JULY 1990

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FEATURES

RB10 ANTENNA - VALVE TECHNOLOGY - TAMING COMPUTER HASH - FURTHER NOTES ON 6m ANTENNAS

REVIEWS

MIZUHO MX QRP SSB RIG

ICOM R1 HAND-HELD COMMUNICATIONS RECEIVER

PLUS

BACKSCATTER - COMPETITION - PW DISCOUNT VOUCHER

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THE NEW
FT-1000 FOR DYNAMIC DX

YAESU

The FT-1000 is a new top of the range all mode h.f. transceiver that is the result of more than 25,000 hours of intensive research by Yaesu's top design engineers. They have adopted a completely new approach to the application of digital and RF technology. The extensive use of surface mounted components has allowed *six* microprocessors and *five* Direct Digital Synthesisers to be integrated with a simple to use operator interface to give a highly reliable full featured transceiver that has been optimised for serious h.f. applications. Please write or call SMC or your local authorised Yaesu dealer for the full specifications of this dynamic new transceiver and discover how you can open up the bands.

YAESU

YAESU

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Prices and specifications are subject to change without notice

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Regular Features

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THE NEW IC-2SE, SIMPLE OR MULTI-FUNCTION 144 MHz FM TRANSCEIVER

Icom's tradition of building high quality, reliable handhelds continues with the IC-2SE an incredibly compact handheld designed with features that exceed larger, bulky handhelds. The IC-2SE proves that superior quality comes in all sizes.

4SE, 7cm VERSION NOW AVAILABLE

Slim and unbelievably compact.

The IC-2SE measures only 49(W) x 103.5(H) x 33(D)* mm with the BP-82 Battery Pack. Hold the IC-2SE in your hand to truly appreciate its miniature size. Weighing just 270g† with the BP-82, the IC-2SE will easily fit anywhere – on belts in shirt pockets, handbags, etc. *1.9(W) x 4(H) x 1.3(D) in. † 9.5 oz.

Simple design for operating convenience.

Even with its tremendous versatility and a wide variety of functions, the IC-2SE is easy to use. All functions are performed by a total of just six switches and three controls. The IC2SE includes both simple and multi-function modes. The result is two transceivers in one: both an easy-operation and multi-function transceiver. Simple mode ensures totally error-free operations. Multi-function mode allows you a variety of function settings depending on your operating requirements.

Other advanced features:

Reduced size doesn't have to mean reduced quality. The IC-2SE proves this with a wide variety of advanced functions.

- Tuning control on the top panel for quick QSYing.
- Monitor function that allows checking of the input frequency of a repeater.
- Function display that clearly shows all information required for operations.
- Splash resistant design and durable aluminum die-cast rear panel for dependable outdoor operations.

Options

• **BA-11, Bottom Cap.** Protective cap for terminals on the bose of the IC-2SE.

• **Battery packs and case.**

BP-81	7.2V, 110mAh
BP-82	7.2V, 300mAh
BP-83	7.2V, 600mAh
BP-84	7.2V, 1000mAh
BP-85	12V, 340mAh
BP-86	Case for six R6 (AA) size batteries

• **BC-72E, AC Battery Charger.**
Desk top charger for the BP-81- BP-85.

• **CP-12, Cigarette lighter cable with noise filter.** Allows you to use the IC-2SE through a 12V cigarette lighter socket. Also chorges the BP-81 - BP-85.

• **FA-140BB, 144MHz flexible antenna.**
Flexible ontenno for 144MHz band operation. Some type supplied with the IC-2SE.

•**HM-46, Speaker/Microphone.**
Combination speaker and microphone equipped with an eorphone jack. Clips to your shirt or lopel.

•**HS-51, Headset.** Headset with VOX functian that allows you hands-free operation.

• **Carrying Cases.**

Carrying Case	Battery Packs, Battery Case
LC-53	BP-81
LC-55	BP-81, BP-83 or BP-86
LC-56	BP-84 or BP-85

• **MB-30, Mounting Bracket.**
Mounts the IC-2SE in a vehicle or on a wall.

• **OPC-235, Mini DC Power Cable.**
For use with a 13.8 V DC power supply

Icom (UK) Ltd.
Dept PW, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 0227 363859. 24 Hour.

Count on us!

THE COMPACT HANDHELD WITH A SPLIT PERSONALITY

5 Watt Output Power.
Utilizing a specially designed ultra-small highly efficient power module, the IC-2SE delivers o full 5 W* of output power. Bring those distant repeaters into range.
* At 13.8V DC

48 Memory Channels.
The IC-2SE has 48 fully-programmable memory channels and one call channel. Each memory and call channel stores an operating frequency and other informotion required for repeater operations.

Convenient Repeater Functions.
The IC-2SE is equipped with programmable offset frequencies for occessing repeaters. All memory channels and a coll channel store repeater information for your convenience. The IC-2SE includes a newly designed 1750 Hz tone call transmit function. A 1750 Hz tone call transmits when the PTT switch is pushed twice quickly.

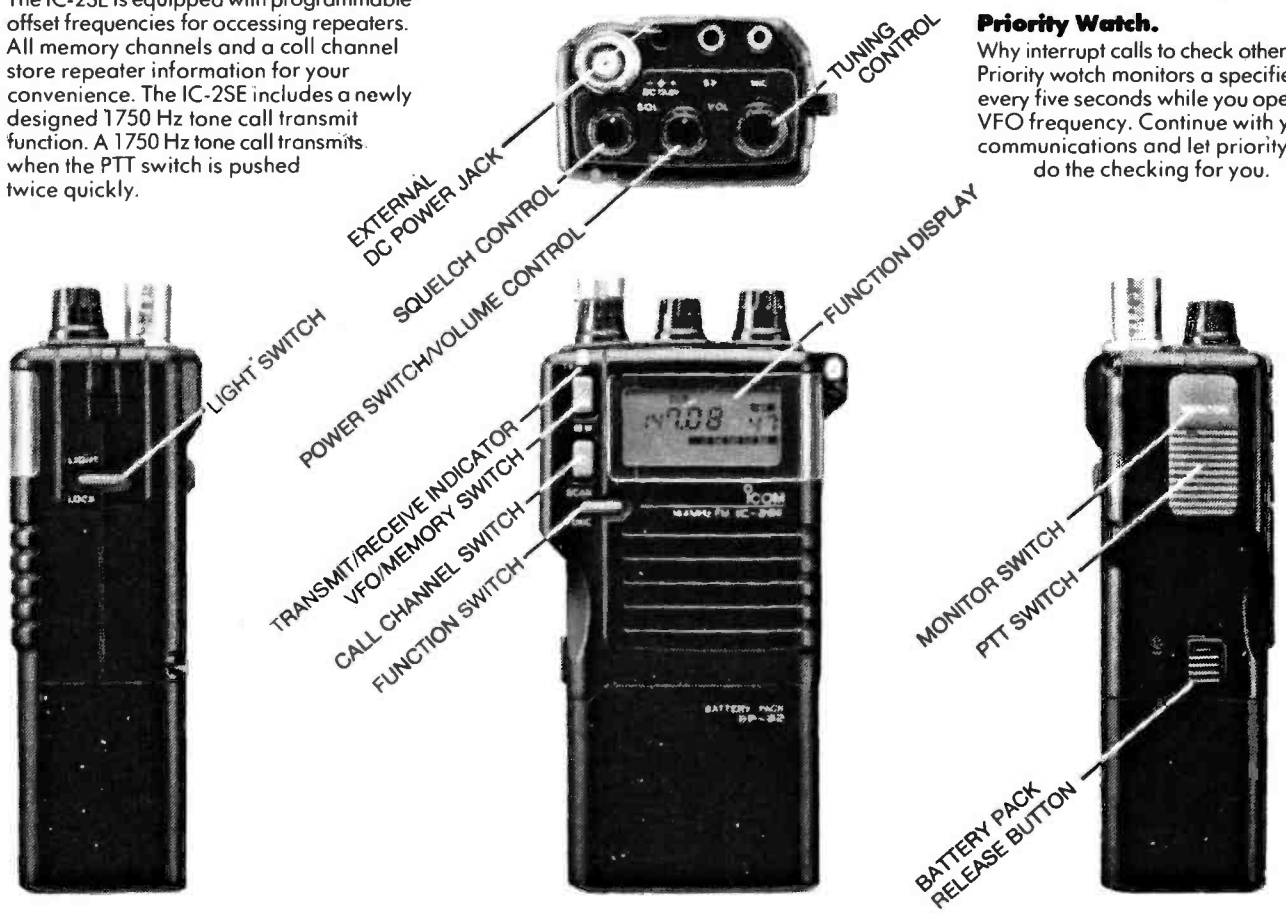
Power Saver for longer operating time.
The power sover ensures lower current flow during standby conditions. Operating times are much longer than with older, more conventional transceivers.

Built-in Clock with timer functions.
The IC-2SE is equipped with an advanced 24-hour system clock with timer function. The transceiver automatically turns on when real time matches o pre-programmed time. This is perfect for scheduling QSO's. Auto power-off timers and other settings can be made in clock mode.

Convenient Scan Functions.
The IC-2SE is equipped with VFO and memory scan.
- **VFO Scan.** VFO Scon repeatedly scons all VFO frequencies. In addition, unnecessary frequencies can be skipped.
- **Memory Scan.** Memory scan repeotedly scans memory chonnels.

Auto Power Off Timer Function.
If you ever forget to turn the IC-2SE off, don't worry. It will turn itself off. Power-off time can be selected or deactivated using multi-function mode. Preserve bottery pack power for the times when you need it most.

Priority Watch.
Why interrupt calls to check other stations? Priority watch monitors a specified station every five seconds while you operate on a VFO frequency. Continue with your communications and let priority watch do the checking for you.



Helpline: Telephone us free of charge on **0800 521145** Mon-Fri 0900-13.00 and 14.00-17.30. This service is strictly for obtaining information about or ordering Icom equipment. We regret this cannot be used by dealers or for repair enquiries and parts orders, thank you.
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SMC South Midlands C

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STOCKTAKING STOCKTAKING

ALL SMC BRANCHES WILL BE CLOSED ON FRI 29th JUNE FOR ANNUAL STOCKTAKING

THE NEW FT1000

BRIEF SPECIFICATIONS

- ★ General Coverage Receiver 100kHz-30MHz
- ★ Ham bands TX 160-10m
- ★ Modes CW, USB, LSB, AM, FM, RTTY and PACKET
- ★ VFO steps 10Hz CW, SSB, RTTY, 100Hz AM, FM, PKT
- ★ Auto antenna impedance range 16.7 to 150 ohms
- ★ Selectable receiver band widths 2.4Khz, 2Khz, 500Hz, 250Hz
- ★ Dual band receiver tuning and monitoring with balance control
- ★ Power output up to 200 watts P.E.P. 50W AM
- ★ Sensitivity preamp on SSB/CW 0.25 micro volts 10dB S/N
- ★ D.D.S. Direct Digital Synthesiser
- ★ Dual selectable noise blankers with adjustable threshold
- ★ Frequency stability ± 20ppm (0 to +50°C) ± 200Hz F3 ± 0.5ppm (0 to +60°C), ± 150Hz, F3 with TXCO-1 fitted
- ★ 99 memories

ADDITIONAL FEATURES

Other features include adjustable IF width, IF shift, IF notch and APF controls. AGC presentable for fast, medium and slow + defeat, on/off selectable, preamp+adjustable attenuator -6dB, -12dB, -18dB,. Adjustable — mic gain, RF power o/p, processor and drive controls. Built in electronic keyer with adjustable speed control. Twin independent frequency displays with mode indication + much more.

FANTASTIC PERFORMANCE, REALISTIC PRICE

- ★ 160-10M HF TRANSCEIVER
- ★ GENERAL COVERAGE RECEIVER
- ★ ALL MODE (FM OPTIONAL)
- ★ 0-100W OUTPUT (25W AM CARR.)
- ★ CW NARROW (500Hz) STANDARD
- ★ LARGE CLEAR LCD DISPLAY
- ★ SIMPLE OPERATION (see pic below)

All major controls are grouped together for convenience and ease of operation.

The FT-747GX is a compact SSB/CW/Am and (optionally) FM transceiver providing 100 watts of PEP output on all hf amateur bands, and general coverage reception continuously from 100kHz to 30MHz. A front panel mounted loudspeaker and clear, unobstructed display and control layout make this set a real joy to use. Convenient features include operator selectable coarse and fine tuning steps optimized for each mode, dual (A/B) vfos, along with twenty memory channels which store mode and skip-scan status for auto resume scanning of selectable memories. Eighteen of the memories can also store independent transmit and receive frequencies for easy recall of split-frequency operations. Wideband (6kHz) AM and narrowband (500Hz) CW IF filters are included as standard, along with a clarifier, switchable 20dB receiver attenuator and noise blanker. User programming for more advanced control by an external computer is possible through the CAT (Computer Aided Transceiver) System. The transmitter power amplifier is enclosed in its own diecast aluminium heat-sink chamber inside the transceiver, with forced-air cooling by an internal fan allowing full power FM and packet, RTTY, SSTV and AMTOR operation when used with a heavy duty power supply.

WARNING: If you buy FT747GX not designed for the U.K. market, these may not be fitted with AM/CW filters which you may not be able to obtain.

LEEDS
SMC (Northern)
Nowell Lane
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Leeds LS9 6JE
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Closed Sat afternoon

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YAESU

SUMMER SPECIALS
70CMS HANDHELD BARGAIN
BRAND NEW EX COMMERCIAL HANDHELDS SUITABLE FOR USE ON 70CMS
6 CHANNEL CRYSTAL CONTROLLED TRANSCEIVER

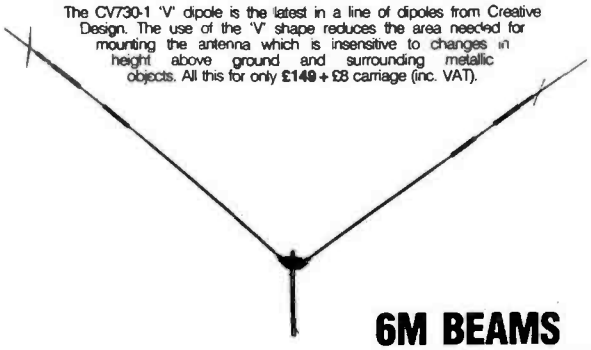
SUPPLIED C/W NICAD (LESS CRYSTALS & CHARGER) **ONLY £99.00** inc VAT

CREATE CREATE CREATE CREATE CREATE

The CREATE company has, for the past twenty years, been the leading manufacturer of amateur and commercial antennas (mainly HF) in Japan.

Now available to customers in the UK through South Midlands Communications, the appointed distributor, are the popular CREATE HF beams to cover the 10/15/20 metre bands, HF baluns up to 10KW PEP and the exciting 10/15/20/40V dipole which has elements of only 19ft and is designed in such a way that it can be mounted in particularly awkward places. SMC also stock what must be one of the largest amateur antennas available, the 40 metre full sized beam, as well as 6 and 7 element and six metre yagis and professional quality log, periodic antennas for 50-1300 and 105-1300MHz. CREATE also manufacture rotators to exacting levels of precision and these have virtually no back lash, quiet gears, variable speed and large torque. All are now available from SMC stock. *Please contact us NOW for full details.*

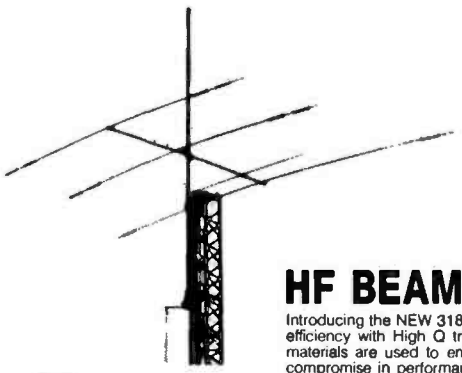
The CV730-1 'V' dipole is the latest in a line of dipoles from Creative Design. The use of the 'V' shape reduces the area needed for mounting the antenna which is insensitive to changes in height above ground and surrounding metallic objects. All this for only **£149** + £8 carriage (inc. VAT).

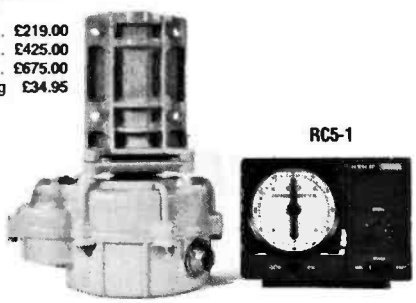


ROTATORS

The **RC5 Series** of rotators from **Creative Design** are built to meet the exacting standards required by both professional and amateur users. A range of models is available designed to cater for medium to large sized antennas. All the rotators are manufactured with high quality components allowing continued and reliable operation.

RC5-1 ..... £219.00
RC5A-3 ..... £425.00
RC5B-3 ..... £675.00
CK46 Rotary bearing £34.95





RC5-1

6M BEAMS

New from Creative Design are a range of 6m beams, the CL6DX 6 element, CL6DXX 7 element and CL6DXZ 8 element.

All these **antennas** are the result of long and continued research to achieve the best possible performance whilst remaining both cost effective and extremely robust.

CL6DX 6 ele 13dB* **£115.00**
CL6DXX 7 ele 14.3dB* **£168.99**
CL6DXZ 8 ele 14.5dB* **£225.00**
*Manufacturers figures.

HF BEAMS

Introducing the NEW 318 series of DX Tribanders from Create which offer outstanding efficiency with High Q traps especially designed for 14, 21, & 28MHz. High grade materials are used to ensure long life, maximum reliability and light weight with no compromise in performance.

All beams supplied complete with balun

CD318JR 4 ele 10-15-20M 750W PEP Gain 7:7:5:8dB F/B 18dB — Only **£299** P&P £5.90
CD318 4 ele 10-15-20M 2KW PEP Gain 7:8:8:5dB F/B 18:20:20dB — Only **£349** P&P £5.90
CD318B 5 ele 10-15-20M 2KW PEP Gain 7:5:9:95dB F/B 20:18:20dB — Only **£449** P&P £7.90
CL408-4 3 ele Yagi 40M 4KW PEP Gain 8dB F/B 22-18dB — Only **£999** P&P £12.50
CV48 40M vertical 2KW PEP 500W PEP Radial wires included suitable for ground or roof mounting — Only **£210**
AD385 Matching network 40/80M for CV48 remote switchable — Only **£49** P&P £2.85
CV730V-1 V dipole for 10-15-20-40 1KW-2KW PEP 19' ele capable of being mounted anywhere Only **£149** P&P £3.50

FREE FINANCE ON SELECTED ITEMS
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Details of eligible items available on request
*Subject to status.

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Importer warranty on Yaesu Musen products. Ably staffed and equipped Service Department. Daily contact with the Yaesu, Musen-factory. Tens of thousands of spares and test equipment.

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FANTASTIC SAVINGS ON SOME OF YAESU'S BEST SELLING RADIOS

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SAVE £160

*CAN BE EASILY INTERNALLY LINKED FOR 9600 & 1200 BAUD PSK PACKET OPERATION

FT4700RH NOW ONLY **£499**
SAVE £176

FT470 NOW ONLY **£349**
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AR-1000 HANDHELD SCANNER

Basic Spec.
Freq. ranges:
8-600MHz and 805-1300MHz
Freq. selection:
By direct keypad entry or by tuning knob on top panel.
Mem. channels:
1000 arranged conveniently in ten banks of 100, with direct keyboard access to any memory.
Reception modes:
AM, FM (narrow) and FM (wide).

RECEIVER COMES COMPLETE AND READY TO GO

ONLY £249.00 + P&P £4.00

NEW – AR-3000 – NEW YES IT'S FINALLY HERE!!

The AR-3000 Wideband Receiver is now available.

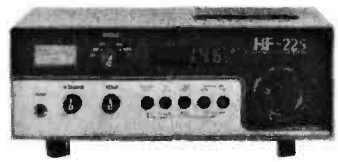
Basic Spec.
Freq. range:
1000KHz to 2036MHz without any gaps.
Reception Modes:
LSB, USB, CW, FM (wide), FM (narrow) and AM.
Mem. channels:
400 memory channels in 4 banks of 100.
Freq. selection:
By direct keypad entry or by tuning knob on front panel.

ONLY £765.00 + P&P £5.00

HF-225

HF general coverage receiver, 30KHz to 30MHz.

(The HF225 has been voted "Receiver of the Year" by World Radio and TV Handbook)



ONLY £425.00 + P&P £7.50

ICOM IC-24ET

Icoms New Mini Dual Band Handheld for 2M & 70cms.

Features:
- ★ Full Duplex
- ★ 5W output on 13.8v
- ★ Up to 80 memory channels
- ★ Dual Band display
- ★ CTCSS option available
- ★ Compact and lightweight 52(w) × 136.5(h) × 34.5(d)

ONLY £385.00 + P&P £4.00

STANDARD C528

Features:
- ★ Full Duplex
- ★ 5W output on 13.8v
- ★ Dual Watch facility
- ★ Dual Band display
- ★ 144-146, 430-440 and 800-975MHz Rx only
- ★ CTCSS option available

ONLY £379.00 P & P £4.00

ALINCO DJ-500E

for 2M and 70cms.

Features:
- ★ Up to 6W output
- ★ 20 memories
- ★ Battery saver
- ★ 700mAH nicad
- ★ Includes charger
- ★ Full Duplex
- ★ Receive option of: 140-170MHz 430-460MHz 870-900MHz

ONLY £319.00 + P&P £4.00

KENWOOD TR-751E

25w 2M multimode transceiver. This radio can be used mobile or makes a superb 2M Base station if used with a 13.8v PSU.

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YAESU FT290RII

2.5w 2M multimode transceiver. This radio can be used either portable, mobile or as a Base if used on a 13.8v PSU.

ONLY £429.00 + P&P £5.00

YAESU FT690RII

2.5w 6M multimode transceiver. This is just the ticket to work all those excellent E's openings on 6 metres.

ONLY £429.00 + P&P £5.00

SECONDHAND ITEMS

YAESU FT290RII excellent cond. ..... £345.00 + p&p £5.00
FDK 750X 10W 2M multi mode ..... £225.00 + p&p £5.00
BEARCAT 800XLT Scanner covers 29-54, 118-174, 406-512 & 806-912MHz. ..... £159.95 + p&p £5.00
ICOM IC-900 Mobile system, consisting of 25W 2M module and 10W 10M module. This superb fibre optically linked mobile system is complete and as new. ..... £615.00 p&p FREE
STANDARD C58 2M 1W multimode. This is a superb portable/mobile/base 2M transceiver and is as NEW. ..... £230.00 + p&p £5.00
MML144/30LS 2M 30W linear with preamp. Would suit either the C58 or Yaesu FT290R. ..... £85.00 + p&p £4.00
NRO525 Top of the range HF receiver complete with external speaker. This unit is a demo model & therefore has 12 month warranty. ..... £950.00 + p&p £15.00
REALISTIC PRO-2005 VHF/UHF scanner. Covers 25-520 and 760-1300MHz, AM, FM(narrow) and FM(wide). 400 mem. As new condition. ..... £265.00 + p&p £5.00
JUPITER II handheld scanner, covers 25-550MHz and 800-1300MHz. AM and FM. This is as new. ..... £199.00 + p&p £4.00
YAESU FT101ZD AM Band HF Transceiver. ..... £420.00 + p&p £5.00
ICOM IC-505 10W 6M multimode trans. Complete and as new. £345.00 + p&p £5.00
BNOS LP50-3-50 50W 6M linear with preamp, would suit either FT690R or IC-505. Superb cond. ..... £110.00 + p&p £4.00
REALISTIC PRO-2004 VHF/UHF Scanner, Coverage 25-550MHz & 760-1300MHz. AM and FM. This is in superb condition with box & manuals. ..... £185.00 + p&p £5.00
REGENCY MX8000 (same as AR-2002). Covers 25-550MHz and 800-1300MHz. Mint cond. ..... £310.00 + p&p £5.00
YAESU FT747GX AM Band Transmit, general coverage receive. This unit is in superb condition with box & manuals. ..... £429.00 + p&p £10.00
SONY ICF-2001D Portable Short-wave receiver. This unit is only 1 month old and is complete & as new. ..... £245.00 + p&p £5.00
YAESU FT-203R 2.5W 2M handheld. ..... £130.00 + p&p £4.00
R537S Handheld airband receiver. ..... £40.00 + p&p £4.00
CD-660 CW/RTTY/Amtor decoder. This will decode all the above types of transmissions and display them on a TV or video monitor. Printer output is available. ..... £155.00 + p&p £5.00
TRIO TR9130 25W 2M multimode transceiver, still one of the most sought-after of 2M multimodes. ..... £349.00 + p&p £5.00
TRIO TR-9130 25W 2M multimode transceiver. Same as above, but not quite as good cond. ..... £320.00 + p&p £5.00
YAESU FT-208R 2.5W 2M handheld transceiver. ..... £129.00 + p&p £4.00
DEMO MODEL Kenwood TH-75E Dual band 2M/70cms Transceiver. .....
PK-232 Terminal unit for Packet, Amtor, Rtty, Fax, CW, Navtex, complete with CBM64 software. ..... £230.00 + p&p £5.00

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JUP2	DC cigar lead	4.95
JUP3	Set of 4 nicads	6.00
JUP4	Mains adapter	14.50
DA900	Flexible antenna	9.00
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DR510E	2m/70cm mobile	549.00
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EDH10	DC to DC ALX2E	16.95
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EBP6NAZ	Nicad 9.6V 450mAh	29.95
ELH230D	2m amp. 1-5W/10-30W	75.00
ELH260D	2m amp. 1-3W/50W	119.00

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SX400	Vswr 140-525 MHz	79.00
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SX1000	Vswr 1.8-1300 MHz	159.00
P300	30 Amp psu	149.00
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W540	Vswr 140-525 MHz	63.00
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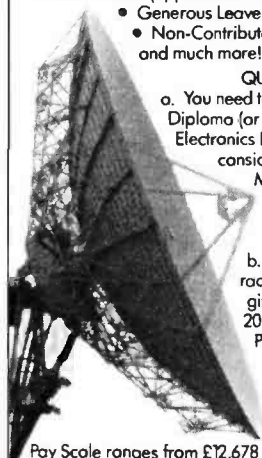

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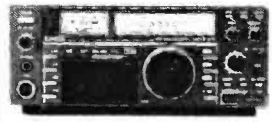

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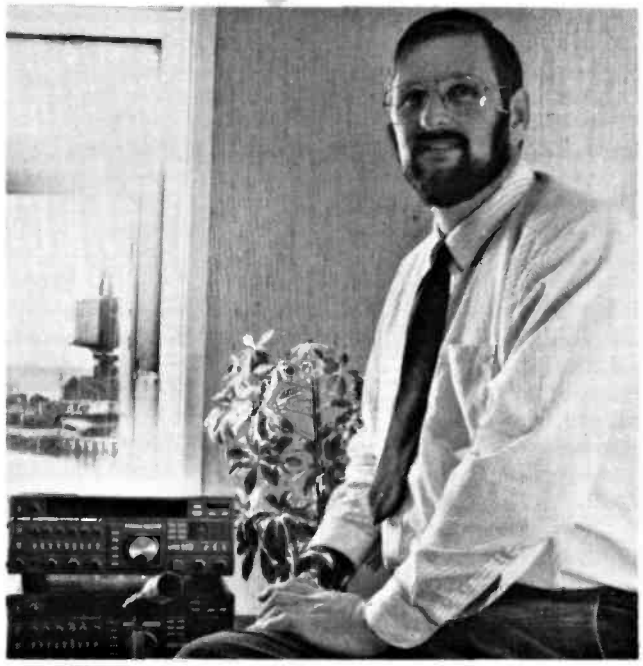

Rob Mannion G3XFD

Many of us have grown up with *PW*. Let's face it, for many of us the magazine has been part of our lives for many years. The publishing of the 1000th issue arrives as a many-faced milestone. First it graphically illustrates how old we're getting, secondly we're reminded how long we've been in the radio hobby. To round off the reminders - we come face to face with the stark reality of the enormous changes that we've seen in the last 58 years.

Sitting in the editor's chair, I am very aware of the legacy handed down to me by the late and great F. J. Camm. But I don't have a picture of him in my office and his portrait doesn't look down at me while I work! Yet, I am still fully aware of the debt we owe to this most prolific technical writer and editor. Not even he could have forseen the enormity of the change that *PW* would see, even in the years from 1932 to 1959 when he died.

To many, including myself, *PW* long since ceased to be 'just a magazine'. It became an institution long ago for me, and I've no doubt that many of you feel the same. I know that to be true from the many hundreds of loyal readers that my colleagues and I have met at rallies, events and club meetings.

Camm's Comics

The term 'Camm's Comics' was a derisory term for many years - but nowadays I regard it as a term of affection. F.J. was the pioneer of popular technical journalism. I'm convinced that he would have been on 'Tomorrow's World' as programme editor if television if we know it today, was available in 1932.

Very often, one good idea spawns others and apart from *Practical Television* and *Practical Electronics*, *PW's* influence shows in other magazines that have themselves grown and established distinct identities.

