forget it! For genuine buyers call into the shop. I won't quote a price on the phone, so get travelling.

Deposit £ to obscene to print. Monthly payments £ complete bewilderment!

Kenwood TS-790E

The favourite amongst DXers. Dual band 2/70 with a 23CM option. It's full 45W output on 2/70 & first rate as is the receiver.

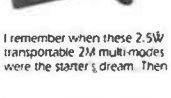
Deposit £469.95 with twelve payments of only £115.00. Total £1849.95 Zero APR

Icom IC970H

When Icom build something to beat everyone else, they sure do it in style! You may have to trade in the kids, but who cares! You want the best? Then you can have it and pay me over a whole 18 MONTHS - FREE FINANCE !!

Deposit £670.00 and eighteen payments of only £110.00. Total £2650 Zero APR

Yaesu FT290R mk11



I remember when these 2.5W transportable 2M multi-modes were the starter's dream. Then someone jacked the price through the roof... well it's back down to earth again and I'm giving FREE Nicads & charger and FREE FINANCE!!

Deposit £99.00 with twelve payments of only £33.33. Total £499.00 Zero APR.

Yaesu FT790R mk11

Just like the FT290, if you're a NOVICE and want the ultimate in 70CM multi-mode communication. Yaesu and my new price is a real winner! O.K. so you'll still get FREE NICADS & CHARGER in the deal!

Deposit £110.00 with twelve payments of only £40.75. Total £599.00 Zero APR.

Icom IC-275H/475H

The best in single band 100W base stations! A deal offering you either on a specially extended 18 month free finance offer for January only!

Deposit £389.00 with EIGHTEEN payments of only £55.55. Total £1389 (IC275H)

RECEIVERS

Yaesu FRG-100

Remember when Yaesu introduced this excellent "second receiver" for the shack and then the price shot up? Well I've got fifteen pieces at a give-away price AND you can still buy on FREE FINANCE!!

Deposit £99.00 with twelve payments of only £33.33. Total £499.00 Zero APR.

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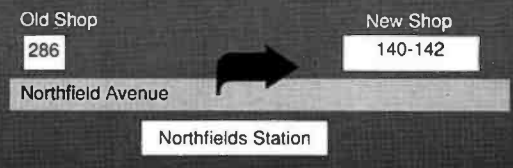

By Tube, still the same Piccadilly line and get off at Northfields, but turn RIGHT, (instead of left for the old shop), walk less than five hundred yards and the showroom is on your left hand side. For those of you who know RUPERT'S Vintage Wireless shop, we're opposite! By car, much the same as before, i.e the same road, still between the M4 & the M40 motorways. Phone for precise details.

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SWITCH VISA RSGB

Valve & Special Edition

This month, as PW has a 'Valve & Vintage' theme, Ron Ham brings you news of wireless museums and collections and takes a look at Second World War infantry communications equipment.

Welcome to this special 'Valve & Vintage' themed issue of *PW*. This time, our 'wireless shop' is open for a bit longer than usual, to mark the special occasion!

Chris Spencer (Sutton) in his capacity as the Headmaster, took his 1938 Murphy A40C domestic radio into his school. It was done as part of a project on the 20th century. "The children were fascinated and it led to many of them getting a lot of information from their grandparents about early radio and television sets" said Chris.

Having shown parties of school-children around the vintage wireless exhibition at the Amberley Chalk Pits museum, I know how much they enjoy the subject. I remember their looks of amazement at the size and style of the military gear used during the Second World War.

Museum And Collections

Having mentioned the Chalk Pits Museum, reminds me to suggest how you could plan a day out next summer by visiting the various wireless museums and collections. There are many to see, and there's lots of interest for the whole family.

I've already briefly mentioned the Chalk Pits. Here you'll see good collections of early wireless equipment, amid other exhibits. The Chalk Pits Museum is located at **Amberley, near Arundel, West Sussex BN18 9LT. Tel: (0798) 831370.**

You can get to the Chalk Pits by car, via the B2139 road which you can join from A29 Bognor Regis to Pulborough trunk road. If you don't have a car, don't worry, the British Rail station on the Mid Sussex line (from London Victoria) is adjacent to the museum.

Further along the south coast there's **Buckleys Yesterday's World.** This is located at **Battle, Hastings, East Sussex. Tel: (0424) 775378** for further information.

Dedicated To Radio

Among the collections dedicated to radio are the **Vintage Wireless Museum, at the Headquarters of The British Vintage Wireless Society.** This is located at **23 Rosendale Rd, West Dulwich, London SE21. Tel: 081-670-3667** for further information. This well known museum is run by **Gerald Wells** who recently featured in a Saturday evening BBC Radio 4 documentary programme on his life with radio.

Now it's back down to West Sussex. At Lindfield, you can find **Ray Leworthy's Vintage Wireless Museum** in the Old Brewery. It's at **53 High Street, Lindfield, West Sussex. Tel: (0444) 484552.** Visitors are welcome, but it's best to 'phone first for an appointment.

Both Gerald Welles and Ray Leworthy are members of the British Vintage Wireless Society. They are always pleased to chat about their collections to fellow enthusiasts and members of the public

Down in Dorset, not far from the *PW* Editorial offices, is the home of the **Royal Signals Museum. Tex Swann** G1TEX and Rob Mannion G3XFD the Editor, tell me that this museum, located at Blandford Camp, Blandford Forum, has a most comprehensive vintage military communications and wireless collection. For further details contact the Curator, **Roger Pickard on (0258) 482248.**

I would be pleased if you let me know about any other places where vintage equipment is on display. This is because, most places, which include military gear, will no doubt be celebrating the 50th anniversary of D-day later this year.

Transfer Resistance

The Second World War had been over some 12 years when the 'transfer resistance' (transistor) was ready for use. Another five or ten years elapsed before it was commonly used in commercial and domestic radio equipment.

The original transistors were little electronic devices, about the size of a nut. They had three wire legs, worked with voltages less than 10V and required just a few milliamps of current.

Another advantage was that the transistor ran without a heater. It could also be soldered directly into a circuit, thus doing away with the multi-pin socket required for every valve fitted in a set.

It was soon realised that the transistor could withstand mechanical shock and extremes of temperature. It was also to revolutionise radio production beyond our wildest dreams!

The transistor's modest power demands are insignificant when compared to a thermionic valve. The valve of course produces a lot of internal heat and because of its glass envelope, is very fragile.

The majority of 'mains' type of valve require about 6V, at 300 or more milliamperes, to heat their filaments (heaters). They also required around 200V at 10ma or more from a high tension supply.

Looking back (to my working days as a radio and TV engineer), the 'cost' of using valves was reflected throughout the set. So, let's take a closer look at

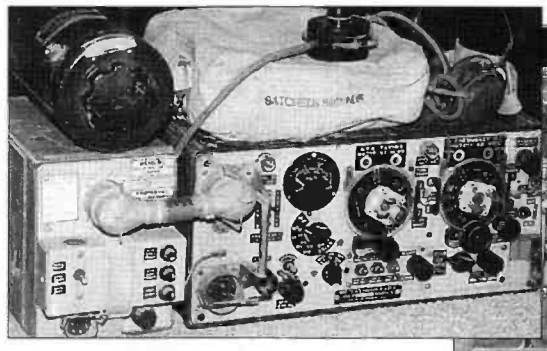


Fig. 1: The WS19, or '19 Set', complete with associated power supply (utilising a rotary converter and a vibrator) antenna tuning variometer and equipment satchel. This version carries Russian wording together with the standard English markings (see text).

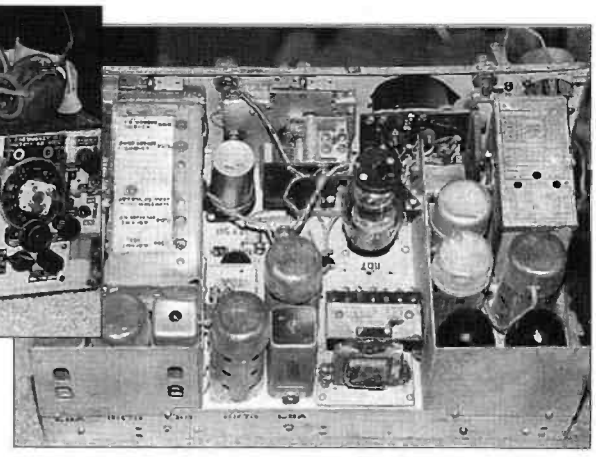
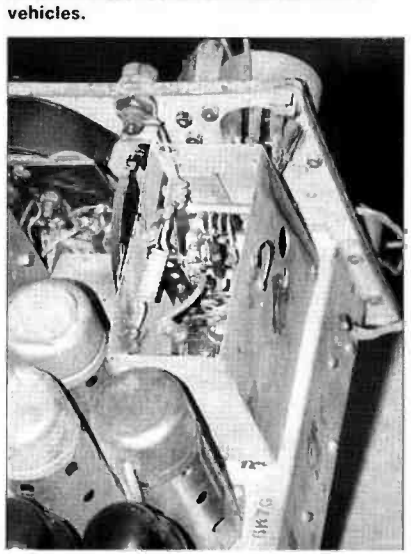


Fig. 2: An internal view of the 19 set. The short range v.h.f. 'B' set is located inside the screened compartment on the far right, directly behind the front panel.

Fig. 3: A closer look at the single valved v.h.f. transceiver (inside screened compartment). It was used for short range intercommunications between armoured vehicles.



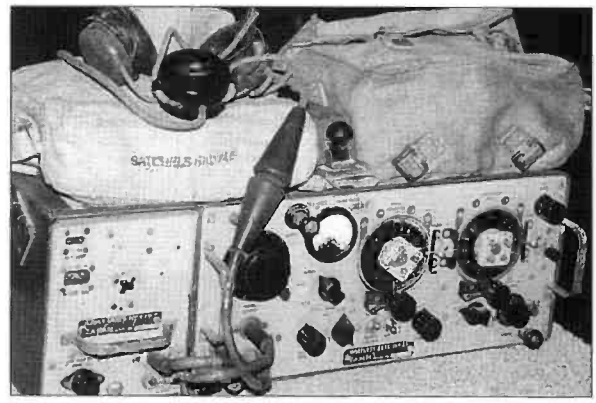


Fig. 4: The 22 set had a lower r.f. power output than the 19 set. This transceiver used a vibrator type of power supply (see text).

Vintage

By Ron Ham

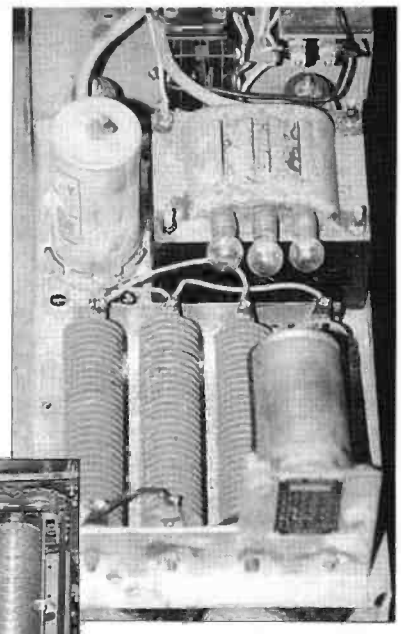


Fig. 6: An internal view of the 22 set p.s.u. The group of finned, cylindrical metal oxide rectifiers are on the left lower of the photograph, while the vibrator unit itself is directly to the left of the transformer (see text).

what was involved.

In valved sets, physically large resistances were used to withstand the heat and handle the current. There were also capacitors with high working voltage, which were fitted in all parts of the associated circuitry.

Well insulated inter-valve wiring, good quality potentiometers, transformers and switches with quick and positive actions all helped to provide a reasonable life and reliability for most valved receivers. So, with this in mind, let's look back 50 years and see the almost impossible demands placed upon valved transmitters and receivers, in times of war.

Normandy Beaches

Early on June 6th 1944, thousands of Allied soldiers with their equipment landed on the Normandy beaches. They were to begin the mammoth task of freeing Europe from enemy occupation.

The Normandy operation was code named 'Overlord'. The date was called D-day, or Deliverance day.

Ships and aircraft from many nations supported the invasion forces by shelling and bombing inland targets. They also landed armour, artillery and general military supplies along with dropping airborne troops and delivering equipment to the local resistance fighters.

Obviously good communications between all concerned on Operation Overlord was essential. In my view, this was the largest mobile operation of all time.

Fifty years ago when all this happened there were no semiconductors or satellite communications. The wide-variety of sets used by the Allied nations were based on the delicate and current hungry valve. They all used the high voltages and hefty components, connectors and leads that went with them.

This year sees the 50th anniversary of this operation. Because of this I'm devoting most of this extended episode of Valve & Vintage to some of the mobile and portable wireless sets used throughout the campaign.

I think it's fair to say that the wireless equipment aboard ship, in the air and at the base stations in the UK had adequate power supplies and maintenance arrangements. So, let's take a good look at those sets that had to be humped about by man and/or vehicle, used on the move and often under enemy fire.

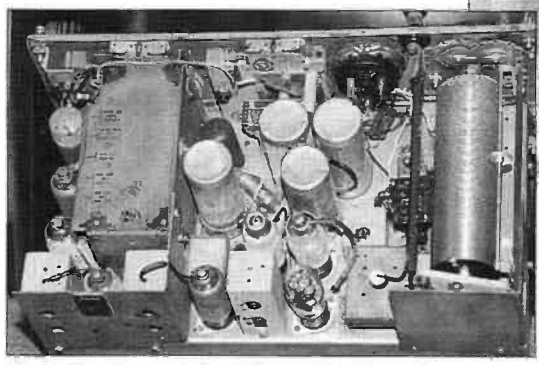


Fig. 5: The 22 set used a 'roller coaster' type of antenna matching device (see text).

Armoured Vehicles

So much had to be thought about when wireless went to war. Especially so in armoured cars and tanks which were generally fitted with the now famous WS19, Fig. 1.

The 19 sets were made, with various modifications known as MkI, MkII and MkIII, between 1941 and 1943. Although the name plate on the set shown in Fig. 1 is the (Canadian) MkIII, the dials are scribed MkII.

The combined rotary transformer and vibrator power unit is on the left in the photograph. The vehicle's rod antenna matching unit (a variometer) is housed above it.

George Saunders (Reading) told me that the MkII was mainly produced in North America. And, "because they were also supplied to the Soviet Army, they had Russian and English engraving on the front panels".

George added that the "MkII had damping resistors fitted across all the i.f. transformers so that under intense vibration any core movement would not affect receiver performance too badly".

The vehicle engines had to be suppressed to stop electrical noise blotting out reception on both the 'A' and 'B' sections of the set. The h.f. ('A' set), tuned by the two large dials on the right, covered 2-8MHz.

The v.h.f. 'B' set, adjusted by the thumb wheel on the left of the meter, worked around 235MHz. The v.h.f. set had a short-range and was used like a telephone between vehicles in action.

A modified WS19, the MkIII, was a version of the MkII. This was fitted with an extra toggle switch on the front panel (below centre dial) to reduce power consumption. It also had improvements to the r.f. gain control, c.w. reception and the transmitter keying system.

"The MkIII supply unit had a separate 550V generator for the sender. This was separately controlled by the microphone pressel switch", George told me.

Apart from enemy fire, engine noise and the tank's own gunfire was a problem for the crew. So, in addition to padded headphones (top right, Fig. 1) an intercom amplifier was built into the set.

The top chassis layout of the 15 valve WS19 is shown in Fig. 2. Broadly speaking, it has the h.f. receiver section on the left, the h.f. transmitter in the centre with its 807 PA (behind the meter casing) and the audio amplifiers on the lower right.

The single valve (CV6) v.h.f. transceiver is in the screened compartment at the top right. Looking inside, Fig. 3, the 235MHz tuning coil and the top cap anode and grid connections of the v.h.f. valve are visible at the upper and lower of the can respectively.

Less Power

George Saunders told me that "unarmoured vehicles did not need a v.h.f. 'B' set, so the WS22, as developed, was used (Fig. 3). It had a lower output than the WS19, but was generally adequate".

The photograph, Fig. 4, shows the WS22 with its power supply unit and accessories. The Morse key (between the satchels in Fig. 4) can be strapped to the operator's leg for use in the field with the '22' set or inside a tank with the '19' set.

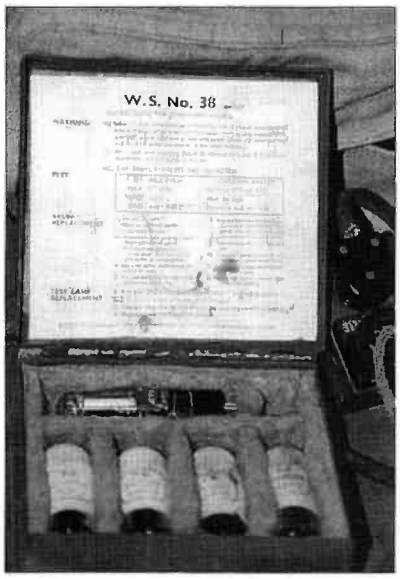


Fig. 7: Spare valve set for the 38 set.

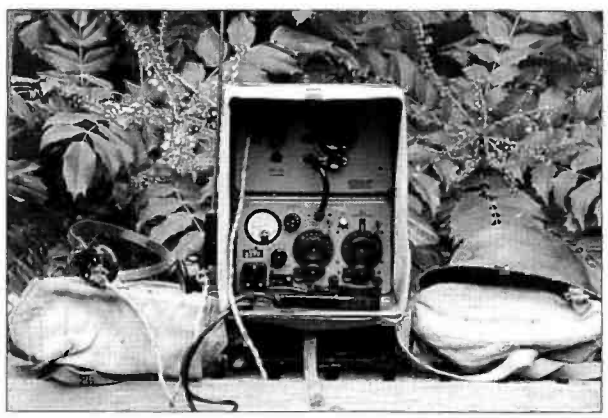


Fig. 8: The 18 set, although primarily designed for military use, was to become a popular transceiver for amateur radio use in peacetime.

Unlike the WS19, which has a variometer for antenna matching (top left, **Fig. 1**), the WS22 has a 'roller coaster' for this purpose (large knob, on the left of the meter in **Fig. 4**). The power unit, a vibrator only type, is shown on the left.

The 'roller coaster' type of antenna tuner (right) and the transceiver's 12 valves can be seen on the upper chassis layout in **Fig. 5**. Incidentally, the '22' set had a special container for parachute landings and was also fitted in some Jeeps.

each type of set

Replacement vibrators were often packed inside the transceiver casing. For instance, the power pack for the WS19 (left, **Fig. 1**) has a spare vibrator and a cold cathode rectifier (OZ4A) fitted in unwired sockets on the chassis.

The satchels for the WS18, **Fig. 8**, and WS38, **Fig. 9**, contained, a headset and a hand or throat microphone. There was also a case of spare valves and replacement dry batteries.

mainly used by the infantry. The WS18, **Fig. 8**, was a back-pack set and had a greater range than the 38 set. It could also handle radiotelephone and Morse traffic.

The main carrying case of the 18 set was shaped to fit on a soldier's back, **Fig. 11**. The microphone and headset leads were long enough for a second man to operate the set while the troops were on the move. A canvas weather protection cover (on the right, **Fig. 11**) was fitted to the front of the 18 set.

around the operator's neck. A pair of antenna rods were carried in a 'rifle' type sling from the shoulder.

The 38 top panel had only two controls. These were a combined on/off and send/receive switch and a large tuning knob (bottom and centre of **Fig. 12**).

Both the transmitter and receiver could be tuned on the 38 set. They worked between 6 and 9MHz, and tuning was on the one centre knob for ease of operation. The upper chassis layout, showing the five valves, mounted below the control panel of the 38 is shown in **Fig. 12**.

Fig. 9: The 38 set was normally carried on a webbing harness mounted on the operator's chest (see text).

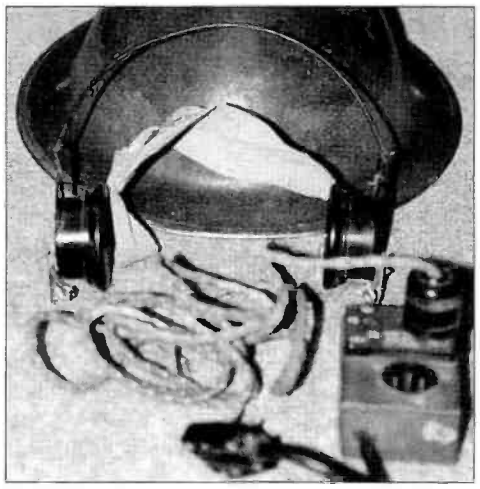


Fig. 10: The 38 set's headphones were designed to be worn under a protective steel helmet. Also in the photograph is the special junction box for headphone and microphone connections (see text).

Vibrator Power Units

Some of you may not be familiar with vibrator power units. So, let's take a closer look at how they work.

Vibrator units were used to provide the necessary high tension (h.t.) on portable equipment. Contacts inside the vibrator container (known as a 'can' and shown on the left of transformer, **Fig. 6**) vibrate at a given frequency when the supply voltage, which could be either 2, 6, 12 or 24V, is applied.

On the vibrator type of p.s.u., the 'chopped' d.c. current from the vibrating contacts is connected to the primary winding of a specially wound step-up transformer. The high voltage output from the transformer is then rectified by the bank of metal rectifiers at the lower end of the chassis of the p.s.u..

A rewireable fuse is situated at the top centre above the main on/off switch. To the right of the switch is the 12V power input socket and an outlet for an inspection lamp.

Also visible are the three spare bulbs on the side of the transformer. These are for the front panel, power-on, indicator light seen at the bottom left **Fig. 4**.

Damaged In Action

Component failure with new equipment was unlikely. However, sets could be damaged in action by enemy fire or by mechanical shock and vibration.

Obviously, glass items like valves, fuses and pilot lamps were the most vulnerable. So, to assist with field repairs a case of spare valves, **Fig. 7**, was supplied, in a signals satchel, for

Accessories For Wartime

Much thought was given to the accessories for wartime and ease of use. Wireless operators were often called upon to defend their position, with a firearm they would need their hands free and their heads protected.

The headphones for the 38 set, **Fig. 10**, were designed to go under a steel helmet and the leads had a good length. The photograph in **Fig. 10** also shows the 38 set's battery plug and junction box. This had different jack sockets to prevent the headset and microphones from being accidentally interchanged.

Used By Infantry

The 18 and 38 sets were the two dry-battery operated transmitter receivers

The 18 set was provided with a number of short (approximately 12in long) antenna rods with joint sleeves fitted at one end. These could be assembled to make an antenna of around 12 to 14ft long. The were stored in slots near the angle-adjustable socket in the centre of **Fig. 11**.

Webbing Harness

The 38 set, as shown in **Fig. 9**, was normally carried in a webbing harness. This was attached at about chest level on the operator with the rod antenna protruding over his right shoulder.