For those of our readers who can remember, or still have, copies of pre- or post-war *PW's* it may seem that the magazine has changed beyond all recognition. In my mind however, they would be wrong, because when you can see the issues from almost six decades together - the link between them is very strong. In other words, you can see how PW has evolved into the magazine we read today.

The radio hobby is continuing to evolve rapidly. *PW* has to change too, but who can dare imagine what the future is for amateur radio communications? I can compare my thoughts on the subject by describing a cartoon I enjoyed recently The cartoon depicted a very bored man, sitting beside a computer. It was obvious that his job was to press a button on the computer. The background showed another man, pushing another computer (complete with a large index finger on an even larger hand) that was obviously just about to make the operator redundant.

It might seem a bit far-fetched - but just think, this is already happening in our hobby. We've already got amateur radio **without** the amateur!

Surprise Packet

Recently, after watching packet radio in action, a question remained in my head. Is packet radio the future? Will we go off to work in years to come, and return to see what DX has been worked by our automated radio station? Will the radio amateur become redundant?

Now don't get me wrong, I'm all for progress and new ideas. PW has, and will always reflect modern developments applicable to the radio amateur, home constructor and s.w.l. But, despite this I was left to wonder about the impact of this system that allows computer-linking via the amateur radio bands.

I found the idea of packet radio fascinating. It seems efficient, error-free, and apparently doesn't seem to suffer from interference from other communication modes. The radio amateurs that operate packet networks are technically competent, and are obviously very keen radio communication enthusiasts.

But is packet radio, Amateur Radio? This question is heard more frequently as this aspect of radio communication becomes increasingly popular. Packet radio appears to be the main growth area in the widening field of amateur radio. I've no doubt that dedicated hand-held packet transceivers will be with us soon. I've already heard from one amateur who was claiming a possible 'first' for a 'static mobile' packet QSO via an amateur satellite!

Presence Required

The many facets of the radio hobby fascinate me.but I like to feel I'm still needed! Perhaps packet radio will eventually have its own frequencies - away from the amateur bands. It may develop into a separate service. This facility could allow **anyone** with a computer, appropriate antenna and dedicated transmitter to join in. While their automatic equipment is receiving data from other enthusiasts, they could be doing something else (maybe operating on the amateur bands?).

One or two computer enthusiasts have asked me "Why can't we link our computers by radio. We know computers, and we can buy and set up the necessary links - although amateur radio doesn't interest us as such".

Personally, I think that a separate packet radio service will come. After all, *PW* provided the initial 'push' for other magazines

No one at the time of writing, knows which direction the radio hobby will take in the years to come. But then you can be sure that *PW* will continue to cover amateur radio and the hobby in general, in whatever direction it takes. Perhaps *PW* number 2000 will be on disk to save paper by then!

From Us to You

In rounding off this month, speaking for everyone at *PW*, I must thank you all for the many letters we've received as the magazine approached its 1000th issue. Everyone here regards the care of the magazine and your interest as readers, of prime importance, enjoyable hard work and a great honour. We never forget that you are also an essential part of the team. Well done all of you!

73s from everyone on *Practical Wireless*.

73s DE G3XFD

Receiving You...

Send your letters to the Editorial Offices in Poole, the address is on our contents page. Writer of the Star Letter each month will receive a voucher worth £10 to spend on items from our PCB or Book Services, or on *PW* back numbers, binders, reprints or computer program cassettes. And there's a £5 voucher for every other letter published.
Letters must be original, and not duplicated to any other magazines. We reserve the right to edit or shorten any letter. Brief letters may be filed via our Prestel Mailbox number 202671191. The views expressed in letters are not necessarily those of *Practical Wireless*.

★★★★★STAR LETTER★★★★★

Dear Sir

I was delighted with your efforts in May *PW* to acknowledge the existence of CB radio and to assure it might be used by normal and intelligent people. It may be hard to remember that CB was promoted as a serious communication mode open to everyone, perhaps for emergency purposes and especially among the isolated or elderly.

It seems to me to be a calculated toffee-nosed position for licensed radio amateurs to regard CB radio as an inferior medium. It is true that people using it have not endeared themselves to casual listeners shocked by some language and expressed attitudes to life. Nevertheless, the freedom to communicate freely through space although in a limited way seems to me to be one of the things democracy is about.

It is not after all much to pass a technical examination and a Morse test. To be accorded thereafter the right to transmit as a radio amateur in most modes and on a useful selection of frequencies seems a great privilege especially since the only obligation, to train oneself, is never tested by the licensing authority. Many licensed amateurs never want to do more than chat. That is what happens legitimately on CB frequencies.

I hope you will continue CB Corner and perhaps by admirable diplomacy bring about a conciliation between CB users and amateurs. There are a number of technical and legal matters which clever contributors could discuss to enhance the activities of CB users and even perhaps, by interesting them, accelerate the entrance of some into amateur radio.

Gordon Lines G1TMA
Reigate
Surrey

Dear Sir

Re: 'Keylines' May 1990/Home Construction

As an avid home-brewer and QPRer I am happy to work from the circuit alone, but I am only able to do this as I consider myself an intermediate/advanced constructor.

There was of course a time many years ago when I began as a novice constructor (of early *PW* valve rigs by G3OGR) and I always appreciated a tourist/laymans guide to the circuit. In later years, the p.c.b. overlay was very helpful.

I respectfully suggest in constructional articles you continue to do this, for two reasons:

1. It encourages beginners - and remember how you felt on your first project with a soldering iron.

2. For us more experienced men, I believe we can read between the lines of constructional text, see what was in the authors mind, and tailor the project to our particular needs. Plagiarism lives.

'Keylines' aside, *PW* is an excellent journal - keep it up.

R. I. Leask G4CEO Sharnbrook Beds

Dear Sir

Having recently added two extra speakers to my hi-fi for surround sound, I noticed that by listening to a.m. signals, the two extra loudspeakers converted mono signal into stereo four channel sound.

Having monitored this surprising discovery for a few weeks I have found that the signal needs to be strong and steady and, derived from a stereo source. I have also found BBC External Services transmit the most stereo programmes.

You can also apply this to TV sound.

Alexander Kevan
Newton Stewart
Wigtownshire

Dear Sir

I thought I would just drop you a line to let you know how much I enjoy the new format of your magazine. The paper and print is much clearer, the items more interesting!

I am also glad to see a CB item has been included each month, CB rekindled my interest in radio and gave me the incentive to take the ticket and get involved in amateur radio.

Finally, as per your request in your June Keylines column, I would agree in a 'Bargain Basement' type wanted ads column in your magazine.

All the best for the future

T. Ritchie G0GSL Wanstead London

G3XFD replies: The letters above are typical of the replies received in favour of the CB page in PW but they do not seem to reflect the negative 'feedback' we're getting from you at rallies and events regarding this feature. We would very much like to know YOUR feelings on this matter. Please send your vote marked either YES for the CB page or NO for the CB page. Please include your name and address as the first three votes 'out of the hat' will win PW subscriptions (Whichever way they vote!) Don't forget to mark your postcard FREEPOST and it won't cost you anything! All votes in by July 12 please.

Dear Sir

When the April issue of *PW* turned up I was very pleased to see Dick Pascoe's article 'The Windom Revisited' which was just what I was looking for, as many of the dipoles that had been erected on my 'antenna farm' over the years have been marginal to say the least. But there we were, a Windom with all the relevant measurements including details of the balum, a chance not to be missed, so out to the workshop and build all the bits. The antenna has now been up a week and without question it is the best thing since 'sliced bread'. One point I would like to ask Mr Pascoe is that when he erected his unit, he lives in a three storey house and is able to drop the 300Ω feed in a vertical axis, in my case, living in a single storey house the feed and balum lie on the ceiling above the shack, does this reduce the performance in any way? As a point of interest which may help other constructors I have found that an a.t.u. must be used to get good results.

Thank you Mr Pascoe for letting us into your secret.

Nigel R. Tucker
Harare
Zimbabwe

Dear Sir

Re: Split frequency operation

I am compelled to write to you regarding the above, and related operating practices most of which I find bad.

The recent practice of DX stations on expeditions Bouvet Island, Spratly, etc,. operating the procedure of transmitting on one frequency and listening across 30-50kHz has to be condemned. How can anyone listen across 50kHz at once? Impossible one might say - band congestion results, hundreds of stations call at random across the 'split' oblivious by choice to what QSOs might already be in progress in the hope that the DX station will hear them.

Let's get back to 5kHz splits if split frequency operation has to be worked at all and occupy no more than a 5kHz bandwidth when 'listening-up'.

DX expedition managers please note and let's get organisation back into the chaos that has started to become all too apparent.

Brian Mulleady
GM0KWL
Camelon, Falkirk

Dear Sir

I heartily endorse G4J0T's plea for a revival of a.m. in 'Receiving You' June *PW*. I called for the same in my letter in 'Members Mailbag', *Radcom* February 1988 when I put forward some views re the student (novice) licence. I also endorse your footnote re extending it to bands other than 28MHz

But please, not 3 watts or so. Bearing in mind that the power is shared between the sidebands and the carrier let us have 10 watts as a minimum; easily obtained with *v*-m.o.s. Although as an old valve man I wouldn't know how to modulate *v*-m.o.s!

In the same letter I called for a revival of the 'super-gainer' RX, ie a simple superhet comprising frequency converter(s) followed by a t.r.f. (straight) RX as i.f./audio. As I pointed out a t.r.f. is good for all three modes, c.w., s.s.b., a.m. The t.r.f. could be used on its own for top band with converters added for other bands as and when required. Don't forget to include some suitable audio filters; low-pass would be adequate with cut-offs of, say, 500Hz c.w., 2kHz s.s.b. and 4kHz (or 6?) a.m.

Finally, 'ugly' construction please (tagstrips, tagboards, Veroboards, etc).; no twee high-density p.c.b.s. And with the layout resembling the circuit diagram as far as possible.

R. G. Taylor G3AVQ
Henley-on-Thames
Oxon

Dear Sir

After reading Alex L. Dicks comments, very properly accorded your Star Letter in this month's issue of the journal, may I say how wholeheartedly I, and many other local amateurs echo his remarks.

After more than fifty years unflagging interest in the hobby, during which time many experiments and d.i.y. projects have been undertaken, culminating in successfully attaining a pass in the RAE with a distinction for each paper, I leave you to imagine my impotent fury upon learning this morning from the GB2RS news, that, should I care to attain the dizzy heights of 5w.p.m. Morse, I can swap my 'B' licence for the so-called 'Novice' licence! Big Deal!

Trevor C. Harris G7FDH
Peacehaven, East Sussex

Dear Sir

Re: Duke of Edinburgh Scheme

I wonder if I may make an appeal through the pages of your excellent magazine.

I have been running a Radio Society here since last September with a view to fulfilling some of the skills awards for the Duke of Edinburgh Scheme. I have girls following syllabuses from all 3 components; short wave listening, radio construction and amateur radio.

Up till now I have been using equipment brought from home and am finding that the continual moving is taking its toll, gear is getting knocked about and, on the whole, the system is very unsatisfactory.

I wonder if any of your readers have equipment, components, wire, poles, etc., surplus to their requirements which they might care to donate, or loan, to the school. I am prepared to collect and will accept equipment in any condition.

Readers can contact me at the following address:

Watford Grammar School For Girls
Lady's Close
Watford
WD1 8AE
Telephone: 223403

Or at home on Luton (0582) 508259. If I am not at home they may leave a message on my machine.

Keep up the good work on what is undoubtedly the best radio mag going.

Tony Kelsey-Stead G0COQ
Lady's Close Watford

Dear Sir

For one taking up Ham radio again after a five-year layoff, hindsight gives me a slightly different viewpoint on the novice licence/Morse issue. When I look at the vast gaps in my theoretical knowledge and my ineptitude at c.w., I wish that (a) I could study for the RAE again and (b) that I could have somehow been forced to use c.w. after I passed the test.

I now want to get capable at c.w., and I reckon that a period of enforced c.w. - only operation in the past would have done me the world of good. Looking back, it was far too easy to abandon the key and grab hold of the mic. I now feel quite ashamed of having to use six times as much bandwidth than I actually need to for my QSOs. What I'm saying is that any new novice licence should be c.w. only. Elitist? No! Just don't want to see people scared to death of using c.w. on the air like I was!

Seems that it's once again down to practice, practice, practice if I'm going to get up there with the 30w.p.m.-men. A bizarre ambition? Well, what other ambitions can be left for a Ham with limited technical ability, limited antenna space, limited financial resources and an aversion to rag-chewers!

Arthur Wardell G0DKJ
Halifax
West Yorkshire

Dear Sir

I wish to express my support for the views of G4JQT.

I am convinced that amateur radio is in decline, and that we as amateurs will be responsible for its demise.

The indiscriminate introduction of s.s.b. on all bands is in my opinion a major cause.

To the newcomer to the hobby s.s.b. is hard to understand and equipment to transmit and receive it almost impossible to build.

I am not convinced that s.s.b. is the godsend that everyone once thought it would be, listen to any band and the misuse of the mode often creates more problems than would the equivalent a.m. signal.

Single sideband should be restricted to certain DX segments or bands, and other well defined bands should be reserved for simpler modes more suited to the purpose of the user including the novice.

Amateur radio is supposed to be for self-training in the art. Sitting in front of an all-singing dancing black box does nothing in my view to promote this concept. Far more satisfaction is obtained in building, operating and improving upon something which one has designed and built from scratch at minimal expence.

An excellent start can be made by constructing and operating a.m. equipment.

I will be happy to join a Group to promote the use of a.m.

P. Simpkins G3MCL Winchester, Hants

Services

Queries
We will always try to help readers having dificulties with a *Practical Wireless* project, but please note the following simple rules:
1: We cannot give advice on modifications to our designs, nor on commercial radio, TV or electronic equipment.
2: We cannot deal with technical queries over the telephone.
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 query adequately.
5: Only one query per letter please.

Back Numbers & Binders
Limited stocks of many issues of *PW* for the past years are available at £1.65 each including post and packing.
Binders, each holding one volume of *PW*, are available price £4.50 each (£1 P&P for one, £2 for two or more).
Send all orders to the Post Sales Department.

Subscriptions
Subscriptions are available both for the UK and overseas. Please see current issues for the latest prices.

Constructional Projects
Each constructional project is given a rating to guide readers as to its complexity.
Beginner: A project that can be tackled by a beginner who is able to identify components and handle a soldering iron fairly competently.
Intermediate: A fair degree of experience in building electronic or radio projects is assumed, but only basic test equipment is needed to complete any tests and adjustments.
Advanced: A project likely to appeal to an experienced constructor and often requiring access to workshop facilities and test equipment for construction, testing and alignment. Definitely not recommended for a beginner to tackle on their own.
Components for our projects are usually available from advertisers. For more difficult items a source will be suggested in the article. Kits for many of our recent projects are available from CPL Electronics and FJP kits, both of who advertise in the magazine.
The printed circuit boards are available, mail order, from the Post Sales Department.

Mail Order
All *PW* services are available Mail Order, either by post or using the 24hr Mail Order Hotline (0202) 665524. Payment should be by cheque (overseas orders must be drawn on a London Clearing Bank), Access, Mastercard or Visa please.

Wireless Line
This is an information service for the radio enthusiast, updated each Friday. Calls cost 38p per minutes peak time and 25p per minute off-peak. The number to ring is: (0898) 654632.

Newsdesk '90

Junk Sale

August 27: The Huntingdon Junk Sale & Auction will be held at the Medway Centre, Coneygear Road, Huntingdon, Cambs. The doors open from 10am to 4pm, food and drink will be available all day. The junk sale will be twice the size of last year's event and will include surplus gear, components, a Bring & Buy and the Ouse Valley Repeater Group Stand. **G1YVS. Tel: (0836) 611025 or (0487) 830212 (eves).**

Silver Jubilee Award

The Bromsgrove & District ARC have a Silver Jubilee Award available.

To receive the award, a QSO must be held with either GB2VGG or GB25VGG and four other Bromsgrove Club stations from the callsigns listed here.

G3VGG, G7AQU, G4IVJ, GB2RUB, GB0FS, GB0BC, G4JHY, G4JVB, G3RLF, G0KIN, G2CLN, G4MBW, G4FP, G8IO, G4LRL, G0BLT, G0BIR, G4AAL, G3RBL, G6VTA, G4PZQ, G7FAZ, G0HPG, G0HPH or G7ESV.

John Harvey G4IVJ
Tel: (021) 477 7447

Open Day

This year marks the 70th anniversary of the founding of Stockport Radio Society, formerly the Stockport Wireless Society. The inaugural meeting was held on 4 June 1920.

To celebrate the occasion, the Society will be holding an Open Day from 9.30am to 5.30pm on Saturday June 23 in Room 14 at the Dialstone Centre, Lisburne Lane, Stockport. There will be a display of equipment from each of the seven decades that the Society has been in existence and a special event station will be on the air.

Andrew Paterson G0HAL
Tel: (061) 480 3236

Loudenboomer

The SRW Kilowatt Loudenboomer is now in production and is available 'off the shelf'. It gives an easy 400W p.e.p. (or c.w.) output on all nine bands - 1.8 to 28MHz - when driven by a standard 50 to 100W output h.f. rig. It is size compatible with modern rigs, 356 x 254 x 127mm. The 240V mains p.s.u. is integral and the whole unit weighs less than 7kg.

Full TVI precautions have been taken. The antenna output is filtered by a 7-section l.p.f. with a 35MHz cut-off. Attention has also been paid to complete screening, including the meter and fan apertures.

SRW Communications Ltd.,
Astrid House
The Green
Swinton
Malton, North Yorks
Tel: (0653) 697513

Moving House

Greenweld Electronics have moved. Their new address is **Greenweld Electronics Ltd., 27 Park Road, Southampton SO1 3TB. Tel: (0703) 236363**. They have a further 6000sq ft of storage and office space now and will be expanding their operations to include many new lines. Their trade counter will be supplying retailers and bulk users with their entire range.

Cash in all Rally Season long with Practical Wireless

Cut out this coupon and bring it with you to any of the rallies that *Practical Wireless* is attending and you can save 5% on goods bought from our stand. If you collect the coupon from two separate months of Practical Wireless you can save 10% on goods purchased from *Practical Wireless* at the rally.

If you don't want to cut up your magazine, bring the whole issue along and we will validate the coupon without removing it from your magazine.

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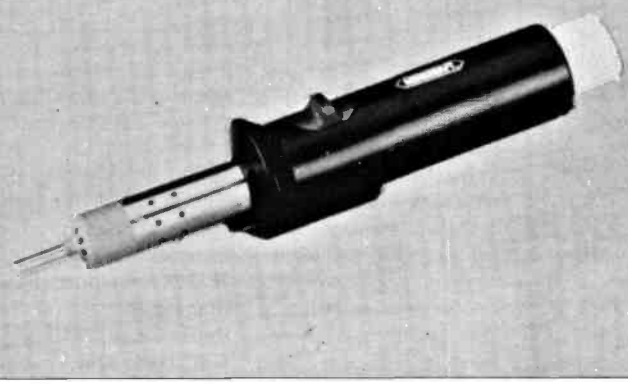
P	Q	A	E	R	K	H	E	V	A	N	N	O	M	I	J	Y	L	G	O	Z	C	G	O	Y	B	G

PRIZES.....

This month we have three very special prizes on offer to readers. There are three **Minicraft Cordless Soldering Irons from Black and Decker** for the first three correct answers out of the 'hat'. The Cordless Soldering iron enables the user to solder anywhere. This is just one of the many items available in the Minicraft range specifically designed for the hobby enthusiast.



Twenty different 'radio' words have been hidden in the letter grid. They have been printed across (forwards or backwards), up and down or diagonally, but they are always in a straight line without odd letters in between. You can use the letters in the grid more than once for different words, and they're not all used. Once you have found all twenty words, mark them on the grid and send in your answers.

Send your entry to PW Publishing Ltd., July 1990 Wordsearch Competition, Enefco House, The Quay, Poole, Dorset BH15 1PP. Closing Date last post received Friday 13 July 1990. The Editor's decision on the winner is final, no correspondence will be entered into.

Name .....

Address .....

.....

.....

.....

.....

Postcode .....

Newsdesk '90

RSGB Sporadic-E Hotline

The RSGB Sporadic-E hotline trial is currently operating for the 1990 season. The recorded message will contain details of potential Es locations within Europe and when available, the recent Boulder K index. This is not a forecast, but hopefully will be a guide to more profitable operating based on results from previous years. The telephone number is: (0426) 952211 (local rate call).

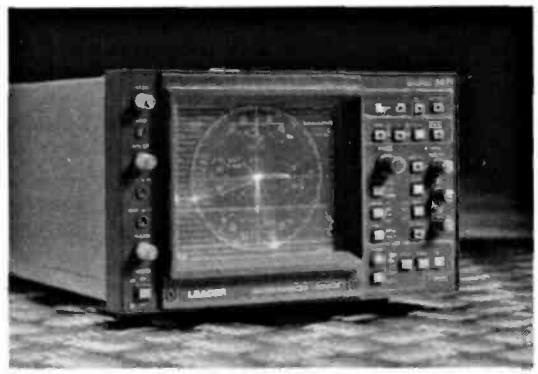
This experimental service is run on an ad-hoc basis and will be updated as new data becomes available (when Anglia Weatherman Jim Bacon is at work!). The precise cause of Es is still not clearly understood. However, by taking part in openings amateur can usefully add to the current level of knowledge - so please try it and then send your logs to **G3YLA, QTHR, the IARU Region 1 Sporadic-E Co-ordinator**.

Annual Stocktaking

Would readers please note that all South Midlands Communications branches will be closed on Friday June 29 for their annual stocktaking.

Silent Key Sale

A sale of surplus v.h.f./u.h.f. goods by auction will take place on July 7 at 2.30pm at The Centre, Shepton Mallet, Somerset. This is the equipment of the late John Glastonbury G8KBQ. The proceeds will go to the local radio club and Musgrove Park Hospital.



TV Test

The Leader 5871, now available in the UK from Thurlby-Thandar Ltd., is a TV signal test instrument that integrates waveform-monitor and vectorscope functions.

Waveform and vector signals can be displayed independently or simultaneously on the instrument's high-intensity, high-resolution 150mm rectangular c.r.t.

The 5871 has a built-in subcarrier horizontal phase-measuring function for video editing and a 9-point memory to allow the pre-setting and recall of field and line numbers. The subcarrier horizontal phase can be numerically read from the c.r.t., as can phase variations or jitter.

Thurlby-Thandar Ltd., 2 Glebe Road, Huntingdon, Cambs PE18 7DX.

WAB

The WAB presented over £5000 to the Guide Dog for the Blind Appeal at the Drayton Manor Rally. The dogs sponsored by the WAB will, once trained, will be returned to the hobby for blind s.w.l.s or licensed amateurs.

On a different tack, someone walked off with their Book Numbers for Issue List on Sunday at the NEC. Without it they are unable to complete their membership list in time for the AGM. If you bought a book from the WAB Stand at the NEC on Sunday 21st, please contact any of the Committee as soon as possible.

Waterproof Tape

Rubbaweld is a self-amalgamating tape that welds to itself on contact. Applied by stretching and wrapping the tape around the object to be sealed, Rubbaweld forms a solid rubber coating which provides excellent electrical insulation properties and protection against water penetration.

It protects electrical fittings from water and chaffing, making it ideal for outside antennas and other external electrics. Other applications include general electrical work and hose and pipe repairs.

Rubbaweld is supplied in a 3m x 25mm roll, complete with instructions and is available by mail for £2.65 including VAT and P&P.

Geedon Performance Coatings Ltd., Commerce Park, Whitehall Road, Colchester CO2 8HX. Tel: (0206) 42234.

East to West QRP Weekend

This event, sponsored jointly by the G-QRP Club and the Czech QRP group, will be the largest QRP event yet organised. It will take place from September 28 to 30.

It is open to all QRP operators in Europe and Asiatic Russia, whether members of a QRP Club or not. The objective is maximum QRP communication between stations in eastern Europe/Asiatic Russia and stations in western Europe.

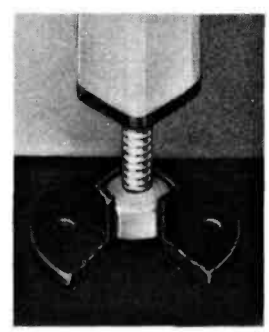
Logs will be adjudicated by the Czech QRP group and merit awards will be produced and issued by the G-QRP Club. The leading UK entrant will also receive and el-bug paddle donated by G4ZPY Paddle Keys.

Bolt Support Foot

Moss Plastic Parts, the Kidlington based manufacturer of small plastic components, have introduced an inexpensive Bolt Support Foot for applications that use a standard M8 bolt to position furniture, domestic appliances, industrial cabinets, etc., to the correct height.

The support is inserted over the head of the bolt, and with the help of a suitably sizes spanner, can rotate in either direction to ensure that the height of the unit or appliance is correct. The support can be locked in place by using screws or nails in the two holes moulded into the foot.

Moss Plastic Parts Ltd., Langford Lane, Kidlington, Oxford OX5 1HX. Tel: (08675) 3073.



Digital Wind Speed

The 'Windy' is a hand-held anemometer available from Incastec Associates Ltd. This compact instrument, running on a PP3 battery, gives an accurate digital readout of wind-speed in knots or metres/sec (switchable) with comparison scales for Beaufort or kmh.

The Windy retails at £75 including VAT. For further details, contact:

Incastec. 75/77 Christchurch Road, Ringwood, Hants BH24 1DH. Tel: (0425) 476211.

Newsdesk '90

Catalogues

Klippon now produce a full-colour guide to the selection of enclosures for various applications and environments.

The brochure provides tabulated information on the environments, finishes and advantages of using mild steel, stainless steel, die cast aluminium, cast iron, polyester (GRP), polycarbonate and ABS enclosures.

Copies are available free of charge. **Klippon. Tel: (0795) 580999**.

Klippon has also produced a full-colour brochure on its custom assembly service which provides assembly of terminals, enclosures and components to particular specifications.

The publication features details of the terminal and box assembly capability, computerised engraving and the CAD design facility. Copies are available free of charge. **Klippon. Tel: (0795) 580999**.

The latest catalogue from Mauritron Technical Services details the copies of workshop manuals they hold for all kinds of equipment of all ages. There is a section on amateur radio, CB as well as test equipment. Their catalogue is available free of charge. **MTS 8 Cherry Tree Road, Chinnor, Oxon. Tel: (0844) 51694**.

Another firm to offer catalogues free of charge are RF Engineering Ltd. They have recently been appointed UK distributor for Barker and Williamson Inc, for all kinds of equipment - antennas, transmatch, switches, etc. Other products on offer are air wound inductors, chokes and cables to mention only a few. **RF Engineering Ltd. Tel: (0706) 214118**.

Johnsons Shortwave Radio have quite a large catlogue available to readers. It contains detailed descriptions of many of their products lines. Most radios have reviews where full details of all the functions can be assertained. **Johnsons Shortwave Radio, 43 Friar Street, Worcester WR1 2NA**.

Hamlin has produced a new brochure on its latest range of l.c.d. modules which covers dot matrix and intelligent graphic types, in stantdard TN of Supertwist STN technology. Copies are available free of charge. **Hamlin. Tel: (0379) 644411**.

The Vintage Wireless Company Ltd have produced a short form component catalogue in lieu of news sheet No. 134. Their full illustrated catalogue will be available later. **Vintage Wireless Company Ltd. Tel: (0272) 565472**.

Alinco Hand-helds

The DJ-160E and DJ-460E are two recent additions to the Alinco range. Their power output is 2W, although 5W is possible with higher voltage battery packs. Their extended receive range is 137-174MHz for the 144MHz version and 410-470MHz for the 430MHz version.

Features include 20 memories, versatile programmed scanning, priority channel, d.t.m.f. TX (RX optional), comprehensive d.t.m.f. calling frequencies, free split function, battery save, auto power off, reverse repeater, multi-frequency steps, S-meter and many more as standard.

The price is around £229 including VAT for each model and this includes NiCads, charger, carry strap and belt clip.

Waters & Stanton Electronics.
18-29 Main Road,
Hockley,
Essex SS5 4QS.

DXpedition

A group of radio amateurs from the Kilmarnock and Loudoun ARC have been visiting some of the smaller Scottish islands over the last few summers to set up portable radio stations. Last year they visited Gigha and the previous year were on Pladda. The destination this time is Iona, off the south-west coast of Mull. The station will make contact with other amateur radio stations throughout the world between July 21 and 25. Both Morse code and speech transmissions will be used.

This is believed to be the first major operation of this type from Iona. Other radio amateurs have visited the island for short periods with fairly simple equipment, but due to the restrictions of access and facilities, no large scale, high power operation has taken place. The Kilmarnock and Loudoun group have obtained special permission and arranged facilities for a five day stay. It is estimated that between two and three thousand separate contacts will be made and a QSL card will be sent to each one.

Callsign: GM0ADX/P

Operators: Barry GM3YEH, Bill GM3ZRT and Adam GM0KAZ

Logkeepers: Calum Beggs and Billy Strachan

Dates: Saturday July 21 to Wednesday July 25

Frequencies: c.w. - 1.84, 3.52, 7.02, 14.02, 21.02 & 28.02MHz

s.s.b. - 1.92, 3.72, 7.08, 14.19, 21.22, 28.52MHz

144 and 50MHz operation will take place if equipment can be borrowed

QSL Information: All contacts will be QSLed via the Bureau. Direct QSLs via GM3ZRT, QTHR.