The antenna socket, (mounted on the top of the set panel, **Figs. 9** and **12**), can be rotated. This was to allow a thinner and shorter antenna rod to be inserted.

In use, the two satchels are hung

Eddystone Radio

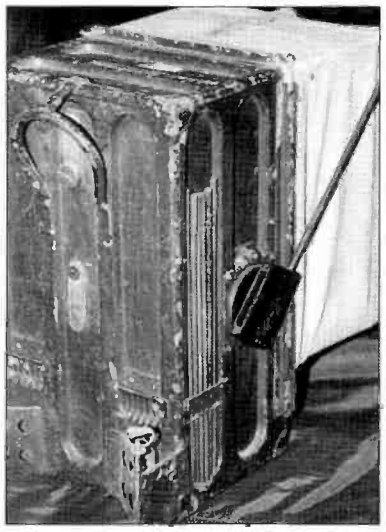
My recent reference to the Eddystone Radio 358 communications receiver brought back nne reader's memories. It prompted ex-Petty Office Radio Mechanic **Ron Wilson** (Exeter) to write to me.

Ron tells me that the 'X' after '358' means that the set has a crystal filter. Apparently this model was known in the Royal Navy as a 'B34'.

The famous Eddystone Radio company made a lot of radio equipment for the armed forces throughout the Second World War. I'm pleased that they're still very much in business as part of the Marconi Communications Company.

We've got a lot of Eddystone enthusiasts reading *PW*. And, I've no doubt that readers and military wireless collectors may like to know about the **Eddystone User Group**. You can obtain further details by contacting **W. E. Moore, Moore Cottage, 112 Edgeside Lane, Waterfoot, Rossendale, Lancashire BB4 9TR**.

I hope you've enjoyed this special 'feature length' edition of Valve & Vintage. Don't forget you can write to me at any time. In this respect, the *Practical Wireless* vintage 'wireless shop' is never closed. Send your letters to me at 'Faraday', Greyfriars, Storrington, West Sussex RH20 2HE.



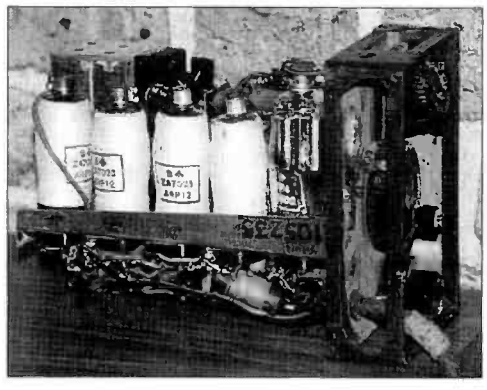


Fig. 11: The 18 set was provided with a webbing rucksack for carrying purposes. The whip type of antenna for the 6 to 9MHz transceiver, was provided by tubular copper-plated steel rods, stored on the side of the casing when not in use (see text).

Fig. 12: The valve line up of the 38 set. The 2V filament ARP12 pentodes and the double pentode ATP4 were used in both the 18 and 38 set.

Continued from page 23

number of front panel controls. So, let's get rid of **SQUELCH, SCAN, TS** and **FUNC**; let's relegate the microphone level control to the back, and find room for some proper memory and band-changing buttons.

Summing Up

In summing up, I have the impression that the design of the IC-707 owes more to technical considerations than to user requirements. But it performs well enough, and sounds good on the air.

However, I must say that the IC-707 shows its parentage well on the audio side. I really did think the audio engineering on transmit and particularly on receive, was excellent. To have decent audio on this type of transceiver is unusual.

The bottom line is that I think that the IC-707 is rather expensive for a 'budget' transceiver, given the lack of facilities. I also consider that some of the functions are implemented in a clumsy way.

In these hard times, I don't think Icom can rely on their reputation to sell equipment, the market will decide this. My personal guess is that the only way to persuade people to buy the IC-707 in any numbers, would be a big price cut.

My thanks for the loan of the review IC-707 go to Icom (UK) Ltd., Sea Street, Herne Bay, Kent CT6 8LD. Tel: (0227) 741741, FAX (0227) 741742, who can supply the transceiver for £895.

After seeing a copy of the G3SQX review, Dennis Goodwin G4SOT, Amateur Radio Sales Manager, Icom (UK) Ltd., sent us the following comments in answer to the points raised by Ed Taylor.

Thank you for giving us the opportunity for replying to the review of the IC-707 by Ed Taylor G3SQX. I am pleased that Ed liked the technical performance of the IC-707, however, Icom's marketing strategy for this model is on simplicity with a minimum amount of front panel switches and controls making this transceiver ideal for mobile or portable operation. Where more features are required for continual base station use, then the Icom IC-728 or IC-737 may be more suitable.

A new accessory the EX-1514 (Ed would not have known about this at the time of writing) is an external VOX unit which is connected between the microphone and transceiver mic socket. This can be used on the IC-707 and many other Icom transceivers.

This last year has seen significant price increases of imported amateur equipment, (as you know due to the exchange rate against the Japanese Yen) it is worth pointing out that had the IC-707 been released in August 1992 then the r.r.p. would have been in the region of £695.00. I am not sure that what Ed is expecting to pay for a budget transceiver, as a comparison the Kenwood TS-140S retails for £899.95 and the Yaesu FT-840 at £879.00

A big price cut is not conceivable unless market demand is abnormally high, (the classic supermarket/corner shop situation) so Icom will rely on its reputation for quality products and our newly released two year warranty.

Dennis Goodwin G4SOT
Icom (UK) Ltd.

Specifications

Manufacturer's Abridged Specifications

Frequency coverage	
Receive only	500kHz - 30 MHz (lower frequencies at reduced spec.)
Transmit	1.8, 3.5, 7, 10.1, 14, 18.1, 21, 24.9, 28 MHz
Modes	u.s.b./l.s.b., a.m
Power	s.s.b./c.w. 5 -100W, a.m.: 5 - 25W f.m. (with optional unit): 5 - 100W
Memories	25, plus 5, storing split frequencies, and 2 scan channels
Frequency stability	Better than ±30 Hz per hour in stable temperature environment (±200 Hz at switch-on)
Spurious signal suppression	Carrier: > 40dB Other (including unwanted sideband): > 50dB Receiver: > 70dB
Receiver sensitivity	With 10dB pre-amp, for 10dB signal/noise: s.s.b., c.w., 1.8 - 30MHz: < 0.16 µV a.m. 500kHz - 1.8MHz: < 13µV 1.8 - 30MHz: < 2µV
Receiver selectivity	s.s.b., c.w.: 2.1kHz at 6dB 4kHz at 60dB a.m.: 6kHz at 6dB 20kHz at 60dB
Audio output:	2.6W into 8Ω
Receiver independent tuning range:	±1.2kHz
Power requirement	13.8V d.c., ±15%. 20A on transmit (2.1A on receive at maximum audio)
Weight	4.1 kg
Dimensions	240 x 95 x 239 mm

Richard Q. Marris G2BZQ describes a simple valved 3.5MHz transmitter which is capable of good stability and is simple to make.

A Valved Transmitter For 3.5MHz

My transmitter project is a highly efficient, rugged and simple, low power c.w. unit delivering more than 10W. As it's crystal controlled with stabilised h.t., and a buffer stage between the crystal oscillator and power amplifier stages, it produces an exceptionally clean c.w. performance.

Valves are used throughout, as I think they are the most reliable. They're also easily replaced and readily available.

Every item used was found in my junk box. Many long forgotten bits and pieces were located in various parts of the QTH and garage.

The transmitter was designed around available components. It was fun building the transmitter and a pleasure to use it on air.

Many amateurs will have some, if not all, of the necessary parts. However, some components are readily available from advertisers of surplus or new components, and other sources such as rallies.

Simple Circuit

The project uses a simple circuit as the transmitter uses valves. All the valves used are readily available, and can be overrun and abused - unlike many transistors!

If the valves fail, you just pull them out and plug in a replacement. Remember that valves which were designed before the Second World War are still in use, so they must be considered reliable and worthy of use.

My prototype transmitter was assembled in to two units of approximately equal size. These are in the form of the transmitter and a.c. power supply.

The two separate units are interconnected with a cable and plug socket assembly. This is done so that the power supply unit (p.s.u.) can be used with other equipment.

However, the circuits and layouts I'm describing can be amalgamated into one chassis/cabinet to provide a complete transmitter with integral power unit. The dimensions are not critical.

Practically speaking, any suitable chassis/cabinet(s) can be used for the project. No real attempt at miniaturisation was made. The object was reliability, making it easy to build and easy to service.

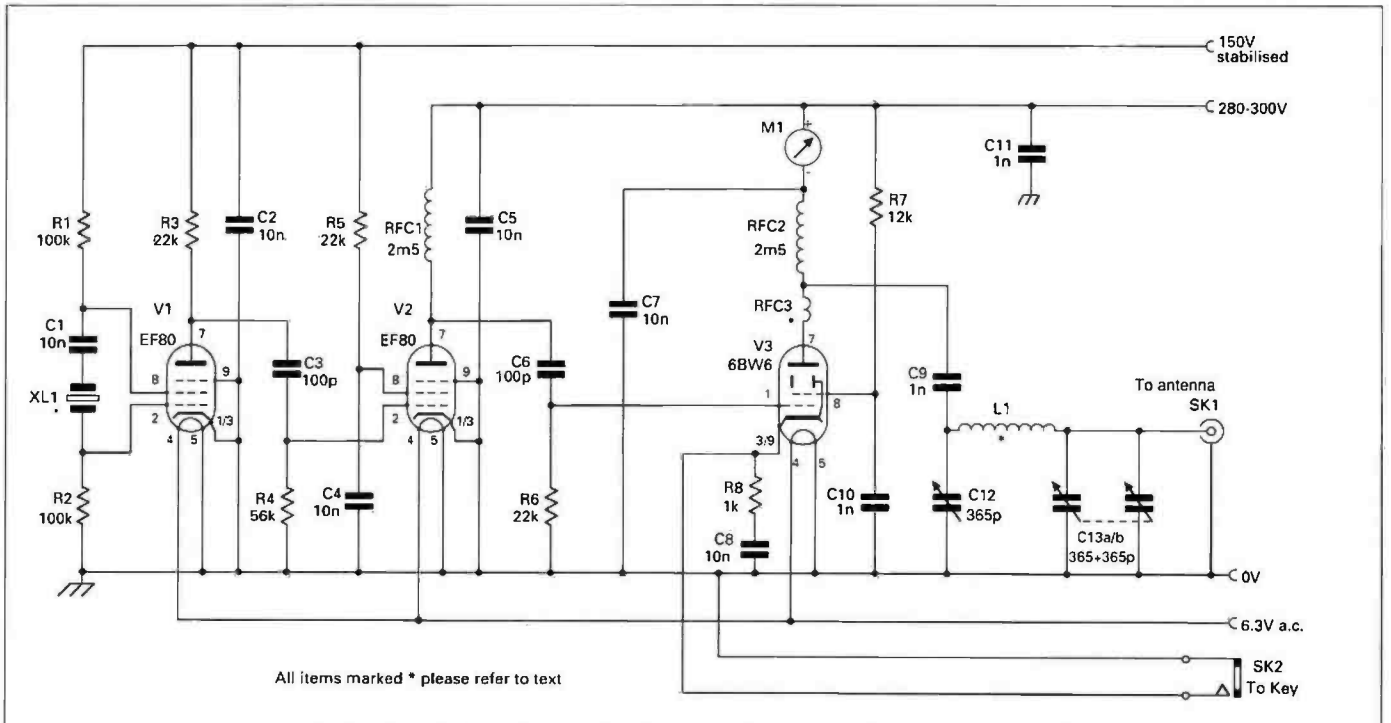


Fig. 1: Circuit of the 3.5MHz valved transmitter project described by G2BZQ.

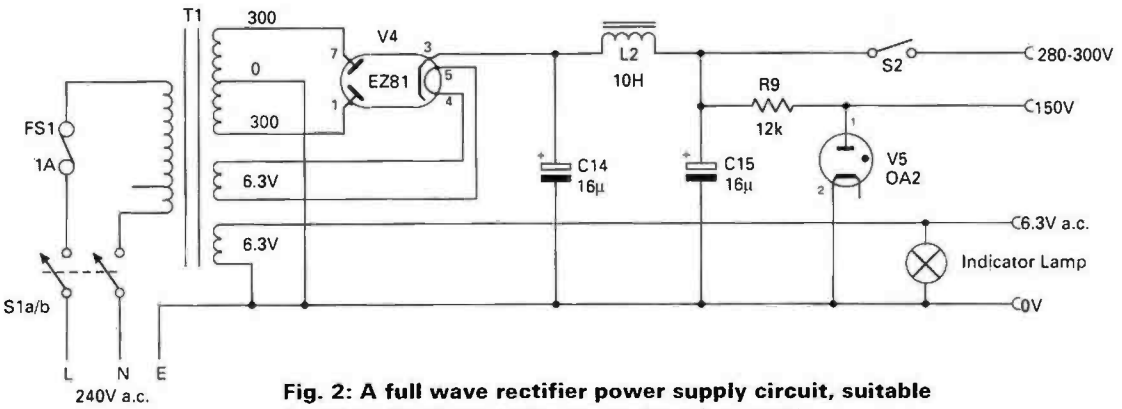


Fig. 2: A full wave rectifier power supply circuit, suitable for use with the 3.5MHz transmitter (see text).

Transmitter Described

The transmitter can be described as a 10 to 15W input unit. But my prototype seems quite happy running with 16W input (c.w.).

Conventional, well tried and tested circuitry has been used throughout. Signal strength with stability, quality and reliability was my target. The good quality of the resulting c.w. signal has been remarked on by other stations during QSOs.

The circuits are shown in **Figs. 1** and **2**. Each circuit terminates with four power points, which have to be joined together.

The joining can be done with a cable/plug/socket arrangement. The sockets must be at the rear of the a.c./p.u. with the plugs from the transmitter.

Any a.c. existing p.s.u. providing 250-300V d.c. at 100mA, plus a 150V stabilised supply would be suitable. Two 6.3V heater windings of at 1.5 amp minimum are required.

Crystal Oscillator

The transmitter line up, **Fig. 1**, consists of a crystal oscillator stage, a buffer amplifier and a p.a. output stage. The suggested power unit, **Fig. 2**, consists of a valve full wave rectifier and a voltage stabiliser.

The crystal oscillator stage uses an EF80/6BX6 valve (V1) in a simple Pierce Colpitts crystal oscillator. This particular layout using g2 of the valve, V1, as an anode is called an electron coupled oscillator. The oscillator output is buffered by the anode circuit of V1.

The crystal socket (I used FT243 crystals) is mounted on the front panel of the transmitter unit. The oscillator is fed with stabilised h.t. supply (150V). There is a bit of luxury with a crystal type oscillator, but this technique ensures you of very clean and stable signals.

The next stage is the buffer amplifier with another EF80/6BX6 valve (V2). This is an extra stability refinement, giving some extra drive to the p.a. stage

The power amplifier uses a 6BW6 valve (V3) which is rated at 11 to 12W input according to an old *ARRL Handbook* I have. The 6BW6 is supplied with 280V h.t. positive on the prototype, and uses a well tried and proven circuit.

A conventional network output tuned circuit is used to match 50-75Ω coaxial feedlines to a suitable antenna via a suitable matching unit. V1, V2 and V3 use B9A valve bases.

Editorial note: We strongly recommend, that to reduce possible EMC problems, that this transmitter be used in conjunction with a low pass filter unit. It should be connected between the output and the antenna tuning unit. The filter should have a sharp cut-off above 30MHz.

Keyed Cathode

The p.a. stage is keyed on the cathode. To assist the prevention of interference, it's provided with suitable key click suppression.

A 100mA meter is wired into the anode circuit for tuning and loading purposes, and monitoring the anode h.t. current. By measuring the h.t. voltage on the anode circuit, and multiplying it by the anode current reading on the meter, you'll have the p.a. power input in watts.

The a.c. power unit I used provides 280V h.t., plus a stabilised voltage of 150 d.c. for the crystal oscillator. It consists of a mains transformer in a full-wave rectifying circuit using an EZ81/6CA4 rectifier valve (B9A base).

The two l.t. windings for the valve heaters should be 6.3V a.c. each. A minimum of 1 and 1.5A ratings respectively is required.

The h.t. is smoothed by means of a 10H 100mA choke. The choke works in conjunction with two 16µF electrolytic capacitors (min 450V working).

The OA2 voltage stabiliser (B7G base) valve is used to provide the 150V h.t. line. A small 6V dial light bulb is wired into the heater circuit, and panel mounted to show when the power unit is switched on.

The switch, S2, is the **Standby/Transmit** (and net) switch. When the switch is 'open' the h.t. to the transmitter is disconnected. When S2 is closed (with the Morse key up) only the crystal oscillator is running.

Holding the Morse key down brings the p.a. into action. Before testing, make certain that your receiver is suitably protected before you operate the p.a. stage.

In practice, S2 can be a pair of contacts on a send/receive relay (or switch). This can change over the antenna from transmit to receive.

Potenentially Lethal

Whatever switching arrangements are used on the transmitter, remember the voltages are potentially lethal. This is because there is approximately 300V on the switch contacts.

In operation, the receiver being used must be protected against the full 'blast' of r.f. from the transmitter. Don't forget also, that r.f. voltages like mains voltages can be lethal. In addition, they must be treated with extra respect, as they can give you unpleasant r.f. burns .

My prototype transmitter was built into a small metal case, and another was used for the p.s.u. However, you might like to build the unit into one case.

The layout of the main components is not critical, and the exact position of the components will vary depending on the size of the actual components used. However, it's best to follow good r.f. practice and screen the transmitter to reduce EMC problems.

All resistors are 0.5W watt rating except where otherwise indicated. Capacitors are 350V working (minimum) unless otherwise stated.

Good quality capacitors should be used in this project. Decoupling capacitors should be connected as close as possible to their points to be decoupled. They should be grounded directly to the nearest point of the chassis, and securely fixed with solder tags.

Tuning Inductance

The main p.a. tuning inductance is wound on a 1in diameter Paxolin tubing. I wound 35 turns of 24s.w.g. enamelled copper wire on the tubing, with spacing of a wire diameter between turns.

A simple anti-parasitic choke is provided by RFC3. It consists of seven turns of pvc covered single core hook-up wire, wound onto a 0.125in diameter rod as a mandrel which is then removed. The result is a self-supporting choke.

All wiring should have adequate insulation and be carefully soldered. This precaution is essential when you're dealing with a.c. mains and h.t. voltages. The switches S1 and S2 should be good quality switched operating well within their voltage ratings.

Testing Stage

After you've carried out the usual safety checks (for shorts and wiring errors), you can start the testing stage. With the power supply connected, a 3.5MHz band FT243 crystal (or other suitable type) is plugged into the crystal socket

mounted on the front panel.

Next, you should connect a 15W (minimum) dummy load (50Ω impedance) into the antenna socket. You are now ready to switch on.

To start, S2 is put into standby position (contacts open). On switching on the power unit switch, S1, to on, the dial light should come on and there will be no reading on the meter. The 'off load' h.t. voltages should be checked after allowing two minutes warming up period.

Now switch on S2 and with the Morse key up, there should still be no meter reading. But it should be possible to pick up the crystal oscillator on a nearby receiver - tuned to the crystal frequency of course.

With both variable capacitors at minimum capacity, S2 is closed to apply h.t. to the p.a. stage. Holding the Morse key down will produce a meter reading, and C12 should be quickly rotated for the minimum current dip on the meter - this is resonance.

The other variable capacitor, C13a,b, should be increased until a reading of about 40mA appears on the meter. Now retune C12, for minimum dip, and if necessary, increase again back to 40mA.

On the prototype, with antenna connected, I found the transmitter can be loaded to 60mA at 280V h.t. This corresponds to 16.8W input, and the 6BW6 valve seems to be quite happy about this level.

The stability and c.w. note can be key checked with the receiver, with the r.f. gain turned well down and the transmitter operating into a dummy load or antenna.

On The Air

On the air the c.w note should be found to be absolutely clean, sharp, with no chirp. This is entirely due to the use of a crystal oscillator with stabilised h.t., and a buffer amplifier between the crystal oscillator and p.a. stages. To get the best out of this approach, the transmitter must use rigid construction techniques.

Initial loading in the antenna is identical to that of the dummy load. However, if the antenna impedance is very low, it may be necessary to connect a high voltage ceramic disc or silver mica capacitor (1kV working) across C12a,b.

In practice I found that capacities of 500 or 750pf should suffice. Such a situation might arise with an end fed wire, but in practice a good a.t.u. and low pass filter should always be used with any antenna.

The circuitry of the transmitter is a little above average for a valved rig. But the refinements used, are well worth while for anyone wishing to put out a T9++ c.w. signal on 3.5MHz.

Good luck with your junk box transmitter. It's cheap to make and should provide a lot of enjoyment on the air.

PW

Shopping List

Resistors

Metal Film 1W 5% (or similar sized resistors)

1kΩ	1	R8
12kΩ	2	R7, 9
22kΩ	3	R3, 5, 6
56kΩ	1	R4
100kΩ	2	R1, 2

Capacitors

Polyester 350V (or other types with not less than 300V working)

100pF	2	C3, C6 (could also be Silver mica type)
1nF	2	C10, 11
10nF	6	C1, 2, 4, 5, 7, 8

Disc Ceramic (minimum of 1000V working)

1nF	1	C9

Air spaced variable

0-350pF	1	C12 (Jackson O type single gang)
0-700pF	1	C13a/b (Jackson O type dual gang)

Electrolytic 450V working (minimum)

16µF	2	C14, 15

Inductors

2.5mH	1	RFC1 (must be rated for high voltage)
10H	1	L2 (value at 100mA loading)

Valves

OA2	1	V5 (or similar: 150B2, 150C2, 150C4 etc.)
6BW6	1	V3
EF80/6BX6	2	V1,2
EZ81	1	V4 (or EZ80 with reduced current loading)

Miscellaneous

A suitable mains transformer (250-0-250V +6.3V +6.3V) Valve holders (4 by B9A and one B7G), one 100mA meter, plugs and sockets to suit, a 1A fuse and fuse holder, one s.p.s.t. switch, one d.p.s.t. switch, good quality interconnecting wire (with insulation for at least 350V. The chassis could be made from either metal or high quality p.c.b. material.

Using Valves - A Practical Approach

Rob Mannion G3XFD is a keen constructor and user of valved equipment. He explains how you can overcome problems in finding the components needed for projects using valves, especially for those enthusiasts who may not have a well filled junk box.

One of the most common comments to come from *PW* readers on the occasions when we publish valved projects, refers to the difficulty of obtaining specialised components. Readers often say "I'd like to build a valved project, but I don't have the necessary components". So, in answer to all you keen types who would like to have a go, (as you might expect!) I've got some practical suggestions.