For further information, contact:

Barry Beggs
27 Burnawn Place
Galston, Ayrshire KA4 8JY
Tel: (0563) 820212 (evenings) or 041-331 3512 (day)

Special Event Stations

GB2NTS: This station will be on the air over the week July 15-22 for the Castle Country Four Castles Event. The castles will be Grampian Region Drum Castle, Castle Fraser, Craigievar Castle and Leith Hall. A certificate is available for overseas stations if they work any two of the stations or for the UK if they work any three. Annotation is available for working all four stations (the cost for the certificate is 50p, 1 Dollar or equivalent). Robbie GM4UQG, PO Box 59, Hamilton, Lanarkshire ML3 6QB.

GB70SIG: To celebrate the 70th Anniversary of the formation of the Royal Corps of Signals, the Scarborough Special Events Group, with members from RSARS, RNARS and RAFARS propose to run a special event station from the Royal Signals Training Centre, Burniston Barracks, Scarborough during the period June 10 to July 7.

Operation will be around 3.725 and 7.055MHz on the h.f. bands, plus 144MHz s.s.b. operation and f.m., in addition to activity on the RSARS nets. Special QSL cards will be available and further details can be obtained from: Roy Clayton G4SSH, QTHR.

GB0RAF: From June 16 to 21 this station will be on the air from RAF Coningsby.

GB2RAF: This station will be on the air from RAF Locking over the weekend of June 22/23.

GB50BOB: On July 8, this station will be on the air form the Science Museum Wroughton.

GB50BOB: This time this station will be on the air from RAF Swinderby over the weekend August 3/6.

GB50RAF: Again the Science Muesum Wroughton will be on the air, this time using a different callsign on August 12.

GB2BHH: This special event station will be on the air from Burton Hill House School, Malmesbury on June 16 and 17. The school is for disabled children and their school fete is on June 16. G4KJV. Tel: (0249) 720456.

GAREX ELECTRONICS

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Automatic frame capture and animation from Meteosat, also still pictures from NOAA & other VHF satellites. Complete system from antenna to colour monitor, including Atari ST1040 computer & software **£1695.00**
Atari interface unit + software only **£458.85**
COMMODORE AMIGA Interface + software for animation & superb high resolution pictures (600 pixels×400 lines) **£458.85**
PCSAT+ for IBM & clones, expandable system from XT+CGA up to 386+VGA. Interface and standard software **£458.85**
Upgrade software for Animation, NOAA, VGA & Paint available.
Complete system: Meteosat antenna, preamp, receiver/interface, software & cables (state which computer) **£688.85**

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The basic METEOSAT system, no complications, no computer, just a plug in and go package that can be up and running in 10 minutes. Antenna through to 12" mono monitor: **£995.95**

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Meteosat Receiver antenna input, 2 watt audio output **£270.25**
Meteosat Preamp 15dB gain 0.6dB NF GaAs FET **£109.25**
NOAA 2 channel High Immunity Receiver **£149.95**
NOAA BASIC Turnstile Antenna **£39.95**
NOAA BASIC Preamp 3 pole filter, boxed, 14dB gain **£28.70**

GAREX VHF RECEIVERS

A simple but versatile design capable of covering spot frequencies in the range 25–200MHz; sensitive double superhet with choice of IF bandwidths from "W-SAT" to "12.5kHz" PMR. Single channel xtal controlled with multi-channel options. (Prices from **£49.95**)
Mains power supply module 12v regulated 250mA **£15. 50**

GAREX VHF PREAMPLIFIERS

Miniature General Purpose only 34×9×15mm, any frequency in range 40–200MHz, up to 25dB gain
Stock versions: 6m, 4m, 2m & 137MHz (W-SAT) **£11.45**
Airband 118–136MHz (reduced gain) **£11.45**
Other frequencies in the range 40–200MHz to order **£13.75**
High Performance 2 metre Preamp
3 band-pass stages, 16dB gain, 1dB NF, RF switched (up to 35 watts) with gas-filled relays, assembled pcb **£39.95**
Boxed version, with BNC connectors **£49.95**
Gas-filled relays as used in preamp **£4.95**

TONE BURST GENERATOR

Miniature (38×18×10mm) xtal controlled 1750Hz **£17.95**

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A popular line for many years. Economy package: chassis section cut from commercial R/T gear, re-wired & tidied up to make a free-standing unit, no expensive cabinet, just basic value for money.
12V DC input, 250V 150mA DC output **£10.95**
12V DC input, 400V 200mA DC output **£11.95**
24V versions to order.

4 Metre Rx CONVERTER

High quality PMR front end by famous manufacturer, modified by Garex to make 4 metre convertre: 10–11MHz output. Full circuit and connection details **£16.95**

4 METRE 0.5 WATT TX

Tx Low Power driver unit matching above Rx, with modulator, fully aligned with data **£15.95**
(or + xtal for 70.45MHz **£19.95**)

REVCO TABLE MICROPHONES

Very high quality PTT Base Mikes 600 or 2.4k ohm (state which) **£55.00**

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12V Operation, handles 50 watts up to 200MHz **£1.95; 5 for £7.50**

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TX-3 RTTY CW ASCII TRANSCEIVE

High performance, low cost. Unbeatable features. **BBC,CBM64** tape £20, disc £22. **SPECTRUM** tape £35, +3 disc £37 inc adapter board. **VIC20** RTTY CW program tape £20. All need our TIFI interface or a terminal unit.

GX-2 FAX SSTV TRANSCEIVE

All modes of FAX and colour/mono SSTV. Review in March 90 Amateur Radio. **BBC** only. Complete system only £99 or £119 with FAX direct printing option.

RX-8 MULTIMODE RECEIVE SYSTEM

FAX to screen and printer, colour **SSTV**, HF and VHF **PACKET, RTTY, AMTOR, CW, ASCII, UoSAT**. Every feature. Full disc, printer support. Reviews Oct 89 Ham Radio Today & March 90 Amateur Radio. **BBC** only. Complete system only £259. **DISCOUNT** for RX-4 users.

RX-4 RTTY CW SSTV AMTOR RECEIVE

Still a best-seller. **BBC, CBM64** tape £25, disc £27. VIC20 tape £25. **SPECTRUM** tape £40, +3 disc £42 inc adapter board. All need our TIFI interface, **SPECTRUM** software-only version £25.

TIF1 INTERFACE for best HF & VHF performance with our software. Kit £20, ready-made & boxed £40. Only with TX-3 or RX-4 software.

APT-1 WEATHER SATELLITE RECEIVE MODULE

Converts satellite signal for display on any FAX system. £59. For use with RX-8, all connections included and price only £39 if ordered at same time as RX-8.

Also **MORSE TUTOR** £6, **LOGBOOK** £8, **RAE MATHS** £9 for **BBC, CBM64, VIC20, SPECTRUM**. **BBC LOCATOR** with UK, Europe, World maps £10. All available on disc £2 extra.

Full information available on everything. Please ask.
Prices include VAT and p&p by return.

technical software (P.W.)

Fron, Upper Llandwrog, Caernarfon LL54 7RF
Tel: 0286 881886

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AR1201 Alignment (support) bearing. Allows greater/higher head loads. Fitted above rotor. **£18.10.**

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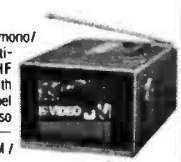

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★ Stable VFO ★ Sidetone ★ Audio Filter
★ Requires 12/14 VDC ★ Very detailed instructions ★ Black steel case
★ Printed panel

COMPANION ANTENNA TUNING UNITS

TU1 Kit — £39.25 Ready Built — £54.50
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★ Large dia. coil ★ High grade capacitor ★ Built in balun ★ Circuits to match your antenna ★ Up to 30 Watts of CW ★ TU2 has sensitive QRP/SWR meter

Send SAE for brochure or call Alan G4DVW on 0602 382509

LAKE ELECTRONICS

7 Middleton Close, Nuthall, Nottingham NG16 1BX
(callers by appointment only)

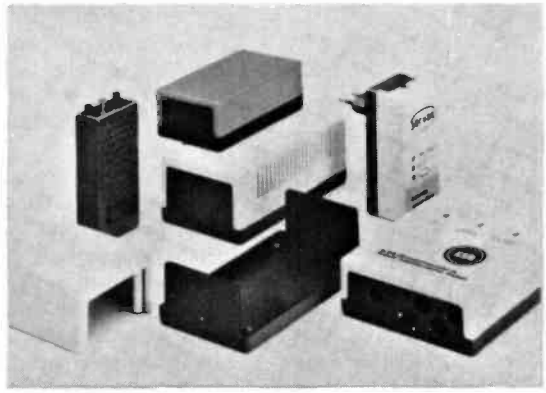
Newsdesk '90

Element

Element is a new range of small instrument and electronic units available, in a new standard colour, from Bopla Ltd. The company are still maintaining the traditional colours of light grey shell and dark grey base while introducing an alternative mid grey lower shell.

The enclosure is made from two interlocking sections. It has the advantage that when the upper section is removed components can be installed quickly and conveniently into the lower section. For mounting a chassis or p.c.b., threaded brass inserts are provided as standard.

The Element range of cases is designed to VDE standards for light-duty requirements. The cases are moulded in high-impact polystyrene which is easily drilled or machined if required.



Protected to IP44, Element is available in a comprehensive size and colour range. The various accessories range from wall mounting metal brackets, tilt feet and handles to either carry the case or to support it at an angle. Dual purpose plastics clips are also available to provide an instant snap-on lid.

Bopla Ltd
29 Faraday Road
Aylesbury
Bucks HP19 3RY
Tel: (0296) 399999

The Double Whiskey Award

This award is in honour of Jim Adamson G1AWW, who died in late March 1990. Jim was a founder member of Widnes and Runcorn ARC and, at the time of his death, was actively supporting the club in his position as Club President.

Proceeds from this award will be donated to Cancer Research.

Scoring System:

Club station G0FWR - 10 points

Club members - 5 points

Special event stations run by Widnes & Runcorn ARC - 5 points

To claim the h.f. award, all stations require 25 points to claim the award. To claim the v.h.f. award, UK stations require 25 points, non-UK stations require 15 points.

The award starts from July 1990, contacts via repeaters do **not** count towards this award.

The award is open to s.w.l.s and can be claimed by sending details of the station heard, time, date and frequency to G1VJP.

The award costs £2 sterling or 8IRCs. To claim the award please send your log extracts, signed by one other amateur, to:

G1VJP
216 Alder Street, Newton-le-Willows
Merseyside WA12 8HS

Tokens & Vouchers

Following the news that the RAIBC in Northern Ireland collect BP petrol coupons, we have heard that they now have a FREEPOST address for people to use.

They can make use of all kinds of stamps and coupons: Shell, BP, Maxol, Esso, Texaco, Green Shield, Blue Chip, Priveligi and Air Miles, even the coupons you get in cigarette packets can be used. They can all be sent to the RAIBC via their FREEPOST address. So far they have been able to obtain more than £7000 worth of equipment in this way.

RAIBC (NI)
FREEPOST BE1769, Belfast, N Ireland BT12 5BR

Waterproof Mic

Bruel & Kjaer has introduced a weatherproof microphone unit which complies with both IEC651 Type 1 and BS5969 and features outstanding omnidirectional characteristics.

The Type 4184 weatherproof microphone is designed for use in noise monitoring applications, either pole-mounted for permanent installation or tripod-mounted for semi-permanent or portable use. The unit can withstand most humid and corrosive atmospheres, and features an integral windscreen and rain protection to IEC529. The construction of the microphone minimises variations of sensitivity with temperature change. Each microphone is individually factory-calibrated from 20Hz to 20kHz and is delivered with a calibration chart.

Bruel & Kjaer (UK) Ltd
92 Uxbridge Road, Harrow HA3 6BZ.
Tel: 081-954 9504

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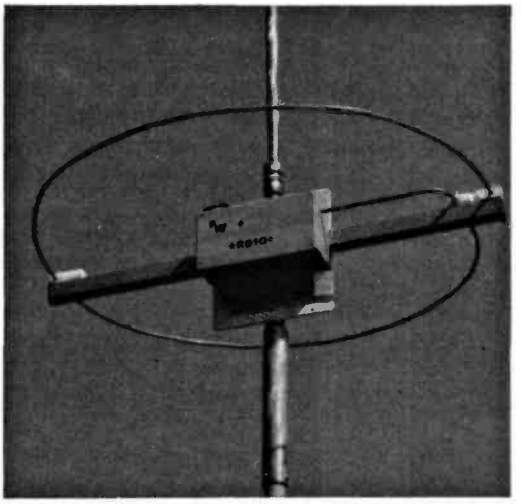
Payment by Access, Mastercard, Eurocard or Visa also accepted on telephone orders to Poole (0202) 665524.
Normally despatched by return of post but please allow 28 days for delivery.

Prices include VAT where appropriate.

Construction

The RB10 Antenna – *for 28MHz*

This versatile antenna, ideal for portable or base operation, has been designed by Fred Judd G2BCX, with 28MHz enthusiasts in mind.



The RB10 stems from the 'Ring Base' antenna that I designed some years ago for 144MHz band operation. (*PW*, September 1982, subsequently reprinted in *Wires and Waves*) which employed a half-wave radiating element.

Continued experimental work with this configuration resulted in a relatively efficient but smaller version for 144MHz mobile operation using an inductively loaded 'short quarter-wave' radiator. From this , the RB10 Ring Base antenna for the 28MHz band, has been developed.

Firstly, the RB10 is not difficult to construct, despite seemingly complexity, and it has three applications. The antenna has been designed primarily for portable operation - hence the 'sectional' construction which allows it to be carried in the car.

On the other hand, it can be used as a 'fixed' station antenna mounted at the top of a mast, in which case the radiating element may be in one length (aluminium tube) for either the 28MHz amateur band or the 27MHz CB band.

The dimension provided are for the portable (sectional) version of the antenna intended for the 28MHz amateur band. However, only very little adjustment is needed to make the antenna suitable for the 27MHz CB band.

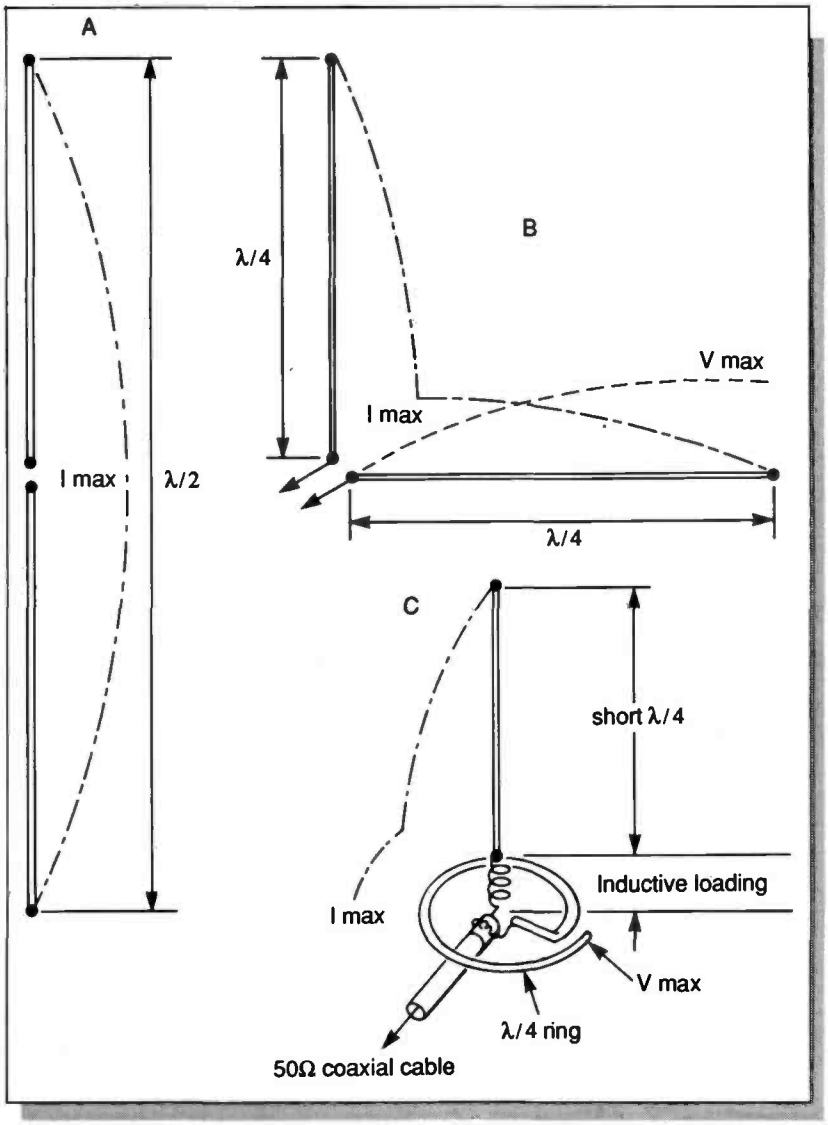


Fig. 1.1: Development of the ring-base from a half-wave dipole.

General Performance

Operational tests were carried out at my QTH, a fairly open area in the Norfolk countryside. Two prototypes were constructed, one for 'portable' operation as in this article, the other, with a slight difference in construction, being intended for 'fixed' station working.

During 28MHz band 'openings', quite satisfying results were obtained from both prototypes, For example, in a few hours, one afternoon, using s.s.b. and the portable version of the RB10, numerous countries were worked. These included VK, VE, several different USA states, including some in the far West.

I also worked Japan, Greece and stations in both the Middle East and nearer home including various parts of the USSR and more distant Europeans. My rig for the tests was an FT102 running at 100W.

Signal reports were generally good while propagation conditions remained at their peak., although it should be remembered that an antenna of this nature does not have the same efficiency as a full dipole but it is omni-directional and relatively compact.

Function and Antenna Configuration.

The derivation of the ring base antenna from a dipole and its 'electrical' function, is illustrated in Fig. 1.1. The current distribution of a normal dipole is shown by (A) and this would remain the same with the antenna folded as in (B). However, with the 'horizontal' portion formed into a ring, its self-inductance is increased so the length has to be reduced to maintain resonance, i.e, the ring has a circumference of approximately 1/8th wavelength.

The 'vertical' quarter-wave is also reduced in length, by a factor a little over 20 per cent. to obtain more convenient 'section' lengths, although a small amount of inductive loading is used to maintain resonance and an acceptable current as in (C). With reduced radiation resistance the input impedance becomes 50Ω.

Vertical Radiation

Operational height above ground is relative to the ring base and the optimum is 0.2 wavelength (reference to the frequency band in use) or approximately two metres. The computer produced pattern for radiation at 'vertical' angles is shown in Fig.1. 2 and is for the height stated although the pattern will not change much as the height above ground is increased.

Height (to the ring) from either ground, or a roof-top, must NOT be less than 1.5 metres. Any height lower than this will result in de-tuning and a totally unacceptable performance. The RB10, as previously mentioned, is otherwise omni-directional.

VSWR versus Bandwidth

The very top section of the radiating element is adjustable and its loading inductance turns can be opened out, or squeezed in a little, to obtain precise resonance and minimum VSWR at band centre. (Further notes with regard to tuning for the 28MHz amateur band and the 27MHz CB band are provided later).

For fixed station operation the radiating element can be a single length of aluminium tube of, say 12mm in diameter, with a top adjustable section as shown in the diagrams. Copper tube was chosen for the portable version so that the radiating element could consist of two sections coupled at the centre and then onto the short stub on the ring base unit.

The VSWR versus bandwidth for both arrangements was measured with Bird Thru-Line equipment, the results being shown in the computer print-out in Fig.1.3. It is interesting to note the slightly better VSWR versus Bandwidth response obtained with a copper tube radiating element. However, in view of the 'inductive' nature of the RB10, the VSWR is, in either case, well within acceptable limits considering the wide band-width required.

To be continued.

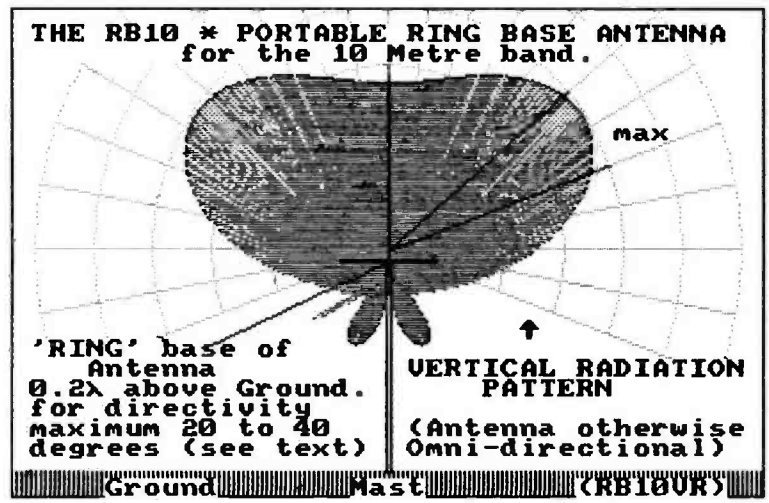


Fig. 1.2: Vertical radiation pattern of the RB10 antenna.

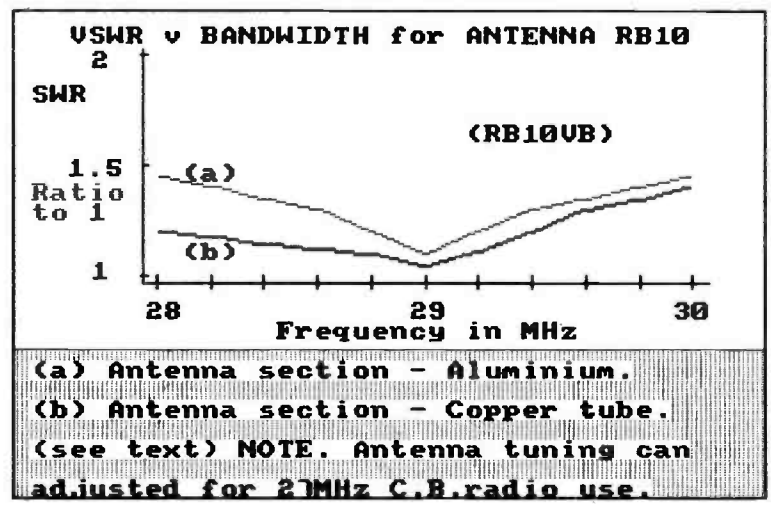


Fig.1.3: VWSR plotted over the board.

Shopping List

Hydraulic brake piping:
1.22m. (4mm diameter, copper or nickel-plated steel)
15mm diameter copper pipe
(for portable version) 1990mm length
12mm aluminium tube
(for fixed station version)
Copper/Brass/Mild steel tubing for ferrules.
Wood/Delrin/ Perspex or other insulating material for ring support.
Dowel/broomstick for stub 220mm to 250mm long
Self-tapping screws, hose-clip, polypropylene ropes for guy lines, metal mounting panel, plastics box, coaxial cable connector, 15mm brass compression type plumbing fittings with 'olives' (5)

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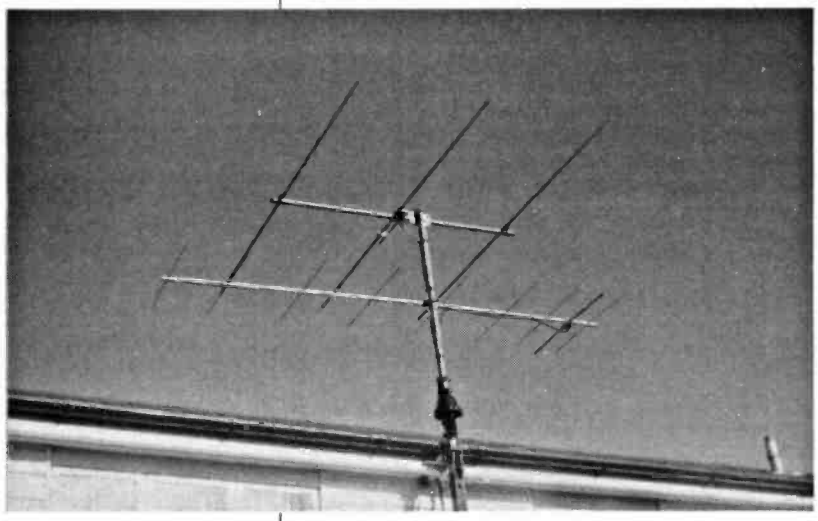
Next month in part 2, Fred shows us how to build the RB10.

Feature

Further Notes on the Small 50MHz Yagi



Many readers showed a lot of interest in the original 50MHz Yagi project published in July 1989 and now, one year on, Ken Willis G8VR brings us up to date with modifications and furthers ideas on the same theme.

Judging from correspondence received and comments heard over the air, there has been considerable interest shown in the little three element Yagi which I described in the July '89 issue of *PW*.

Unfortunately I did not make it clear in the article that the coaxial feeder must be connected either to the boom or the centre of the driven element and this caused some confusion initially.

In my antenna, the plastics box which supports the gamma rod and carries the SO239 socket is fitted with a false bottom made from brass. This is connected to the boom using self-tapping screws, and since the SO239 is also connected to it, this effectively connects the coaxial cable outer conductor to the centre point.

Ian White G3SEK, carried out computer analysis of the antenna and found it to be slightly short, suggesting that it resonates above 51MHz. The fact that I obtained a marked peak in noise at 50.110MHz whenever I tuned across this frequency, Ian attributes to the gamma system which was matched at this frequency and as a result was providing the largest noise contribution.

Recently I visited some of the New England 50MHz 'gang'. During a pleasant weekend with Bob Reif W1XP, we again analysed the antenna using a modified MINEC program, developed by the US Navy Ocean Systems Centre. This program, which is now in the public domain, deals with wire antennas, but Bob has modified it to handle Yagi problems and to provide graphical presentation of polar diagrams.

Using this program again indicated that the antenna dimensions were slightly short, but the difference in gain achieved at the apparent (computed) resonance and the matched frequency of 50.1MHz was barely discernible. The forward gain came out as just over 8dB and the front-to-back ratio at 25dB.

I was particularly interested to receive a letter from Etienne Swart ZS6CE who is a well known South African 50MHz operator. He built a version of the antenna to the dimensions given but instead of using circular tubing, Etienne chose 16mm square section aluminium tubing for both the boom and elements.

This technique enabled him to use a simple bolt and wing-nut method to fix the elements to the boom while the flat sides on the driven element permitted a simple gamma-rod termination to be used. This took the form of an aluminium strip fixed to the driven element by self-tapping screws.

Etienne can break down the antenna into its component parts very quickly, making it very effective for portable operation. He claims that an s.w.r. of between 1.1 and 1.5 from 50.1 to 50.4MHz is available with this arrangement. Etienne likes the antenna because of its low wind resistance, presumably because he is a mountain-topper!

So to sum up, the computer suggests making the elements slightly longer, perhaps 50mm or so on all three. However, if you've already built the antenna and matched it well, then there is little to be gained by making any changes. My original antenna continues to work well, with G3CGQ/5N29 and ZS3JO returning from my first call in 'pile ups' recently.

While I was visiting New England the band went wide open to VK and J, so I cannot say whether it would have been as effective over these longer paths in the face of some horrendous QRM.

It would be very interesting is someone who is active on 70MHz could find the time to try a scaled-down version of this antenna on the band. This could be done by reducing all dimensions in the ratio of 5/7. Since this would result in a very small Yagi with a boom length of just 1.295m with the longest element measuring 2.082m. An attractive proposition for a small urban garden!

Stop press: G8VR reports that he has now worked 56 countries and 211 grid squares on 50MHz to date, with WAC. **PW**

Radio Diary

***Practical Wireless & Short Wave Magazine in attendance.**

June 17: The Newbury Radio Boot Sale is being organised by the Newbury & District ARS at Ackland Hall & Recreation Ground, Cold Ash, Newbury between 10am and 3pm. There will be refreshments available, with free entry and parking for visitors. Talk-in will be provided by GB4NBS. **Mike G3VOW. Tel: (0635) 43048**.

***June 24**: The Annual Longleat Mobile Rally will be, as usual, held at Longleat near Warminster, Wilts. **Shaun O'Sullivan G8VPG. Tel: (0225) 873098**.

July 1: The Worcester & District Droitwich Strawberry Rally will be held at the High School, Droitwich. There will be the usual trade stands, Bring & Buy, family entertainment and strawberry fields (weather permitting). Gates open at 11am with free car parking and entrance. **Tony G4OPD. Tel: Worcester 620507 or Derek G4RBO. Tel: Worcester 641733**.

July 1: The York Radio Rally will be in the Tattersall Building, York Race Course, The Knavesmire, York. Doors open at 11am with an entrance fee of 50p (children admitted free). There is ample free parking. On show will be amateur radio, electronics and computing, arts and crafts, there's a grand Bring & Buy, Morse tests, lectures on various aspects of amateur radio, a raffle and talk-in on S22. A licensed bar and cafe will be available for refreshments. The Knavesmire is well signposted and there will additional RAC signs round the main approaches to York. **Frank Webb G3ZKS. Tel: (0904) 625798**.

July 1: Newport ARS are holding their 3rd Grand Surplus Equipment and Junk Sale at the Brynglas Community Education Centre, Brynglas Road, Newport. The Sale is open from 10.30am to 4pm (10am for the disabled). **Kevin GW7BSC. Tel: (0633) 262488**.

July 6, 7 & 8: The Popular Flying Association Rally is again being held at Cranfield Aerodrome, Bedfordshire. All activities related to flying, including airband radio will have a place there.

July 14: The Cornish Radio Amateur Club Rally will be held in the Richard Lander School, Truro. There will be the usual trade stands, Bring & Buy, a computer display/demo and a weather satellite demo. There will be refreshments, good free parking and the doors open at 10am (9.30am for the disabled). **Rolf Little G7FKR. Tel: (0872) 72554**.

***July 15**: The Sussex Amateur Radio and Computer Fair will be held at Brighton Racecourse. All the usual traders and other attractions will be there. Doors open from 10.30am to 4.30pm, with entrance at £1. **Ron Bray G8VEH (QTHR). Tel: (0273) 415654 office hourse or (0903) 763978 other times**.

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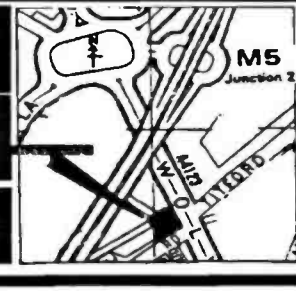

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Theory

Valve Technology & Characteristics - Part 1

Following a very brief historical note Peter Buchan G3INR takes a look at thermionic emission and then goes on to the diode and triode characteristics and the duties each device perform.

Sitting down to write this caused me to drift into what probably could be described as a 'brown study' where ones' mind searches below the many layers of thought that fill the present day. I was taken back to the cold winter evenings when you would switch on the gear before tea and leave it warming up the shack for the evenings exploration of say, the c.w. end of the 3.5MHz band. European and Scandinavian contacts giving way to CT3 and CT2 as the evening wore on, and perhaps just before closing one might chat with Jack VE1ZZ exchanging reports of perhaps 55/69 or thereabouts followed by one or two quick QSOs with East Coast W stations.

Mercury Vapour rectifiers pulsing gently with the c.w. and the soft hum of the transformers coupled with the all pervading 'smell' of electricity, gave you the feeling of being given a glimpse of wonderland. The added bonus of course was that the gear expressed your own personality, you had made it, perhaps even designed it, and joy of joys you were operating it. That was the secret behind the Radio Amateur I believe, and the tremendous value they set upon being the owner of a callsign. They were indeed halcyon days. No less should they be now and the following look at the thermionic valve might awaken memories for some and be an introduction to a different world for others.

The History

Valves or tubes as the Americans call them have been with us for nearly 100 years. It was in the 1880s that Thomas Edison, who had already developed the incandescent lamp, found that a current passed across the space between a heated filament and a metal plate sealed inside the evacuated envelope of a lamp. The story goes that the metal plate had been introduced deliberately to attract the soot, given off by the filament, which gradually clouded the inside of the lamp above the filament. Curiosity then gave the lead to attaching a galvanometer from the metal pin attached to the plate, and around which the glass seal had been made, to the source of the filament voltage. To his, no doubt surprise and delight, he found that a small current flowed; about 2mA, this became known as the 'Edison Effect'. The 'Effect' was followed up by another famous name, J.A. Fleming, but it was not until 1899 that J.J. Thomson announced his theory of electrons which gave a clue to the Edison Effect

Fleming realised that this unilateral flow of current could be used for the detection of oscillating currents and in 1904 took out a British Patent for the device to be used for the detection of radio and audio frequencies. This point marks the introduction of the valve into radio engineering. Three years later Lee de Forest took out an American Patent by introducing a third electrode into the original Fleming valve which produced an enormous increase in the potential of the device, but it was still some years before these were fully developed. When vacuum techniques had been substantially improved the triode valve came into general use and revolutionised the science of radio communication.

Fundamentals

The fundamental feature of a thermionic valve is the control of electron flow. To be able to do this there must be a source of 'free' electrons available. Free electrons are those which may be acted upon by forces, perhaps some little distance away. In an ordinary valve the filament is heated to a temperature where vigorous activity takes place within the structure of the material. Electrons near the surface of the filament are ejected by these internal forces and drawn away from the source by the attraction of a positive potential placed upon the anode of the valve. The electrons are set free by the addition of thermal [heat] energy. The atoms that lose their compliment of electrons become positively charged and are called ions. Thus the words therm, meaning heat, and ion meaning a charged particle are combined to make the word thermionic. Electrons are released by thermionic emission.

To achieve electron emission, the material that is heated must be placed in a vacuum. The pressure in a thermionic valve is reduced to about one millionth

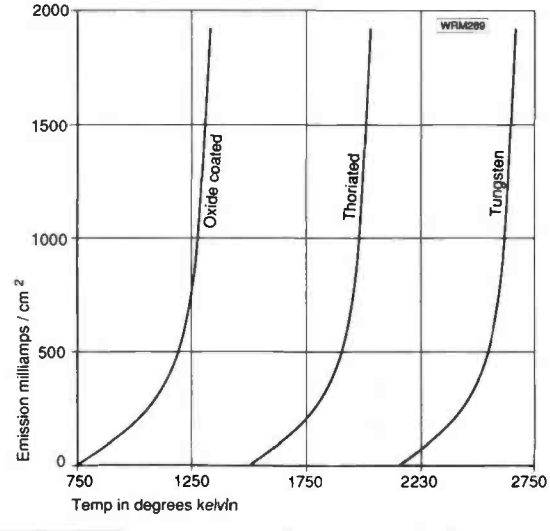
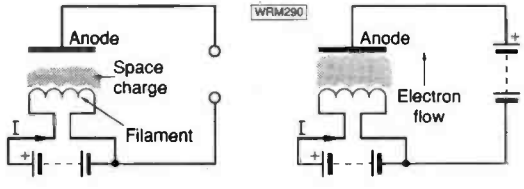


Fig. 1.1: [a] Graph showing the different emissions from three materials at different temperatures.

[b] Fundamental diode action showing space charge around the filament and electron flow with anode voltage applied to the anode.



of atmospheric pressure. Importance of a good vacuum is increased as the power rating of the valve is increased, because an electron attracted by a potential of only 10V can reach a velocity of a 1600km/sec [a thousand miles a second]. Should a gas molecule be encountered at this velocity the force of impact releases electrons from the molecule, leaving behind a positive ion, which in turn is now accelerated toward the filament which it subsequently strikes with considerable force. In a similar way the electrons reaching the anode do so with considerable kinetic energy, and therefore during operation, due to this bombardment, the temperature of the anode increases. Some older transmitting valves had anodes which glowed cherry red when operating normally. In some instances with home-built equipment valves which were not intended to show any colour when operating, also glowed cherry red. Needless to say these valves had a short life.

Choice of material for the valve filament is governed by the work one may get from it and the melting point. Copious electron emission at low temperatures would be desirable, with good efficiency. Thoriated tungsten and oxide coated material is used in valves designed for receivers and associated equipment, where the cost in terms of power and dissipated heat are important factors. However, in large power valves uncoated tungsten is used. Performance of these materials is shown in graphical form in Fig. 1.1(a). Other materials such as Tantalum are used in large power valves but these are really outside the scope of this article.

The Two Electrode Thermionic Valve

In the simplest form the diode (two electrode thermionic valve) consists of a heated filament or cathode and a metal plate called the anode. The sketch in Fig. 1.1 (b) shows the representative parts and their functions. The filament is heated by passing current through it and due to the temperature reached electron emission takes place. A number of different filament and cathode assemblies can be seen in Fig. 1.2. Without a positive anode potential the emitted electrons form a cloud surrounding the filament. This is known as the space charge. Electrons ejected eventually fall back to the filament like molecules above a boiling liquid. When a voltage is applied to the anode an electron drift commences across the evacuated space towards the anode, the electrons being accelerated by the attraction of the positive potential. Acceleration and final velocity of the electrons is governed by the value of the anode voltage, but not in a linear manner. If the anode voltage is doubled the electron velocity is increased by only $\sqrt{2}$ times the previous velocity. Remember that kinetic energy (KE) is $1/2mv^2$ where m is the mass of the particle and v is the velocity.

So

$$KE = \frac{1}{2} mv^2$$

$$2KE = mv^2$$

$$v = \sqrt{\frac{2KE}{m}} = \sqrt{2} \times \sqrt{\frac{KE}{m}}$$

This relationship shows that the flow of current will not be linear and will not obey Ohm's Law. Evidence of this becomes clear when the anode current versus anode voltage is plotted. A circuit diagram suitable for obtaining the characteristics of a diode valve is shown in Fig. 1.3(a). As the anode

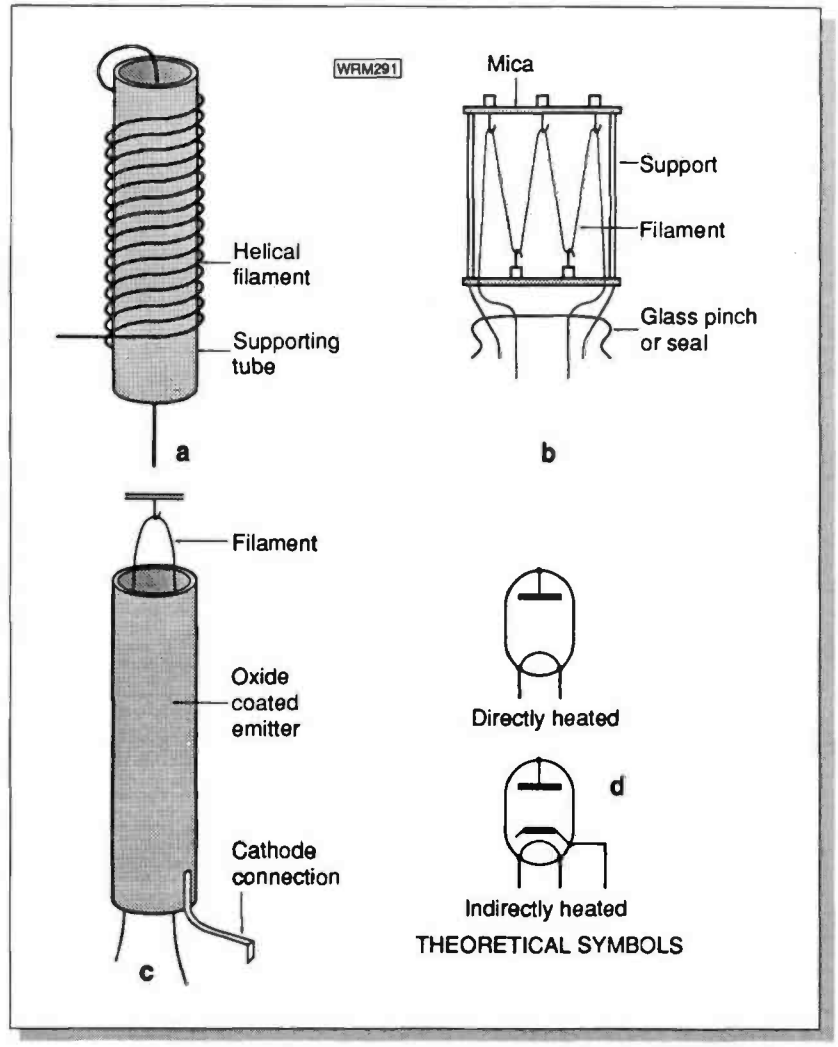
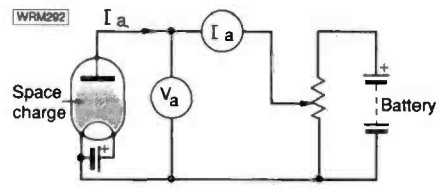


Fig. 1. 2: [a] Helical wound filament on supporting insulated tube. [b] Zig-zag filament supported on mica bridges held apart by insulating tubes. [c] Indirectly heated emitter or cathode. The cathode is coated with oxide to increase emission. [d] Diode valve symbols for directly and indirectly heated cathodes

Fig. 1.3: [a] Simple circuit for determining the static characteristic of the diode.



[b] Static diode curve

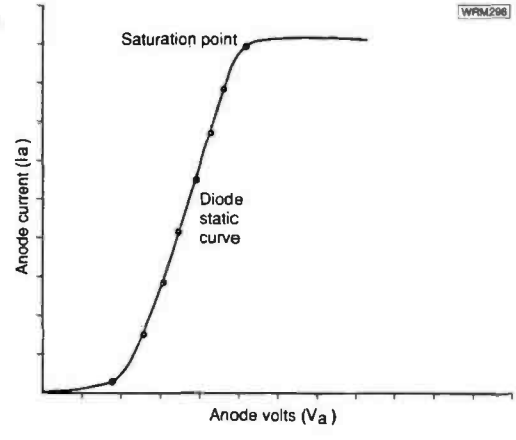
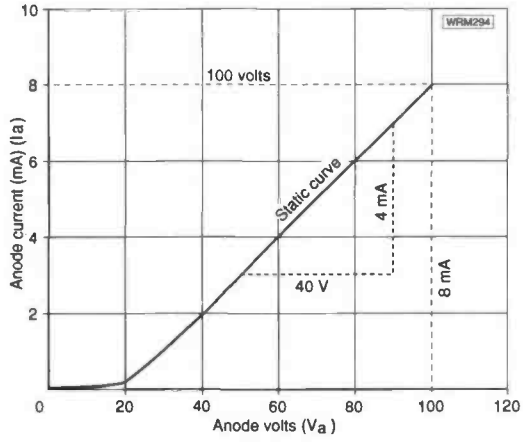


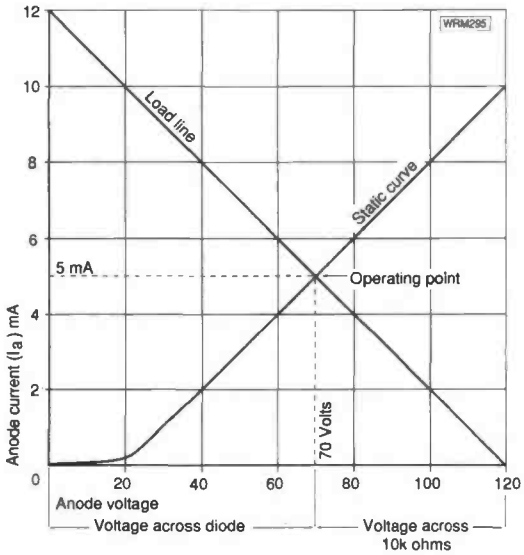
Table 1.1

Va (volts)	0	20	40	60	80	100	120
Ia (ma)	0	.4	2	4	6	8	12

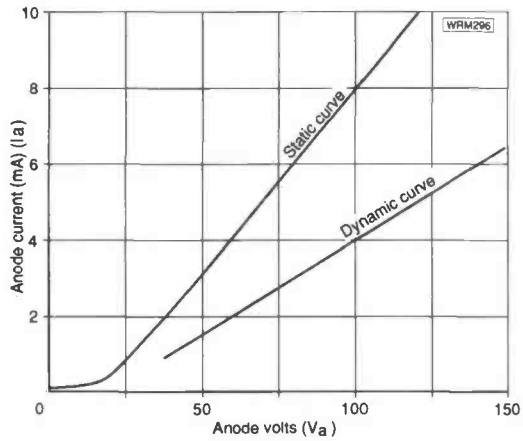
Fig. 1.4:
[a]Static curve for typical diode, showing method of selecting values for anode d.c. resistance and anode a.c. resistance.



[b] Static with load showing diode operating point.



[c] Static diode curve accompanied by the dynamic curve for an anode load resistor of 10kΩ



voltage is increased the space charge surrounding the heated filament (or cathode) begins to thin out and the electrons move toward the anode. This allows the migrating electrons to be replaced with more from the filament. Anode current increases as anode voltage is raised and eventually a point is reached where the number of electrons reaching the anode is matched by the number leaving the filament. this is the saturation point for the particular filament temperature. To increase anode current further the filament temperature must be raised. (Note: Never exceed the manufacturers recommended filament voltage).

The static Ia/Va curve plotted in Fig. 1.3(b) is simply drawn to illustrate the shape and characteristic of a thermionic diode. As a building block for a diode rectifier or detector the static curve is useful in determining the anode d.c. resistance (diode forward resistance Rf),and the anode a.c. resistance (ra). A static curve plotted from figures shown in Table.1.1 can be sen in Fig. 1.4(a). These figures are representative of a small diode in terms of current and power.

Finding the anode d.c. resistance [Rf] from the curve in Fig 1.4[a] is relatively simple. Take the anode voltage [Va] at say 100V and divide it be the corresponding current [Ia] of 8mA. This gives an anode resistance of 12500Ω. If you take other values from the curve you will find that the anode d.c. resistance falls as the anode voltage is increased and rises as the anode voltage is decreased, thereby demonstrating the non linear characteristic. For the anode a.c. resistance [ra], the more linear portion of the curve is used, say from Ia equals 2mA upwards. Selecting from Va of 45V to 85V, and the corresponding current from Ia of 3mA to 7mA is a change of 4mA. Dividing the 40V change by the 4mA change gives an anode a.c. resistance of 10000Ω, or ra equals 10kΩ. Providing you stay on the linear portion of the curve a small change in anode voltage divided by a corresponding small change in anode current will yield an ra of 10kΩ.

Up to now the diode has been operated without an anode load resistor. Adding a resistor of say 10kΩ in series with the anode will enable us to determine the dynamic or working characteristic of the diode. With this resistor in series we can look at two extreme conditions in the operation of the diode. First, suppose the diode is short circuited, then all the voltage would be dropped across the 10kΩ anode load resistor. Current flowing would be 120V divided by the 10kΩ resistor giving a current of 12mA. Secondly assume the diode is open circuited, the current would be zero and the voltage at the anode end of the resistor would be 120V. Mark these two extreme points in on the graph of Fig 4[b]. Connect the two points with a straight line. Where the line intersects with the static curve is the operating point of the diode. This straight line is known as the load line. For a current Ia of 2mA, 40V [Va] is dropped across the diode, this current has to flow through the anode load resistor causing a drop of 20V. 20+40V is 60V.

From the figures above in Table 1.2 the dynamic curve for the diode may be plotted. See Fig 1.4[c].

When the diode is used as a rectifier the anode load becomes the equipment which the rectified current will supply. That is to say that if you have some piece of equipment that requires say 120V and a current of 50mA the power supply will see a load of 2.4kΩ. Or another example which certainly would use a semi-conductor diode, but the principle is the same, would be a 12V battery charger. The charger would be expected to charge a 12V battery at say 10A. This means that the charger voltage might be 2V greater than the battery voltage, and if this fact caused 10A to flow into the battery the anode load for the charger diode would be 0.2Ω.

Although it is probably unlikely that many would want to use a thermionic diode for a detector, the principles involved are included. The diode detector works at a different level to the diode rectifier. Anode load resistors are very much higher in an effort to obtain greater efficiency. Choice of anode

load resistor is governed by the ratio of RL[load resistor] to RDC being 20 to 100. RDC you will remember was 12500Ω so the load resistor will lie between 250kΩ and 1.25MΩ. A basic diode detector circuit, with component values for a modulation depth of 75% and a maximum modulation frequency of 10kHz is shown in Fig. 1.5. The *L* and *C* would probably be tuned to 465kHz, the i.f. frequency.

One of the common applications of the diode valve was the rectification of alternating current. Nowadays this function is performed by the semiconductor diodes, which have a much lower forward resistance, and consequently are more efficient. However, for the sake of completeness Fig 1.6 shows the way the a.c. is rectified and a brief mention is made of the efficiencies attained. The mention of maximum power output or transfer in Fig 1.6 does not imply that you should attempt to take maximum power from a power supply. Think of what would happen if you attempted to take maximum power from a car battery by matching the load to the battery internal impedance.

Power transfer becomes more important as we move on to the multi-electrode valve as we shall see when we look at triode and pentode output valves. For the moment we move on to the simple triode [three electrode] valve which is a development of the diode as mentioned earlier and was introduced by Lee de Forest in the early part of this century. What de Forest did was to introduce a third electrode which he placed between the cathode and the anode. This extra electrode acts as a controlling electrode which under the control of the circuit designer, regulates the flow of current through the valve. It does this by being connected to a negative voltage supply, the supply may be varied and as a result the anode current varies in sympathy with it. The degree to which the anode current follows faithfully the varying negative voltage is a measure of the linearity of the device. To put it another way it indicates how well the valve can amplify without introducing distortion. One important feature is that the third electrode does not take any current from its voltage supply [unless operated as a power amplifier]. This fact should indicate to you that it offers a very high impedance to any source of voltage or signal. **PW**

Table 1.2

Ia(mA)	Va (volts)	Vr (volts)	Va + Vr
2	40	20	60
4	60	40	100
6	80	60	140

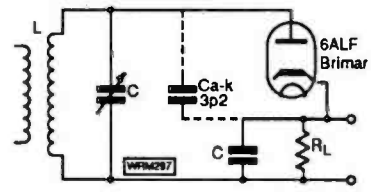


Fig. 1.5: This shows the simple circuit for a diode detector that would demodulate a.m. signals found on the broadcast bands. In addition the means of arriving at the best value for the diode load and the value of capacitor has been described

For R_L = 250000Ω

Highest modulation frequency 10kHz (a.m.)

$$\frac{X_C}{R_L} = \frac{m}{\sqrt{1 - m^2}} = \frac{0.75}{0.661} = 1.134$$

where m is modulation depth, say 75%

$$\therefore X_C = 1.134 \times 250 \times 10^3$$

$$= 283.5k\Omega$$

X_C = 283.5kΩ at 10kHz

C = 56pF (greater than 10 times C_{a-k})

values between 50 and 100pF are common

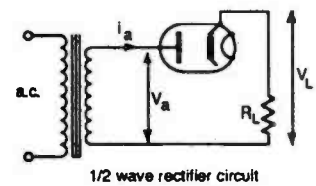


Fig. 1.6. A half wave rectifier circuit.

$$\text{Efficiency} = \frac{P_{out}}{P_{in}} \times 100\% \text{ (by calculus)}$$

$$= \left(\frac{\frac{Im}{\pi}}{\frac{Im}{2}}\right)^2 \times \frac{100}{1 + \frac{ra}{R_L}}$$

$$= \frac{40.6}{1 + \frac{ra}{R_L}}\%$$

Maximum power out is achieved when R_L is the same as ra

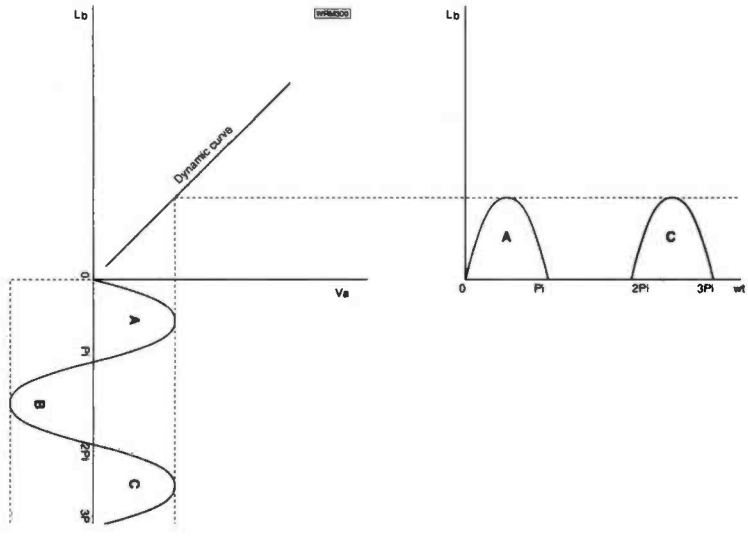


Fig. 1. 6a. Showing a.c. input and half wave rectified d.c. output.

Peter continues with part 2 next month

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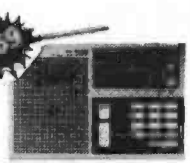


Taming Computer Hash

Feature

Many home computers can be used as terminals for weather pictures, SSTV and RTTY. They provide access to these services with a convenience and cost that only a few years ago would have been unheard of. The big drawback though is that many home computers generate high levels of 'hash' that can wipe-out radio reception. Following a plea from readers for a cure to this problem, Peter Rouse explains some of the steps that can be taken to reduce 'hash'.

The problem of what is now popularly called 'hash' is fairly complex. In order to operate, the computer's circuitry relies on streams of square wave signals which, like most square waves, are rich in harmonics. The hash from most computers is in the form of magnetic radiation but electromagnetic radiation is also involved. It is a sad fact of life, that unlike many developed nations, Britain has yet to impose any controls on how much hash a computer is permitted to radiate. This is dramatically demonstrated in my own shack where I can use my American made Apple computer (complying with FCC regulations) with little if any real affect on receivers in the same room, whereas all the radio gear has to be switched off when a certain British made computer is switched on. Home computers are not alone in causing this type of problem and as someone who lives in a built-up area I have identified even worse problems from 'Space Invader' type arcade games, microcomputer based self-service petrol pumps and even some mini-computers used by business houses.

The sad part is that at the manufacturing stage, the computer can be quietened down quite cheaply - tackling the problem later comes more expensive.

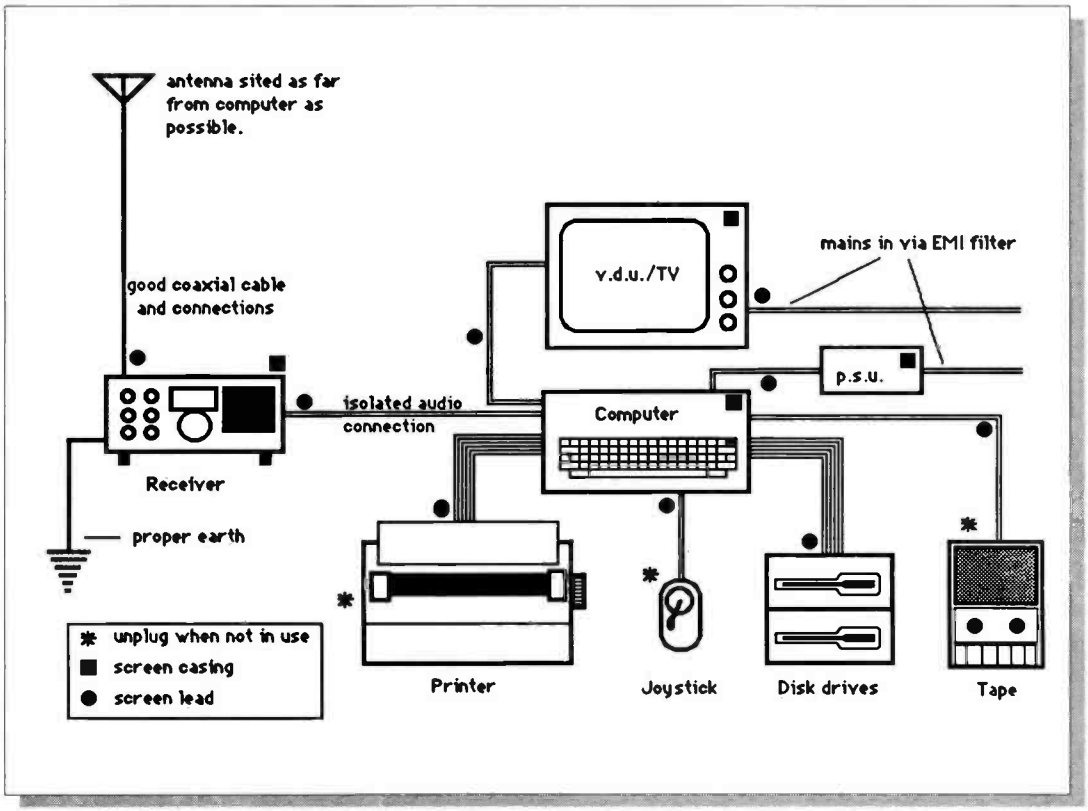
The Solutions

It must be stressed from the outset that there is no simple or single step to cure the problem and even when all the recommendations have been carried out it is likely that the problem will be noticeably lessened rather than completely eliminated.

Antennas: The first and most obvious step is to ensure that the antenna system is not inviting problems. It should be sited as far as possible from the computer and connections should be checked - corroded earth points and the like are a recipe for problems.

The computer: The first and most obvious step to cut hash levels is to screen the computer case, assuming it is a plastics type. There are two ways of tackling the problem. The first, and most expensive, is to completely re-house the computer circuit board and keyboard in a metal case or cases. In the latter instance the circuit boards are housed in a simple equipment case and the keyboard in a separate metal case. Keyboard housings are available with ready cut front panels from a number of the larger mail order component suppliers and the keyboard is attached to the circuit box with screened cable.