Those of us who have been active in the hobby for a long time, have well stocked junk boxes. I'm fortunate in that respect, for despite having moved home frequently in the last ten years, my stock of spares and odds and ends is adequate.

But if you're not fortunate enough to have a good junk box full of valve bits and pieces, don't despair! There are many sources of valves and associated components available through advertisers in *PW*, at rallies, the big amateur radio shows and 'Bargain Basement' type advertisements.

Where To Look?

The answer has got to be **here** (in *PW*). I've prepared a list of our advertisers who can help you generally, or with specific items.

Regular *PW* advertiser **John Birkett, of 25 The Strait, Lincoln LN2 1JF. Tel: (0522) 520767,** always has a good stock of valve associated equipment and components.

For the valve radio enthusiast, John Birkett has a good stock of variable capacitors, valve holders, transformers (telephone enquiries on what's in stock are welcomed) and high voltage capacitors are always available. Also available are radio frequency and audio chokes.

John also has a good stock of valves, including EF80, 6BW6 and other popular types. However, one of the biggest problems can be finding high voltage capacitors, and John Birkett has a plentiful supply of these!

So, if you're in the Lincoln area, why not persuade the family that you should also visit the beautiful cathedral? Before you go, or after your visit, you can stroll down the Straits, and find yourself in a radio surplus wonderland!

London-based **Colomor (Electronics) Ltd., of 170 Goldhawk Road, London W12 8HJ. Tel: 081-743-0899, FAX 081-749-3934,** are long established valve specialists. Their valve list is free, and they can also supply valve bases. Colomor's **Barbara Stanton** will be pleased to help you, provide up to date prices and availability of the valve you require.

Another long established valve supplier advertising in *PW* is **Langrex Supplies Ltd.,** who are based in Croydon in Surrey. This company regular publish a very short selection of valves from their large stock (they report that they have in excess of 10 000 types in stock) in *PW*. However, if the valve you need is not listed in their advert, try calling their **Michael Rhodes on 081-684-1166, FAX 081-684-3056,** for further details. Alternatively you can write to them at **1 Mayo Road, Croydon, Surrey CR0 2QP.**

Chevet Vintage Supplies, of 157 Dickson Road, Blackpool, Lancashire FY1 2EU. Tel: (0253) 751858 or 302979, are known in historical wireless circles, particularly for their books. However, they can also supplies valves and they report that a hardware list will soon be available.

Lake Electronics. Alan Lake G4DVW is well known for the various 'kits with all the bits' he produces. However, Alan is also a specialist on older radio books and you'll be able to see his wide range at most of the big amateur radio shows. Valve manuals are one of the most sought after specialist items that Alan stocks, and it's worth calling him to see what's available.

You can contact **Alan Lake G4DVW at 7 Middleton Close, Nuthall, Nottingham NG16 1BX (callers by appointment please). Tel: (0602) 382509.**

Wilson Valves (Proprietor Jim Fish G4MH). Jim Fish G4MH is a familiar to many amateurs from the days of his shop in Chapel Hill, Huddersfield. But nowadays, Jim has become even better known for his specialist valve service. Along with a comprehensive stock of valves and hardware, Jim can also supply full information and valve base details and other difficult to find information. Further details from **Jim Fish G4MH at 28 Banks Avenue, Golcar, Huddersfield, Yorkshire HD7 4LZ. Tel: (0484) 654650/420774, FAX (0484) 655699.**

Maplin Electronic Supplies. Maplin are well known to *PW* readers, and within their giant catalogue you'll find a selection of valves and components suitable for valved projects. For the smaller valved projects (such as a receiver or low powered transmitter) Maplin can also supply a suitable 250V high tension transformer with a 6.3V heater winding. Catalogues are available from Maplin stores nationwide, or WH Smith, Menzies (and R. S. McColl in Scotland) and other large book shops or newsagents in the United Kingdom. Overseas readers are gladly catered for, further details from **Maplin Electronics, PO Box 3, Rayleigh, Essex, England SS6 8LR. Tel: (0702) 554161, FAX (0702) 553935.**

Rob Mannion

The Eddyston

Chris Pettit G0EYO, Managing Director of Eddystone Radio Ltd., takes a brief look back at the history of one of the most famous names in radio.

The Eddystone Radio museum, with Chris Pettit G0EYO, Managing Director.

A Trivial Pursuit Question: What's the connection between a ladies hair grip, a shortwave receiver and a lighthouse off the south west coast of England? Answer: Eddystone Radio, manufacturer of short wave receivers since 1923 and now equally famous for its f.m. broadcast transmitters which are used by the BBC and other broadcasters throughout the world.

The origins of the world famous Eddystone symbol, rest in a Birmingham based company called Jarrett and Rainsford Limited. This company were manufacturers of pins and decorative goods in the 1860s.

In 1898, George A. Laughton started with J & R as an office boy. In 1911 he started a separate company called Stratton and Company who made badges and gentlemen's jewellery.

Later, in 1912 G. A. Laughton became a director of Jarrett and Rainsford's. And in 1919 the company was renamed Jarrett, Rainsford and Laughton, having bought out Stratton and Co., Ltd.

Incidentally, the name Stratton was derived from fiction. The name came about because Mrs G. A. Laughton was at that time reading a novel, in which the hero's name was Stratton!

In the 1920s the company was famous for its 'Lady Jayne' hair products, including wave clips, curl clips, slumber helmets, hair curlers, hair grips, compacts, lipstick cases and cuff-links.

But also in the 1920s, the fashion in women's hair styles underwent a revolutionary change. This happened as the fashion went from generally having long hair to the more fashionable, bob, crop and shingle styles.

All the new hair styles were short and hence the demand for hairpins or grips was rapidly declining! For a company like J. R. & L, capable of turning out some six tons of hairpins per week these changes were seen to be something of a major problem.

Miracle Of Radio

The elder son of G. A. Laughton was George Stratton Laughton and he was fascinated by the miracle of radio. He suggested to his father that as 'We'd got the plant, we'd got the men and we'd got the money, why not make radio components'!

So, as a result in the change in women's fashions and a young man's interest, a radio business was started. It began in 1923 and is still going strong today.

The name Eddystone was chosen as a trade name because being that of the world famous lighthouse off Plymouth, it was a name already well-known. The lighthouse signified endurance, reliability and provided a mark which could be pictorially shown with a device easily remembered.

The famous lighthouse device was apparently decided upon, during a short journey after work by G. A. and G. S. Laughton. From that time on Stratton and Company Limited was to be the subsidiary of J. R. & L. specialising in manufacturing radio equipment.

The company started by making component parts for hobbyists. But they quickly started manufacturing complete radio receivers.

Their first receiver was a battery operated two valve medium wave unit with headphone output. It was housed in an oak case and had a glass front panel.

The receiver's glass front panel was provided so that everything that moved inside was visible in operation. Additionally, the filaments of the valves could be seen to light up!

Examples of the first Eddystone receiver are believed to be in existence in one or two enthusiasts' collections somewhere in the UK. Unfortunately, however, we don't have one in the company museum.

Young Enthusiast

During the early days of Eddystone Radio, a young radio enthusiast named Harold Cox joined the company. He was to be the main technical driving force behind the company for almost 40 years.

Harold Cox was joined by another enthusiast, Arthur Edwards G6XJ who was also a radio amateur. Arthur Edwards went on to become commercial general manager and sales director, until the company was sold to the Marconi Company in 1965.

The business continued to make components and receivers for the domestic radio market. In 1925 they became shareholders in the fledgling British Broadcasting Company, at the time a private company and largely owned by the radio trade.

We still have the original British Broadcasting Company share certificate in the Eddystone museum. Somehow, I think it's ironic that in recent years, the modern day BBC have been Eddystone Radio's largest customer for its f.m. broadcast equipment.

It must have been about this time that the company's amateur licence was issued, 6SL. The callsign is now G6SL and it's still occasionally activated.

Around 1926, G. S. Laughton formed the opinion that a big future lay in the use of higher radio frequencies. These frequencies were then almost unused except for experimental transmissions.

The policy of the business was slowly altered. Components were designed and made for the use of experimenters on the higher frequencies, and a receiver was designed for short-wave reception.

The BBC and foreign broadcasters soon introduced high frequency broadcast services. As a result, world-wide reception became possible and this short wave receiver had a world market.

Eddystone Shortwave

The Eddystone h.f. receiver was a two valved design. It was mounted in a glass fronted oak case, and was known as the 'Eddystone Shortwave' (an example is in the

Fig. 1: The Eddystone Model S680, a 15-valved five band 480kHz to 30MHz receiver introduced in 1949 was housed in an aluminium die-cast case.

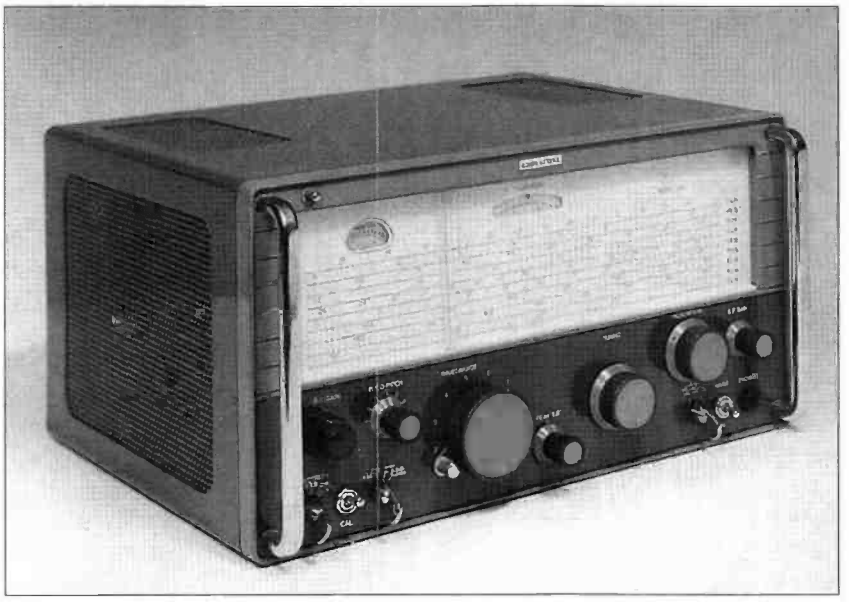


Fig. 2: The later Model 830 300kHz to 30MHz receiver employed a steel case.

museum, and is shown on *PW*'s front cover this month).

The 'Shortwave' covered a range from 15 to 85 metres (20 down to 3.5MHz). It used two 6V valves, one as a regenerative detector, the other as a transformer coupled amplifier. The h.t. supply was provided by a standard 120V battery.

The original h.f. radio was followed between 1928 and 1929 by a series known as the 'Scientifics'. They were presented in a wooden case with an Ebonite panel. This series covered short and medium waves and were available with either three, four, or five valves.

Back in 1924 a retail arm of the company had been formed under the name Webbs Radio. A shop was opened in Birmingham and five shops were eventually in operation.

However, due to other pressures of the business the retail project was not developed. In the end, the only shop retained was Webbs Radio in London. This flourished until the mid 1960s when the company was sold to Marconi and they made their decision to withdraw from the retail market.

The demand for high frequency equipment grew. So, Strattons no longer manufactured equipment solely for the domestic radio market.

Production was concentrated on receivers for overseas users. Eddystone customers included sugar, tea, coffee, cocoa, and rubber planters. There were also mining engineers, public works constructors and overseas administrators.

All Wave Fours

The receivers used by the foreign-based customers were known as the 'All Wave Fours'. They had tropicalised components and were built into a solid aluminium die-cast case with integral screening.

The integral screening was an idea of Harold Cox. When the lid was closed, the case became insect tight and spider proof! This was an important feature when you consider the export markets the radios were destined for.

Several versions of the 'All Wave Fours' were issued from 1930 to 1934. The die-cast case was probably the forerunner of the famous Eddystone die-cast boxes which the company still manufactures and sells todays.

For the UK market, high frequency components and receivers were made for the radio amateur and home constructor. Kits were available as well as a yearly constructors magazine known as *The Short Wave Manual*.

'The Scientific Two', 'The Short Wave Two' and 'The Kilodyne Four' were all kit sets. Other famous names from the 1930s were the 'Overseas Four' (1933), 'The Sphinx' (1934), available as mains or battery, 'The Homelander' (1935) and 'The Quadradyne' (1935) with its steel case.

The first communications superhet receiver was the ECR (1936). This was fitted with an S-meter and coil packs.

Very High Frequencies

From the early 1930s, development work was undertaken to extend the high frequencies up to very high frequencies (v.h.f.). This work led to equipment operating from 30 to 60MHz being produced by 1935.

The company made a special quench type v.h.f. transceiver operating in the 60MHz region. This was used by the Oxford University Expedition to Mount Everest in the Himalayas. These were believed to be the first 'walkie-talkies' in the world and they had a range of 5-6 miles.

The company was busy during the years 1935-39. This was when a great deal of effort, hard work and cost, were put into convincing the Police and Military authorities to accept the use of portable v.h.f. two-way equipment for use in cars and tanks.

The police in different parts of the country built their own experimental v.h.f. equipment and Eddystone components were sold to them. But the Military authorities were lagging behind Germany in making use of portable two-way equipment.

It was not until after the Munich crisis in 1938 that Strattons' years of effort in developing v.h.f. equipment bore fruit. Fortunately, it was then able to serve a purpose of national importance.

The Metropolitan police and Scotland Yard were concerned that enemy bombing might destroy their telephone communications. To safeguard communications they asked Strattons to produce an automatic v.h.f. wireless telephone system to provide communications between all the police stations.

To produce the necessary communications system involved a 24-hour, seven days a week effort by the employees of Strattons. The hard work resulted in equipment which when tested in trials provided the best performance.

The excellent design and the results obtained were largely due to Harold Cox. He had the able assistance of George Brown, G5BJ, on the transmitter section of the equipment.

George Brown later left Strattons to take charge of the radio section of the Birmingham police. Helping him on the police project were Garnett Lapworth G6DL and Ted Lauze, The Chief Draughtsman.

Another 'junior' on the project was Bill Cooke G0ION. Bill went on to become Chief Engineer of the company and was my predecessor as Managing Director.

With the threat of war, delivery was of vital importance. With good team work and with disregard to normal working hours, the whole installation was built and delivered to the Metropolitan police by July 1939.

The new police communications system worked with great success right throughout the war period. Unfortunately the tremendous effort had its casualties, particularly a breakdown in the health of G. S. Laughton.

As a result, of his fathers' breakdown G. S. Laughton went out to Australia in place of his father in May 1939. He went in order to extend the development of J. R. & L's Australian factory.

The place of G. S. L. was taken by Jerome Laughton. He carried on the co-ordination of the radio business during the whole of the war-time period.

Police Communications

The original order for police communications was followed by other similar orders to supply equipment to many other police forces. They included: Birmingham, Glasgow, City of London, Edinburgh, Renfrew, Dumbarton, Paisley, Stoke and the other surrounding pottery towns.

The base station of the S214/215 police transmitter receiver had ten valves in the receiver and 23 on the transmitter. The mobile unit, identified as S440/450, had ten valves in the receiver and four valves in the transmitter.

During The Second World War, design improvements on v.h.f. equipment were made. Eventually between 3000 and 4000 v.h.f. systems were supplied to the Admiralty.

The Eddystone v.h.f. was used in the D-Day landings to provide cross-channel communications. In

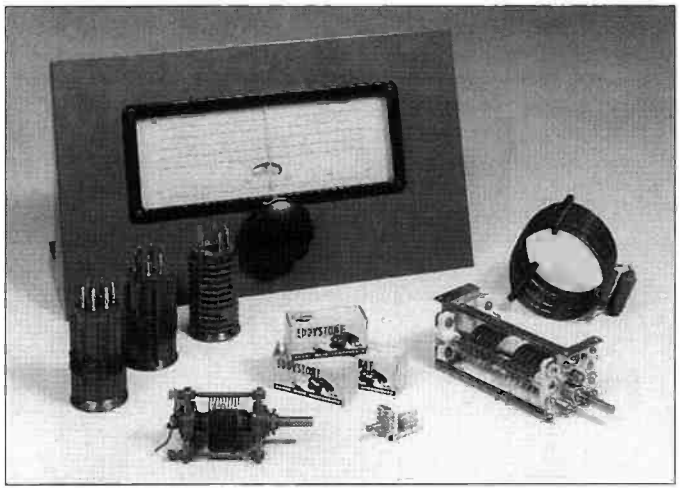


Fig. 3: A selection of components and the Eddystone 898 slow motion dial for which the company became famous for between 1925 and the 1960s.

fact, the equipment was still being supplied in 1948/49 and during that time Strattons also equipped Belfast Harbour with v.h.f. radio equipment.

National Importance

The Company's contribution to the war effort was considerable and one item, a special form of tuning capacitor, was considered to be of national importance. This was the Type 339 differential condenser for use on h.f.

The Type 339 was developed by the company for the National Physical Laboratory in 1935. During the Second World War it was incorporated in the special IFF (Identification Friend or Foe) radar transponder equipment carried by our aircraft.

The company suffered severe war damage. In October 1940, enemy bombing destroyed the radio works in Bromsgrove Street with an oil bomb.

In minutes the factory was ablaze from end to end. The fire watch consisting of Ted Lauze, Harold Cox and E. J. Pickard G6VA sprang into action.

With great personal courage and disregard for their own safety the fire watch constantly entered the blazing building. They managed to bring out practically all the valuable test equipment.

The next day production was set up in another part of the company's works. Within three weeks production had been resumed and was being built up again, when another raid destroyed the whole factory.

The second raid was devastating. The only items salvaged from that raid were two signal generators and a Q-meter.

The Bath Tub

Immediately after the second raid on the Bromsgrove Street premises, a new site had to be found. To this end, a lido on the outskirts of Birmingham, known as the 'Bath Tub', was taken over by the company.

The Bath Tub was a complex, consisting of a fun-fair, swimming pool and dance hall. It was opened by Gracie Fields in 1937, but was disused by the time war started.

Using a great deal of improvisation, production was restarted. Within three months, production figures had outstripped the original pre-blitz figures.

Another important war-time radio was the 358 receiver. This was a 7-valved, nine band (with plug-in coils) superhet covering 110kHz to 31MHz. These receivers were particularly important to the services as the only comparable set was made in the USA, and was therefore suppliers of them were subject to enemy submarine activity.

The 358 unit was also the company's first professional communications receiver. This receiver helped provide the company with a reputation as a designer and manufacturer of communications equipment.

The 358 receiver had several versions, the Navy version was known as the B34 while the Airforce/Army version was known as the R1448 **(see front cover)**.

The 358X had a crystal filter, and the models 400 and 400X were for c.w. reception only. During hostilities, these receivers were used extensively for the monitoring of enemy traffic.

By the end of The Second World War and the return of peace, Stratton's had supplied the Police and Armed Forces with 4,500,000 radio components. They had supplied 4,500 transmitters, 7,250 receivers, and 45,000 supplementary pieces of equipment. And by the way, we were (and still are!) operating out of the Bath Tub!

After the war, the markets became flooded with Government surplus radio equipment. This made it difficult for the company to sell its products. Export markets were also difficult as the USA had very good supplies of its own products.

Bill Cooke, remembers his return to work from war service in the RAF. One of the first products he designed, far from being a glittering new receiver, was an r.f. seaming machine for the parent company who were launching themselves into the plastics market!

Bill also remembers being asked to design an electric clock and refusing the request! He did however, design and build six projection TV sets, Model 793 and a console TV receiver, Model 800.

The company obviously did not see their future in the TV receiver business for they never made any more models, perhaps the owners thought TV was not going to catch on!

Increased Competition

Surprisingly, in the post war period, the company withdrew from the v.h.f. two-way radio business. This was due to increased competition from Pye, particularly with regard to rental arrangements.

The company decided to concentrate on specialised communications equipment. It would continue to be well constructed for performance and stability, selling on these points rather than price.

After the war and into the 1950s this policy brought considerable success to the company. As a result there was hardly a country in the world to which they did not export receivers.

In 1947 the company introduced the S640. This was a mains powered, 9-valved, three band comm-unications superhet, covering 1.1 to 32MHz, with a crystal filter. This model was also badged as a Marconi receiver.

A broadcast version of the S640, known as the S659 was also introduced in 1947. In 1948, the S670, 7-valved, four band superhet covering 150kHz to 30MHz arrived. This was an a.c./d.c. set for marine use either as a cabin receiver or as a ship's main receiver.

The S670 was used extensively by the Marconi International Marine Company (MIMCO). In 1949, the S670 was followed by the S680 which was a mains powered, 15-valved, five band, professional communications superhet receiver, covering 480kHz to 30MHz with S-meter and variable selectivity.

In 1950 the S740 was introduced as a mains powered 8-valved, four band communications receiver covering 480kHz to 30MHz. The broadcast version was known as the S710B. Receivers of this decade were recognisable by the 180° dials (see **Fig. 1**).

Famous Dial

The now world famous Eddystone linear slow-motion dial was introduced in 1950. It was subsequently used on many of its most famous receivers up until the introduction of the Model 958 in 1969.

This really was the era of high quality mechanical engineering being used to solve electrical problems. Some of the variable capacitor and inductance mechanisms were truly works of art.

Strattons, were amongst the first to introduce tuneable v.h.f. receivers onto the market. And 1953 saw the introduction of a range of receivers.

The new range started with the little known Model 760 covering 19 to 300MHz. There was also the 770M covering 19 to 230MHz, followed by the world famous 770R covering 19-165MHz, and the 770U covering 150 to 500MHz.

The 770 v.h.f./u.h.f. receivers were six band 19-valved sets providing reception of a.m./c.w. and f.m. Some 11 versions of the 770R were made over the years that followed.

The 770R was used by the Americans for tracking the first Russian 'Sputnik' to orbit the earth. Subsequently, considerable quantities went to Russia, China and Jodrell Bank.

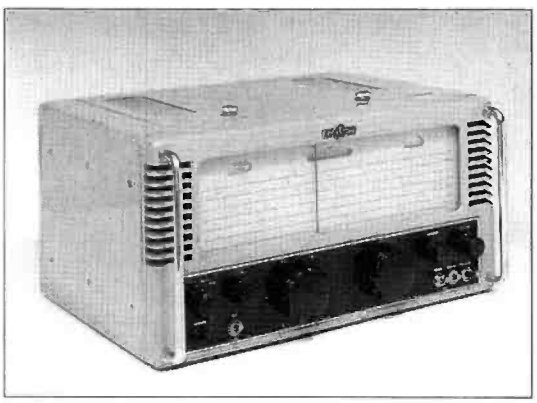


Fig. 4: The Eddystone 770R v.h.f. receiver. This 19-valved set covered 19 to 165MHz in six bands and was introduced in 1953.

The 1950s saw other famous Eddystone receivers introduced. These included the S750 mains powered double superhet, covering 480kHz to 32MHz in four bands.