The second option is to screen the existing case. Many people have simply stuck aluminium kitchen foil on the inside of the case but be warned that there are risks involved and I know of disastrous damage caused to one computer when part of the foil became detached and touched the track side of the p.c.b. A safer method is to spray the inside of the casing with a special aerosol paint that is now available. It is known as Nickel Screening and the one I have used is manufactured by Electrolube. It is quite pricey but one can goes a long way and the same spray can be used to screen small plastics boxes, etc. All the electronics will need to be stripped-out of the case and masking tape and newspaper used to cover the outside of the casing. Once the paint has dried, carefully examine any raised pillars that normally support the p.c.b. and make sure that they do not come in contact with live tracks. If they do then the paint must be scraped off the pillar. Once the computer is re-assembled it is of course essential that the paint (or the aluminium foil) makes contact with the circuit ground (in the case of the BBC-B the power supply module case is



Steps for reducing hash. Do not assume that the audio and VDU cables supplied with your computer are screened - often they are not.

grounded and will supply the necessary contact when in place).

One problem that still remains with computers using one-piece plastics cases, is that the keyboard cut-out still provides a large unscreened area. On some computers it is near impossible to do anything about this but on the BBC-B, the metal plate that supports the keyboard should be grounded by drilling a small hole on one corner and fixing a solder tag for the connection.

Theres one further step that can be tried. Most home micro's will have at least two quartz crystals somewhere on the circuit board. Try grounding their cases whilst monitoring hash levels. Do not be surprised though if grounding one crystal reduces noise but grounding another increases noise.

Interconnections: The leads that connect disk drives, printers, monitor, joy-sticks and even the cassette recorder can all be sources of hash radiation. Wherever possible these should be screened and peripherals that are not being used should be disconnected. Replacing the leads of the cassette recorder, Monitor (RGB types are not always supplied with screened leads) and joy-stick with screened multi-core cable is not a big problem but is difficult with the printer and disc drive because most use plugs designed for attachment to ribbon cable. The easiest solution is to wrap them in aluminium foil held in place with adhesive tape which is then grounded. In some cases, a similar drop in hash levels might be possible by using the 'clip-on' type of ferrite chokes that are now available.

It is worth noting that earthing between cases can sometimes cause quite dramatic drops in hash levels. Using jumper wires try grounding cases in different combinations. This can be particularly effective with the typical BBC-B set-up using metal cased disc drives and monitor.

Mains Leads: On some computers, a fair degree of radiation is via the connection to the mains supply. Computer power supplies basically fall into two categories, integrated (where the supply stages are built into the main case like the BBC-B) or separate (such as the Spectrum with its simple external mains/d.c. adaptor). The best solution is to use an EMI (electromagnetic interference) filter. These consist of a network of chokes and capacitors and are usually supplied in a sealed casing with mains in/mains out and earth connections. Unless you have a computer with plenty of space inside, the EMI filter will need to be housed in a small case outside the micro. It should be inserted into the mains lead as close as possible to the power supply stage. In the case of separate power supplies it is probably worth re-housing the circuitry with the EMI filter in a new earthed metal case. The existing d.c. feed cable to the computer should be replaced with a screened type.

EMI filters provide an added bonus in that they also remove mains spikes and this can eliminate glitches in the computer. However, the type of EMI filter discussed here should not be confused with the type that merely replaces the mains plug, to be really effective in cutting hash coming out of the computer, the filter must be as close to the micro's mains transformer as possible.

Monitor/TV receiver: Probably the biggest problem posed by a monitor or TV receiver are time-base harmonics. These do not pose a big problem at v.h.f. and above but on the h.f. bands can caused severe interference. The problem can be tackled in a similar way to the computer itself. If the monitor or TV has a plastic casing then the inside can be sprayed with Nickel screening. The mains input to the set can also incorporate an EMI filter. In my own experience, when both these steps are taken this provides a big reduction in hash levels.

One final point of note is that some of the leads supplied for systems using RGB video (such as the BBC-B) are not screened. They should be.

The receiver: The majority of amateur transceivers have well screened metal cases but other equipment might not have. If not, it is important that screening is provided. When I first acquired an AOR-2002 scanner with computer control interface I had enormous problems with hash and a dramatic improvement was made when I screened the scanner's casing with Nickel spray.

On some equipment, it seems that a fair degree of hash can be caused by the simple interconnection between the receiver and the computer. For instance I noticed hash levels drop when using an isolated audio feed between a receiver and RTTY interface. This consisted of nothing more than a telephone pick-up coil taped to the mesh of the receiver's loudspeaker and a simple pre-amplifier to boost the signal to a level needed by the interface. However, an even better solution could be to use a circuit based on an opto-coupler.

Step-by-step

Taming your micro is a little like taming vehicle ignition noise. Each step in itself may not seem to make a lot of difference but by adopting more and more measures, the problem is finally brought under control. Do not be discouraged if hash levels do not drop by any considerable degree until you have adopted most of the measures shown. With time, patience and sadly some expense, it is possible to bring the average computer under reasonable control.

Finally, I would draw attention to the QRM eliminator made by S.E.M. which was reviewed in the February 1988 edition of *Practical Wireless*.

PW

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Icom IC-R1 Review

REVIEW

Summer's here and many of us like to get 'out and about' and perhaps try a little portable operation at the same time. Rob Mannion G3XFD has been trying the Icom IC-R1 hand-held receiver with this in mind.

The trend that's really caught my eye at shows and rallies is the increasing popular fashion for minute rigs. The Icom IC-R1 certainly fits neatly in this category.When the review receiver arrived I was amazed at the small size of the unit. To say it is minute is an exaggeration! I should also point out that the hand holding the receiver is not mine but that of a YL *PW* staff member!

What The R1 Does

Unfortunately I was unable to obtain a circuit for this apparently complex piece of miniaturisation. Still, even by a description of the facilities available you can quickly appreciate how intricate the R1 must be inside.

Features include continuous coverage from 100kHz to 1300MHz, and very small physical size even with the (supplied) NiCad batteries fitted. A NiCad charger is also supplied A dual frequency control system, entry by keyboard or controlled by a rotary knob. Multiple scanning functions which include an auto-write memory scan and a 24-hour clock system with timer functions.

Sound Advice

When I took delivery of the loan receiver I was also given some very sound advice. I was told to sit myself down, and read through the comprehensive instruction manual before attempting to use the receiver.

It will be obvious to anyone who tries an R1 for themselves, that they'll have to be very careful when using the control panel-pad. The buttons are very small and the rotary tuning knob is, of course, minute. To add to my problems I have a very large hand and this made it much more difficult to use.

The Multi-Function Display

The liquid crystal display is small (of course!) but is relatively easy to read and is very comprehensive.

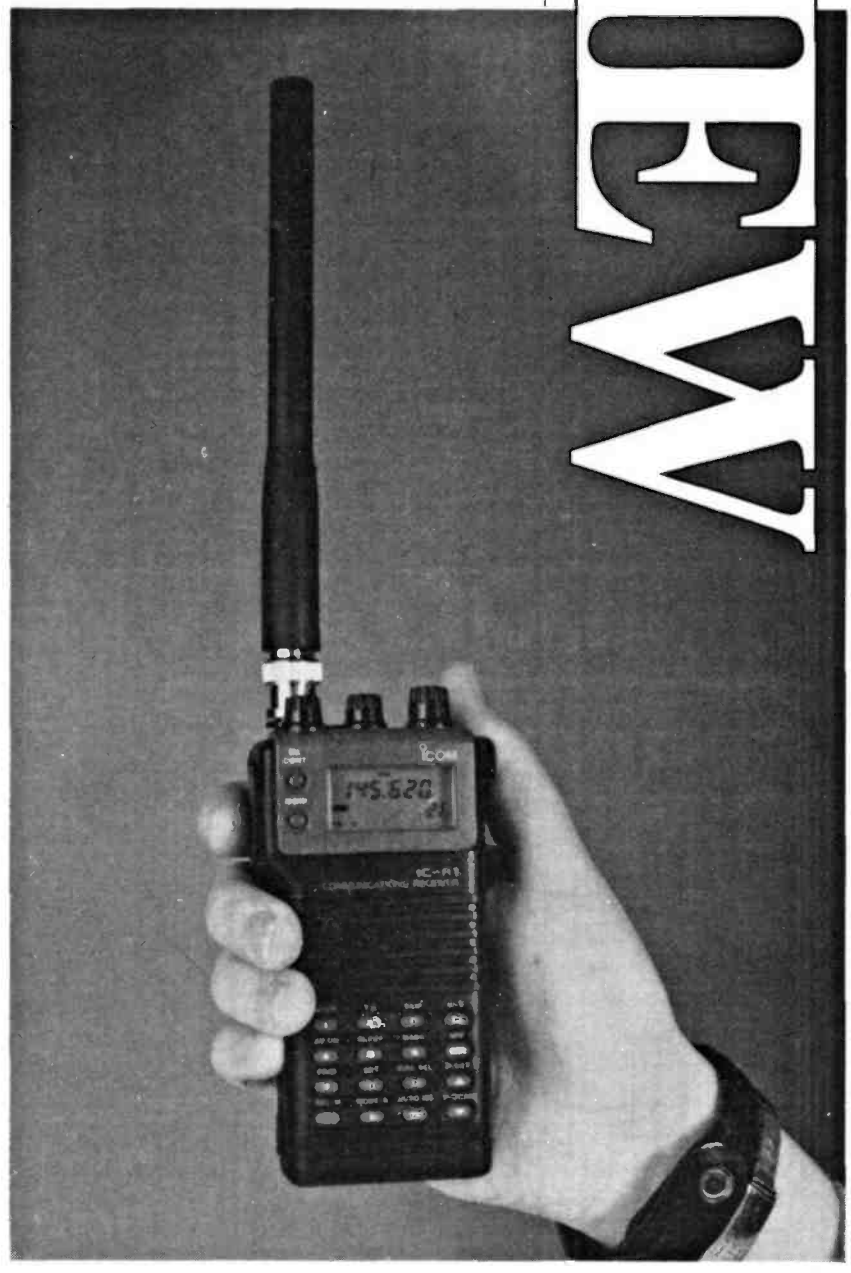
The display provides information on frequency, reception mode, auto-memory scan, scan up-down indications, memory selected indication, memory channel readout, priority channel indicator, tuning step indications, scanning indication, dial selection indicator and signal strength indication.

Scanning

The scan mode of operation is a most useful aid. The programmed scan mode sequentially scans each frequency, but for amateur radio use I found that the memory scanning mode was very helpful as I could avoid using the very small controls as much as possible. Once the 144MHz memory channels had been entered via the key-pad, I found that the R1 sat on the shelf quite happily until someone came up on 'local' favourite channel.

Potential users must be aware that the scan function must be disabled (the instruction manual clearly helps on this point) because otherwise the scan will continue after ten seconds has passed!

Scanning speed is adjustable and the manual



The Icom IC-R1 Communications Receiver held by a young lady on the *PW* staff team.

REVIEW

Specifications

Selectable tuning steps:	0.5, 5, 8, 9, 10, 12.5, 15, 20, 30, 50kHz
Number of memory channels:	100
Reception modes:	f.m., a.m. wide f.m. (w.b.f.m.)
Antenna impedance:	50Ω (unbalanced)
Power supply requirements:	7.2V d.c. (internal battery)or external power source 6-16V d.c.
Current drain:	Maximum audio output, less than 300mA. Power saved. Average consumption 15mA. duty cycle receive: Standby = 1: 16
Usable temperature range:	-10°C to +60°C
Dimensions:	102.5mm (H) x 49mm (W) x 35mm (D)
Weight:	280g
Receive System:	a.m. f.m. triple-conversion superhet. w.b.f.m. Double-conversion.
Intermediate frequencies:	
First	266.7MHz to 266.66.7095MHz
Second	10.7MHz
Third	455kHz (f.m./a.m. only)
Sensitivity:	
a.m. (for 10dB s/n)	1.6µV (2-24.9995MHz) 0.79µV(25-905MHz)
f.m. (for 12dB SINAD)	6.3µV (2-24.9995MHz) 0.4µV (25-905MHz)
w.b.f.m. (for 12dB SINAD)	6.3µV (2-24.995MHz) 3.16µV (25-905MHz)
Squelch Sensitivity:	
a.m.	1.26µV (2-24.9995MHz) 0.63µV (25-905MHz)
f.m.	0.63µV (2-24.9995MHz) 0.32µV (25-905MHz)
Selectivity:	
a.m.	More than 15kHz / -6dB
f.m.	More than 15kHz/ -6dB
w.b.f.m.	More than 150kHz/ -6dB
Audio Output Power:	150mW at 10% distortion with an 8Ω load.
Audio output impedance:	8Ω

The Icom IC-R1 hand-held Communications receiver is available from **Icom (UK) Ltd, Sea Street, Herne Bay, Kent CT6 8LD** at £399.

This photograph shows the scale of the Icom IC-R1 hand-held receiver.

states that it can be varied from 10 channels per second to as high as 20 per second.

Lower Frequency Listening

Quite honestly, I found that the facility to listen on the lower frequencies was not much help to me. I quickly found this out when I tried to find Radio 4 on 198kHz where, as expected, it needed another antenna. On Band II broadcast f.m. duty I found the receiver to be very sensitive. I also found that if the unit was connected to an antenna other than the 'rubber duck', it seemed to overload and cross-modulate. However, the manual does warn the user that the R1 is prone to this problem and that the unit will pick up its own local oscillators on certain frequencies, and these are described in the comprehensive manual.

Final Thoughts

So, to sum up my opinion on this receiver I must be frank and honest. I am wondering who the receiver is aimed at. Apart from the wideband capability, which would be useful when checking for harmonics and other problems, I can't think of a use for it in my shack. Still, it cannot be denied that it is a very clever and beautifully made device. My thanks to Icom (UK) Ltd for the loan of the review model. **PW**

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AT940	Auto/ATU	244.88	(4.00)
SP940	Ext Speaker	87.85	(4.00)
TS140	HF 9 Band Gen. Cov. TX/RX	882.00	(–)
TS680S	HF/6m TX Gen. Cov. RX	985.00	(–)
TS440	9 Band TX General Cov RX	1138.81	(–)
AT440	Auto/ATU	144.82	(4.00)
PS50	H/Duty PSU	222.49	(4.00)
AT230	All Band ATU/Power Meter	208.67	(3.00)
SP230	External Speaker Unit	86.49	(4.00)
PS430	Matching Power Supply	173.78	(4.00)
SP430	Matching Speaker	40.81	(4.00)
SM220	Station Monitor	343.62	(4.00)
BS8	Band Scope Unit (830/840)	77.00	(2.50)
TL922	10/160 2kW Linear	1495.00	(10.00)
TH25	NEW 2m H/Held	238.00	(4.00)
TH45	NEW 70cm H/Held	269.00	(4.00)
TH75	NEW 2m/70cm H/Held	P.O.A.	(–)
TH205	2m H/H	215.28	(4.00)
TH215	2m H/H Keyboard	282.13	(4.00)
TR751	2m 25W M/M Mobile	599.00	(–)
TS790	VHF/UHF Transceiver	1495.00	(–)
R2000	Gen Coverage HF/RX	589.00	(–)
VC10	118-174MHz Converter (R2000)	161.84	(3.00)
R5000	General Coverage HF/RX	675.00	(–)
VC20	118-174MHz Converter (R5000)	167.21	(3.00)
TM701	NEW 2m/70cm FM Mobile	499.00	(5.00)
TM731	2m/70cm FM Mobile	685.00	(5.00)
TM231E	NEW 2m FM Mobile 50/10/5W	289.00	(6.00)
TM431E	NEW 70cm FM Mobile 35/10/5W	319.00	(6.00)
SMC30	Speaker/Mic TH21/4/2800	28.31	(3.00)
MC50	4P Desk Mic	46.08	(4.00)
MC60A	8P Desk Mic	88.22	(4.00)
MC80	Electric Desk Mic	53.96	(3.00)
MC85	Desk Mic Audio Level Comp	99.00	(4.00)
MC43	8P Fist Mic	22.22	(3.00)
MC35	4P Fist Mic	21.72	(3.00)
MC55	Mobile Mic (6p.o. 8p)	52.67	(3.00)
LF30	HF Low Pass Filter	32.26	(2.50)
HS6	Lightweight H/phones	24.38	(2.50)
HS5	Deluxe H/phones	37.54	(2.50)
RZ1	500Hz-950MHz AM/FM Scanner	465.00	(6.00)

SWR/PWR Meters

HANSEN			
W720S	130/440MHz 20/200W	62.75	(2.50)
JD110	1.5-150MHz	16.60	(2.50)
YMIX	3.5-150MHz	31.60	(3.00)
Yaesu YS60	1.8-60MHz	93.15	(3.00)
Yaesu YS500	140-525MHz	81.85	(3.00)
Hansen			
FS500H	1.8-30MHz	53.40	(3.00)

Miscellaneous

SMCS 2U	2 Way SO239 Switch	18.95	(2.50)
SMCS 2N	2 way 'n' Skts Switch	23.50	(2.50)
Kenpro KP21N	2 way Switch 'n' Socket Deluxe	27.00	(2.50)
T30	30W Dummy Load	10.29	(2.50)
T100	100W Dummy load	49.00	(3.00)
T200	200W Dummy load	85.00	(3.00)
WAI	Wavemeter 120-450MHz	24.95	(2.00)
PK232	Packet/RTTY Terminal	299.95	(3.00)
Datong D70	Morse Tutor	63.40	(3.00)
Datong FL2	Audio Filter	100.91	(3.00)
Datong FL3	Audio Filter/Autonotch	145.51	(3.00)
Datong ASP	Processor 4pin	93.15	(3.00)
Datong ASP	Processor 8pin	93.15	(3.00)
Datong AD370	Active Antenna	77.62	(3.00)
Datong PCI	General Coverage Converter	164.90	(3.00)

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Practical Wireless

3D

Published by
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Vol. 1 —— No. 1
SEPTEMBER 24th, 1932

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NEVADA COMMUNICATIONS

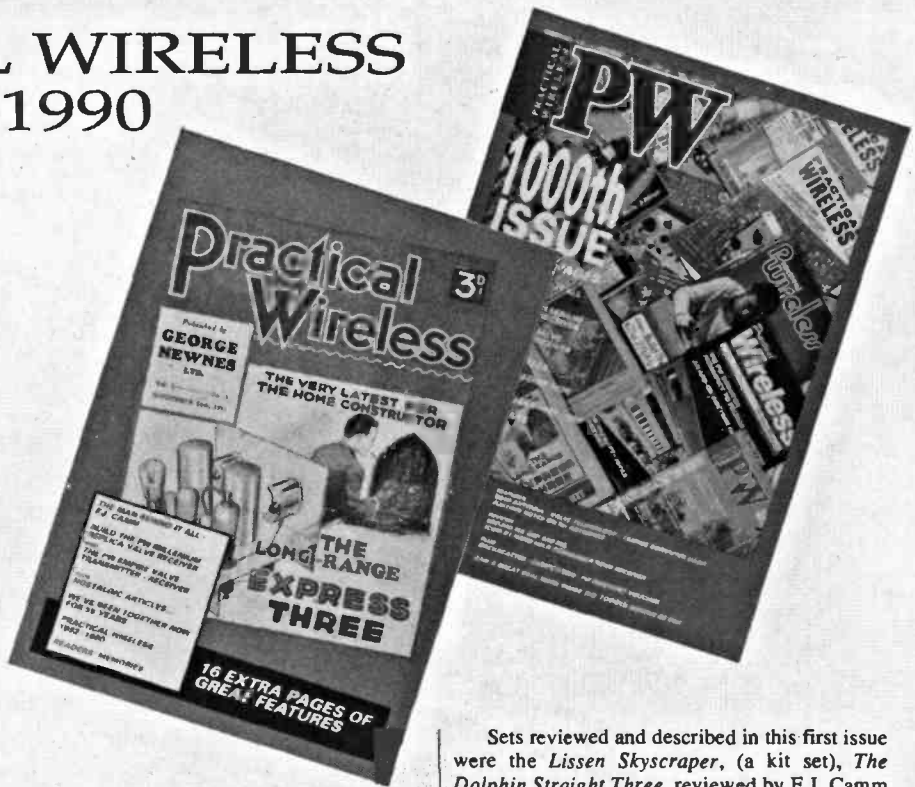
THE MAN BEHIND IT ALL... F.J. CAMM

Everyone in the radio hobby is familiar with the name behind 'Camm's Comics' - but few know anything of the man himself says Joan Ham.

Ask anyone familiar with technical publications about F.J. Camm and the response is immediate. 'Oh yes! Camm's Comics'. Ask who he was, or what is actually known about him, and it is unlikely that there will be any further information, not even his first names. F.J.Camm is the man everyone knows about, until further details are wanted.

Frederick James Camm was born on 6 October 1895, the second son of Frederick William Camm and his wife Mary (nee Smith) at 10 Alma Road, Windsor. His father was a carpenter and joiner, and over the next 20 years ten more children were born, increasing the family in the house in Alma Road to 14 including parents. One of the youngest sisters lives there still, and in 1986 entertained the mayor, the local Press and others when a blue plaque was unveiled - not to F.J., but to his older brother Sidney. It was Sidney - later Sir Sidney - who designed the famous *Hurricane* and *Harrier* aircraft, but Frederick also left us a legacy which lives today in the form of *Practical Wireless*.

PRACTICAL WIRELESS 1932-1990



The Practical Wireless Story

Practical Wireless, now proudly notching up its 1 000th issue, first appeared in 1932. Number 1, Volume 1, was published on September 24th by George Newnes, priced 3d and consisted of 68 pages. Its cover, printed in red and blue, advertised 'the very latest for the home constructor' with a chassis picture of the *Long-Range Express Three* and a listener tuning the set in its elegant church-window shaped cabinet

The chassis of the *Long Range Three* was itself an innovation, departing from the usual 'breadboard' construction and giving a professional finish with all the untidy wiring and components tucked away out of sight underneath.

Free Blue-Print

The cover headline offered a free blue print for this set and the foot of the page advertised *Pilot Author* Kits. There was another free offer of a presentation volume of Newnes *Wireless Constructors' Encyclopaedia* valued at 8/6d . To obtain this, the reader turned to page 56, where there were two forms, one an order to the newsagent ordering the magazine weekly until further notice, and the other to be sent to *PW* for a subscription voucher. This had to carry 13 gift stamps cut from the back cover of 13 consecutive *PWs*, plus a postal order for 2/4d to cover "registration, postage, packing and insurance" to receive the encyclopaedia. (After which, no doubt, the reader was hooked on the new *PW*). Another free book, All About Tuning and Tuning Coils, was promised the following week. Over 60 000 readers took up the offer, and its popularity caused it to be reprinted by the *News Chronicle*..

In the field of radio alone, there was hardly an aspect which didn't have a useful handbook written for it by F.J. Circuits, short-wave, superhet receivers, coils chokes and transformers, wireless transmission, television and others were all catered for. In particular his wireless encyclopaedias were characterised by simple easily-understood explanations of every relevant theory and stage of construction, the components, design and methods of work were printed in a large legible typeface right across the page and illustrated by superb, clear line drawings, which were so well executed that it was possible in black and white to see whether an object was made of metal, wood, glass or Bakelite.

In the layout of pages, the books were extremely readable and aesthetically pleasing, making use of 'flow-round' text broken up with framed pages, assembling story-boards on specific topics. In addition to the weekly group of magazines, F.J. was producing a steady stream of hardbacks, all carrying his individual stamp.

Popular Format

The same popular format used in the encyclopaedias undoubtedly gave rise to the collective title of *Camm's Comics*. The term is not derogatory, but describes very accurately, the visually-appealing layout techniques which he truly pioneered. These methods produced technical journals that could easily be understood by the non-expert.

Sets reviewed and described in this first issue were the *Lissen Skyscraper*, (a kit set), *The Dolphin Straight Three*, reviewed by F.J. Camm himself and described as a splendid economy receiver, cheaply constructed and extremely selective, *The Long-range Express Three* and *The Lotus Bud* beginning a weekly feature of sets "tested on our aerial".

Editorial Staff

The technical staff consisted of H.J. Barton-Chapple, Frank Preston, W.B. Richardson and W.J. Delaney, who was the sub-editor for many years. Their editorial offices were equipped with a laboratory in which components and sets could be tested and appraised.

A page headed *My Favourite Circuit* was compiled from the editorial staff contributions. Frank Preston as an experimenter and designer opted for a "well-known det. 2 L.F. type of circuit", W.J. Delaney wrote of his home receiver, which as a musician must have adequate volume and above-reproach quality, and was a three-stage S.G., detector and output stage circuit. (William Delaney's son is the drummer and bandleader Eric Delaney).

A similar circuit was chosen by W.B. Richardson using a pentode in the last stage basing his choice on consideration of local conditions and value for money; H.J. Barton-Chapple having designed a great many sets found the choice of a favourite difficult, but described a four-valve circuit which was simple to operate and could be used by "any member of the family".

F.J. Camm pointed out that you could not have everything, an improvement to one part of the circuit led to complications in another, but in the spirit of the question opted for a detector with leaky grid rectification followed by two l.f. amplification stages on the basis that it was an all round simple circuit, easy to construct and operate for non-technical amateurs.

That was how readers of the first *PW* were introduced to its experts and their attitudes and approach to wireless. By November of that year, *PW* published an eight-page photogravure supplement by Barton-Chapple featuring 'The Argus Three'. It could be purchased as a kit from Direct Radio for £8.13.0d complete with three valves and cabinet, or for £5.2.6d without.

Standards Set

The style, the policies and the standards were set, and *PW* and its editor rapidly made it clear that they existed to give readers a real service. It was no idle boast. January 1933 began with Frank Preston introducing the *Selectone* battery receiver and by the end of the same month, F.J. Camm's specially designed four-valve *Fury Four* receiver was available to readers. It was cheap, easy to build and simple to operate. Moreover, F.J. published a signed personal guarantee that if these claims were not met, every reader could have his personal advice free of charge until the set worked satisfactorily.

Pocket Tools

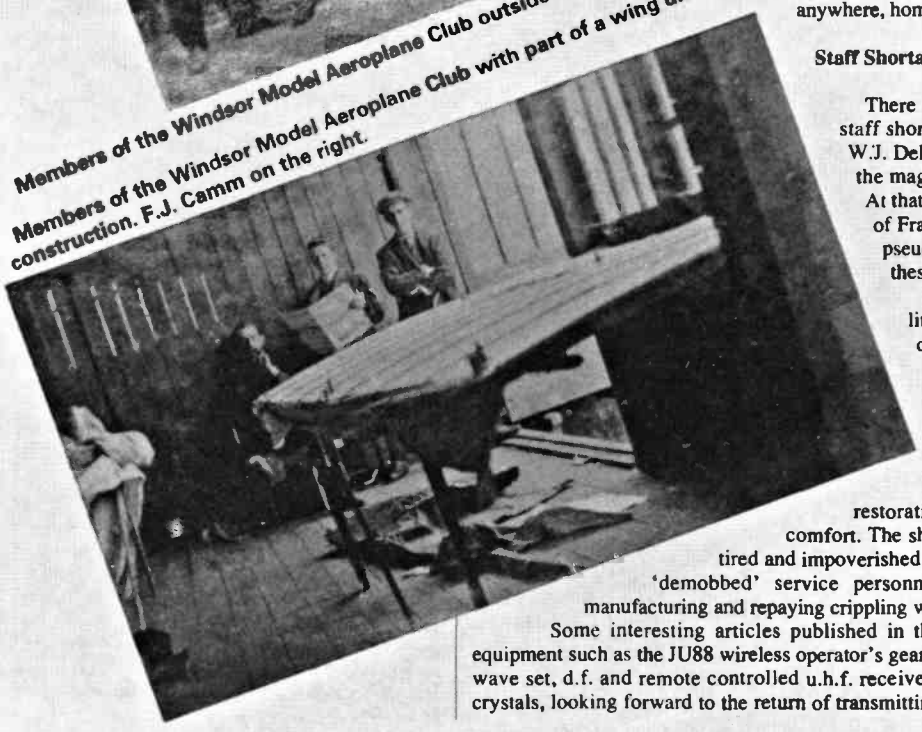
Practical Wireless celebrated its first birthday by having a pocket tool box, the size of a cigarette case, made and fitted with beautifully made tools. It was offered free to every reader, and we are pleased that we have one of these in the Chalk Pits Museum.

Amalgamation

By 1934, one of the competing wireless journals was showing the strain. It was *Amateur Wireless* published by Cassell and Company, a magazine which had grown out of *Everyday Science* - edited by F.J. Camm. The answer was amalgamation, and *Practical Wireless* became *Practical and Amateur Wireless* still for the same cover price of 3d. By the following year *PW* incorporated *Practical Television.*

In 1938, the last of *PWs* competitors ceased publication, and in that same year the last of F.J's pre-war designs was published; with the descriptive title of the *Push-Button Four*. The October 29th issue carried the designer's photograph on the front cover, with a picture of the set out of its cabinet; the constructional details were completed from the previous week, with three good photographic views of the chassis. It was the end of the happy pre-war *PW* with its free offers, new wireless designs and kits, eager reports of the latest in the world of wireless, television, amateur activities and everything associated with the 1930s.

Members of the Windsor Model Aeroplane Club outside their workshop in 1912-13



Members of the Windsor Model Aeroplane Club with part of a wing under construction. F.J. Camm on the right.

The Second World War and the 1940s

The war began to bite very quickly. Before it was a few months old, Britain felt the shortages of everything that had to run the gauntlet of the U-boats; *PW* in common with other publications was chronically short of paper, and was slimmed to half of its pages.