There was also the Stratton 700 which was a monster receiver. It was some 50% bigger than the standard receiver, and was a ten band, 12-

valved set with dual switched intermediate frequencies and was d.c. supplies only.

Stratton 700 receivers were used on the Cunard Liners RMS *Queen Elizabeth* and the RMS *Queen Mary* sailing between Southampton and New York. They were badged by MIMCO and International Marine Radio (IMR).

In 1954, the 840 a.c./d.c. 7-valved communications receiver covering four bands was launched. And, in 1956 the first of the amateur band receivers, the 888 was available.

A 12-valved receiver covering six h.f. amateur bands, the 888 proved very popular with its a.m./c.w. reception and double-conversion design. A new version was introduced in 1957, with a product detector for single sideband (s.s.b.) use and this was known as the 888A.

In 1958 the famous 730 series of radio was introduced for the Ministry of Defence. Covering 480kHz to 30MHz in five bands, it was a 15-valved receiver, and some 10 versions were introduced over the years.

Style Changed

As the 1960s arrived, the style of receivers changed a little. Grey steel cabinets replaced the black die-cast aluminium style of the 1950s. The large linear slow motion dial was retained, but other things were happening in the parent company.

In 1958 the company had changed its name from Jarrett, Rainsford and Laughton to Laughton and Sons. In 1965 Stratton's was sold to the Marconi Company, at that time part of the English Electric Group, which was shortly afterwards to become part of the General Electric Company.

Probably, a certain confusion had always existed in people's minds because radios were made by Stratton and Company. Although Stratton fancy goods were made by Laughton and Sons.

It seemed a good idea then, as Stratton's was acquiring a new parent (Marconi), to change its name, leaving Laughton's in clear cut possession of the Stratton name. So, Stratton and Company therefore became Eddystone Radio Limited.

The Eddystone and Marconi companies had worked together for many years and were friends of long standing. Both the Marconi Company and the Marconi International Marine Company used a great deal of Eddystone equipment in their communications systems.

Eddystone Radio is now a wholly owned subsidiary of GEC Marconi Communications Limited. The latter is owned by the Italian arm of GEC Marconi, Marconi SpA.

The 1960s also saw a wonderful period for Eddystone receivers with the introduction of the 830. This was a 15-valved, 300kHz to 30MHz nine band double superhet mains receiver providing a.m./c.w. and s.s.b. reception.

Many versions of the 830 receiver were sold to users all over the world. These included the Diplomatic Wireless Service, and users in Sweden, Canada and Germany.

There were also the 770S receivers. These covered 500 to 1000MHz with a tuneable cavity oscillator, and there were MkII versions of the 770R and 770U which were sold to all the armed services.

Another series, were the 850 v.l.f. (very low frequency) receivers covering 10 to 600kHz. The 880 series, were 23-valved, 30-band, monster rack-mounting l.f./h.f. receivers, using techniques similar to the famous Racal RA17 with one band per MHz.

Incidentally, there's a story from this period which I believe to be true. The story was that Eddystone, along with other established receiver manufacturers of the period, turned down the concept of the Barlow Wadley loop superhet receiver.

The Barlow Wadley loop superhet originated in South Africa. It was offered round by the MOD for a receiver manufacturer to take up. Only one small company did so, and this was Racal, and just look where they are today!

Transistorised Receivers

The 1960s also saw the introduction of transistorised receivers. The first Eddystone transistorised set was the 960 introduced in 1962. It was based on the 940, a 13-valved, 480kHz to 30MHz five bands communications receiver.

The 960 looked identical to the 940 receiver. It had 19 transistors mounted into valve holders powered from an internal battery.

The 960 designer, Geoff Woodburn G3AYW (recently a silent key), told me the story that he was only given one of each transistor. He was then told in no uncertain manner that if he was to blow one during the design stage he would be fired!

By 1963 the famous EC10 transistorised communications receiver was launched. This was a small receiver, with 10 devices and covered 500kHz to 30MHz in five bands.

A broadcast version of the EC10 was produced as the EB35. It covered 150kHz to 30MHz plus the new v.h.f. Band II f.m. broadcast bands of 88 to 108MHz, and was introduced in 1966.

The last valve receiver was probably the EA12, a 17-valved, nine band superhet receiver covering just the amateur bands from 1.8 to 30MHz. This was introduced in 1964.

Feeling The Competition

By the end of the 1960s, Eddystone was feeling the competition from many other receiver manufacturers. These included manufacturers such as Racal, and Plessey for its professional communications receivers and from the Japanese for lower priced transistorised receivers.

Throughout the 1970s the company's main products were; the 958 solid-state communications receiver covering 10kHz to 30MHz in ten bands. This was used by the armed services as well as the marine companies as a main ship's receiver.

The 958 was reputed to be the finest receiver Eddystone ever made. But it had a very complex mechanical tuning arrangement.

There was also the 990 series of transistorised v.h.f./u.h.f. receivers. These covered 30 to 240MHz and 250 to 850MHz.

Another range was provided by the 1830 series of ship's receivers. These used an analogue read-out for frequency and covered 120kHz to 30MHz, with ten tuned crystal frequencies.

The Eddystone fortunes during this time were very much tied to those of the marine industry. Unfortunately, this was ultimately to prove costly to the company.

The closure of the Suez canal resulted in larger and larger ships being built. Unfortunately, they still only had one radio room, and the increased competition from the far east depressed the British ship building industry.

By the end of the 1970s the company was hurting. It was not sure where its future lay.

A new generation of solid-state digital display receivers was introduced in 1980. This was the 1837 series of l.f./h.f. receivers and the 1990 series v.h.f./u.h.f. receivers, whilst these sold well they were selling into a smaller market place.

In 1984 a new development was started. This was for a microprocessor based scanning and 99 channel memory l.f./h.f. receiver using touch pad membrane front panels. This is how the 1650 series of receivers was born.

Solid State Transmitting

The company was also building a relationship with the BBC. This came about when we made solid state transmitting products the BBC had designed for its Band II v.h.f. f.m. expansion.

The company soon licensed the transmitting products for sale to non-BBC customers throughout the world. So began its re-birth as a broadcast transmitter provider.

Other products were licensed to give it a solid-state medium frequency transmitter capability. However, despite the renewed interests, the company has never abandoned its communications interests.

In 1985 the company commenced development on a low cost six channel h.f. s.s.b. transceiver for use in the third world as a mobile radio telephone. This product is still sold today, with many thousands in constant use throughout Africa and the Far East.

In the 1990s the company has become a major provider of f.m. transmitter systems with sales world-wide. In fact, it's now the major UK manufacturer of such products.

Today, Eddystone is continuing to develop both broadcast and communication products and sees its future in both those fields. However, you cannot be the Managing Director of a company like Eddystone without having regard for its long and famous past.

Our 70th anniversary was celebrated in 1993. We are proud of our past and very excited for our future.

Chris Pettit G0EYO

Reference Sources

1. *A Century of Achievement*. The Story of Laughton and Sons Limited, 1860-1960, published by William Sessions Limited, The Ebor Press York, 1960 (out of print).

2. *The First 50 Years, 1923 To 1973*, company booklet, celebrating the Golden Jubilee of Eddystone, published 1973 (out of print).

3. *Eddystone User Group Newsletter*, published by Eddystone User Group, (can be contacted through Eddystone Radio Limited, Alvechurch Road, West Heath, Birmingham B31 3PP, Tel: 021 475 2231. Fax: 021 477 5224).

The late Stan Crabtree G3OXC was fascinated in the techniques used in the early days of wireless. In the last of his articles written for PW, Stan provided a fascinating insight to the ingenious and sometimes downright dangerous systems used by the pioneers.

Keying The Early Way

The already well established keying techniques employed for Morse telegraphy took a diverse turn when it was used for signalling with early wireless apparatus. It was soon apparent that the keys used in land-line telegraphic circuits were totally unsuitable due to the larger currents to be interrupted.

Early wireless pioneers found they had a problem. The precision engineered keys used by European telegraphers and the 'bug' keys recently introduced on American land-line circuits could not be employed.

In the place of the then familiar Morse key

Fig. 1: The Marconi key. The base contains a capacitor for spark reduction (see text).

there appeared a variety of devices. They were often incongruous, mechanical arrangements, which were necessary to key the transmission of damped wireless waves.

Induction Coil

In the pioneering days, when using a 10in induction coil, the primary supply had a current of about 10 amperes which had to be interrupted. The first requirement therefore, was for large platinum contacts and a long insulated handle!

In order to quench the spark at the key contacts, on breaking the circuit, a large capacitor was also needed across the contacts And, in addition to these basic requirements the pioneers of the period introduced their own ideas for transmitter keying.

The Marconi Company key followed the general rule of 'big handle', 'big contacts'. This was fitted on the growing number of ships belonging to companies who had contracted Marconi to supply and fit wireless installations.

The Marconi key, **Fig. 1**, with a handle of hard rubber, was some 5in long and set at right angles to the keying lever. This key, with its bottom 'skirt' resembled the shape of Abraham Lincoln's famous top hat!

Brass contacts were used on the Marconi key. Knurled brass nuts on a

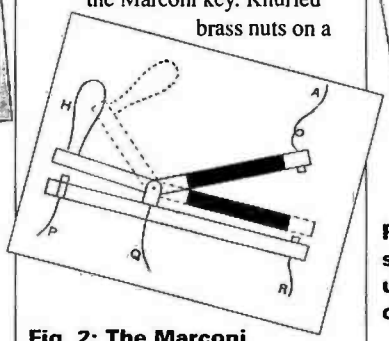


Fig. 2: The Marconi Company developed a changeover Morse key which disconnected the antenna from the receiver before transmission (see text).

threaded rod were provided on the fixed and movable parts. This was to allow connections to be made to the series connected battery and primary winding of the induction coil.

Grasped Firmly

To operate the Marconi key, the instructions said the handle had to be "grasped firmly and depressed". The key of course was operating with the lever working against the pull of a spring.

From the design of the Marconi key, it's reasonable to suppose that the expression 'pump handle' as a description was derived from keys of this period. The feather light touch of two or three fingers adopted by operators in later years was not possible with this equipment.

It's easy to realise why sending speeds in the early days of wireless were usually in the order of ten words per minute. And whilst the operators may not have succumbed to the usual land-line

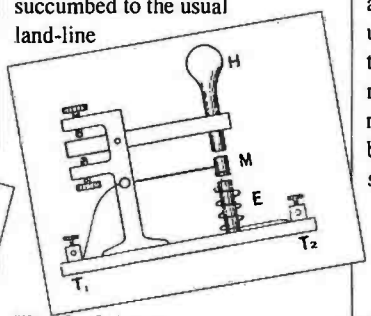


Fig. 3: A 'non sparking' Morse key used with alternating currents (see text).

telegraphist's complaint of 'glass wrist', they may well have been vulnerable to the painful 'tennis elbow' condition.

Key Control

The Marconi Company was the first to devise a key to act as control for a send/receive system, **Fig. 2**. When the key was not in use, the lever was arranged to rest on back contact which served to connect the antenna to the receiving instrument.

Professor F. Braun designed a key which enabled 50 amperes of alternating current to be interrupted. This was carried out without endangering the operator, the coil and the interrupter of the key.

With Professor Braun's key, **Fig. 3**, the keying was arranged so that the principal contact could not be broken until the instant when the primary current passed through its zero value. This was achieved by making the primary current pass through an electromagnet which held down the contact once the lever was pushed downwards.

In use, the primary circuit on the Braun system was not broken again, even if the key was raised, until the primary current passed through its zero value. Due to this method, termed 'automatic minimum current cut-out', the break was rendered virtually sparkless.

There was another method to prevent sparking during

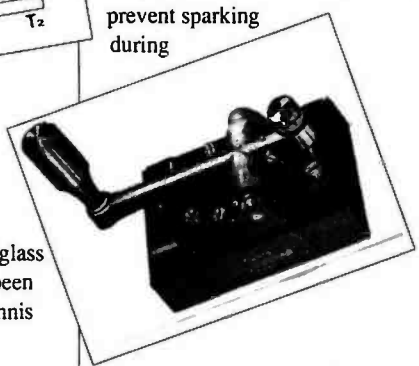


Fig. 4: A Morse key of the early wireless period with magnetic 'blow out' (see text).

the early period. It was used by Telefunken and others, and the method used was to fit the key

with a magnetic 'blowout' system, **Fig. 4**.

The magnetic 'blow out' system used electromagnets which were mounted on the key, positioned with their axis at right angles to the line joining the contacts. The magnetic field 'blew' out the spark which tended to form on breaking.

In the Telefunken system it was usual to employ several contacts arranged in parallel when currents of 40 amperes and above had to be keyed.

There was also a key devised

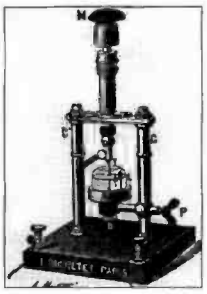


Fig. 5: The complex Ducretet Morse key, fully described by G3OXC in the text.

in 1904 by the Paris instrument maker Eugene Ducretet, **Fig. 5**. It was made during his collaboration with Popov in manufacturing wireless telegraphy equipment. It bears a resemblance to a present day date stamping machine and seemed to work on the same principle.

The Ducretet key appears to provide a rather intricate mechanism for a relatively simple switching task (refer to **Fig. 5**). It consisted of two insulated stands **C**, which supported a cup containing mercury.

A spring loaded handle **M**, was arranged to move through the bar connecting the stands. When the handle was pressed down, a metallic point on the bottom came into contact with the mercury and completed the primary circuit.

Tuned Apparatus

When tuned apparatus began to be used, other techniques came into use. One method used, was to throw the secondary or antenna circuit out of tune with the primary condenser circuit by short circuiting inductance.

Another idea was to short circuit the condenser in the spark circuit by means of an impedance coil. This was almost a forerunner of present day frequency shift keying (f.s.k.).

Considering the long wavelengths employed, the system used to key such an arrangement was a particularly ambitious task at this time. One method, used by the Canadian Reginald Fessenden, is shown in the diagram, **Fig. 6**.

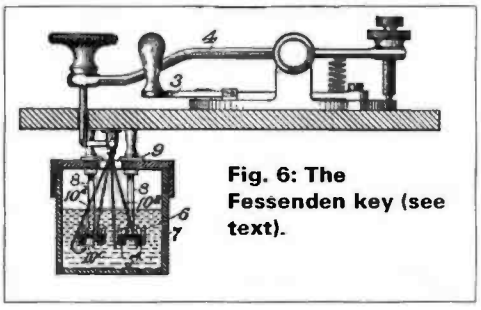


Fig. 6: The Fessenden key (see text).

The device is contained in an oil-filled chamber and attached below a normal Morse key.

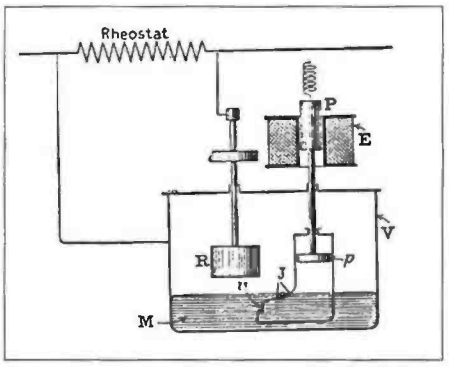


Fig. 7: The automatic keying device as used for sending time signals from the Eiffel Tower in Paris (see text).

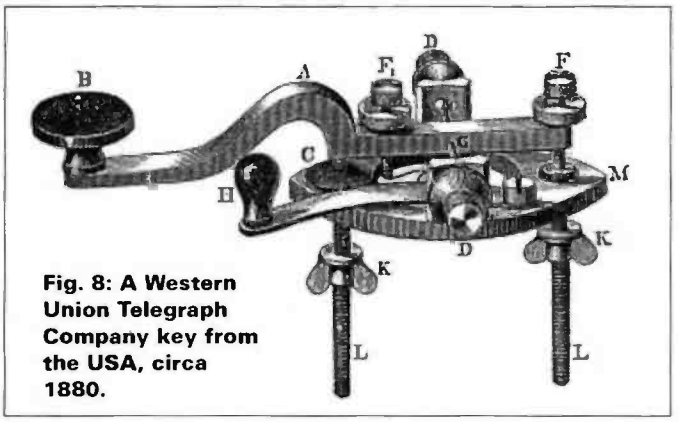


Fig. 8: A Western Union Telegraph Company key from the USA, circa 1880.

The key lever (**4** in diagram **Fig. 6**) has fingers (**10**) attached and arranged to be pressed into contact with wires connected to the circuit which is to be shunted upon keying.

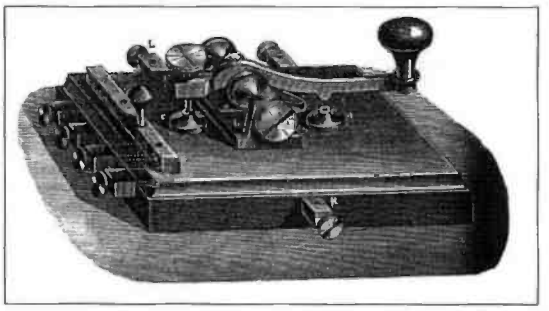


Fig. 9: A finely engineered key as used by operators of the Australian telegraph circuits in the late 1890s.

Fessenden's rival, Lee Forest, produced a similar key. In this version a curved projecting arm was attached to the keying lever and extended into a compartment containing oil.

The Lee Forest key's arm had a contact on the lower end. This connected with another contact fitted to the base of the oil compartment.

Eiffel Tower Station

A novel type of keying was used for the spark transmission of time signals from the Eiffel Tower station (callsign FL) in 1910. Normal hand keying of the station's 60kW output was performed by the short circuiting of resistances in the primary circuit of the power transformer.

However, the normal method used at the Eiffel tower was obviously unsuitable for accurate time sequences. These originated from the clock of the Paris Observatory. So, Commandant Ferrie, in charge of French Military Wireless at this time, devised a special system of keying, **Fig. 7**.

The technique employed by Ferrie is shown in the diagram. It consisted of a mercury pump **P** and a rotating electrode **R** installed in a container holding an amount of mercury **M**.

A current sent via contacts on the Standard Observatory clock energised a solenoid **E**. This depressed a piston **P** against the pull of a spring.

When the clock circuit closed, the pump caused a squirt of mercury to take place against the rotating electrode. This effectively short circuited the resistance in series with the feeder transformer and thus a spark took place! Experiment showed there was a constant delay of 0.2 seconds between the spark signal and clock time.

Sophisticated Methods

It was not long before more sophisticated keying methods were employed. Initially, the relay key in which an ordinary telegraph key was manipulated, activated an electromagnet which in turn closed the circuit of the supply to the changing transformer circuit. Eventually, the keyed relay was followed by automatic sending by punched tape.

However, in the formative years of wireless telegraphy, hand keying was compulsory for all traffic. And, bearing in mind the type of keying instruments in use, it's no wonder that operators were expected to be physically fit to operate them!

PW

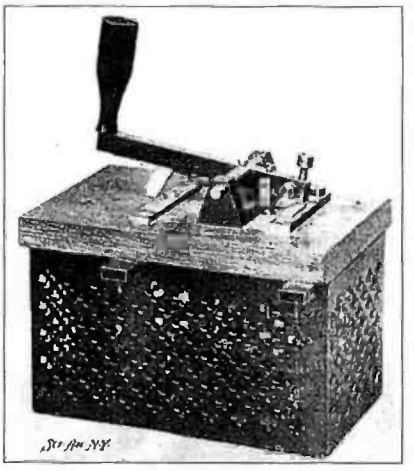


Fig. 10: An American key from the early wireless period.

Mike Birch G0KDZ takes us back to around 40 years ago. His article takes the form of a letter of reply from an experienced operator to a keen novice listener from the mid 1990s, aimed at encouraging the newcomer.

Looking Back At Listening - 40 Years On

My friend, I thank you for your reply to my letter. Regarding your letter concerning my being a s.w.l. of 40 years ago, I guess you are not interested in DX as such, but rather in cards of particular interest.

I enclose a selection of those where either the country no longer exists, or the prefix has changed. The cards include curiosities like the French Zone of Austria.

Also included are cards from British and American forces occupying places where they are no longer found, (KA - American Forces Japan), the Royal signals from various places, including Germany where BAOR was allocated DL2 callsigns.

I've also included a couple of the great names of the day. There's W1BB of 'Top Band' fame, and PY2CK who must have been one of the greatest DXers of the era. Many PYs still remember him today.

A couple of curiosities are DI9AA from Dr. Hans Hass' expedition. He was a contemporary of Jacques Cousteau in undersea exploration and an early TV personality with his underwater camera work.

Another curiosity was Fletcher's Ice Island. Unfortunately, KF3AA went off the air suddenly, and the rumour was that it had drifted into USSR waters and the operators arrested. However, from the given position, that was unlikely.

Graduating To Eddystone

Much of my listening was done on an HRO receiver. This was before I graduated on to an Eddystone 740 while doing my National Service with the 2nd Royal Tank Regiment.

I was a radio operator in a Centurion tank. And, I'm going to tell a story I don't tell over the air!

I learned that a DL2 operator had returned to the UK, and the call was not re-issued. So I took it over.

I had picked up c.w. from listening. I was then able to use the 19 set in my tank with standard rod antenna on the 7MHz band for c.w. operation only, for some 18 months.

Despite the supposed limited range of the 19 set on QRP, I was amazed at how easy it was to get comparative DX. My best DX was OY (Faroe Islands).

I remember the tremendous friendliness of the DL operators in Munster. They, although knowing I was unlicensed (in other words technically I was a pirate), invited me into their homes and encouraged and helped me work towards the RAE.

Sadly, I did not take the RAE until 35 years later But I assure you that I did not operate unlicensed after my return to the UK.

Another Story

I've got another story which might amuse you. The HRO had no tuning scale on the dial as such, but used a graduated scale. The actual frequency being obtained from reading a graph.

The story started when I wanted to check the calibration of the HRO. I then found Radio Moscow broadcasting all over the h.f. bands, so I wrote off to

Fig. 1: The QSL card issued by Hans and Lottie Hass. This couple became famous for their underwater photography on British (monochrome) TV.