In 1941 things were even worse and F.J. was battling against overwhelming difficulties. The magazine appeared monthly instead of weekly, and cost 6d. There was a Limitation of Supplies Act in force and the call-up of men into the forces left the service industries severely reduced, so there were problems about maintaining domestic receivers.

The editorials of the war years were concerned largely with war news. A constructional article featured a single valve medium wave set on a bread-board with front panel - the metal chassis was a thing of the past, but the set was adequate to keep people informed and entertained, even though it was stripped to its basics.

Wartime issues carried 'Active Service Lists' of radio engineers and allied skills in the forces, adverts for wireless enthusiasts to join the RAF for interesting jobs, and one intriguing advert for women with physics skills or degrees to join the WAAFS for 'confidential' work. The advertisement said that applicants had to " be prepared to go anywhere, home or abroad".

Staff Shortages

There were other signs of war. *PW* was not untouched by staff shortages, and the names of H.J. Barton-Chapple, and W.J. Delaney disappeared from the 'staff' names printed on the magazine 'masthead' along with that of the the editor. At that time, F.J. was producing his magazine with the help of Frank Preston and L.O. Sparks. Could this have been a pseudonym for whoever was available? Eventually, even these names were no longer printed as staff.

1944 saw *PW* in its 12th year of issue, but it had little to celebrate other than its continuity against the odds. The 44 page monthly magazine was reduced in format from 8.5in x 11.5in to 6.5in x 9in, and the price increased to 9d.

Post-War Problems

The immediate post-war years saw the restoration of the television service but brought little extra comfort. The shortages were just as severe, sometimes worse as a tired and impoverished Britain faced the task of rebuilding, re-establishing 'demobbed' service personnel, turning war industries back to peacetime manufacturing and repaying crippling war debts.

Some interesting articles published in those years included reports on German wartime equipment such as the JU88 wireless operator's gear, featuring the FUG, LOP, EZ6 (long wave), a short wave set, d.f. and remote controlled u.h.f. receiver. Other articles concerned the grinding of quartz crystals, looking forward to the return of transmitting licences, and mouthwatering adverts of such ex-

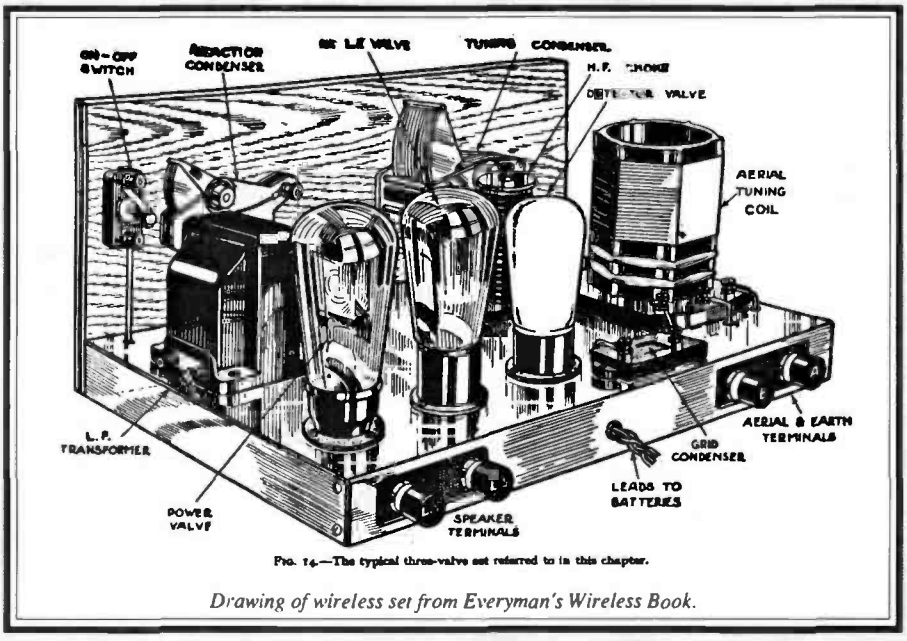


FIG. 14.—The typical three-valve set referred to in this chapter.

Drawing of wireless set from Everyman's Wireless Book.

government equipment as a brand-new T1154 transmitter for 10 guineas, Air Ministry voltmeters at 19/11d and ammeters at 17/6d.

Another interesting development of the day was a tiny transmitter/receiver almost the size of a cigarette case, 'developed from secret service sets' and produced by Teleradios.

1947 dawned with Britain still in the grip of post-war shortages and problems. New designs, although F.J. assured readers that he had some on the stocks, were still not published and the *PW* query service had to be suspended because of staff shortages, but radio clubs were reviving and their reports were invited for publication. In reply G5BY was reported to be the first to hear W1HDQ on 50MHz across the Atlantic during an F2 event.

August 1947 brought a most eagerly-awaited announcement of the first post-war Radiolympia. The *Practical Wireless* stand was on the ground floor, where readers could see a full range of the famous blueprints and technical books.

The November issue carried full show reports, but Britain's first radio show, only two years after the war, was all "jam tomorrow" and F.J. reported that it consisted of "1939 designs in new dressings".

The most noticeable feature about the slim postwar *PW*s is their lack of photographs. There were usually one or two in the *World of Wireless* round-up which followed the editorial, but the rest of the magazine was illustrated with line drawings.

The late 1940s continued to be years of restrictions, shortages, difficulties and austerity. One 1947 editorial reported rumours that the wireless licence was about to go up from £1 to £1.10s.0d, or to £2.10s.0d if it included TV.

The Purchase Tax on radio and television receivers was raised from 33% to 66% in an effort to divert sets from the home market to much-needed export. This was accompanied by outcries from the manufacturers and *PW*s editorial.

Government Surplus

The main source of equipment for home constructors and radio trade alike was the government surplus market. Articles appeared on using war surplus gear, and famous sets like the ex-RAF TR9, the R1155, WS18 and others, were converted to uses for which they had not been designed. Adverts offered an ex-RAF TR9 for £6, or a B2 (suitcase 'Spy' set) new and unused for £9 plus 5/- carriage. An American SCR625 mine detector was offered complete for £10.10s.0d for "treasure hunting, pipe tracing, detecting metal in trees before sawing into them", etc.

Things began to look up a little. More photographs appeared in *PW*, and by July 1948 there was an increased allocation of paper, allowing more magazines to be printed. *Practical Television* reappeared on the cover, with a separate section inside, and as the 16th Radiolympia approached, television was making up a large part of the interest.

Stand 100 at Radiolympia was advertised in the October 1949 issue, where readers could see the full range of technical books on wireless, television, engineering, mathematics and kindred subjects, meet the editorial staff and F.J. Camm himself.

***PW* Television Design**

Signs of a return to the pre-war traditions of *PW* took the shape of a new design for a *Practical Wireless* Television Receiver demonstrated at Olympia. It used ex-government EF50 valves, and was featured over several issues.

By April, there was no mention of Practical *Television* on the cover of *PW*. Inside the magazine, a notice announced the launch of the title as a companion journal. Television had become too big for a few pages in a wireless magazine, and there was a need which F.J. was not slow to recognise.

Issue No.1 of the new journal was published on March 24th, the first new title to appear and only 24 days after the end of paper rationing. Television was the absorbing interest of the early 50s - the Sutton Coldfield transmitter had opened and television-in-a-car was demonstrated at the Motor and Radio Shows when HMV installed a set in a *Standard Vanguard* car.

The 1950 Show at Castle Bromwich, Birmingham proved the enormous success of the *PW Televisor*. Although the BBC predicted that only 4000 people would be interested, *PW* proved that nearer 50000 were building and experimenting with TV. F.J. suggested in an editorial that the BBC should cater for these enthusiasts with a dedicated programme once a week, putting out experimental transmissions as 2MT (Writtle) had done in the early days of wireless and invite their reception reports. He pointed out that they would have the services of thousands of observers absolutely free.

Early in 1952, *PW* offered the first free blueprint since 1939. It was for the *Mini Four* battery portable, a neat little set measuring 6.5in x 5in x 3.5in and its great popularity was assured because Britain was once again plunged into austerity and power cuts.

A noticeable omission from the pages of *PW* since the war had been F.J. Camm. His name appeared as editor, and the editorials carried his initials, but no designs or articles had his by-line. But even if F.J. was not putting his name to articles during those years, his books came from the presses of George Newnes in a steady stream. *The New PW Encyclopaedia* (12th Edn.) was published at 1 Guinea and over 300 000 copies were sold; *Television Principles and Practice* at 25/-; *Practical Motorist's Encyclopaedia* at 17/6 (8th Edn); *Wireless Transmission* 6/- and many others.

It's virtually impossible to separate this review of *PW* from F.J's working life and his other activities for he was by now also editing the *Practical* group of magazines, a mixture of weeklies and monthlies. *Practical Engineering* was offering a free pocket book every week for eight weeks, and the *Mini Four* Portable design had produced enormous demand, so much so that the issue with the free blueprint sold out on

PW's 21st birthday and F.J. Camm's Coronet Four.

publication day in spite of an increased print run. The blueprint and constructional details were reprinted and sold at 1/- to meet demand.

Practical Wireless Comes of Age

The arrival of 1953 was a milestone for Britain and *PW*. The year was a morale-boosting anticipation of the coronation of H.M. Queen Elizabeth II. Television sales boomed and true to tradition, a special new *PW* receiver was promised. The magazine reported and reviewed transistors, valveless radio and TV. Printed circuits and transformer windings produced like sheets of stamps featured in the magazine. F.J. predicted in an editorial, "In a few years it seems, transistors will oust the valve as we know it today."

F.J. Camm made a rare reappearance as a journalist with a new series of articles, *Beginners' Guide to Radio*. It was a return to the early days, with his ultra-simple explanations, wonderfully clear drawings and easy projects.

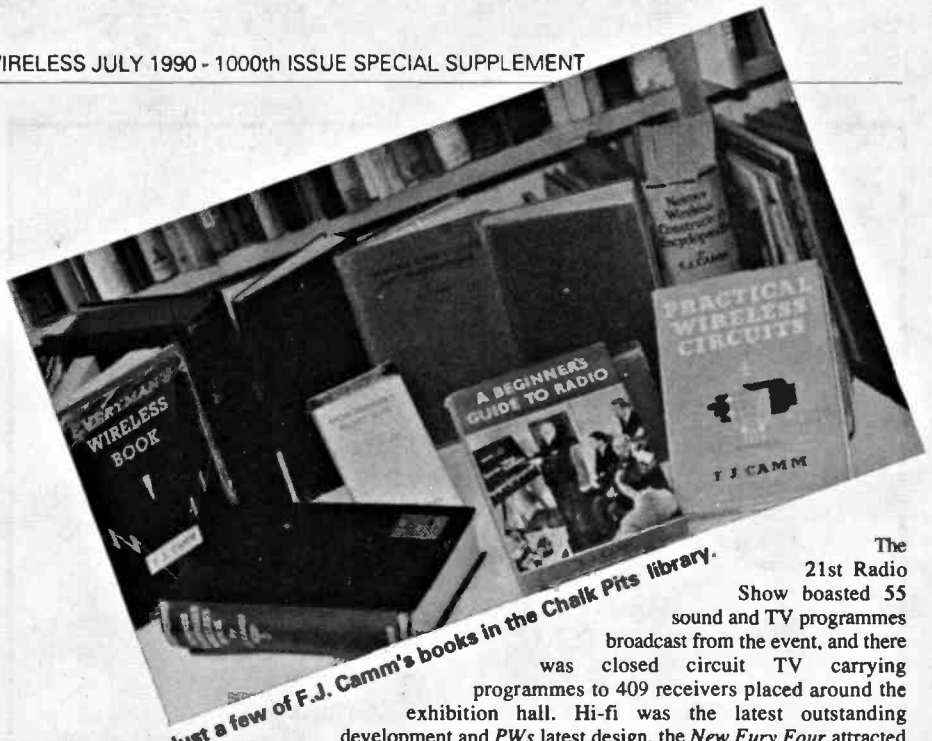
Camm's Comment

The next time that F.J. voiced his opinion in an editorial, was after the Coronation. He had viewed the outside broadcasts in the *PW* laboratory looking, he said, not for the programme contents but for technical failures. Honest with praise as with brickbats, he declared that there were none. The day was the finest BBC achievement of the time. It was estimated that there were 3 000 000 TV licences but this bore no reflection on the actual number of people who watched the unique event. Television parties for those who had no set probably meant an average of six viewers per screen.

Hardly had the excitement died away, than *PW* itself was plunged into its own great celebrations. October saw the publication of the 96 page 21st birthday number and it was time to review the past and look forward to the future. There was a full-size blueprint of F.J.Camm's *Coronet A.C. Four*, free with every issue.

Manufacturers sent good wishes, some of whom had advertised since the early days. Sir Ian Jacob, Director-General of the BBC, sent his greetings, and F.J. wrote of the 21 years of *PW* progress; of his own 21 years as editor, praising his loyal staff and the support and encouragement which he had always received from his publishers George Newnes.

All the famous *PW* guaranteed receivers were listed year by year, and W.J.Delaney introduced a new six-octave electronic organ. There was no time to bask in past glories.



Just a few of F.J. Camm's books in the Chalk Pits library.

The 21st Radio Show boasted 55 sound and TV programmes broadcast from the event, and there was closed circuit TV carrying programmes to 409 receivers placed around the exhibition hall. Hi-fi was the latest outstanding development and *PWs* latest design, the *New Fury Four* attracted great interest. And, just to encourage the buying public, the government relaxed hire-purchase restrictions.

The Practical Wireless Film Show

The popular annual film shows began when F.J. saw the Mullard film made for the trade on the manufacture of valves. The film was so interesting that he persuaded Mullard to put on an evening show for readers and radio amateurs at Caxton Hall. F.J. was in the chair, with a director of Mullard introducing the film. The hall was packed to capacity, but even people who turned up without tickets were found standing room!

A spokesman from RCA stated that sunspots improved communications; Project Vanguard, the USA contribution to the International Geophysical Year sought satellite observations from amateurs world-wide. Russia astounded the world with the launch of the first artificial earth satellite. As ever, F. J. realised the potential."The advantages which must follow from the launching of this satellite must benefit radio science", read the editorial.

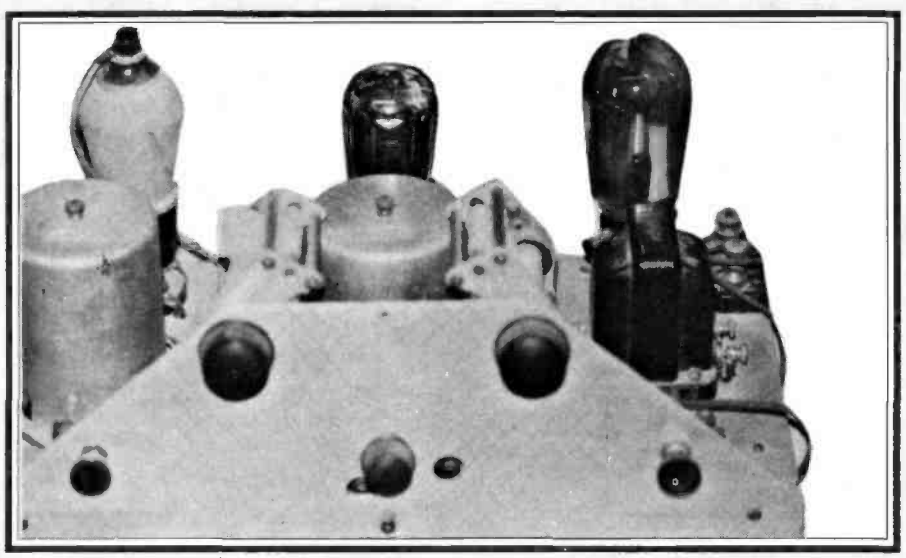
Working to the End

F.J. Camm loved his work and followed every new development with lively enthusiasm; he had kept faith with the promise made in the first *PW* to inform readers of the latest in scientific advances; he held strong opinions and believed in stating them in plain language.

He seemed to live in his office and was often to be found there on a Saturday, when the rest of George Newnes was closed and it was nothing unusual for him to still be working on Sunday. One weekend early in 1959, he was taken ill in his office.

The May issue of *PW* missed his name from the cover of the magazine for the first time in 27 years, and a small box in the centre of the editorial page carried the announcement of his death and a tribute to his 27 years as editor.

Practical Wireless under his editorship had reached volume 35, No 629, which even WWII could not interrupt. As was said of Sir Christopher Wren and St Paul's - "If you seek his monument, look around you." F.J. Camm's monument rests on many bookshelves and reference libraries,. His life was lived through the printed word and it lives on in *PW* as we know it today.


Typical three-valve kit of the time in Chalk Pits Museum.

Trends and Transistors

The magazine forged ahead into the 'trendy' 1960s. A new series of free blueprints were offered and avidly collected by readers. Constructors were offered many choices of kits and ready-made receivers. Particularly popular in the early 60s were the small portables but advertisements for one-valve receivers and kits still showed there was a lot of interest in proven technology.

The growth of interest in electronics as a hobby led to the need for yet another magazine to fill the gap. *Practical Electronics* appeared, as yet another off-shoot of *PW* and a new era was born. The new title, although it had some overlap in coverage, concentrated on electronic rather radio applications and many readers ended up buying both magazines!

In the late 1960s and early 1970s *PW*, in the forefront of innovation as F. J. would have wished, had several 'firsts' to its credit. Among them was the *PW 'Treasure Tracer'* metal detector. Many hundreds were built and the project became another favourite.

In 1980, the new decade began with a firm

policy decision to concentrate on amateur radio and communications for the enthusiast. By this time the flood of war and government surplus had dropped to a trickle and specialist, high quality imports from the Far East had really begun to make their mark. Unusual Oriental names, virtually unknown before the late 70s, became amateur household words.

The impact of semiconductors, microprocessors and latterly, large-scale-integration made miniaturisation a reality from British and foreign manufacturers alike. Not to be outdone *PW* offered state-of-the art projects such as the *PW Nimbus* modular 144MHz transceiver design and the *PW Sherborne* synthesised a.m.-f.m. tuner.

Throughout the 1980s *PW* continued to offer new designs, projects and ideas. Amateur radio satellites, computerised RTTY and Television topics were all featured by the magazine. The astounding growth in popularity in the latest digital communications mode - packet radio - soon earned its own regular page within *PWs* covers.

A milestone in the history of the magazine was reached in 1987 when it became a separate, independent company operating from the Poole Quay offices on 1 February 1986. The long established *Short Wave Magazine* joined forces with the new PW Publishing Company Ltd on 1 January 1987. *Short Wave Magazine* then became a specialised journal catering for the different needs of the dedicated listener. Editorially, both magazines now aim to complement rather than compete.

PW entered the 90s - its 6th decade - with a new look, new paper, a strong new editorial team and a positive approach. F.J. may not be in the office at Poole, but his influence and approach lives on!

PW Blueprint given with the first issue and a selection of contemporary components from the Chalk Pits Museum.


September 24th, 1932
PRACTICAL WIRELESS
1
FACTS YOU SHOULD KNOW ABOUT THE MAZDA 2-VOLT RANGE
In this exceptionally efficient range of 2-volt valves will be found types to suit all battery operated sets.
THE HL2, an outstanding example of Mazda sensitivity, is an excellent cumulative grid detector. Amp. Factor 31. Imped: 20,000 ohms.
THE S215 VM. is a new variable-mu screened grid valve of extreme sensitivity and low inter-electrode capacity.
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THE P220 and P220A will operate balanced armature and moving coil speakers respectively at full volume with extremely economical anode consumption.
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The amazing
MAZDA
THE BRITISH VALVES
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V 165


WIRELESS
September 24th, 1932
FUSE-HOLDERS
Programme 1932-33
1 SINGLE SAFETY
2 TWIN SAFETY
3
4 PANEL FUSE-HOLDER
5 FLEX FUSEHOLDER
6 WANDER-FUSE
7
SPARE FUSES Shown Actual Size
LONG FUSE. All ratings, 60, 150, 250, 500, 750 m/a., 1 amp., 2 amp., 3 amp. SHORT FUSE. For WANDER-FUSE only, 60, 150 and 500 m/a.
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Set manufacturers, Government Departments, technical experts, the leading Wireless Journals—ALL use and specify Belling-Lee Radio Connections. Make them your choice.
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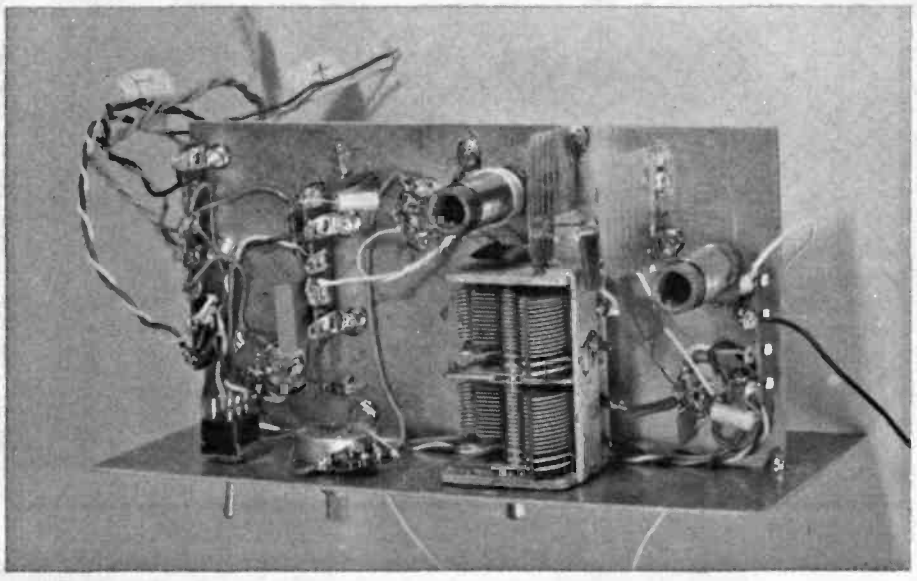
Write for Complete List
BELLING-LEE
FOR EVERY RADIO CONNECTION

PW MILLENIUM VALVE RECEIVER PROJECT



To Celebrate PWs 1000th issue, Peter Buchan G3INR has re-created a receiver design typical of the 1930s which uses easily obtained valves and easy-to-build techniques

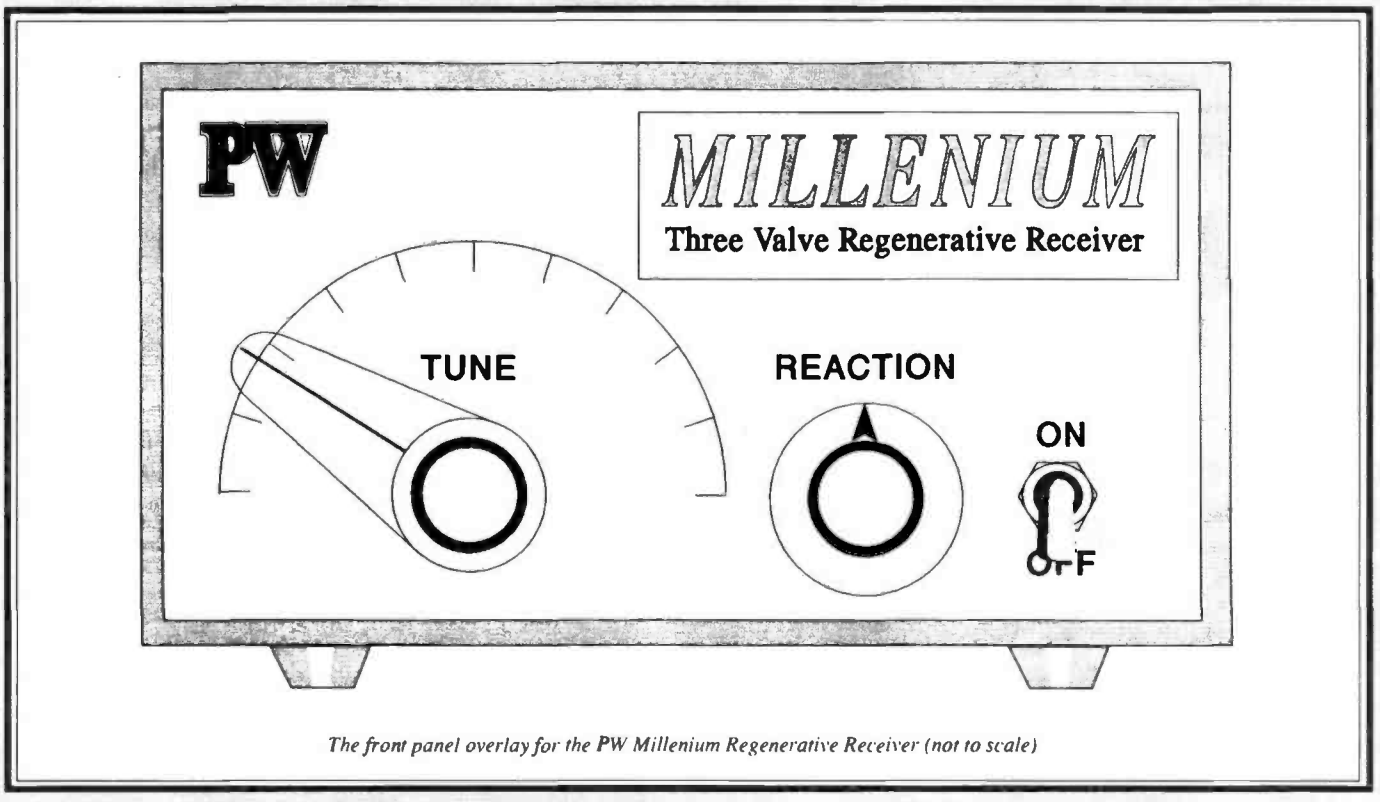
My first thoughts on the *Millenium* project centred on a mains-powered receiver. But when I considered those of you who don't have a suitable power supply, I decided to use the easily obtained 1T4 B7G base miniature pentode. These useful little valves only cost a £1 or so from various sources.

Another advantage to these valves is that they are very economical in use. If you haven't built (and I recommend that you do!) the '*Power Supply for Battery Radio*' unit designed and built by Stefan Niewiadomski (May 1990 *PW*) you can even run this little receiver from a battery power supply.

I haven't seen the old-fashioned h.t. and l.t. batteries for years but you can easily make up your own by series connecting 6 or 7 of the PP3 type. If you can afford to buy as many, the best number is of course 10 as this makes the required 90V supply. However, amateur radio requires innovation and I experimented and found that if I kept the filament voltage at 1.5V (the designed filament voltage) the receiver would still work on an h.t. as low as 27V. This voltage can be provided by 3 of the 9V type PP3s in series.

In fact, with only 3 h.t. batteries needed, you could buy the heavy-duty alkaline type which would provide a longer life.

The *PW Millenium* was built using an unusual technique, but I've no doubt that other constructors have also used the idea themselves. As aluminium chassis and the necessary facilities to work the material (plus the valuable experience) may not be available, I built the chassis and front panel from copper laminate p.c.b. material.



The front panel overlay for the PW Millenium Regenerative Receiver (not to scale)

This has many advantages, not the least being minimum effort! You can solder the valve-holder lugs to the copper laminate and erect screens by the same method. You can also solder direct to the earth-plane.

The circuit of the *Millenium* is very straightforward and it is based on the old favourite, the t.r.f. receiver. The tuned-radio-frequency stage amplifier, V1, has the antenna transformer-coupled to it. I recommend using a variable capacitor to tune the r.f. stage, but you could pre-tune it with a trimmer.

The l.f. choke in the anode circuit of V2 can be any small audio-frequency choke or the mains primary (secondary not used) of a very small 240 to 6 volt transformer. The audio output transformer in the anode circuit of V3 - which is connected as a triode - can either be from an old 'all-dry' receiver or another 240 to 6 volt p.s.u. transformer. The output to the headphones is then taken from the secondary winding (what would have been the low voltage output from the transformer)

You can also economise by making the r.f. chokes if they're not in your 'junk' box. They can be made by winding 100 turns of 28 s.w.g. enamelled wire onto the body of a 220kΩ 1W resistor.

Shopping list

How much? £20
How difficult? Intermediate

Resistors
5% 0.4W Carbon film

33kΩ	1	R3
220kΩ	1	R2
1.5MΩ	1	R1
4.7MΩ	1	R5

Potentiometer (panel mounting)

50kΩ	1	R4

Capacitors
Ceramic

47pF	1	C2
100pF	2	C3, C4
10nF	1	C5
22nF	1	C1

Variable Capacitor
Recommended 100pF with built-in trimmers

Inductors
See table 1 and text.

Miscellaneous

3 B7G valve holders (J. Birkett Lincoln) 3 type 1T4 valves (Birkett of Lincoln and Colomor Electronics of London). Coil former material (plastics preferred), audio-output transformer (Maplin YN12N suitable, see text) audio choke (Maplin YN12N suitable, see text) p.c.b. material for chassis, switches, headphones, connecting wire.

J. Birkett, 25 The Strait, Lincoln, LN2 1JF

Colomor (Electronics) Ltd 170 Goldhawk Road, London, W12 8HJ.

Maplin Electronics, PO Box 3 Rayleigh, Essex, SS6 8LR.

The author's original circuit diagram of the receiver.