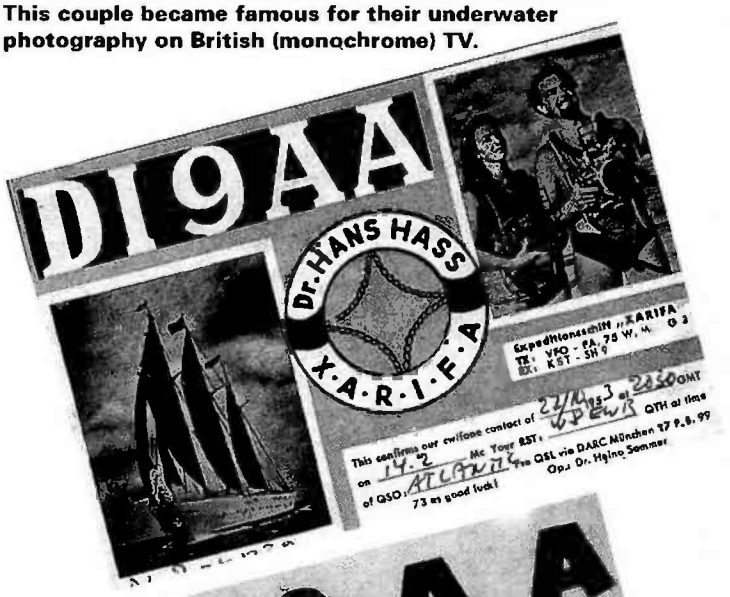


Fig. 2: The card issued for QSLs from 'Fletechers Ice Island'. Mystery surrounds the station's sudden disappearance.

Moscow asking for full details of their broadcasts!

To make my request to Radio Moscow look genuine, I said that I found their programmes very interesting. In return, they sent a load of material back.

I heard a year later, just before I was being demobilised from the Army, that due to the material from Radio Moscow arriving, I had been quietly investigated by the Special Investigation Branch (SIB) and had narrowly escaped being posted to some administration job in Catterick.

As I was a regimental headquarters (RHQ) operator it was felt that I could do some damage if the balloon went up. Of course, if I had been posted, I would never have been told the reason. I learned from the Regimental post corporal that my mail was checked, and it was piles of QSL cards from all over the world that convinced them that I was a harmless short wave radio listener!

Radio Ceylon

I remember one weekend afternoon picking up Radio Ceylon. Their Prime Minister, Sennenaika, or some similar name had been thrown from a horse and landed on his head and suffered severe injuries.

Radio Ceylon was transmitting an appeal. They wanted anyone picking up their transmission to contact a brain surgeon, Sir Hugh Cairns with an Oxford phone number, to get him to fly out to operate.

The message was endlessly repeated, I found the Guard Commander, a Sergeant, who said that he could not disturb the Orderly Officer with a matter like that. "It's none of our business, and anyway, if it's important, the Signals will be dealing with it"!

Fortunately, some radio amateur in the UK picked up the message. They got someone to take action, and the Government was preparing to send Cairns out by the new Comet jet when the PM in Ceylon died. It was in the headlines the next day.

I've only had time for a few short stories this time. I hope you've had your appetite 'whetted' for more listening and you enjoy collecting QSLs from radio amateurs and the broadcasters.

Good luck with your new found hobby. May short wave listening provide you with as much pleasure as I got from it.

G0KDZ

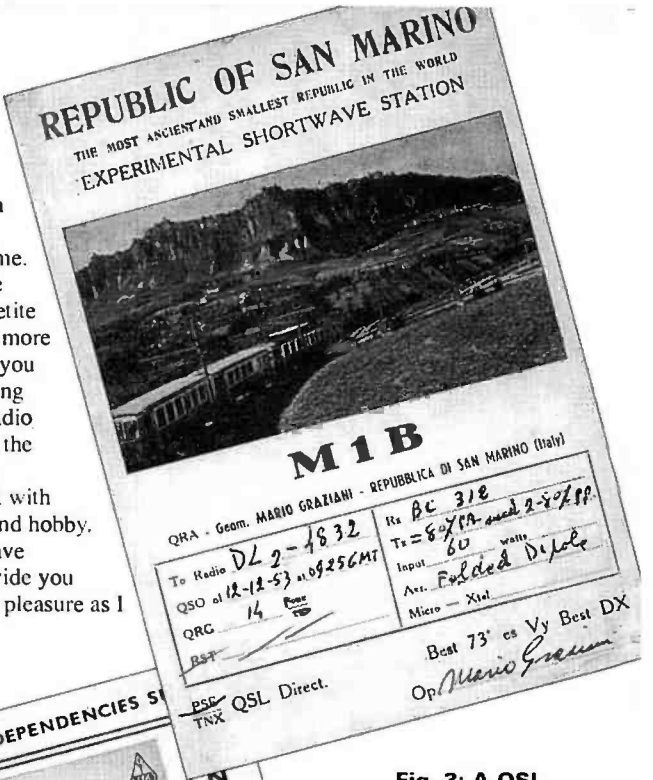


Fig. 3: A QSL from the Republic of San Marino.

Fig. 4: Cards from the Falkland Islands were rare, although the same cannot be said for the penguins!

WHAT A GOOD IDEA!

New Use For Old Controls

Following good r.f. and receiver practice, I placed the v.f.o. I had just built, in the middle of a receiver chassis. My problems began however, when I tried to make the control shafts for the wave change and tuning controls reach out to the outside world.

The flexible extension shaft had little or no support where it passed through the metal chassis. This fact created two problems

The first problem, was that the tuning was not very smooth, the shaft kept snagging on the metal edge, due mainly to misalignment and slackness of support.

The second problem was related to the first in that, after a time, the plastics shaft became worn down and caused even more displacement and difficulty in tuning.

What I needed was a bush for the control shafts to pass through. To cut a long story short, I used an old volume control.

Many of the old volume controls are still to be found. The metal shafts can be quite long and they have their own bush built in. See the accompanying photograph for a fully disassembled control and a partially assembled extension shaft.

The metal shaft has the added advantage that it may also be earthed. This helps in cutting down on external influences on the v.f.o.

Michael Stott G0NEE
Ovington on Tyne
Northumberland.

A Touch of

Patrick Allely GW3KJW turns his critical pen this time (suitably dipped in dark wit with a tint of humour) to comment on the British method of callsign allocation, which he regards to be a rather weird and almost bizarre system. He also takes a comparitive look at the simpler and more straightforward Irish system. So, it's over to you Patrick.....

I was listening on 144MHz s.s.b. today to a conversation between a newly licensed G7 and a G8 + three letter station. The G7 was naturally eager to learn and was asking a series of intelligent questions to further his knowledge of his hobby. One of the questions he asked was 'Are you a Class A or Class B licensee'?

My first reaction was that of incredulity. Everyone knows the answer to that, but thinking more deeply and following a line of reason, I reconsidered my initial impression.

How could he have known? There's no apparent hard and fast rule that denotes a Class A from a Class B callsign, and no quick obvious source of reference.

I have been asked on a number of occasions by radio amateurs abroad and from the Republic of Ireland, to explain the quaint licensing allocation system used in the United Kingdom. And I believe that there are a number of UK amateurs and short wave listeners who are unaware of the seemingly illogical issue of callsigns.

Similarly, there are a great number of British enthusiasts who have no inkling of the machinations of the Eire allocation of amateur radio licence callsigns. So, I have tried to explain their system, which in itself is a test of ingenuity.

Original Experimenters

In the early days in the UK, the original radio experimenters did not have any need to hold a licence. Such legislation did not exist, as radio was then in its infancy. Anyone interested enough to follow the experiments of Marconi and others could do so without authorisation.

However, these early pioneers were talented engineers, and soon, some of them were building and operating very high powered transmitters the signals from which were being received on simple receivers a vast distance away.

As always, politicians recognised the value of mass communication. They soon put a stop to these unauthorised transmissions.

Early Wireless Telegraphy Acts allowed authorised experimenters to build and transmit signals on various frequencies. They also allocated them a callsign.

Initially, the callsign consisted of a number followed by two letters. This was a system also used in public broadcasting as with 2LO for example, but with more amateurs taking up the new hobby, legislation demanded a change.

So, a change was made in conjunction with an international agreement of radio callsign prefixes. In this way the first recognisable amateur callsigns were issued and the G2 + two letters were heard.

Early Amateurs

The early radio amateurs were seemingly more egotistical than their modern counterparts. An examination of old call books, will show that many of the early callsigns incorporated the initial letters of the holder's name.

As the licence and callsign was issued with the personalised 'cherished' personal type letters, the series was stretched to cope with the demand. This resulted in G3 + 2, G4 + 2, G5 + 2, G6 + 2 and G8 + 2 letters being issued fairly randomly.

There were two classes of licence, a full transmitting licence and an 'Artificial Aerial' licence. With the 'AA' licence, the licensee was allowed to build equipment but only transmit into a dummy load. Needless to say, this requirement was not always kept, so there's nothing new in the concept of a Novice Licence!

During the early period, the series of callsigns for amateur use did not use G1, G7, G9 or G0. This system came to an end at the outbreak of The Second World War when all amateur radio activity ceased. Many of the now expert radio experimenters found themselves deeply involved in military communications.

Radio Activity Returned

With the cessation of hostilities, life slowly returned to normal. Amateur radio activity returned, but now without the artificial aerial restriction.

The pre Second World War 'AA' callsigns were withdrawn. They were replaced with a G2 + 3 letter callsign which ran in sequence up to G2H—.

There was then only one class of licence. However, a new licensee was restricted to a power input of 25W input and c.w. (Morse) operation only for their first year of operation.

The end of the G2 + three letter allocation was followed by G3 + three letter series callsigns. This continued for a long period, as amateur radio did not then have the following it enjoys today.

Some 30 years ago, a lot of pressure was placed upon the government to amend qualifications. The pressure was for an amateur licence to allow a type of licence - restricted to v.h.f. and above and free of the need to take a Morse test.

The 'Morse Free' licence was granted and the so-called Class B licence was introduced, using the callsign series G8 + 3 letters. Contrary to a widespread misconception, licensed amateurs could operate on v.h.f. and above before introduction of the Class B licence!

Separate Licence

A separate licence was originally required for mobile operation. Although the callsign was not changed, the licensee had to add the suffix /M ('Stroke Mobile). This licence cost an extra £1.50

Additionally, a separate licence had to be granted for anyone wishing to transmit television signals. A TV licence callsign was in the G6 + 3 letters followed by /T.

For visiting amateurs wishing to operate in the United Kingdom, a reciprocal licence was available. The callsigns of reciprocal licences were in the G5 + three letters series.

Eventually, the G3 + three letters series were all allocated. Newly-licensed callsigns were then issued with G4 + three letters.

The separate ATV licence was then cancelled. The right to transmit pictures was incorporated, as with the mobile licence, into the main licence. This then made the G6 + three letter series free, which were then used as Class B licence callsigns on the expiry of the G8 + three series. The G5 + three letter callsigns were also cancelled following a CEPTU agreement, but these, as yet, have not been re-issued.

Massive Influx

The massive influx of new radio amateurs from CB radio in the early 1980s meant a rapid allocation of callsigns. The new licensees quickly exhausted the

Class

G6 + three letter series, which were then followed by the G1 + three letters.

The trend continued and in a short time the G4 + three letters were followed by G0 + three letters. Finally, the G1 + three series were followed by the G7 + three letters which is where we are at the time of writing!

I'll simplify, by summing up so far:

Class A: G2 + two letters, G3 + two letters, G4 + two letters, G5 + two letters, G6 + two letters, G8 + two letters. There are also: G2 + three letters, G3 + three letters G4 + three letters and G0 + three letters.

The Class B callsigns are: G8 + three letters, G6 + three letters, G1 + three letters and G7 + three letters.

Anomaly In Legislation

There's an anomaly in that the legislation recognises the constituent parts of the United Kingdom as one State. But it also accepts the different countries within the UK as being united!

The 'united anomaly' means that prefix of each country forming the UK is incorporated in the callsign following the home location of the station. This means that theoretically seven amateur callsigns could sequentially be G2AA, GW2AB (the W representing Wales), GI2AC (The I representing Northern Ireland), GM2AD (the M representing Scotland).

Although they're independent for most purposes and not actually part of the UK (we share the 'Crown' - the Queen' and other things such as defence), the Isle of Man and Channel Isles are also represented in the same system. The Isle of Man is represented as GD2AE, The Isle of Jersey as GJ2AF and Guernsey as GU2AG.

Callsigns Re-issued

There is provision for the re-allocation of an expired licence. Very often early callsigns, which have been re-issued, are heard on the air.

The Department of Trade & Industry's Radiocommunications Agency can help with older callsigns. They will, on application and with the permission of the original holder, or the next of kin, re-issue such licenses.

However, they will only re-issue the old callsigns in accordance with the class of licence. For example, an old Class A licence would not be re-issued to a Class B licence or vice versa.

Very often, radio clubs will hold an older licence, the callsign of which was originally that of a late founder of that club. One which springs to mind is G6UQ a club callsign of the Stockport Radio Society. I also know of old 'AA' licence holders with a G2 + three letter callsign being re-issued with their original pre-war Artificial Aerial callsign.

The allocation of Special Event callsigns, the ubiquitous GB prefix, follows the same rules for Class A and Class B allocation. But I have yet to find out if GB9 is Class A or B!

The only time I know that a GB9 prefix has been issued was to commemorate the Doomsday Book. When I asked the operator at the time whether or not it was Class A or B, he didn't know! It now appears that Special Event callsigns which incorporate the Q code, ie GB3QRM are allowed, although such series are not issued in a general licence.

The Irish System

Having assimilated the vagaries of the British callsign system, the Irish system is a 'doddle'. In Ireland they follow a logical, if slightly unusual sequence.

Originally, EI callsigns were followed by a single letter and ran in the following sequence - EI1B and so on. It did not take too long to exhaust this sequence and it was replaced by a two letter suffix, EI1AA, EI2AA etc., and this is the current position with regard to Class A licence callsigns except that the EI1 and E10 prefix are no longer issued.

The introduction of Class B licensing in the Republic of Ireland meant a distinctive Class B callsign. This consists of a three letter suffix ending with the letter **B**, again the number is issued sequentially EI5CZB is a case in point.

Ireland has other three letter suffix callsigns which are significantly different from their normal Class B licence. For example, there are a number of licences issued to clubs.

With the Irish amateur radio club licence, very often the suffix indicates the initial letters of the club. Another example of variation is the callsign EI4LRC, which is is that of the Limerick 144MHz repeater.

Just to add a little interest to the Irish licence, the system allows the issue of an EJ prefix licence when operation takes place on an off-shore island. For example, the callsign EJ1000 was used on Dalkey Island, located in Dublin Bay, to celebrate the Dublin City Millenium.

So there you have it, two simple callsign allocation systems based on a logic which defeats me. But with my perverse humour, they delight me intensely!

However, the systems still cause me some confusion when I'm trying to sort out the various callsigns. And, I've not even discussed the Novice callsigns yet. But perhaps that's another delight waiting for Perverse Patrick's treatment!

PW

Radio Diary

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

January 23: Oldham ARC are holding their annual radio rally at the Queen Elizabeth Hall, Civic Centre, West Street, Oldham, Lancashire. Large trade presence, free parking, doors open at 11am, 10.30am for disabled visitors. Morse testing available, talk-in on S22, Bring & Buy. Free programme draw prize and mobile contact prize. **Kathy G4ZEP, QTHR.**

February 13: 3rd Northern Cross Rally is being held at the Rodillian School on the A61 between Leeds and Wakefield (near junction M1/M62). Doors open at 11am, 10.30am for disabled visitors and Bring & Buy. Usual dealers, ample parking, bar & refreshments, Morse test and talk-in on S22. **Dave Gray on (0532) 827883.**

February 26: The 9th Rainham Radio Rally is being held at a new and larger venue at the Rainham School for Girls, Derwent Way, Rainham, Gillingham, Kent. Junction 4 M42, well signposted. Traders, ample parking, Bring & Buy, refreshments. Admission £1, children under 16 Free, Talk-in on S22. **G7JBO on (0634) 365980.**

***March 12/13:** The London Amateur Radio & Computer Show will be held at the Picketts Lock Centre, Picketts Lock Lane, Edmonton, London N9. Large trade presence, free parking, lectures and disabled facilities. Bring & Buy, special interest groups, talk-in on S22. **(0923) 893929.**

March 27: Bournemouth Radio Society are holding their 7th Annual Sale at Kinson Community Centre, Pelhams Park, Milhams Road, Kinson, Bournemouth. Doors open at 10am. Talk-in from G1BRS on S22. Amateur Radio and Computer Traders, clubs and specialised groups. Admission £1 including free raffle ticket. **Ian G2BDV QTHR on (0202) 886887.**

April 3: Launceston Amateur Radio Club will be holding its 8th amateur radio rally at Launceston College. Doors open at 10.30am, well known traders, ample parking, RSGB Morse tests on demand (bring two passport photographs). **Roy G0IKC on (0409) 221624 or Rodney & Joy on (0566) 775167.**

April 17: Bury Radio Society will be holding a rally at the Castle Leisure Centre, Bolton St. Bury. Doors open at 11am, 10.30am for disabled visitors. Bring & Buy, talk-in on S22, refreshments and bar available. **Laurence on 061-762 9308 evenings.**

Specifications - The Mysteries Explained

IF THERE'S ANY ASPECT OF EQUIPMENT SPECIFICATIONS PUZZLING YOU, PLEASE WRITE AND LET IAN POOLE KNOW. WRITE TO 'SPECIFICATIONS - THE MYSTERIES EXPLAINED', C/O OF THE PW OFFICES IN BROADSTONE.

Ian Poole G3YWX continues to unravel the mysteries of equipment specifications. In this second part of a series of articles Ian deals with Image Response.

Superhet radios have many advantages in terms of performance over other types of receiver. As a result they are used far more than any other type. Despite this, they still have some disadvantages.

One disadvantage of the superhet is the image response. This is where signals on another frequency are picked up by the receiver. Fortunately, it is possible to reduce this to a level where it is not a problem in most good receivers. However, it is still an important part of the specification and one which should be noted when choosing a receiver.

THE SUPERHET

To investigate how the image response arises, it's necessary to look at how the superhet radio works. A block diagram of the major parts of this type of radio is shown in **Fig. 1** and to help in the explanation I've added a few example figures.

The radio in **Fig. 1** has an intermediate frequency (i.f.) of 500kHz, with a local oscillator (l.o.) running at 2.0MHz. A signal of 1.5MHz mixes with the local oscillator to produce signals at 500kHz and 3.5MHz. These two frequencies are the sum and difference frequencies of the l.o. and signal. Naturally the i.f. stages will reject the sum frequency and only allow the 500kHz signal through.

It is also possible for a signal at 2.5MHz to mix with the local oscillator to give an output at 500kHz. In other words, two signals can mix with the local oscillator equally well to produce a signal at the intermediate frequency. One is the wanted signal and the other is the unwanted or image signal.

To overcome this image problem some tuning must be placed in the radio frequency stages prior to the mixer. This will allow the wanted signal through and reject the image as shown in **Fig. 2**. This tuning does not have to separate one station from the next, it only has to reject the image signal many kiloHertz or even MegaHertz away.

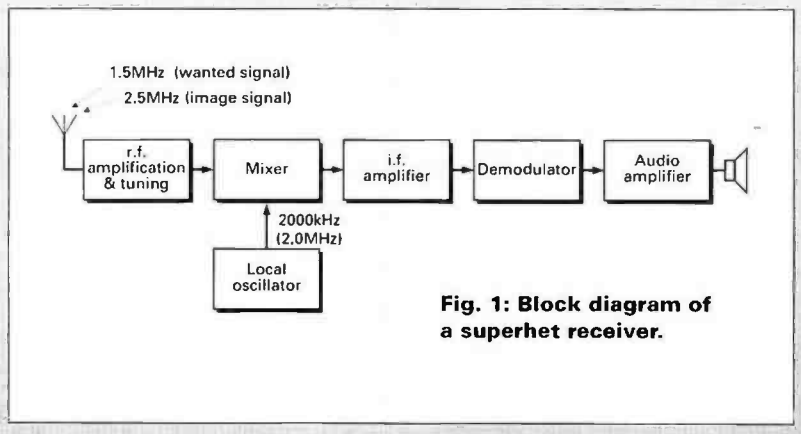


Fig. 1: Block diagram of a superhet receiver.

QUALITY TUNED CIRCUIT

The quality of the tuned circuit in the radio frequency stages plays a major part in determining how well the image response is rejected. Giving these tuned circuits a very high Q or degree of selectivity will obviously mean that a large amount of rejection is achieved.

However, superhet operation means that the tuned circuits have to tune at exactly the same frequency rate as the local oscillator. If they do not keep in track then the wanted signal will be attenuated as the receiver is tuned. Achieving the right r.f. selectivity is a compromise between obtaining sufficient rejection and being able to track the wanted signal.

Fortunately, there is another method which can be used to improve the image rejection. You will have noticed that the frequency difference between the wanted signal and the image is twice that of the i.f. This means that if the intermediate frequency is increased then the image will move further away from the wanted signal, making it easier to reject.

Many older receivers have a single low intermediate frequency because high frequency filters were not then available. Nowadays it's usual to use higher intermediate frequencies because good quality filters are available at these frequencies. Popular i.f.s include 9 and 10MHz.

Alternatively, a high first i.f., to give good image rejection, can be used with a second conversion to a lower frequency to give the required level of i.f. selectivity. Often the new synthesizer receivers will convert up to a high frequency, possibly 40MHz or more, and then convert this to a lower i.f.

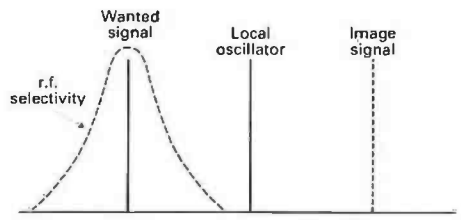


Fig. 2: Selectivity of the r.f. stages of a superhet.

SPECIFIED IMAGE REJECTION

A receiver will have its image rejection specified as a number of dB at a certain frequency. To explain this, take the example where a figure is quoted as 80dB at 14MHz.

The 80dB is an important figure. It means that if signals of the same strength on the wanted and the image channels were fed into the receiver, then the image signal would be 80dB less at the output than the wanted one (i.e. 1/10 000 in terms of voltage or 1/100 000 000 in terms of power).

It is also important to specify the image response at various frequencies as it can vary quite considerably. Often at higher frequencies where the percentage difference between the wanted and the image signals is less, image frequency rejection will become much worse.

Today's receivers boast very good image figures. Usually they are able to provide well in excess of 80dB rejection at most frequencies, falling to 60dB at their worst.

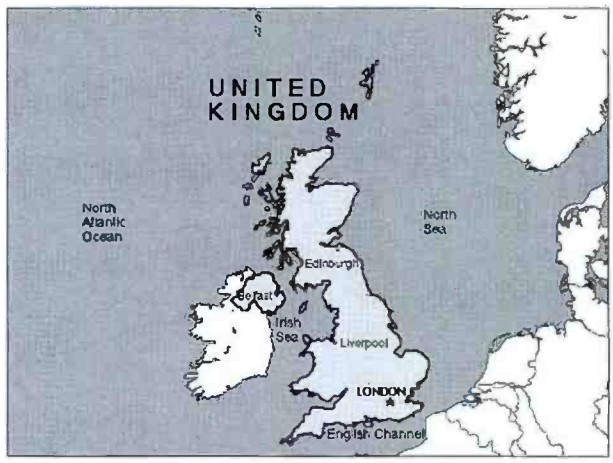
PW

The Computer in Your Shack

BITS & BYTES

Peter Hunter G0GSZ has news of another amateur radio CD-ROM as well as some interesting news for Commodore and Amiga users.