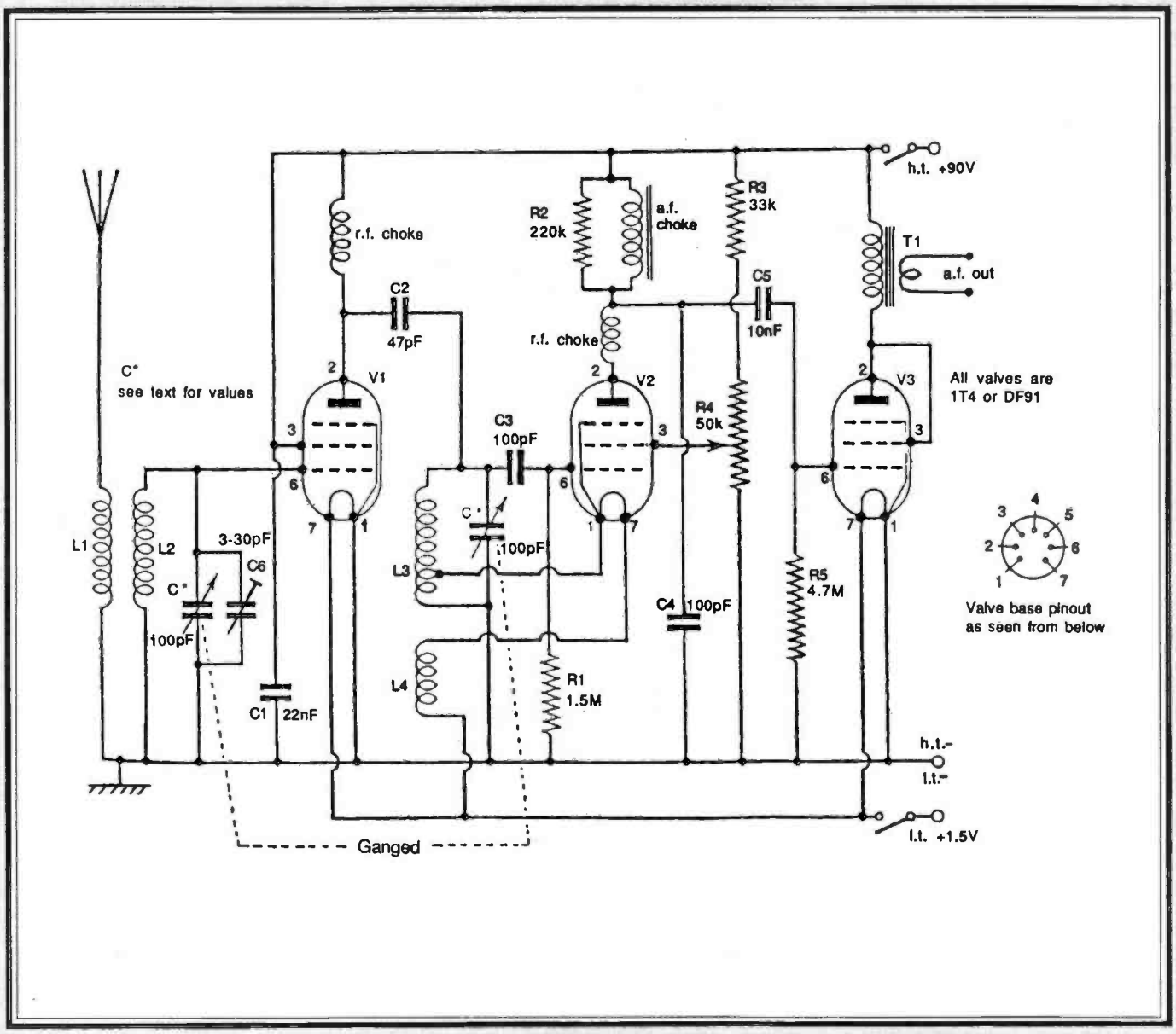


Table 1

Coils wound with 28 s.w.g. enamelled wire.

3.5-4MHz	L1 = 7 turns	L2 = 60 turns closewound	L3 = 60 turns closewound	tap L3 at 10 turns	L4 = 10 turns.
6.9-7.4MHz	L1 = 5 turns	L2 = 30 turns closewound.	L3 = 30 turns closewound	tap L3 at 5 turns	L4 = 5 turns.
13-14.4MHz	L1 = 3 turns	L2 = 20 turns over 10mm	L3 = 20 turns wound over 10mm	tap L3 at 3.5 turns.	L4 = 3.5 turns.
20.5-22MHz	L1 = 3 turns	L2 = 13 turns over 10mm	L3 = 13 turns over 10mm	tap L3 at 3 turns	L4 = 3 turns.
27-30MHz	L1 = 2 turns	L2 = 10 turns over 5mm	L3 = 10 turns over 5mm	tap L3 at 3 turns	L4 = 3 turns.

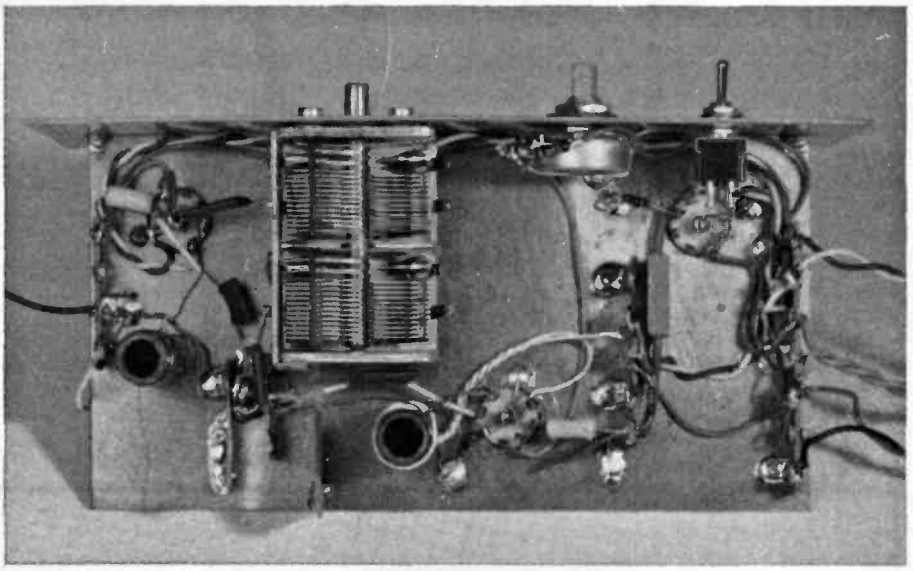
Screening between stages is easily arranged by soldering small (scrap pieces will do) pieces of p.c.b. to the earth plane. You can even use the 'tinplate' from dismantled soft-drink cans for screens as only the tops are usually aluminium - but watch your fingers on sharp edges!

I fixed the r.f. coils to the 'chassis' by use of a 'hot melt' glue gun. This has proved to be very practical in use and I also found that the coil winding could be anchored by the same method.

The r.f. amplifier stage is capacitor-coupled to the regenerative-detector stage as this system make the coil winding easier. Unusually, the feedback for the self-oscillating detector stage is fixed. Control of the 'feedback' (and hence the stage 'gain') is actually achieved by varying the screen-grid voltage by the 50kΩ variable resistor.

This form of 'reaction' control is very smooth. In use I found I could easily resolve c.w, and s.s.b. The receiver has proved to be a delight to use in this respect. In use you carefully increase the gain until the detector is just oscillating (for c.w. and s.s.b.). Mind you, you'll have to practice to resolve s.s.b.. It's a definite knack, but fun! Resolving a.m. is a very simple procedure. In this mode you adjust the 'reaction' so that the receiver is not quite oscillating. You'll really notice the circcuit gain as you adjust the control.

Details of the coils are provided in Table 1.



Internal view of the prototype Millenium.

The suggested coil winding are based on 25mm diameter formers, but you can adjust the windings to suit your own formers. I recommend using a 100pF variable capacitor if available, but you can use a smaller or larger capacity and adjust the windings to suit. A grid-dip or gate dip oscillator will help in this respect.

Have fun, this little receiver will perhaps revive many memories for us 'Old 'uns' and introduce the 'youngsters' to a new delight.

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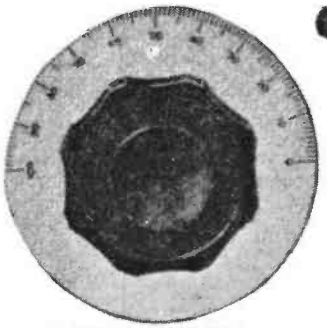
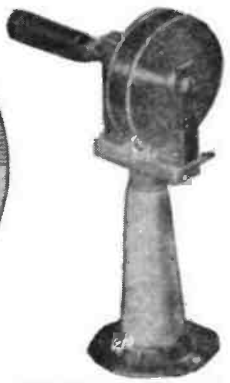
Cat. No. 1049 (wing-nut fitting) Price 1/6
Cat. No. 1095 (2BA Plug and Socket fitting) Price 1/8



POPULAR TYPE DIAL

Direct Drive. Cat. No. 1098.
The 4in. Scale is satin finish aluminium with clearly marked divisions. It is fitted with a 2½in. knob for ¼in. spindles. Price 4/6



NEUTRALISING CONDENSER. Cat. No. 1038.

For H.F. circuits using low-capacity triodes. Maximum voltage 2,000 volts D.C. Capacity variation 1-8 mmfd. Frequentite pillar iosulator mounting. Insulated adjusting knob. Price 6/6

HIGH-VOLTAGE MICRODENSER.

Highly efficient. Soldered brass vanes. Constantly maintained capacity; very low minimum 3 mmfd. DL9 insulation. ¼in. spindle extended for ganging. Peak flash over voltage 3,500 volts. Easy to gang—capacity matched within 1 per cent.
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MINIATURE POPULAR TYPE DIAL

Direct Drive
Cat. No. 1099.
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London Service:
Webb's Radio, 14, Soho St., Oxford St., W.1

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SHORT WAVE COMPONENTS

FLEXIBLE COUPLING UNIT. Cat. No. 1096.

For front panel control of awkwardly placed components. Will drive through 90 deg. perfectly. One hole fixing. For ¼in. Spindle. Cable length 5½ins. Price 3/6.

READERS' MEMORIES 1932-1990

As PW celebrates its 1000th issue some of our readers have taken the opportunity to send their congratulations and share their own memories.

...On this auspicious occasion of the 1000th edition of *Practical Wireless* it gives me very great pleasure to write and offer congratulations to the *Practical Wireless* team on behalf of the Radio Society of great Britain.

In common with many other radio enthusiasts, I nurtured my budding interest in radio through reading the pages of *Practical Wireless* each month. This initial interest evolved into keen enthusiasm and the eventual obtaining of an Amateur Transmitting Licence together with satisfying participation in the activities of the Radio Society of Great Britain.

I believe that *Practical Wireless* continues to hold an important place in both the development of interest in radio and electronics as a hobby and also towards their practice in a rewarding career.

Congratulations *Practical Wireless* from the Radio Society of Great Britain. May your success continue and the magazine grow from strength to strength!

Frank Hall GM8BZX
President RSGB

...1000th Edition of *Practical Wireless*

On behalf of all those involved in producing *Radio Communication*, may I offer hearty congratulations to you on reaching your 1000th edition. In these changing times, it is common for technical publications to last only a year or two. It is therefore quite remarkable that *Practical Wireless* has been so durable.

Many of us here at RSGB HQ learnt the basics of radio from reading *PW*. In my own case, I owe a great debt to the writings of the late F.G. Rayer G3OGR in the 1960s.

May I wish you every success as you embark on the second thousand!

Mike Dennison G3XDV
on behalf of all *RadCom* staff.

...Reference *PW* 1000th issue.

I have taken *Practical Wireless* since 1936 when I left school. The first receiver I built was a crystal set, my first transmitter was a one valve effort employing a 240B which I've kept!

As I was a keen F. J. Camm addict I purchased most of his hardback books, *Practical Mechanics* and *Practical Television*.

I've kept a few copies, including the 21st Birthday issue from October 1953, but when I moved from London I had to dispose of many, with many regrets. Maybe it is nostalgia but I liked the 30s and 40s issues best.

Keep up the good work, yours as ever,

R. L. Hoare G3XQW
Saint Austell
Cornwall

...We've noticed that you are due to publish the 1000th issue of *PW* very soon and on behalf of the committee of BARTG, I would like to congratulate all involved with the magazine for reaching this milestone.

I would especially like to congratulate those who have been responsible for re-designing *PW* into its current format as it is now a very rewarding magazine to read. I personally, as Publicity Officer of BARTG , also appreciate the many 'mentions' that you have given to BARTG in the pages of *PW* and *Short Wave Magazine*.

Very well done to all concerned and here's to the next 1000 issues. Thank you for an excellent magazine.

Ian R. Brothwell
G4EAN
Secretary and Publicity Officer
BARTG

...Although the first issue of *Practical Wireless* appeared on the bookstalls in September 1932, numerous other magazines, both weekly and monthly, and devoted to the needs of wireless enthusiasts, were published during the preceding years.

It was through theses that my initiation into wireless both professionally and as an amateur, was well and truly established. There was *Popular Wireless, Modern Wireless, Wireless World, Wireless Magazine, Amateur Wireless*, etc., all of which vied with each other to include 'the best build your own receiver design', free blueprints, free circuit booklets and a multiplicity of special features.

Copies of those early magazines, all but one no longer published, provide fascinating reading. One for instance, carried an article title *'Aren't The Programmes Appalling'* which ended with a suggestion that, "If the listener is dissatisfied with the programmes of the day the BBC should reimburse him or her, with that day's value of the 10 shillings (50 pence) per year licence fee, namely one and a quarter farthings (there were four Farthings to the old penny!). This is an idea that might be applied to current TV programmes!

The constructional features were of course the most sought after content of any of the magazines, like the very ambitious 4 valve (two neutralised hf amplifiers plus detector and l.f. amplifier) receiver. I built at the age of 16. Yes, that's it (and me) in the photograph, but look closely at the copy of of *Popular Wireless* priced at 3d (1.5 pence). The magazine advertises the current 'Radio Exhibition' at Olympia on the front cover. (It was also known as 'Radiolympia').

Many names, still remembered today, were the well known 'by-lines' above the regular features in many of those early magazines. Captain ("Please don't do it") P.P. Ekersley, Sir Oliver Lodge, G.V. Dowding, J.H. Reyner and later H.J. Barton-Chapple (*Practical Wireless*) to mention only a few professionals who were willing to impart their knowledge to the amateurs.

Older readers will be amused to see the famous quotes "Please don't do it" alongside Capt. Ekersley's name but I'd better explain it for the 'youngsters! The plaintive request recalls the use of regenerative detectors and the interference they could cause. The problem of badly adjusted regenerative detectors (in effect becoming low power transmitters) radiating from the long aerials of the day, spoilt reception for many people. Hence the cry from the BBC's Chief Engineer (Capt. Ekersley) "Please don't do it"!

Finally, and well remembered to me personally because I had the honour of working with each at different periods during the war on coastal radar, are J. Scott-Taggart, so well known for the 'ST' series of receivers in *Popular Wireless*, Austin Forsyth G6FO, the founding editor of *Short Wave Magazine*, M. G. Scroggie G5JX, author of the *Foundations of Wireless* of which 250 000 copies were sold before his later revised edition was published. Scroggie also wrote regularly for Wireless World, including the monthly comment feature *Unbiased by Free-Grid*. Very few people ever knew who *'Free Grid'* was.

And for a final final. Congratulations to the present publishers and staff of *Practical Wireless* on its 1000th edition. It seems a long time ago since I set pen to paper to write my first article for it.

Best Wishes from
Fred Judd G2BCX
Cantley
Norfolk.

16 year-old Fred Judd proudly poses with his 4 valve receiver.

...It's a pleasure to send my congratulations to *PW* on reaching its 1000th edition. It also provides me with the opportunity of recalling some cherished moments from my long association with the hobby of amateur radio.

In the early post-war years I took *RadCom* (then *T&R Bulletin*), *Short Wave Magazine and Wireless World*. The last mentioned became too technical for me but I continued with *Short Wave Magazine* for many years.

I recall that the late Clarricoats (then General Secretary of the Society) did not see 'eye to eye' with Austin Forsyth the editor of *Short Wave Magazine*. so it was a pleasant surprise when Austin G6FO, bought me, then a Regional Representative of the RSGB, a cup of tea at a Manchester convention!

Clarricoats' book *World at their Fingertips* tells me that in 1937. Austin Forsysth was "the RSGB representative for South Wales and Monmouthshire". It also records that the RSGB and *Short Wave Magazine* organised the first post-war Old Timers dinner in 1949. Any disagreement there may have been must have come later!

Now that I receive *PW* on a regular basis, your 1000th issue prompts me to tell you that I once sat at a luncheon table with the famous F. J. Camm. In those days, as I'm sure you'll know, radio amateurs affectionately referred to *PW* as *Camm's Comic*! The great man remained completely silent throughout the lunch which he left somewhat early.

I remember marvelling how such a quiet man could be editor of the huge number of magazines that were circulating under his name at the time.

With my best wishes for the next 1000 editions!

Basil O'Brien G2AMV
Heswall
Merseyside

Honorary Vice President RSGB

Please add my appreciation to your ever-growing list of favourable comments on *PW*s new format. I have 68 turns on the tank coil and I find the presentation very much easier to read.

My first meeting with *PW* goes back to early 1939 when I was a teenager just feeling my way as an s.w.l. I am almost certain that F. J. Camm printed the enclosed photograph under the caption 'A corner of Mr. W. G. Andrew's shack'. in October 1939.

I support some of your readers who ask for a little thermionic valve nostalgia. It is over 22 years since I taught valve theory. If you can tolerate their physical size and attendant power supplies, they are certainly immune to the effects of ill treatment and e.m.p.

My best wishes to you all.

Wm. G. Andrews
G3DVW
Aigburth
Liverpool

...With reference to your remarks in 'Keylines' in March *PW* here is a reply from one reader who was not only an enthusiast before the war, but also wrote quite a regular supply of articles for *Practical Wireless* in those days.

F.J. Camm was not generous with by-lines and one would not know which articles were mine, although I did get my name on one in July 1954, by which time I was better known!

I enclose a copy of one of my published designs. I still have this particular receiver in working order!

I remember discussing with F.J. the popularity of the Scott-Taggart receivers which appeared in *Popular Wireless*. He seemed worried about them but need not have bothered, as of course, *Practical Wireless* soon had the field to itself after absorbing *Amateur Wireless*.

My interest in radio began with the BBC opening in 1922 when I was just a lad. We lived in the heights of North London and received a fine signal on a crystal set from 2LO whose aerial was six miles away on the roof of Selfridge's store.

In 1926 my father bought a new house at Harrow and had a friend make us a three-valve receiver (detector- two l.f stages, plug-in coils and two Igranic transformers). The receiver had many adventures and was built and re-built and now stands on a shelf before me in working order - complete with large horn loudspeaker.

This particular receiver really began my serious interest in radio and I began writing for most of the radio papers at the time, including *Practical Wireless*. After the war I became the first British radio amateur to commence operating from Berlin. My collection of QSL cards must be worthy of museum status now! I have one from Douglas Byrne G3KPO, then living in Peterborough, but now living on the Isle of Wight and who often writes to 'Receiving You'.

I'm now embarking on a 1931 valve design to put some fun back into my short wave listening. I'm going to make it harder on myself with a need to bring the reaction up gently - just like the old days!

Sorry to be so long-winded but it's hard to condense a lifetime in radio into a short letter. All good wishes to *PW* in its modern form and with kindest regards,

Gilbert Davey
Peterborough

Author of: *Fun With Radio, Fun With Short Wave Radio, Fun With Electronics, Fun With Transistors, Fun With Hi-Fi, Fun With Silicon Chips*, and contributor to *Boy's Own Paper 1946-1967*.

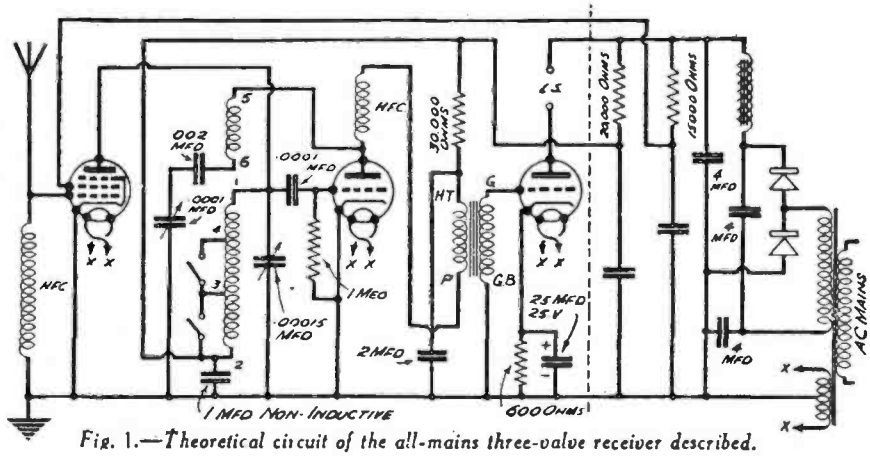

Fig. 1.—Theoretical circuit of the all-mains three-valve receiver described.

Gilbert Davey's circuit as published in Practical & Amateur Wireless, March 1935.

...Congratulations to *PW* on its 1000th issue. I understand that you would like to hear from some of us who knew the magazine in the early days.

I cannot remember which was the first issue of *PW* that I saw, as I was in a remote part of Central Africa at the time and did nor even hear of its birth! But I did take its predecessor *Amateur Wireless* during the 1920s while I was still at school. I built my first crystal set in 1924 and my first contribution to *PW* appeared in December 1943, but it was not accepted by F.J. Camm until I gave him an assurance that the circuit described was original. He said he thought he'd seen it somewhere else!

My article described a receiver designed for use in a country in which mains supplies were rare and batteries very expensive and hard to find. It was therefore necessary to obtain the maximum efficiency from the minimum possible current.

I used this highly sensitive and economical receiver as our normal domestic outfit until the end of 1958. Various modifications took place from time to time including later conversion to mains operation but the main circuit remain unaltered. It would still give a good showing as a broadcast band short wave receiver even today.

Best of luck to you all,

Sir Douglas Hall
Kingsbridge
Devon.

A Battery-operated "Communication" 3-valver

An interesting Superhet Reflex Circuit Possessing Novel Features. **By D. B. HALL, B.A.**

THE writer lives in Northern Rhodesia, and his next door neighbours are 25 miles away. The nearest town, electric light mains, cinema and doctor are 77 miles away by a road which is not always passable. Wireless is therefore supremely important, but there are several problems in the design of a receiver suitable for these conditions. It must be very sensitive in order to provide reliable reception from Daventry under all conditions, and it must also be very economical owing to the high cost of batteries in these parts. They are not only expensive, but very difficult to secure.

The result of four or five years' experimenting is described in this article. Although only three valves are used, the results are similar to those obtained with a superhet with two signal frequency amplifiers, frequency changer, separate oscillator, single I.F. stage, diode detector, triode L.F. amplifier and pentode output.

Frequency Changer

This is the critical part of the circuit, and the values shown should be adhered to. The valve used is a 1A7G 1.4 volt type. A 2-volt heptode has been used successfully in this circuit with some modification to the coils, particularly the tapping point of the oscillator coil; this depends on the particular valve used and is best found by experiment.

An essential point is that the inductance capacity ratio of both tuned circuits must be kept high, otherwise it is impossible to get satisfactory oscillation in the oscillator section *and* satisfactory aerial reaction at the same time, and the exceptionally high gain of this stage depends on smooth reaction being available when required. With 50 mmfd. tuning condensers it is possible to cover 13 to 52 metres with three separate pairs of coils, with convenient overlapping. If the coils are wound as shown the two condensers can be ganged, provided there is some external means of trimming the aerial circuit. This is necessary when reaction is being used. The best method is to gang the condensers in such a way that the fixed plates of the aerial tuner can be rocked through a few degrees by means of a separate control. This method of trimming avoids throwing any extra capacity across the circuit. If it cannot be arranged it is probably better to have the two controls quite separate.

The tapping point on the osoillator coil is really critical, especially in the case of the smallest coil. The position of the tap not only determines the oscillator voltage, but at the same time it has a big effect on aerial reaction. If the tapping is too near the grid end of the coil the oscillator voltage will be too high, and as a result of this the screen current will drop to such a low figure that reaction on the aerial circuit will not be possible. But if the tapping is too low there will be insufficient oscillator voltage for satisfactory conversion, aerial reaction will be fierce, and there will be interlocking of the two tuned circuits. It should be noted that the screen of the valve is the oscillator's anode in this circuit. The real anode is joined to the screen and does little work. The circuit will function quite well with this electrode disconnected.

H.F.C.1. should be a small choke. It should be just large enough to prevent unwanted reaction effects via the H.T. battery, but not so large as to damp the I.F. transformer. H.F.C.2 is a filament choke with low

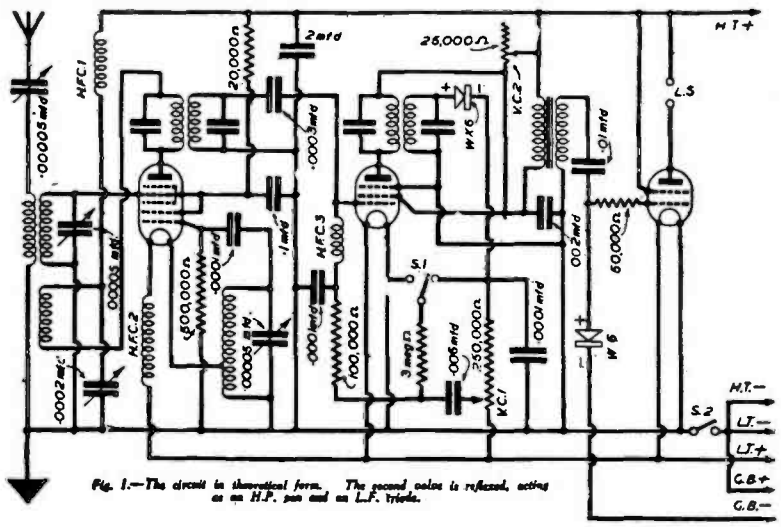

Fig. 1.—The circuit in theoretical form. The second valve is reflexed, acting as an H.F. pen and an L.F. triode.

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The precision and accuracy of the AvoMinor speedily and efficiently track down faults in valves, resistances, batteries and power units, etc. Enables you to keep your set always in perfect working condition. Each model covers a wide field of measurement and provides testing facilities unrivalled by any other meters in their price class.

THE UNIVERSAL AvoMINOR

A precision moving-coil instrument for A.C. and D.C. testing. Has 22 ranges. Gives direct readings of A.C. voltage, D.C. voltage, current and resistance. Total resistance of meter—200,000 ohms—ensures accurate readings. Complete with leads, testing prods, crocodile clips and instruction book.

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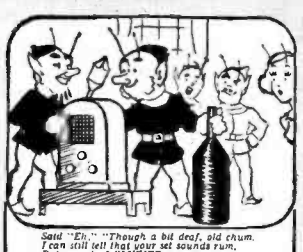

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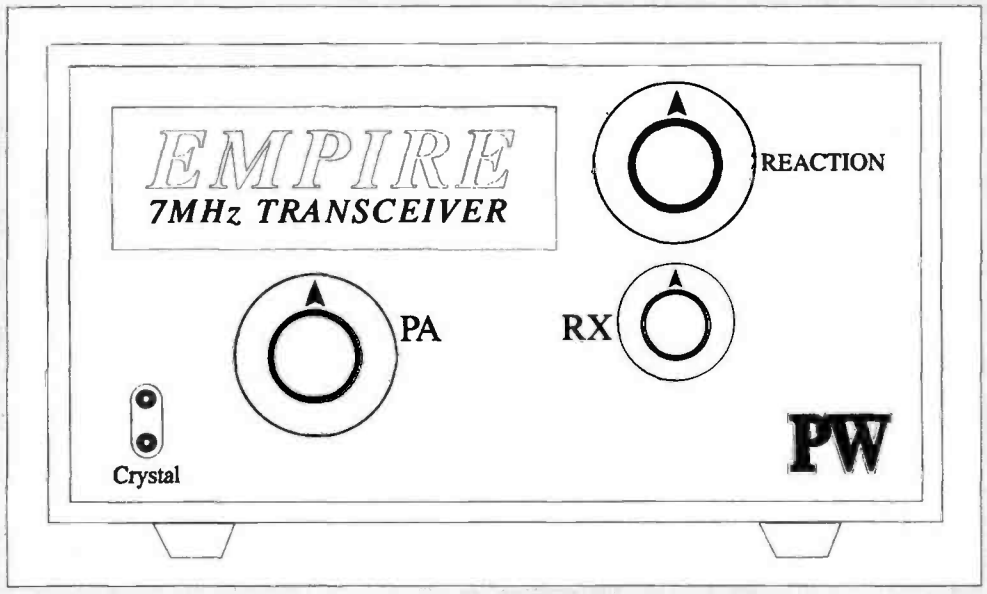
PW EMPIRE TRANSCEIVER



This new 'old' transceiver has been specially developed for the 1000th issue. It uses 90V h.t. 1.5V heater valves and may be operated from the power supply described in the May 90 issue of PW

A 7MHz QRP Transceiver

In the realms of QRP work most modern designs feature semiconductor circuits. The *PW* Empire design has been designed to use valves. These may be new to many readers, but still can perform as well as, if not better than, the equivalent solid state counterpart.