Fig. 1: Map of the UK from the World Of Ham Radio CD-ROM.



Last month I gave you some information about a CD-ROM called *QRZ Ham Radio*. It would seem that amateur radio CD-ROMs are really becoming popular now, especially for those of you who own a PC.

This month I have been sent another new disk. This one is called *World Of Ham Radio Shareware Volume Two*. It's jam packed with amateur radio programs and absolutely hundreds of megabytes of software, all in PKZIP format so as to squeeze even more onto the disk.

This new amateur radio CD-ROM also includes a **clip art** section. This has about seven megabytes of maps in .PCX format. The map of UK in **Fig. 1** is a good example. There is a total of some 240 high standard scanned maps of Countries and Islands around the world contained on the disk.

The maps on the disk can be easily imported to most word processors, used for headed note paper, or for making your own QSL cards, etc. There are also a large number of 'Ham Radio' 'icons' in .GIF format, and much more. All of this clip art is in the Public Domain, which means you don't have to pay anyone for it.

The *World of Ham Radio Shareware* CD is full of programs for just about any subject you can think of in the world of amateur radio. However, it hasn't got a 'Front End' (menu system).

The lack of a 'Front End' means that searching for a program could be a bit time consuming. But, included on the CD are several text files listing what's on the disk, which you can copy over to your hard disk, or printer, and make yourself a full 'catalogue' of the CD's contents.

I showed this CD to **Paul G4ONF**, of the Norwich City Shareware Library. He liked it so much that he has purchased a copy for inclusion in the NCSL catalogue. So, even if you don't own a CD-ROM drive, you can still benefit from the software on this disk. Incidentally, **NCSL can be contacted on (0603) 747782**.

The World Of Ham Radio Shareware volume two CD was produced by **AMSOFT** in the 'good old U.S. of A' and is distributed in the UK by **The DISK TRADER, 85 Curzon Street, Derby DE1 1LN. Tel: (0332) 362770.** It's available for the incredibly low price of just £21.99 inclusive of VAT and postage.

The Disk Trader also produce a catalogue of their extensive range of CD-ROM's, all at prices much lower than I have seen anywhere else. If you own a PC with a CD-ROM drive, then you really should have a copy of the Disk Trader price list.

Amiga Range

I've got good news for those of you using the Commodore Amiga range of computers, and also either using, or thinking of using, packet radio. If you do you'll be pleased to hear that the popular program AMICOM has been upgraded to V2.

The AMICOM program not only works perfectly with the **BSX** TNC, but will also now work fine with almost any TNC. AMICOM V2 has all help files and some instruction files in English, as well as German, so using the program shouldn't be a problem.

I have a copy of AMICOM here, but haven't had it long enough to try it out properly yet, so I'll give you a full report in the next issue of 'Bits & Bytes'. In the mean time, if you are a member of the Amiga Amateur Radio Users Group (AARUG) they have AMICOM V2 in the library. If you are not a member then you can easily join (see 'Bits & Bytes' January 1994 issue).

Membership for AARUG now stands at around the 500 mark. So I feel we can expect to see a lot more **good** software for the Radio Amateur/Amiga user in the near future.

Whilst on the subject of software, I have been asked for details of a good c.w. training program for the Amiga. Does anyone have information that can help? If **you** have written a program, send a copy to me and I'll be glad to review it for you.

Acorn Machines

Finally I have a message for users of the ACORN machines. **Sholto Fisher** wrote in with information of a new program he has written for the amateur radio enthusiast using an Acorn RISC-OS computer. The program is called *RadioBase* and allows the complete computerisation of a station logbook.

The package includes a printed manual and full technical support. The best news is that it only costs £10, which includes VAT and P&P. For more information write direct to **Mr Sholto Fisher, Ridding Bay Lodge, Lakeside, Cumbria LA12 8AU. Tel: 05395 30032.** And don't forget to tell him where you got the information from!

Final-Final

As a final-final. I've had requests from several readers who are looking for a MORSE CODE DECODE program, and circuit diagram, for the IBM PC and compatible computers. What's needed is a simple circuit that 'anyone' can build, that goes between the RS232 outlet of the PC and the AUDIO out (speaker or headphone socket) of the receiver. Plus, a program that will 'translate' the Morse code being received via this 'decoder'.

If YOU have, or know of such a program and circuit, would you please contact me with all the necessary information. I will then pass this information on to those who have requested it, and also publish full details in this column. That way anyone interested can make use of these items.

That's it for this month, once again I have run out of space. I enjoy reading your letters and will always help if I can. So keep the letters coming, as well as items for review. Until next month, 73 and happy computing, from Peter Hunter G0GSZ. 2, Mayes Close, Bowthorpe, Norwich NR5 9AR. Tel/Fax: (0603) 748338. Packet: G0GSZ @ GB7LDI.#35.GBR.EU.

E N D

SATELLITE Scene

P A T G O W E N G 3 I O R

In this month's column Pat Gowen G3IOR has some news on the popular Russian amateur satellites and information on the MIR manned space station activity

Welcome to the world of amateur radio in orbit, where the Russian amateur radio satellites are popular. It may surprise you, but the Russian RS-1 satellite that was launched in October 1978 is now 15 years old.

The RS-1 satellite is still transmitting signals, although its battery went open circuit soon after launch. However, if you listen on 29.401MHz you can still hear this old faithful sending '55' whenever the solar cells are in full sunlight. Sadly, there's not enough power generated to operate the 'A' mode transponder.

Remarkable Contacts

Many remarkable sub-horizon propagation assisted contacts are possible via the Russian RS-12's 'K' mode. For example, **GM4IHJ, NM7M** and myself have all been copying excellent signals from both the RS-10's 29.407 and the RS-12's 29.357MHz beacons.

We were able to copy the signals when the satellites have been over Antarctica, southern South America and South Africa. Reception was also possible over VE8, KL7 and UA0.

Much of the time the 29MHz downlink from RS-10 and RS-12 has been in common with the RS-12 21.210 - 21.250MHz uplink path. So, this means that DX stations have been worked when the satellite is well below the user horizons by as much as -50° elevation.

The 'beyond the mutual horizon QSOs' achieved by myself, included K4ZC (North Carolina), VE2GSX, LU2NI and PJ2MI. Other good 'in range' RS-12 QSOs included RA3IM, F9EA, GW4HBK, UO5OK and DJ9SB. There were also contacts with many other European stations and some of the nearer Ws.

Many other stations were copied, as they were booming in on the RS-12 downlink. They were oblivious to this fact, as they were working terrestrial F2 DX within the RS-12's 40kHz wide uplink passband.

Reactivated Robot

Controller **Andy Mirinov RK3KPK** has reactivated the RS-12 Robot. It's noticeable that the Robot requires a near perfect 1:3 dot-to-dash ratio for it to respond to callers.

While RS-12 is at high angles of elevation or along dark paths, the Robot responds well. However, when in high maximum useable frequency (MUF) conditions, particularly at low elevation angles or sub-horizon, it's almost impossible to get response, although the downlink is actuated by your signal.

The difficulty in the Robot response is thought to be due to the multipath signals changing the dot/dash ratio from 1:3 to 1+n:3+n, where 'n' is the character duration addition. This makes the Morse difficult to read by the Robot.

By changing the Morse keying weighting to give more abrupt dots (clipping them) Robot QSOs may be made. This discovery, together with studies of the erratic Doppler variations during multipath sub-horizon passes, may be used as an excellent ionospheric research tool by keen observers.

Russian Space Station Active

The Russian MIR space station has been active, sometimes turning up on the most unusual frequencies. The crew are having great problems in finding any channel that's not in use by high powered terrestrial f.m. stations.

Swindon based G3BGM reported that he had several contacts with MIR on 145.850MHz. This proved to be highly unpopular with the many satellite users, as both MIR's and the caller's strong wide band f.m. Doppler shifting signal wiped out their OSCAR communications for up to 12 minutes at a time.

The MIR operators then went to 144.450MHz. This action then brought the disapproval of band planners who are anxious to keep f.m. packet and speech above 144.500MHz.

The latest information on MIR is that they are now back on 145.550MHz. Incidentally, Radio Moscow has been re-transmitting recordings of some of the many QSOs made by the MIR operators.

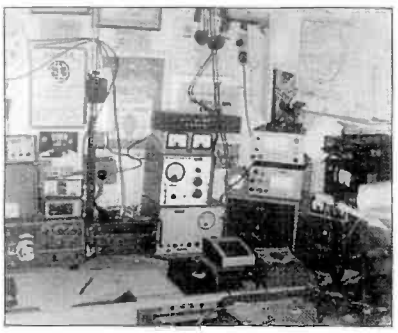


Fig. 1: Dave Rowan G4CUO, lives in Newark, Nottinghamshire. He's a keen RS satellite DX chaser, and the photograph shows a corner of his shack.

Space Callsigns

Sergei Samurov RV3DR reports that many of the cosmonauts who operated from MIR, are now using their space callsigns from their stations on terra firma. These include Musa Manarov U2MIR, Alexander Volkov U4MIR and Sergei Krikalev U5MIR. Also included are Gennady Strekalov U6MIR, Anatoly Artsebarski U7MIR, Alexander Kaleri U8MIR and Vladimir Titov U1MIR.

Some cosmonauts are using more conventional calls. These include Alexander Alexandrov who is now UZ3AP, Vladimir Dzhanibekov now RV3DD and Sergei Avdeyev RV3DW. Alexander Poleschuk R2MIR will soon be RV3DP, Nicolai Budarin will activate RV3DB and Yuri Usachev will be active as RV3DU.

The present crew members of MIR, Vasily Tsibliyev and Alexander Serebrov do not have personal amateur radio licenses. So, they do not have their own call signs while manning MIR.

However, Vasily and Alexander do have permission to use the amateur radio station in MIR. They can use the general callsign R0MIR for speech and R0MIR-1 for the on-board packet radio PMS on 145.550MHz.

Amateur Radio Instruction

Russian cosmonauts will now be given amateur radio instructions by Sergei RV3DR, as a fixed part of their cosmonaut training. So, we can confidently expect the amateur radio station in MIR to be active continuously as long as cosmonauts are on board the space station.

Future amateur radio trained cosmonauts will include Valeri Poliakov U3MIR, Victor Afanasyev U9MIR and Yuri Usachov R3MIR.

Sergei RV3DR is only involved in training the Russian cosmonauts. He recommends that western amateur radio organisations take care of the amateur radio training of the future 'guest' cosmonauts preparing for a stay in MIR.

Sergei has an idea, which could help make the amateur radio activity of a western cosmonaut in MIR as effective as possible. He suggests that the cosmonaut carry out a specific amateur experiment or take some new equipment to MIR. This could be some innovation such as the microphone with voice memory which was taken by the German cosmonaut Flade.

There's news that there are plans to change MIR's amateur radio equipment. In the future, not only 144MHz but also 430MHz and even 1296MHz operation can be expected. Additionally, ATV equipment for use on board the space station is presently being developed in Germany.

Well, I've run out of 'space' again. That's all from amateur radio in orbit for this month.

E N D

PAUL ESSERY GW3KFE

HF BANDS Report

In this month's column Paul Essery GW3KFE passes on some more tips for successful h.f. bands work, along with news from the regular correspondents.

Letters by the beginning of the month addressed to 287 Heol-y-Coleg, Newtown, Powys SY16 1RA.

To find the DX you must know where to look. That's the function of those lists of callsigns. Suggested places to look are: PacketCluster, DX columns in other magazines, *The DX Bulletin*, and *DX News Sheet* weekly from RSGB. (The latter will also notify you of any upcoming DXpedition before they surface. Non-members may subscribe).

Imagine you are looking for a contact with a country YY9. A trawl through all your sources shows a YY9ZZ who appears on 14MHz, generally around 14.???MHz.

You note the quoted time and frequency. Then look at a map for the time difference.

Now turn the computer to your propagation program - Miniprop by W6EL is good. Use sunspot number or flux taken from DK0WCY or the GB2RS News - and see what that says. Make a note of the beam headings, greyline times and so on.

You now know that the wanted station operates, say, in their morning time before work, whether or not there is decent propagation from UK at that time. You also know that they are usually around 14.???MHz on Tuesdays and Thursdays.

The omens look good. So, on Tuesdays and Thursdays you are in the shack at the right time, tuned up, and beam in the right direction.

Remember the negative factors high A or K, figures, to propagation. This information will be provided by DK0WCY. These are **NOT** factors in a propagation program because they are hour-to-hour things.

If A or K are low, YY9ZZ should be in the bag. If they are high, switch off and reduce the QRM! Incidentally, the meaning of the various propagation factors are made clear in the article in recent RSGB *Call Books*.

News And Events

Now for some news and events. First, there's an event for the active listener - The White Rose International Short Wave Listener Contest, from noon GMT on January 15 to noon on 16th.

Although the White Rose Contest covers a 24-hour period you may only operate for 18 hours. There's a compulsory continuous six hour rest period.

The contest has two sections, s.s.b. and c.w. It's open to class B or Novice callsign holders, but no multi-operator or mixed-mode entries.

The White Rose Contest utilises the 1.8, 3.5 and 7MHz bands. The object is to log up to five stations on each band from as many countries as possible.

Countries outside your own continent merit five points, all others one point. Total points so obtained on each band to be multiplied by the number of countries heard on that band.

The grand total is the sum of the band scores. The ARRL Countries List is the norm, but in addition the call areas in Canada, Japan, Australia and New Zealand each count as a country.

Please note that CQ, QRZ, or similar calls cannot be counted. Neither can /AM (aeronautical mobile) or /MM (maritime mobile) stations.

Contestant's log sheets are to show: date, time GMT, station heard, the station being worked, and RS(T) at the s.w.l. QTH. If both sides are heard, they can be claimed, and should take a line each.

Any station can appear in the 'Station Heard' column once only on any band. Logs should be submitted with separate sheets for each band, postmarked no later than February 28, 1994, they should be addressed to **D. A. Whitaker, c/o White Rose ARS, 57 Green Lane, Harrogate HG2 9LP.**

Pratas Island is still 'in the sausage machine' at the time of writing. To old cynic GW3KFE it's beginning to look rather like a 'busted flush'. However, the Peter 1 exercise is very much on target for February.

Band Conditions

Time to look at band conditions now. At the moment of writing (November 21) the bands have been below normal since the beginning of October with barely a flash of brilliance.

Your Letters

Now to your letters. To start off, I'll let that QRP enthusiast **Leighton Smart GW0LBI** from Trelewis in South Wales have first shot.

On 1.8MHz, Leighton now has 41 DXCC countries worked thanks to LX0RL. This time he notes also various Europeans worked on both c.w. and sideband using his ⅜ wavelength antenna.

Leighton's report then turned to 14MHz and the dipole. And, on this band I see SP5NHC (two-way QRP) UT5EH and IK5RD all at 1W c.w. plus K1RX and W3LPL on s.s.b.

Then, Leighton, using another dipole on 21MHz c.w. yielded EA6ZY who used to be G6ZY. He then worked W2CRS/QRPW0MHH/1, N1QY/QRP, W9HAO, and Europeans, at a maximum of 5W.

Loopy!

Alas the transmitting loop (Isoloop) shown in the picture (December 1993, p.48) was not the one **G3BDQ** (and **G2HKU**) use for reception on 1.8MHz as the caption implied. Theirs is for reception only and is a shielded construct made from low-capacitance coaxial cable.

The aim when using a loop is to get the received noise down. The ploy provided G3BDQ a s.s.b. contact with 7X2DG, plus Europeans, UA9s, and T77C all at 599 on c.w.

On 3.5MHz s.s.b. the G3BDQ report logged 4U1ITU, C53HG, K2IAB and ZL2ADX. A change to 7MHz and back to c.w. made HL1EX, HZ1HZ and TG/PA3DZD.

Continuing with c.w. on 21MHz G3BDQ worked YN/SM0OIG, plus on s.s.b. he caught ET3YU and S83H in Transkei as pick of the crop.

Switching to 18MHz produced KL7HF on c.w., while 28MHz produced J28RD plus the odd US station. Clearly, G3BDQ has a crystal ball to predict DX openings on 28MHz!

Now it's time to turn to **Don G3NOF** in Yeovil. He must have felt strongly about conditions, because that sentence burnt a hole! However, he makes the point that 'conditions' and 'activity' interlock, as the CQWW on October 30/31 showed.

On 7MHz C51A provided Don with a new one on the band. The 14MHz best was ZS8MI for sure, and for 18MHz 5T5JC. On 21MHz ET3BH was worked, and 24MHz Ray XX9AW was worked. As for 28MHz Don managed to work TJ1GG.

Over in the Isle of Sheppey G2HKU seems to be on the mend. Though he's still on the waiting list for surgery.

Looking first at low power, G2HKU's IC-721S on 14MHz sorted out T97T. On 18MHz he worked ZD9SXW and VQ9QM, and switching to 21MHz brought PP1RR, and on 24MHz 4X6ZK.

Turning to the 'Big rig' at G2HKU, I find that his Omni VI accounted for VQ9QM on 10MHz, and UA0KAH on 14MHz.

On 18MHz G2HKU hooked VQ9KC and ZD9SXW. Turning to his 21MHz entry I found YN/SM0OIG, ZD9SXW, 9D5CW, HT1T, and VP5P. On 24MHz G2HKU noted YN/SM0OIG, 7Q7XX, VQ9QM, ZD9SXW, and SV5/GM3YOR.

In Stevenage, **Angie G0HGA** notes '3V8AS' worked on 18.070MHz at 12.39 on November 10. Angie heard this long and slow CQ but wonders about whether he was genuine.

Angie's station was alas probably Tunisia Slim! On 3.5MHz Angie raised Stan EA6ZY. So, they have now worked on five bands. On 1.8MHz, various UK and Europeans were raised by Angie. However, she keeps on wandering off to work DX on 144MHz ....what's the world coming to??

E N D

PACKET Panorama

Roger Cooke G3LDI takes a look at the 'unsung hero' - the packet sysop. Roger's timely mention of their problems might ease their load a little.

Running a full-time very busy h.f. gateway, together with the usual v.h.f./u.h.f. ports is a time-consuming business. It takes several hours per day to keep the BBS running smoothly and up to date. It also ties up a great deal of hardware, software, and requires much patience.

On top of all these costs and electricity, the sysop must also maintain the BBS under the terms of his licence. Checking the content of each bulletin is the responsibility of the sysop. Bulletins are also a reflection on the originator, who should stay within the DCC guidelines when issuing bulletins.

Bulletins need thought before putting hands on keyboards, the content of some bulletins makes me question their purpose. This and the sometimes transparently false callsigns, reinforces my opinion that personal passwords are the only secure method of minimising such behaviour.

I was quite sorry to learn that three of my regular h.f. forwardees are stopping BBS operations as from December 31. They are **Manos SV1IW, Jim 4X1RU** and **Peter EA4BS**. Manos and Jim have featured in a previous column but I've just managed to get a picture from Peter EA4BS, **Fig. 1**, with Peter's station details in **Table 1**.

Manos, Jim and Peter have decided, that after eight years, they're going to 'claim back' their h.f. rigs for their own use as it were! Manos is interested in trying out Clover. So Clover may be the next generation of h.f. digital communications between BBSs.

Fig. 1: Peter EA4BS in his shack.

Terminal program.

The terminal program TPK v1.81, is fast becoming the most popular in Australia. I was told of the UK stations running the program and obtained a trial copy from **Alan G3KFN**. This I passed to **Jim G4BDW**, who had volunteered to try it and let me have his thoughts on it.

Jim, a dedicated Lan-link user, has, since trying TPK, gone over to using it full-time. If the user's local BBS is FBB, then TPK certainly has a lot going for it. Jim, pictured in **Fig. 2**, sent the following comments.

"It's the best thing since sliced bread or transistors! It does everything automatically.

I wouldn't use anything else now. Setting up is quite straightforward. With a few keywords, bulletins can be automatically downloaded and captured to disk.

The sysop of the main FBB BBS needs to make a few alterations to the 'PORT.SYS' file and that's it. Another advantage is that the downloading is done in compressed format, thus reducing traffic.

Replying to messages is also simple and the addressing is done for you. This program takes advantage of the broadcast protocol of FBB and keeps lists of bulletins headers that you tag for downloading".

Jim is also interested in using 9600baud as an end user so I hope to have a suitable port for him to start the ball rolling in the new year. If you would like a copy of TPK, just send a formatted disk with return postage and mailer to: **Alan/Chris G3KFN/KC6IKO, 37 Boulter Close, Roborough, Plymouth, Devon PL6 7AY**

Table 1

Callsign EA4BS
QTH : 28670 Villaviciosa de Odon - 25km SW of Madrid, Spain.
Computer: PC 486 AT (clone), 8Mb RAM, 211Mb hard disk. Software : FBB Release SE. Multiconnect and multilingual. There are four ports and 13 channels :

Port/Freq.	Tx	Antenna	Channels	TNC
1 14/21(h.f.)	TS950SD	Exlorer-14	one ch	PK-232
2 430.500	TS-811	16-El.Vert.	four ch	TNC2
3 144.675	FT-212L	Collinear	four ch	TNC2
4 144.625	FT-4700	Dual-band	four ch	TNC2
5 433.675	FT-712RH	Dual-band	four ch	TNC2

Port one, on h.f. has a linear of 1.5kW and auto-QSY, port two has 55W of r.f. with port three with 100 Watts. Software is YAPP only on 144.625 and 433.675MHz.

Table 2

Chairman:	Alan Hobbs, G8GOJ
Secretary:	Ian Brothwell,G4EAN @ GB7BAD
Membership and Subs:	Peter Adams G6LZB @ GB7BST
Components Sales:	Ken Goodwin G0PCB @ GB7DUG
Rally Co-ordinator:	Ian Wilkes,GW3FSW
BARTG Rally:	Peter Nichol G8VXY

BARTG News

As a result of the recent AGM, a few personnel changes have been announced, and are shown in **Table 2**. **Andy G3ZYP** has also joined the committee. The subs are unchanged at £10 per annum.

The BARTG have also just released a booklet called *The BARTG Guide to Packet Radio*. Produced by **Ian G3NRW** of NOSVIEW fame, it provides a friendly and clear introduction to packet. The price is only £1 including P&P and may be obtained from BARTG's publication manager, **Mark Ashby, G6WRB, 47, Ryton Close, Luton LU1 5SR.**

Just enough room to thank those who have bought a copy of my book, *Packet BBS Survival Guide*. I hope to be able to send Amsat a cheque by the end of the year towards Phase 3D. There are still quite a few left if anybody wants one, £4.50 including P&P.

As usual news and views to G3LDI @ GB7LDI, QTHR. Tel: (0508) 70278.

Happy packeting de Roger G3LDI

Fig. 2: Jim G4BDW in his shack. I hope those books are safe and secure!

END

Antenna Workshop

As this is a Vintage related issue of PW, Peter Dodd G3LDO, brings you up to date with a little historical background about antenna development.

In 1819 Hans Christian Oersted, a Danish professor of Physics, found that a compass needle was deflected by current flowing through a nearby wire. From this deflection of the needle, he deduced that electricity could produce magnetism.

In 1831 Michael Faraday demonstrated that a changing magnetic field could produce an electric current. In other words Faraday showed that magnetism could produce electricity.

Classic Treatise

In the classic treatise of 1873, James Clerk Maxwell combined both of the previous ideas. He published the first unified theory of electrical and magnetic behaviour. Not only did Maxwell's equations describe all known electromagnetic phenomena, but in a broader sense he predicted electromagnetic radiation.

Maxwell indicated that an electric charge, which is accelerated or decelerated at a given rate, is accompanied by a pulsating magnetic field of the same rate. This magnetic field, together with the electric field produced by it and at 90° to it, forms enclosed loops of electromagnetic energy. Each loop is repelled by the following one so that the energy is radiated into space.

In the early 1880s, the Berlin Academy of Science offered a prize for research into electromagnetic forces. In 1886 Heinrich Hertz, professor at the Technical Institute of Karlsruhe, assembled equipment to investigate the existence of electromagnetic energy.

The equipment used by Hertz, **Fig. 1**, comprised of an induction coil, spark gap and a dipole antenna. An induction coil is similar to a car ignition spark coil, having a low voltage primary and a high voltage secondary.

The low voltage primary is fed by a pulsed low voltage using a buzzer arrangement. The high voltage at the secondary produced a large spark at the antenna spark gap.

The receiver loop had a very small gap. When the transmitting antenna was energised tiny sparks could be seen at the receiver spark gap.

Electromagnetic Energy

The Heinrich Hertz experiment proved the existence of electromagnetic energy, which up until that time had been only a theory proposed by Maxwell. Heinrich Hertz's later experiments led to the discovery of polarisation, reflection and refraction.

Although Hertz's experiments were described in scientific papers, no one considered the results as having any practical use. Nearly 20 years later Guglielmo Marconi read a magazine that described Hertz's experiments, and was inspired to repeat them.

Marconi was quick to realise the commercial significance of the work done by Hertz and quickly improved transmission distances by adding tuning and large antenna and earth systems. Marconi's greatest achievement was to receive signals

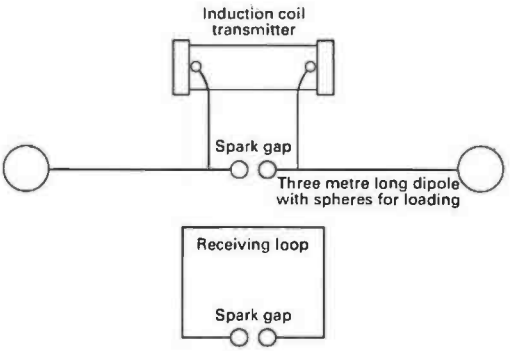


Fig. 1: The original experimental layout used by Heinrich Hertz.

at St. John's, Newfoundland from a station that he built at Poldhu in Cornwall.

Although the early experiments were conducted at very high frequencies with wavelengths of 30cm and 8m, the distance that these waves could be detected was very limited.

Commercial radio development was at low frequencies, when it was found that very low frequencies favoured long ranges. Typical wavelengths used for these radio links ranged from 20 000 to 2000 metres (15 to 150kHz). At these frequencies, antennas were only a fraction of a wavelength high and were very inefficient.

Wooden Towers

In 1905 the standard Marconi antenna was comprised of four 70m high wooden towers, **Fig. 2**, supporting an upside-down cone shaped cage of wires. The inefficiency of this antenna system was overcome by using as much as 50kW of power.

To get an antenna to operate at the frequencies used in 1905, required large inductive resonating circuits, which by their very nature are inefficient. Antennas were designed to have as much top capacity as possible to reduce the size of the inefficient resonating inductance.

Wavelengths less than 200m (1.5MHz) were considered of little value, so these frequencies were allocated to amateurs. Radio amateurs soon discovered that efficient antennas, and ionospheric refraction, made reliable communications at these higher frequencies perfectly feasible, in spite of relatively low transmitter power.

At this time most of the antennas used by amateurs were derivatives of the Marconi antenna shown in **Fig. 2**. However, as technology improved, giving access to the higher h.f. bands, antennas that did not use an earth connection were used.

Of these other antennas the resonant dipole, fed with open wire line, became popular. A swinging link (variable pick-up) was used to find the correct coupling to the transmitter power amplifier anode tuned circuit.

An r.f. ammeter in each of the transmission line conductors told of the greatest r.f. output. At the time v.s.w.r. was not regarded as important (or in many cases even measured).

Commercial radio

When commercial radio discovered the value of communication at wavelengths below 200 metres, much work went into designing effective beam antennas. It was found that arranging banks of

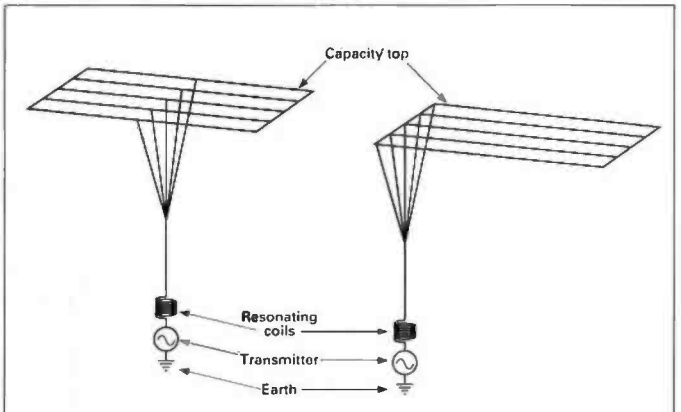


Fig. 2: Two variations of the Marconi type vertical antenna (monopole as opposed to dipole).

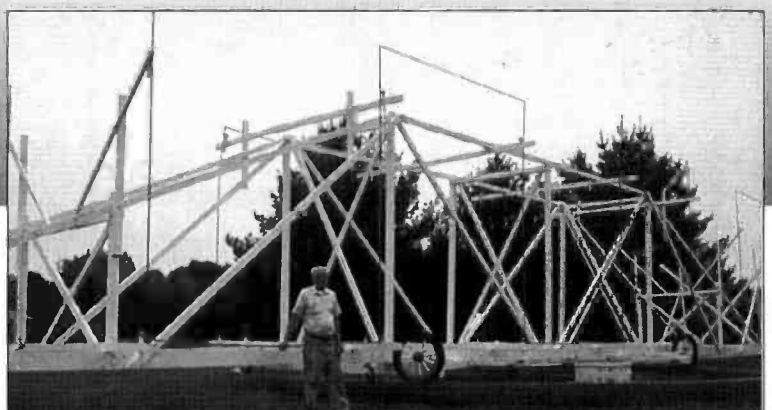


Fig. 5: Janski's Bruce array, with Bert Weller, WD8KBW for size comparison purposes.

dipoles half a wavelength apart and feeding them in phase produced both directivity and gain (compared to a single antenna).

Phasing the antennas is easily achieved. A transmission line produces a 180° phase shift every half wave (within the transmission line). All that they had to do, to retain the correct phasing, was to transpose the feeders, **Fig. 3**, to each set of dipoles.

Sterba Curtain

Another of the antennas that was developed, was the Sterba Curtain. This antenna consists of banks of Quad loop antennas.

The Quad loop antenna had the advantage of not producing 'brushing' (a discharge that occurs from the tips of the elements when fed with high power). The resistance to discharge made it easier to use high powers for short wave broadcasting.

Greatest impact

The antenna that has made the greatest impact on amateur and commercial radio alike, was invented way back in 1926. This parasitic (no direct drive to each element) array antenna, now called the Yagi, was originally designed by Shintaro Uda, an assistant professor at a Tokyo University. His original layout is shown in **Fig. 4**.

Professor Uda measured the gains and directivity of a large number of different sized antennas. The measurements were made on systems with between one and 30 elements. The results were published in a series of articles in the *Journal of the Institute of Electrical Engineers of Japan* between 1926 and 1929.

A colleague of Professor Uda, Hidetsugu Yagi, professor of electrical engineering and Uda's senior, toured the United States. Here he published an article called 'Beam Transmission of Ultra Short Waves' in the Proceedings of the IRE, June 1928. From that point on the antenna became known as the Yagi, or sometimes the Yagi-Uda.

Yagi-Uda parasitic beams didn't come into general use with radio amateurs until the mid-thirties. Their construction was similar to the original Uda design - metal elements mounted on insulators with a wooden boom and tower. Articles for these antennas, all fed with twin feeder, using the original construction techniques persisted until 1947.

Rotating Beam

The first rotatable beam antenna that I can find any reference to is the 21.5MHz. 16 element Bruce array. In spite of the name, this antenna was constructed by Karl G. Janski for Bell Telephone Laboratories. The antenna was designed to locate the source of troublesome atmospherics that were causing interference to transatlantic radio telephone links.

During his investigations, Janski noted, that in the absence of atmospherics, there was always a background hissing noise, whose source moved with the rotation of the earth. After months of observation Janski concluded that the noise was extraterritorial with its source at our galactic centre.

Bert Weller WD8KBW, is shown with this antenna in **Fig. 5**, giving you some idea of size perspective. I wonder if anyone has tried using this antenna on the 21MHz amateur band?

The first all metal parasitic beams were dubbed 'plumbers delight' construction. With it came the use of coaxial cable transmission line and gamma matching

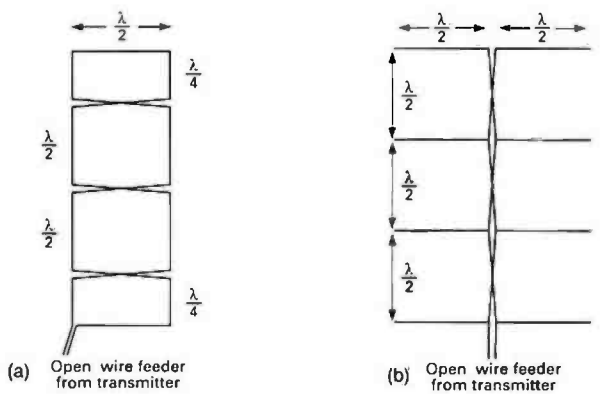


Fig. 3: Broadside phased antenna systems, (a) is the Sterba Curtain, (b) is a horizontal stacked collinear.

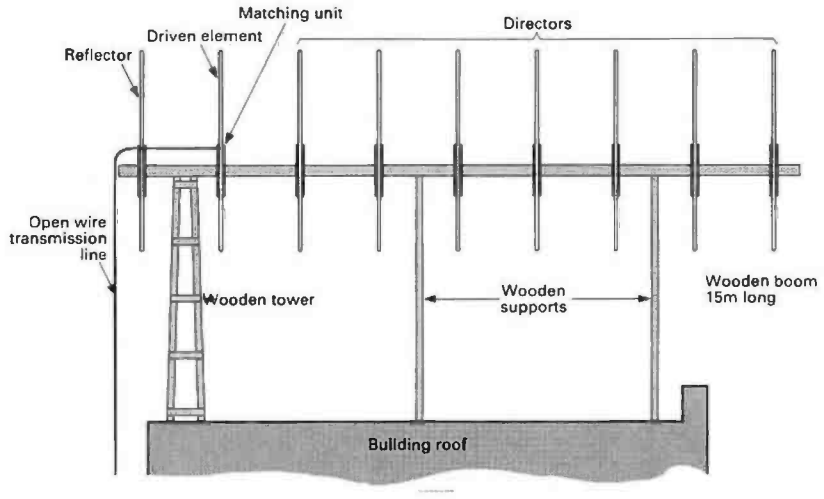


Fig. 4: Professor Uda experimented with parasitic antennas, using this layout.

Exciting Designs

Currently, the most exciting area of amateur antenna design is the construction of high gain antennas for moonbounce. Many of these designs incorporate an array of Yagi antennas all fed in the correct phase to produce a narrow beam and high gain.

PW

VHF Report

DAVID BUTLER G4ASR

David Butler G4ASR reports that conditions on the v.h.f. bands during November were enhanced by excellent tropo openings and numerous weak auroras. On the 50MHz band there were some fleeting Sp-E openings. More people are taking an interest in Earth-Moon-Earth (e.m.e.) communications and the second leg of the ARRL contest gave operators an opportunity to make their first lunar contacts.

Welcome to the world above 30MHz! The excellent tropo that existed for much of October continued well into November.

The excellent conditions covered most of the UK. The good tropo enabled contacts to be made into Scandinavia, central Europe and southern Europe on all the v.h.f., u.h.f. and microwave bands.

For the second month in succession there were times when propagation modes became blurred. Beam north and you could work the DX on aurora!

Turn the beam to the correct heading and you might contact them on tropo. All very confusing, but it certainly sorted out the men from the boys!

Many Directions

Propagation conditions during the first week of November on the 144MHz band were widespread and in many directions. Scottish stations were working into Germany, France and the Czech Republic. Welsh operators were contacting Scandinavia and stations in central England were working all over the place!

Fig. 1: Thomas Schell SM6AFH, Editor of *The Two-Metre News Sheet*, pictured in his shack.

The best path on November 15 was to the south. For over four days, many operators in Wales and central England were working stations situated along the north coast of Spain in locator squares IN53, 63, 73, 83 and 93.

From November 17, propagation was also excellent to Denmark, Norway and Sweden. Stations as far north as JP60 and JP70 were worked from the centre of England. The Lerwick beacon GB3LER (IP90) was even heard in Switzerland by HB9JAW (JN47).

Good Holiday

Noel Moore GI7CMC (IO64) was fortunate to catch the good conditions while on holiday at the end of October. Operating from a coastal QTH about 80km south of Belfast, he reports that conditions on the 144MHz band were tremendous on October 28.

Using an FT-221 with muTek front end and a 7-element Cushcraft Yagi, Noel reports many s.s.b. contacts were made into Belgium, Holland and Germany. A Pye A200 amplifier running 50W output helped boost his signals and kept Noel much in demand from the continental stations.

Whenever conditions are good you'll probably hear **Joe Ludlow GW3ZTH** operating from his portable QTH (IO81) on a local Welsh hill top. During October he made a total of 341 contacts on the 144MHz band, with stations in 18 countries in 79 locator squares.

Joe Ludlow's success shows the advantage of operating from a site 600m a.s.l. Joe is also active on the 430MHz band and reckons that conditions during the period October 30-31 were better on that band than 144MHz.

On October 30 for example, Joe was copying many beacons including FX1UHF (JN18), FX3UHF (IN97), FX4UHB (JN06) and DF0AAB (JO54). A number of Eu contacts were made and HB9MIN was heard at S9+ looking for microwave contacts.

Some German stations, including DL4AKK/P (JN39) and DC6NY (JN59) were worked on October 31 before Joe accidentally blew up his GaAsfet pre-amplifier!

The RAF Club station, **G6RAF** (IO92) operated by **Reg Wooley GW8VHI** made a remarkable contact on the 430MHz band. He contacted RB5PA (KO21) during the evening of October 29. This was at a distance of over 1700km.

David Anderson GM4JJJ (IO86) reports he did well. This was despite having a deaf transverter, no l.n.a. and a 1.5dB feedline loss and he was pleased to work some good DX on the 430MHz band during the period of enhanced tropo.

Conditions were good for GM4JJJ between October 27 to November 2 when stations in 30 locator squares and 10 countries were contacted. His best QSOs were with HB9MIN/P (JN37) and OK1UWA/P (JO70).

David runs 90W into two 19-element Yagis on the 430MHz band. This set-up was sufficient to enable an e.m.e. contact to be made with VE3ONT on November 6.

Propagation on the 430MHz band were very good, especially during the period November 1-6 and 16-20. **Dave Storrs G8GXP** (IO93) worked strings of German stations on November 1. Included in the G8GXP list were DC1EY (JN59), DF6NA (JN49), DC6NY (JN59) and DG7NBE (JO40).

Down on the south coast things were also happening. The station of **G1HWY** (IO90) copied the Czech beacon OK0EA peaking 539.

The enhanced tropo between November 16-20 was excellent according to **GW8VHI**. Contacts from the club station G6RAF during this period included EA1TA (IN53), EA1DKV, F5EAN (JN06), F6CRP (IN96), SM4DHN (JP60) and SM4JWI (JP70). They also heard the beacons HB9F (JN36) and OZ7IGY (JO55).

Girling Pleased

Richard Girling G4FCD (IO92) was very pleased to work HB9MIN/P (JN37) on the 10GHz band. Richard runs 10W output into a 900mm dish at 17m above ground.

Richard's t.w.t. amplifier and receive l.n.a. are mounted in a die-cast box at the focus of the dish. The s.s.b. contact with HB9MIN on October 30 was his best DX of 1993.

Auroral Events

During November there was a significant increase in the number of auroral events. At my QTH (IO81) eight openings on the 50MHz and 144MHz bands were detected.

The eight openings were on November 4, 5, 6, 7, 8, 14, 18 and 19. Most of these were fairly weak although the event on November 18 did produce some good Scandinavian DX.

Among the stations being worked on the 144MHz band between 1500-2000UTC were LA1ZE, LA6VBA, OZ6OL and SM5BSZ.

The 50MHz Band

Time to hear what's been happening on the 50MHz band now. And it's amazing what difference a few weeks makes on this band.

Sporadic-E was noted on 50MHz nearly every day between October 9-30. In November, only three openings via this mode were recorded.

The first Sp-E opening on 50MHz occurred on November 2 at 0913UTC. This was when **David Lancaster G0ISW** (IO84) worked SM3EQ on s.s.b.

Later in the evening, G8GXP reported working CN8ST at 1755UTC and EH8ACW at 2123UTC. On November 6 between 1030-1300UTC the band was again open to the south, contacts being made with stations in EH, I and IS0.

A brief opening was noted by G1IOV around

0930UTC on November 12. He heard the beacon ES0SIX (50.036MHz) and worked SM1MUU at 59 on s.s.b.

As is usual for 50MHz the majority of auroral openings were passed by, with the exception of the event on November 18. This is probably because signals were quite strong and operators could exchange S9 reports!

Australian Permit

Australian **Steve Gregory VK3OT** (QF12) has some interesting news. Steve reports that he's obtained a permit allowing his station to run 1kW on the 50MHz band for a six month period.

Using a single 9-element Yagi Steve made e.m.e. contacts with K6QXY and W6JKV on November 7. He expects to upgrade the antenna system to four 9-element Yagis by February.

Congratulations to **Byron Fletcher G6HCV** on recently obtaining DXCC certificate No. 137. That's 100 countries confirmed on the 50MHz band! Byron is the first 'B' Class licensee to obtain this prestigious award.

Moonbounce Activity

Interest in moonbounce work is increasing. You may think that e.m.e. activity is only for stations with lots of Yagis and a kilowatt at the feed point. That's not strictly true and many small stations are able to work this exciting mode.

The second leg of the ARRL e.m.e. contest held on November 6-7 provided an opportunity for some to prove this. **Ralph Sachs G2CZS** (JO01) is one, and although he didn't work anyone he was very pleased to hear a number of e.m.e. signals on the 144MHz band.

When he was listening around 1100UTC on November 6, while the moon was at an elevation of 14° above the horizon Ralph heard I2FAK, KB8RQ and VE7BQH. He uses a Cushcraft 13B2 13-element Yagi, 10m of UR67 coaxial feeder, a pre-amp in the BNOS amplifier and an FT-290R receiver.

Signals were very audible on the speaker. These results are giving Ralph an appetite for this 'exotic' mode. He's now dreaming of a box of four 13-element Yagis, a mast-head l.n.a. and an az/el rotator!

Actually Ralph doesn't need to dream about such a large array. Good results can be obtained from a two-Yagi system as the following reports testify.

Over in the Netherlands, **Joop Mutter PA0JMV** uses a pair of home-made 16-element Yagis. During the e.m.e. contest he made a total of 54 QSOs on the 144MHz band, all but three being random contacts!

It was a big surprise for Joop to work EA3DXU, another two-Yagi station. A schedule with VP5/WA3HMK (Caicos Island) during the contest was not completed, although Joop heard him with good signals.

However, on November 8 another sked Joop arranged with VP5 was successful. And DXCC country No. 85 was in the log.

Incidentally, the VP5/WA3HMK expedition station was using two 18-element Yagis and 750W. The contact with VP5/WA3HMK brought Joop's total number of stations worked via the moon to 389!

Good System

Lucca Scatena IK5UBM has a good 144MHz system consisting of two 17-element F9FT Yagis. He uses an MGF1302 l.n.a. at the mast-head and feeds the signals via Pope's H-100 cable to a TS-790 transceiver.

For e.m.e. tests the use of an audio filter is invaluable. Lucca worked 18 stations during the contest including VE3ONT, K2GAL, AA4FQ, K5GW, W5UN and KB8RQ.

Another Italian station, **Mario Trioli I1JTQ** has tried his hand at e.m.e. operation on the 144MHz band. He runs a pair of 4CX-250Bs into two 18-element 4218 Cushcraft Yagis. Mario made 30 contacts which included 11 Ws and 2 VEs. All bar one QSO were made on random, without any schedule.

Dave Law G0LBK has been active on the 144MHz band. But he's now building an e.m.e. system for the 1.3GHz band.

Before going QRT on the 144MHz band (because of interference problems) Dave tried his hand in the ARRL contest. Using a small array consisting of four 9-element Yagis he managed to make 45 contacts. These included JL1ZCG, S51WV, UZ3DD, VE3ONT and WD5AGO.

Grinding Noises

At my QTH I was hoping to have got a new array of four 17-element Yagis operational. However, grinding noises from my Ham IV rotator indicated something was amiss.

It turned out that the brake wedge had sheared off. As a consequence, the end-stop mechanism inside the rotator was destroyed.

So, my single 18-element 4218XL Cushcraft Boomer was pressed back into service. I only had time to listen at moonset on November 6 from 1000-1230UTC. During this period I heard VE7BQH, W4ZD, W5UN, W7HAH and made a QSO with KB8RQ.

Of course, with a four-Yagi array you'll work even more stations as the report **from John Regnault G4SWX** (JO02) testifies. He uses four 16-element Yagis and was pleased to work 64 stations in the limited time available.

Included in the G4SWX list were three VEs, 24 Ws, JL1ZCG, LZ2US, RB5PA and UZ2FWA. John notes that because of auroral activity the atmospheric absorption levels were high. This caused most signals to frequently disappear into the noise. He reckons the only cure for this is to expand to 16 Yagis!

The 144MHz station at GM4JJJ consists of a TS-430S driving a home-made transverter and W1SL amplifier. The antenna array is a box of four CueDee Yagis, originally 15-elements but expanded to 17-elements.

Recent contacts by GM4JJJ have included G4DHF/TF/P, FR5DN and 9H1BT. On September 10 David worked VE3ONT at 559, the loudest he's ever heard an e.m.e. station.

Unusual Station

The club station of VE3ONT, the Toronto VHF Society was certainly one of the more unusual stations active during the ARRL contest. They used a 46m diameter radio telescope dish to contact many 100W and single Yagi stations.

A total of 235 QSOs were made by VE3ONT on the 144MHz band in one day. Two days of operation on the 430MHz band produced 246 QSOs.

Another one day session by VE3ONT, this time on the 1.3GHz band, found another 79 callsigns in the log book. They even managed to work all continents (WAC) on this band in less than 10 hours!

The equipment used by the Toronto Society on the v.h.f. and u.h.f. bands ran 1kW into r.h.c.p. helix feeds. On the 1.3GHz band they ran 100W with a circular feed made from a coffee can.

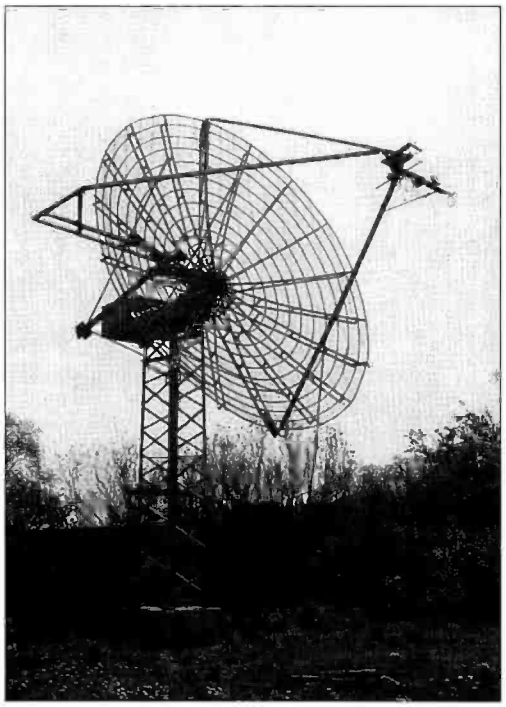


Fig. 2: The e.m.e. dish antenna at OZ9EDR.

Echoes from the moon were extremely loud on the 1.3GHz band and could be heard with less than 1W output! To minimise losses all power amplifiers, low-noise amplifiers and transverters were mounted at the focus of the dish.

The Toronto group, consists of VE2DFO, VE3ASO, VE3BFM, VE3CRU, VE3DSS, VE3EMS VE3KDH, VE3VD and W9IP. They plan to return to the Algonquin Observatory dish for the 1994 ARRL e.m.e. contest.

Deadline Time

It's that deadline time again! Don't forget I always look forward to receiving photographs of your shack, antennas or any v.h.f. activity.

If you make some interesting contacts on whatever mode you use (including repeaters, packet and satellites) let me know about it. Please send your letters to reach me by the end of the month at the very latest. **Don't forget that I can also receive messages via packet radio @ GB7MAD or at my DX cluster GB7DXC.**

E N D

PETER SHORE

BROADCAST Round-up

Peter Shore takes his monthly look at the broadcast bands, starting off with some news on the possible reorganisation of Radio Netherlands.

It seems to be the time for reorganisation at several international radio stations. Among them is Radio Netherlands who are facing potentially major changes. Concentrating in the future more on Europe, perhaps with increased English language programmes to the Continent.

A review team has reported on Radio Netherlands activities. Over the next few months decisions will be taken on how the station should cope with the changing political scene around the world.

You can tune to the Hilversum-based station at:1130-1325 on 9.65 and 5.955MHz; 1730-1930 on 21.59, 21.515, 9.605 and 6.02MHz; 1930-2025 on 21.59, 17.605MHz. Radio Netherlands can also be heard for an hour at 1730 on the World Radio Network, carried on transponder 22 of Astra, and the audio subcarrier at 7.74MHz.

BBC World Service

The BBC World Service, faced with a minimum of a £5 million reduction to its budget in 1994/95, was due to find out in the new November budget if further cuts were to be forced on it by the Treasury. Some newspapers reported in early November that services to western Europe and Africa were under threat if the government persisted in cutting the Bush House budget and that up to 70 jobs would go.

As I write this column, 408 MPs from all parties have signed a Parliamentary Early Day Motion protesting against the cuts. This is an almost unprecedented number. Only half a dozen of the thousands of Early Day Motions since The Second World War have attracted similar numbers of signatures which indicates the level of support that World Service enjoys in Parliament.

News And Broadcasting Schedules

Some late news now about the weekly World Service programme *Waveguide*. The Christmas week edition will feature a whole range of music with connections to radio and broadcasting. Sounds like fun.

The New Year edition will be a review of the year in international broadcasting. Tune in to *Waveguide* at 1030GMT on Christmas Day and New Year's Day.

The World Service has published a guide to all its English language transmitter usage listed by transmitter site and then in frequency order. The guide shows the times of each transmission, bearing and power, and is a must for anyone trying to work out where a World Service English language transmitter is coming from. For details write to **Transmitter Site Guide, PO Box 76, Bush House, London WC2B 4PH.**

The winter schedule of Radio Austria International from Vienna has English broadcasts to Europe: 0530, 0830 and 1030 on 17.87, 15.41, 13.73 and 6.155MHz; 1230 on 15.45, 13.73, 6.155MHz; 1530 on 13.73, 11.78, 9.88 and 6.155MHz;1930 on 13.73, 9.88, 6.155, 5.945MHz.

Radio France Internationale is commissioning five new 500kW transmitters over the coming year. The first was inaugurated at a ceremony at the Allouis-Issodun transmitting station in November which is being upgraded at a cost of millions of francs.

A revolutionary design has sited each transmitter separately and is built in an underground bunker, rather than in a conventional transmitter hall. Each transmitter will have its own dedicated curtain antenna array, which is rotatable.

Most transmitter sites have one set of arrays capable of firing signals in different geographic directions, but it is necessary to switch a transmitter to the appropriate array depending on the target. This makes switching complicated, and in addition takes up huge amounts of land. Linking an individual transmitter directly to a steerable array allows greater flexibility for scheduling both transmitter and antenna.

Broadcasts from RFI can be heard in English at 1230-1300 on 21.645, 15.155, 11.67, 9.805MHz; 1400-1500 on 17.65, 12.035MHz; 1600-1700 on 17.85, 17.795, 17.62, 11.975, 11.705 and 6.175MHz

As well as the French transmitters, RFI has a relay station in French Guyana, and uses other broadcasters' stations in China, Japan, Gabon, Russia and Cyprus. It stopped using Hungarian facilities in November 1993.

A press release recently arrived on my desk from Radio Miami International during November. It said that tests of the station's 5kW transmitter had started, but with just 400W output. The station planned to use 9.955MHz with a bearing of 160° from the Florida base.

Radio Miami International claimed that the low-power signal has been heard as far away as Venezuela. The release went on to say that it expected to be operating at full power from mid-December. Reports on reception, should you be able to catch the station, should be sent to **WRMI, PO Box 526852, Miami, Florida 33152, USA.**

European Target

Nashville based WWCR claims a European target for several of its transmissions, although the choice of frequencies almost undoubtedly rules out reception this side of the Atlantic. All programmes are in English, and the schedule is: 0000-0900 on 7.435MHz; 0000-0800 on 5.81MHz; 1100-0000 on 15.685MHz; 1600-2200 on 15.61MHz; 2200-0000 on 12.16MHz.

Station HCJB in Quito, Ecuador, broadcasts to Europe at 0700 on 6.205 and 11.835MHz and in the European evening at 1900 and 2130 on 17.79 and 15.27MHz. In addition, the station continues to operate its low power single sideband transmitter on 21.455MHz, and at times also on 17.49MHz.

One feature in the HCJB schedule is *What's Cooking in the Andes*, presented by Karen Schmidt. During January Karen will be looking at tasty Cuban food, and visiting a Cuban market. While in February, local Andean cooks will be on the programme.

Tune in on Thursday at 0800 and 1930. The DX Partyline is the Saturday feature and it can be heard in Europe at 0730 and 1900.

Adventist World Radio

The latest edition of Adventist World Radio's *Current* magazine reports on a Buddhist station, Radio Aum Shinrikyo. It says that Radio Aum - whose name means the transitory nature of the universe - is broadcast by Radio Moscow facilities in English at 0430 and 2030, both for thirty minutes.

The morning frequencies include 12.055 and the evening includes 9.55MHz. The studio centre is in Japan, and reception reports can be sent to **381-1 Hitoana, Fujinomiya, Shizuola, 418-01, Japan.**

Adventist World Radio itself can be heard in English in Europe at 1000 on 7.23MHz and 2000 on 7.14MHz.

Again space has caught up with me. Cheerio for now and keep listening and reporting on the broadcast bands.

E N D

FOCAL POINT

The World of ATV

Andy Emmerson G8PTH takes his bi-monthly look at the ATV scene. This month Andy has some thoughts on repeater operation and microwaves.

This month the bulk of letters I've received are about repeater operation and microwaves. Does this mean that 430MHz and slow-scan activity has dried up? Please write and convince me otherwise!

Recently, I heard whispers that work is proceeding to rebuild the Leicester television repeater GB3GV at Markfield, as well as news that further effort is going into the Cambridge television repeater. Confirmation on this would be welcome.

Northampton Repeater

Now for an update on GB3GV, the Northampton ATV repeater, provided by **Tim Forrester G4WIM.**

Tim's letter starts "Just a few quick lines to let you know what we're up to in 'MV Land'. We now have quite a few regular viewers and users (when are we going to see you on the air!?). Stations equipped for both transmit and receive are Dave G4SCJ, George G0KOG, Simon G1IRG, Steve G0NZP, Paul G4XKM, Dick G3TMQ, Paul G0HWC, Mike G6CJN, Phil G4IIO and me, Tim G4WIM. Apologies if I've missed anyone off the list!

"With the exception of Dick G3TMQ, all of the above are using p.l.l. transmitters. This design using surface mount technology throughout will be appearing in the February issue of *Elektor* Magazine.

"We also have quite a cluster of regular viewers most of whom I can't quite recall, but appear on the 'MV Hall of Fame', about eight receive-only in total, some of whom will soon be on transmit as well!

"If funds, time and licences permit, I hope to link MV to TV via TG on 2.3GHz. I've had quite a few chats with Dave G4NJU about it and he seems quite keen. 'MV' continues to operate well, although a better site is being sought and I am planning to make a slotted waveguide aerial for improved e.r.p. and input sensitivity, assuming I can source the right size of extrusion! If people want any further info, give me a call on **(0604) 757401.**"

Thanks for the update Tim, keep me informed of more developments. Tim has also told me that printed circuit boards will be available through himself in this country and through *Elektor* magazine elsewhere.

The boards will be of professional top-quality quality, so that everyone who builds the project should get optimum results. The unit employs the Mitsubishi 2W 'brick' (as do most other designs) and provides sound and vision (the latter on 1249MHz). The board measures 3 x 4in and fits neatly in a standard-sized die-cast box.

Fig. 1: Talk about the long way round! Here's PE1LRS working ON5NY by way of GB3LO, the amateur television repeater in Lowestoft.

Photograph by Paul Godfrey G8JBD in Lowestoft.

Room To Report

I don't always have room to report all the ATV events as they happen, so here, a little belatedly, is some information from last summer as reported by **Brian G3SMU.**

If you've seen 'The Weirdest of Bravo' (well, you may have done if you have Satellite TV), you will know some only slightly less strange goings-on happen on the ATV scene.

Darren G7LWT decided to film his wife giving birth (and why not?), he then digitised this and sent it as a sequence of moving pictures via modem and PC to Tony G4CBW. The transmission took 30 minutes on the phone line and was then rebroadcast on 1270MHz with P5 pictures received by Brian on Winter Hill.

Other events covered on ATV included the Battle of the Atlantic (I think they mean the official opening of the refurbished Western Approaches wartime control bunker, not the actual skirmish some 50 years earlier). This latest event was a full-scale live outside broadcast on ATV (well done!).

At this stage my scribbled notes lose their thread a bit but they mention **Mike EI2DJ,** operating from HMS *Plymouth.* Anyway, whoever was working from whenever, the signals were sent on 10GHz to G3SMU, on from there to Tony G4CBW and were then rebroadcast on the Stoke-on-Trent repeater GB3UD.

It sounds highly complex and a barrel of fun for all involved. Brian adds that GB3UD is working very well and will soon have 3cm input and output, which should increase activity and promote further interest in 10GHz. Good stuff!

More Repeater News

It's time for some more repeater news now, this time from **Chris G1EZJ.** He has sent me a few lines to keep readers up-to-date with what's going on in Stoke-on-Trent.

Chris says "A few weeks ago a conversation took place on two metres with Tony G4CBW about the possibilities of the lads here in Stoke using 10 Gigs (or Gigglyhurts by some) and within a few days the orders went off to Trevor Wraith for a lorry load of Solfan heads. The gun boards were ordered from the BATC Members' Services and when they arrived I had the job of putting **fifteen** of them together and about **twelve** intercarrier sound boards! Well, after a few 'minor problems' the situation is like this. I (G1EZJ) using a pair of 9in horns on transmit and the same on receive. The two systems are both rotatable.

"Mark G0NMY has a Solfan on a 6in horn for transmit and a BSB dish for receive (P5 links Mark from here!). Trevor G0KBI and Arthur G6KGS in Kidsgrove both have excellent links to themselves and also with Brian G3SMU in Bolton!

"Martin G7MRF is working on a 200mW system and will be operational by the time you read this (power mad!). Other members of the group who are in the position of getting their systems up and running are G3OGD Alf, Malcom G7IAM, Eric G1YIU and Bill GI0MV.

"Albert G4DHO is working on the Stoke-on-Trent 10GHz repeater! So, keep your dishes pointing at Stoke and you just never know!

Chris continues with "Just a few lines on 1270MHz activity now. GB3UD is working fine at the moment except for the input being hit by packet radio (whose bright idea was it to stick it on 1240MHz?) so Martin G7MRF has machined a seven-pole interdigital filter which inserted into the (packet operators on 1270MHz?) repeater's input should put paid to the breakthrough.

"Can I also say 'welcome back' to Steve G4DVN, who has been absent on the ATV scene for some time? Well, that's it for now. I hope that this has been of some interest. Can I also thank Trevor G0KBI for all the running about that he does for the group and for the time that he spends chasing around for bits and pieces? Well done Trevor. 73s to all de Chris G1EZJ".

Nice to hear from you Chris, things in Stoke-on-Trent certainly seem to be busy.

That's all I've got room for this time but keep those letters coming in to me at 71 Falcutt Way, Northampton NN2 8PH.

E N D

ARCADE

The PW Shopping Arcade
Welcome to the *Practical Wireless* 'Arcade'. In this section of the magazine, you'll be able to find all those important services 'under one roof' - just like the shopping arcades you see in the High Street.

Let you eyes 'stroll through' the Arcade every month and you'll find all departments open for business including: The Book Service, PCB Service, Binders and details of other *PW* Services. Make a regular habit of 'visiting' the Arcade, because in future, you'll have the chance of seeing special book offers and other bargains. And don't forget, this Arcade is open wherever you're reading *PW*!

Services

Queries:
Practical Wireless,
PW Publishing Ltd., Arrowsmith Court,
Station Approach,
Broadstone, Dorset BH18 8PW.

We will always try to help readers having difficulties with *Practical Wireless* projects, but please note the following simple rules:
1: We **cannot** deal with technical queries over the telephone.
2: We **cannot** give advice on modifications either to our designs, to commercial radio , TV or electronic equipment.
3: All letters asking for advice **must** be accompanied by a stamped self-addressed envelope (or envelope plus IRCs for overseas readers).
4: Make sure you describe the problem adequately, with as much detail as you can possibly supply.
5: Only one problem per letter please.

Back Numbers

Limited stocks of many issues of *PW* for past years are available at £2.00 each including post and packing. If the issue you want is not available, we can photocopy a specific article at a cost of 85p per article or part of article. Over the years, *PW* has reviewed many items of radio related equipment. A list of all the available reviews and their cost can be obtained from the Editorial Offices at Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW for a stamped self-addressed envelope.

Binders

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We have talked to Badger Boards about the club and group discount on orders, and they are happy to continue this service. Club secretaries and group leaders should contact Badger Boards direct for the new discount rates.
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Board	Article (Project) Title	Issue
WR315	PW Bourbon 3.5MHz TX	Aug 93
WR314	UHF Pre-Amplifier	Dec 92
WR313	10MHz Transmitter	Nov 92
WR312	Receive/Mixer (Getting Started)	Nov 92
WR311	Oscillator BFO (Getting Started)	Sept 92
WR310	1.2GHz Pre-scaler	Aug 92
WR309	Volt Reg/Divide by 100	Aug 92
WR308	TTL 1MHz Oscillator (Getting Started)	July 92
WR307	Crystal Checker (Getting Started)	June 92
SET	**WR303/304/305/306** Inductance Bridge	Apr 92
WR302	GDO (Getting Started)	Apr 92
WR301	Challenger Receiver	Feb 92
WR300a	OSCAMP Oscillator	Mar 92
WR300	OSCAMP Amplifier	Feb 92
WR299	Multivibrator (Getting Started)	Jan 92
WR297/298	Additional Beaver boards	
SET	**WR295/296** PW Beaver	Oct 91
SET	**WR292/293/294** Chatterbox	Aug 91
SET	**WR290/291** Robin Freq. Counter	Aug 91
SET	**WR292/293/294** Chatterbox	Aug 91
WR289	Meon-4 (Control)	Jul 91
WR288	Morse Master	Jun 91

WR286	Meon-4 (RF PA)	Jun 91
WR287	Morse (Speedbrush)	May 91
WR255	Meon-4	May 91
WR285	Scope Probe PSU	Apr 91
WR284	Scope Probe	Apr 91
WR283	Sudden Receiver	Mar 91
WR282	Repeater Toneburst	Feb 91
WR281	High Voltage PSU	Jan 91
SET	**WR263/264 +WR276-80** Marland Transmitter	Jul 90 Sep 90
WR272	NiCad Recycler	Jun 90
WR275	Low Voltage Alarm	Jun 90
WR273	Valve PSU	May 90
WR274	RX Attenuator	May 90
WR271	Product Detector	Apr 90
WR270	Badger Cub	Apr 90
WR269	Glynme	Feb 90
WR268	Irwell (RF PA)	Feb 90
WR264	Irwell (Relay)	Feb 90
WR263	Irwell (VFO)	Jan 90
WR267	PW 49'er	Jan 90
WR266	Tuned Active Antenna	Jan 90
WR265	Tuned Active Antenna (PSU)	Jan 90
WR199	Meon 50MHz Transverter	Oct 85
WR161	Marchwood 12V 30A PSU	Jul 83

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Index to Advertisers

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LONDON: - *PAUL* - 11 Watford Way, Hendon,
London NW4 3JL. Tel: 081 202 0073 Fax: 081 202 8873
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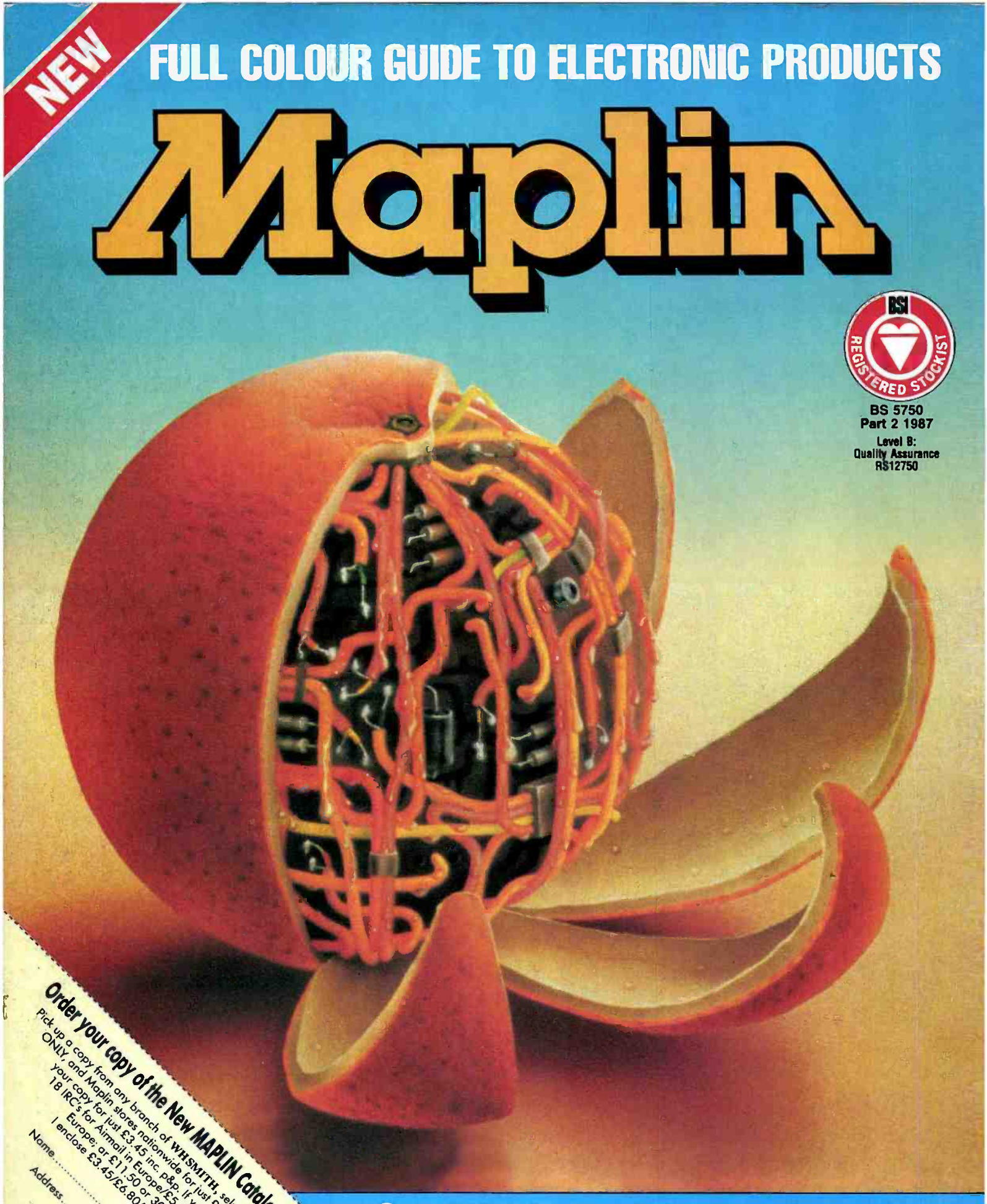

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