Receiver Design

The type of receiver used is a regenerative one. In this type of set, controlled positive feedback is applied to increase the overall gain of the system. This control, ('Reaction'), has one advantage, in that by careful use it is possible to resolve both a.m. and s.s.b. transmissions. The more modern designation is 'a self-oscillating mixer with audio frequency i.f. output'.

The DF92 valve (V2) performs this task. The anode has a double load in that RFC2 forms the load at r.f. and the primary of T1 the load at audio frequencies. A portion of the r.f. signal developed at the anode is fed back to the grid via L4 and tuned circuit L3/C9,10. This signal is mixed with the r.f. input signal from RFC1, the anode load of the pre-amplifier valve V1. As the stage gain of V2 is increased by advancing the reaction control R4 the stage will eventually start to oscillate. This causes any incoming signals to be synchronously detected. The headphones should be high impedance types and ex-military ones have been found to be very sensitive.The type provided with many personal stereo systems may prove inadequate for this project. The tuning capacitors C2/C9 are a small triple gang air-spaced 15pF type (see shopping list) but a 20pF as available from suppliers should work as well.

Transmitter Design

There is little to be said about the transmitter side. Valve V1(DL93) acts as an oscillator with the frequency controlled by the crystal XL1 which is at 7.020MHz. This design seems to run slightly on the high side of the crystal. The power amplifier V4 is permanently connected to the output of the oscillator, and has the h.t. keyed in operation. Capacitor C19 tunes the anode of the p.a. valve. This will allow the set to be matched to most antenna systems in use. Best output, about 500mW, will be into a dipole of 70Ω impedance.

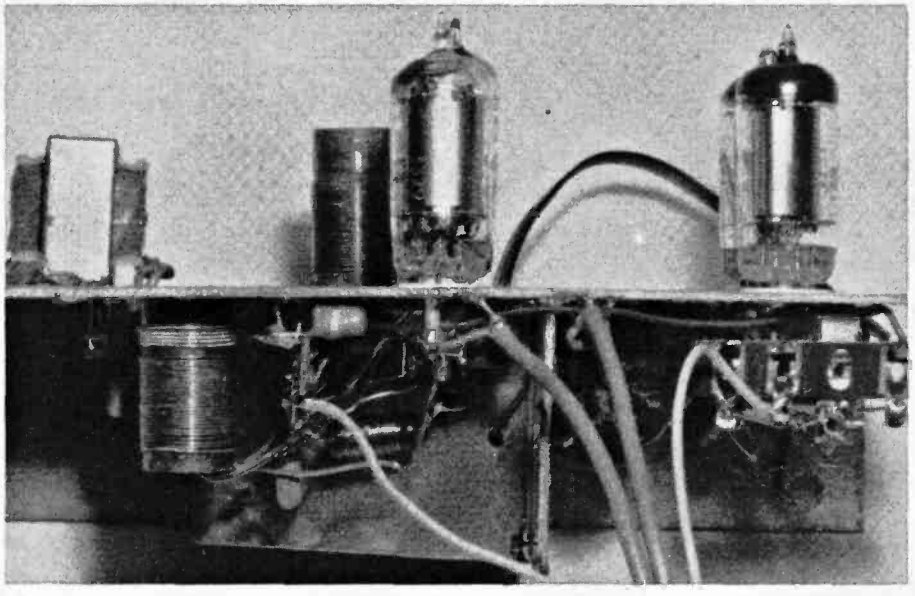
Construction

The 'chassis' was made from pieces of p.c.b. material cut and soldered together to form the main board. This is used throughout as an earth plane as all connections can be made at a convenient point.

Following the circuit diagram, Figs. 1 and 2, and using the suggested layout as drawn in Fig. 4, construct the unit. The only stipulation is that the screening strips should be full chassis depth and preferably using double sided board. Certain lines pass through the screen between the receiver valve V1 and V2 and care should be taken to ensure that these are insulated as they may be at a high potential (+90V).

In Use

Most users of this type of equipment will



A new technique for valve equipment — using P.C.B. material for the 'chassis' construction.

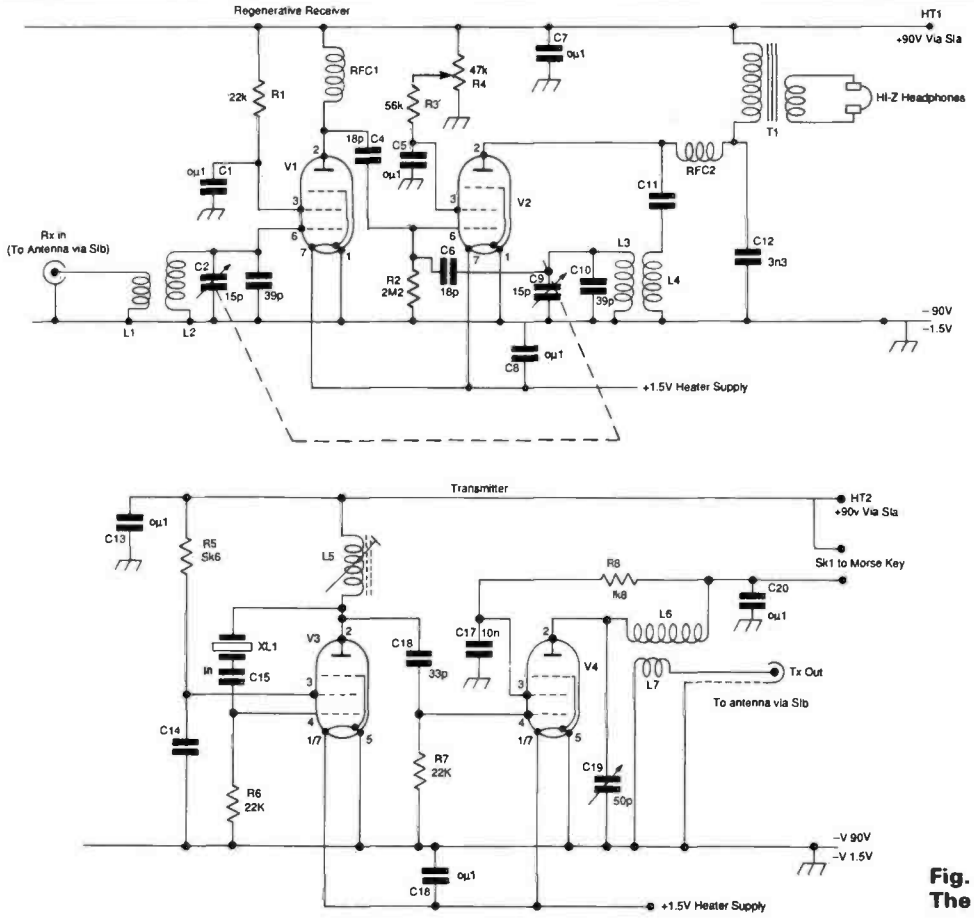
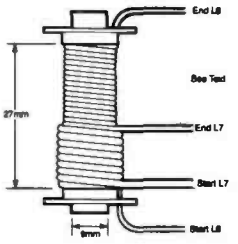


Fig. 1:
The receiver circuit.



L6/L7 Details

Fig. 2:
The transmitter circuit.

need a few words on the use of this rig as they may not have come across the type before.

Receiving

Advance the reaction control until there is an increase in the level of noise from the headphones. Too far advanced and the set becomes 'dead' again. Rotate the receiver tuning control until whistles may be heard. Now slight adjustment of the reaction and tuning controls will allow the signal to be tuned in at maximum volume. Morse and s.s.b. transmissions need the receiver just to be oscillating (more reaction), and a.m. will need a setting of not quite oscillating (less reaction).

Transmitting

WARNING POTENTIALLY LETHAL VOLTAGES ARE PRESENT IN THIS EQUIPMENT.
Take care at all times.

Insert the crystal to be used, and set the switch S1 to 'NET'. Both the oscillator and the receiver are operating but the antenna is disconnected. Tune the receiver to the strong heterodyne of the oscillator. Reduce the setting of the reaction control to ensure accurate setting at this stage.

Turn S1 to transmit. Place a meter set to measure 50mA in parallel with the Morse key and tune the p.a. for minimum current drawn (this should be in the region of 20-30mA). Take the meter out of circuit and use the Morse key as normal. Return S1 to receive at the end of transmission.

The receiver as shown is capable of tuning between 6.8 and 7.5MHz. The tuning capacitor is a triple gang 15pF, covering this range with 1.5 turns on its slow-motion drive spindle.

Shopping list and further drawings on next page.

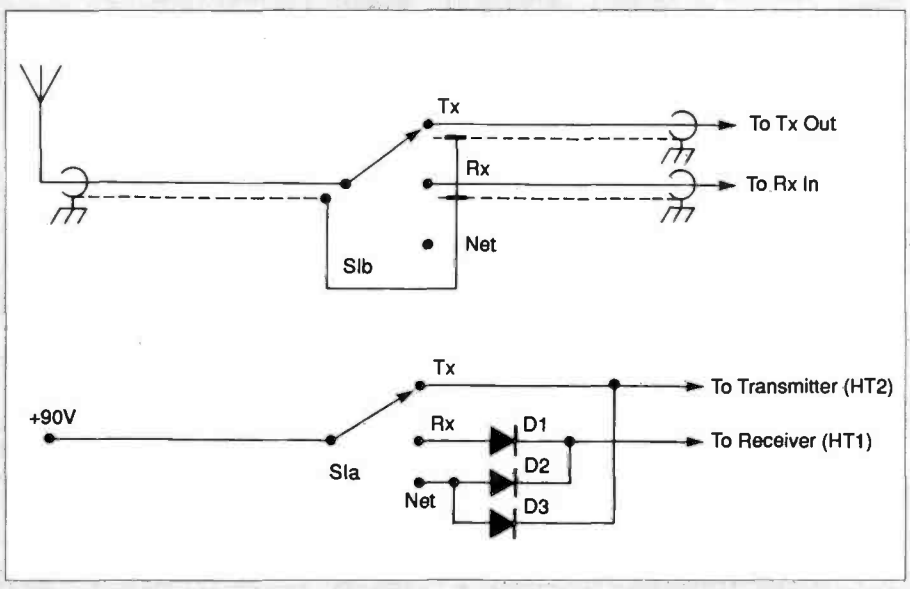


Fig. 3: The Empire transmit-receive switching circuitry.

Shopping List

How much? £30.00

How difficult? Intermediate

Resistors 5%
0.4W Carbon Film

1.8 kΩ	1	R8
5.6 kΩ	1	R5
22 kΩ	3	R1,6,7
56 kΩ	1	R3
2.2MΩ	1	R2

Rotary Potentiometer

47 kΩ	1	R4

Capacitors
Silver Mica 5% tolerance

18pF	2	C4,6
33pF	1	C16
39pF	2	C3,10
180pF	1	C11

Polyester 100V working (minimum voltage)

1nF	1	C15
3.3nF	1	C12
10nF	1	C17
0.1uF	8	C1,5,7,8,13,14,18,20

Variable (Air spaced tuning)

50pF Jackson	1	C19
15pF Triple-gang	1	C2/9

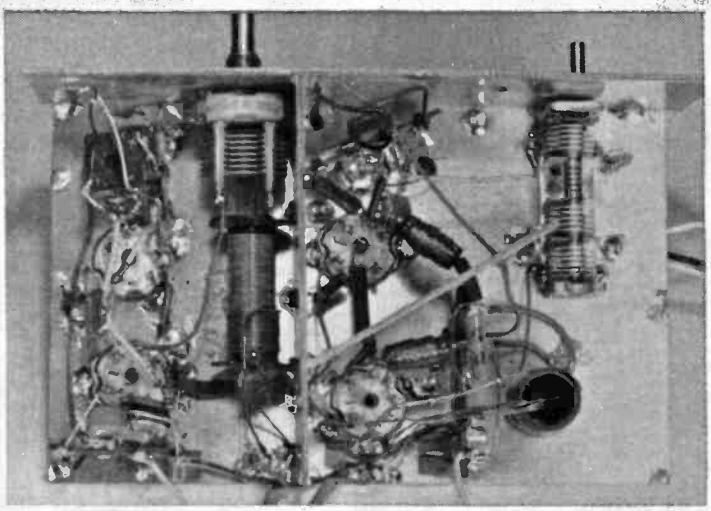
This is an unusual miniature type and may not be readily available, but the editorial staff have secured a number of them. Please contact G1TEX c/o PW offices for more details (Cost about £3.50 including postage).

Semiconductors
Diodes

1N4006	3	D1-3

Valves

DF92	2	V1,2
DL93	2	V3,4



Under-chassis view showing L6/7 and main receiver tuning capacitor in position.

Wound Components

All inductors are wound with enamel covered copper wire. The wire gauge is shown in brackets in the description.
RFC1,2 100T (0.2mm) wire wound on the body of a 220k 1W resistor and varnished.

L1 5T (0.5mm) close-wound on a 15mm air-cored former. Spaced 3mm from:
L2 28T (0.5mm) close-wound on the same former as L1 (see diagrams)

L3 wound as L2 above spaced 3mm from the coil:
L4 14T (0.2mm) wound on the same former as coil L3

L5 consists of 45 Tturns (0.2mm) wire pile wound on a 6mm coil former with a ferrite slug.

L6 and L7 are wound on the centre spool from a 35mm film cassette (see your local fast development shop).
L6 47T (0.5mm) close wound on the spool, ends brought out through the flanges.
L7 10T (1.0mm) close wound over the end of L6 furthest from the anode connection of V4.

Miscellaneous

Crystal of between 7.0 and 7.05MHz.

Pieces of p.c.b. material to make the chassis. 1 piece 200x100mm for the top plate and various lengths about 40mm wide for the sides and screens. One 4P-3W switch, valve holders B7G type. The valves are available from various sources, and several *PW* advertisers can supply them. (J. Birkett of Lincoln can supply valve holders and Colomor Electronics can supply the valves) High impedance/sensitivity headphones, wire to interconnect, miniature coaxial wire Knobs to suit, plugs and sockets to suit. 90/1.5V p.s.u. as described in May *PW*.

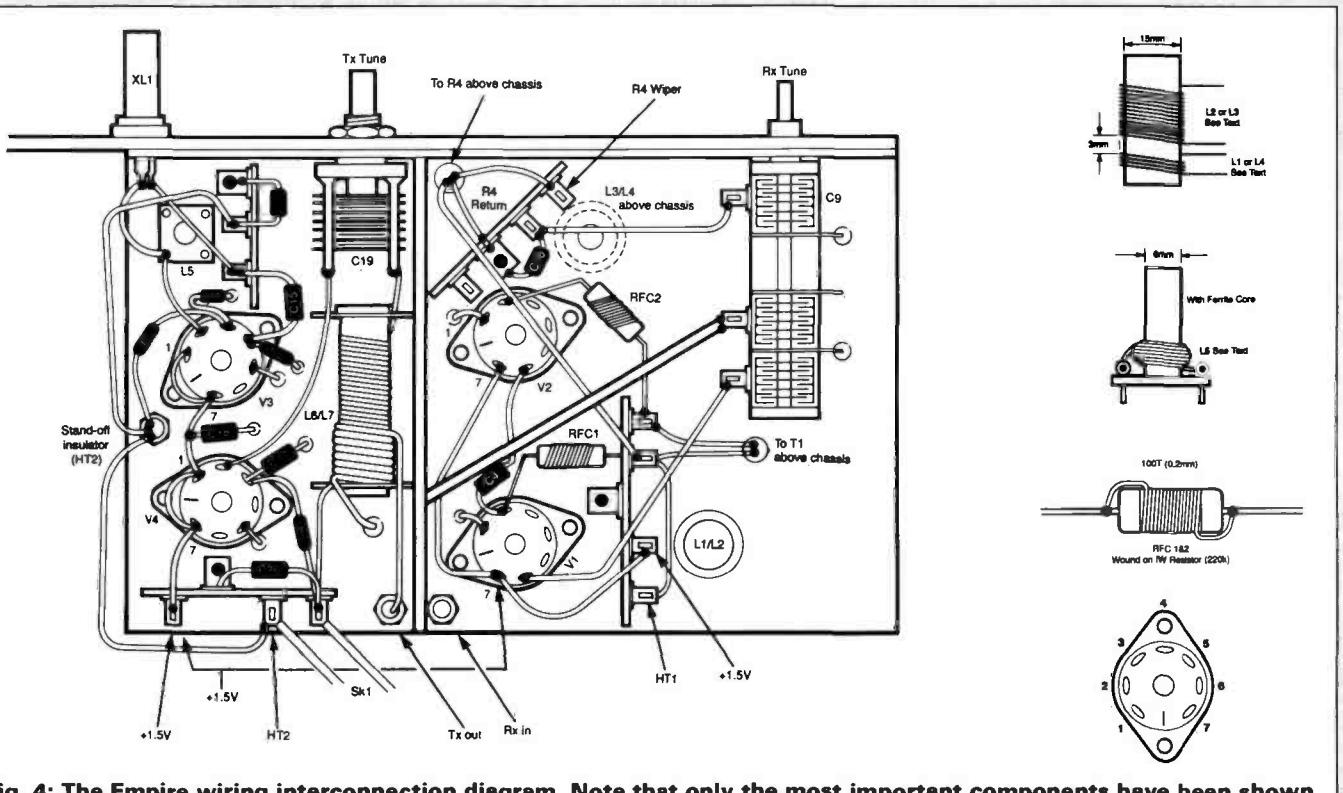


Fig. 4: The Empire wiring interconnection diagram. Note that only the most important components have been shown so as not to complicate the drawing.

WE'VE BEEN TOGETHER NOW FOR 55 YEARS

Gordon Lumley has been a reader of PW now for many years. The story of his early days with the magazine should interest all.

It would be around 1935, when I was 11 or 12 years old that I lived near a small railway station in the rural heart of the North Riding of Yorkshire, that's what is was called in those days. There were six trains a day on the down line and five on the up line, plus a goods train which shunted wagons at every station on the line.

My father had just bought a second-hand wireless set, it was a three-valve 1-V-1 with a British General Tuner, a Reaction Control and a separate loudspeaker. The set was housed in a 'Lift Lid Box'. This wireless gave rise to many questions which ran though my young head, such as, "How did sound get up the twin flex from the lift lid cabinet to the loudspeaker on the mantelpiece?", "Why, when the signalman in the signal-box used his telegraph did my father's wireless reproduce a series of clicks?" "How could electricity be carried in a glass accumulator jar from the village to our house?" "What was in the cells of an h.t. battery, it looked to me like cold mashed potato in a little muslin bag with a carbon rod in the middle?"

Railway Telegraph

I was fascinated by the railway telegraph. I asked lots of questions of the signal man but got few satisfactory replies. My wildest dreams were answered when a new station master arrived at the station and he turned out to be a wireless wizard (to me at least). He was willing to listen to me and to give me answers to my questions, not only that, he gave me his copy of Newnes *Practical Wireless Encyclopaedia*. It was edited by F J Camm. I read and re-read that book and as a result of such devotion to the written word, I decided I would make a crystal receiver. Problems were encountered in obtaining the bits and pieces in the scientific wilderness of rural Yorkshire in the thirties but the station-master found me some Carborundum crystals and a variable condenser and I found a man in the village who had been a dabbler and sold me a pair of headphones for 6d. Now that sum of money represented no less than a dozen errands to the village for various people in the vicinity and the village was 2.3 miles away - I knew it was 2.3 miles because I measured it endless times on my bike mileometer which a kind aunt had bought me for Christmas.

First Wireless

Come the winter a heavy snow storm brought down lots of telephone wires. This was indeed the gods of wireless shining a light upon me, because I was able to acquire the material for an aerial. Shellac I got from the local joiner and with a cardboard tube I made my former. I cannot recall where the instrument wire came from and I won't bore you further except to say that it worked and I heard Radio Newcastle on my headphones using over 100ft of aerial.

The die was cast, though I probably didn't know it. I saved my errand money and bought a Cossor HL2 (a 2V filament triode) second hand from the dabbler, changed the crystal to a leaky grid detector using my tuning coil/condenser, a 2MΩ resistance and a 0.0001μF fixed condenser. My own, very first, 'wireless'. I had little idea how it all worked but I was learning. Some time later I bought from the dabbler, a Mullard PMA2 and with an audio transformer taken from a scrap radio which was given me, I produced an 0V1. My progress continued as time passed but power supplies were a major problem and now I needed a grid bias battery as well.

My parents, sensing some kind of penchant, agreed to order *Practical Wireless*. I was now learning more and more. Some of my questions were being answered, loudspeakers, coupling condensers and even Ohm's Law were less of a mystery. Power supplies bedeviled me, we had no electricity mains, in fact it was to take almost twenty years before those places got electricity. The station master came to my rescue again and told me that although the signal box maintenance men came regularly to renew the Leclanché cells in the signal cabin, there was little wrong with the discarded porous pots that a new charge of sal-ammoniac could not remedy. I knew the whereabouts of the rubbish dump and duly recovered lots of cells which, with old 2lb jam-jars, sal-ammoniac and scraps of perforated zinc from the local joiner (it was used to cover larder windows to keep out flies), I had an l.t. supply, albeit at rather more than 2V. The h.t. was still at father's discretion in that I was allowed to have his 120V batteries when they were 'run down'. I feel sure that he often rejected them before they were discharged in order to help me but would never have admitted to being wasteful. Eventually, I collected enough Leclanché cells to make a 60V h.t. battery but I spent most of the time repairing corroded connecting wires on this venture.

War had started and I joined the Air Training Corps. This meant that three times a week a return journey of twenty miles by bike to Northallerton was undertaken to attend classes but I was more than willing to do so. By this time I had left school and was serving an apprenticeship. I learned some Morse and more about the physical sciences, did some square bashing and felt proud in my ATC uniform. I was still taking *PW*.

I cannot be sure of the year but there was an announcement in *Practical Wireless* about something called RDF. I absorbed what little this article was able to disclose and made up my mind that 'It was for me'. By this time I would be about 17 and keen on the RAF. At 18 I cycled to Middlesbrough and told the recruiting officer I wanted to join the RAF and that I wanted to know all about this RDF. For those of tender years, RDF stood for Range and Direction Finding but was what we now call radar.

I was recruited after some aptitude tests but had to wait some time before being called for training. I was still young and the training facilities were stretched to the limit. After some months I was to report to the Personnel Disposal Centre at RAF Padgate (it sounds dreadful and it was) after attestation and six weeks square bashing and small arms training at Blackpool I was posted to Stockport to undergo ab-Initio training in wireless, etc., at the Stockport Technical College. I was now classified as an AC2.U/T.RDF/WM. That meant Aircraftman, 2nd class (under training) Range & Direction Finding/Wireless Mechanic.

It was a splendid civilian course of three years duration crammed into just over a year, executed by civilian instructiors and overseen by an RAF Education Officer. Every three weeks there was a test which, if failed spelled rejection, or so we were told. At the end of the course there was a final examination in which one obtained a result, classified 'A', 'B' or 'C'. The A's went on to Radio School to study RDF either ground or air, the B's went to W/T School, ground or air and the C's were eliminated.

I never knew what happened to the unfortunate C's, they were never seen again by the 'erudite elite'. I managed an 'A' and went to No. 7 Radio School, South Kensington in the Royal College of Art.

Gordon's QSL card

AND IT DON'T SEEM A DAY TOO LONG

Some six months later I was a 'fully trained' Group One, A.C.2, RDF Mechanic, posted to Special Signals Section, 100 Squadron, Bomber Command, Royal Air Force, Grimsby. I was very proud of my Sparks insignia but due to the highly classified nature of RDF at the time, we were issued with the standard sparks as were all other wireless trades, from Wireless Operator Ground upwards. The RDF business was highly classified in those days and the simple expedient of permitting only the Standard Sparks insignia, made for 'Confusion of the Enemy'. We were all billeted together and because the section had to be manned at night by a duty mechanic, we were excused all guard duties. We were forbidden on pain of courts martial, to talk about out job outside of the section. We could only use equipment circuit diagrams and descriptions by signing out the SD (Secret Document) from the section safe and to make life more difficult, all our course notes were destroyed before leaving RDF School.

The modern station at G3DJE

It is now necessary, in the brevity, to omit the saga of the remaining war years except to say that experience, promotion and effort in a kaleidoscope of activity drove me on to study at any technical college that duty permitted. Private study course and many specialist RAF courses got me a Final Diploma in Radio Communication and another Electrical Technology from the City & Guilds of London Institute by 1946; by the end of that year I was discharged, disabled, from the RAF (but that is another story).

Cable & Wireless

I obtained a job (Technical Assistant) with Cable & Wireless once I got free from hospital treatment. C&W had their own school in those days in Electra House on Victoria Embankment and if one was able to offer something in evidence of being worthwhile, (a City & Guilds Final was accepted) it was possible, after some experience in the Company, to sit for their own 'engineer's ticket'. This covered the technical side, the operational side and signal reading. The first two presented little difficulty but oh dear - signal reading meant 20w.p.m. Morse, both ways, no uncorrected errors, five minutes duration.

Additionaly, one had to read Morse Undulator Slip, Dual Channel Submarine Cable Code, Five Unit Baudot and Seven Unit RCA punched tape. I wasn't very good at any of this but after three attempts at the signal reading I got my ticket, Acting Assistant Engineer. Substantive (paid) rank had to wait for a vacancy and there were several of us, all ex-service, all hoping. Very soon I was allocated duties of a supervisory nature in Wireless Control, then in the Facsimile Room, acting at that stage but later substantive. In those days, C&W communications were world-wide via h.f. radio and submarine cable.

Amateur Licence

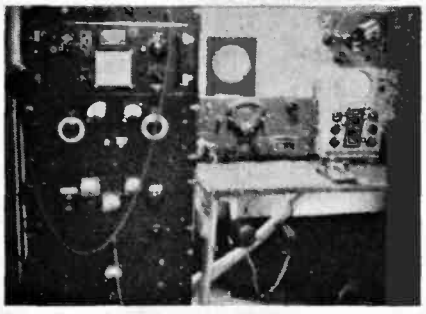
In 1947 I got my Amateur Licence, 25 watts, c.w. only. I was exempt from the technical examination but the Post Office would not accept the C&W Morse test in spite of the vast difference in requirements. Maybe something to do with the general bad feeling which abounded - due to pending nationalisation, (C&W went under Post Office control). I took the test at Harrow Post Office one Saturday morning. A year later I applied for my full licence, 150W input to the final amplifier, c.w. and R/T. The Post Office Radio Inspectors visited my shack and signed the log.My home-brew rig expanded to ten times its original size, an Eimac 35T glowing cherry red now in the Class C final amplifier, and an e.h.t. supply from an ex-government transformer and a pair of mercury vapour rectifiers. A pair of 807s in push-pull modulated the 35T via a Woden modulation transformer. In spite of its size, 6ft high in a 19in rack it only worked on 20m (the 14MHz band).

I did a bit of development work at C&W and learned an awful lot about professional communication but by 1950 my love of aeroplanes called, C&W had been nationalised and so I went to Sperry Gyroscope as a field engineer. By this time I had improved qualifications and after some four years of flight developments work along with customer liaison and servicing of gyro-compasses, auto-pilots and such like, I became involved in the flight trials and development of a computerised flight system/blind landing system known as the Zero Reader Flight Director.

Boscombe Down

My final aeronautical assignment was the flight analysis of certain problems in early 'V' bomber aircraft. The programme was controlled from A & AEE Boscombe Down. Many flights were made from there but ultimately, because of aircraft shortages/commitments I found myself on my old squadron for several months, by then RAF Waddington, from where I flew as a civilian, continuing with the analysis, living in the mess during the week and at home at weekends. Perhaps amongst the most memorable times of my life, although the problems were sticky they were eventually solved.

I had been promoted in 1954 to Superintendent Aeronautical Field Engineering then some time later I was engulfed in overall control of Field Engineering as Dept Manager. My responsibilities covered all Company products in the Marine, Aero and GW fields. The task was world-wide with the exception of the Americas which came under the wing of the US end of the Corporation. Trials, Liaison, Service Documentation, Air Registration Board (now the CAA) Approvals, After-Sales Service and Repairs and Overhauls were all part of the responsibility of the department.



The original G3DJE station

Air & Ground Miles

It was clear that amateur radio activities were going to take a back seat. I was overseas almost as often as at home, ships and aeroplanes do not stay in one place fro long. We had agents in all major countries and marine service offices in all major UK ports. This, together with the administrative back-up necessary left no time for the hobby. I reluctantly sold my station, lock, stock and 19in rack to a chap at Vickers Armstrong Aircraft at Weybridge. I have not seen him since. Perhaps it's as well.

After several years in Field Engineering, I was assigned to the marketing and development of new Naval and Military equipments. I was glad of the commercial experience and a change of management but the overseas travel requirement remained.

My time span with Sperry Rand was a few weeks short of twenty years, after hundreds of thousands, or maybe around the million air and ground miles and a wealth of experience which enabled me to start, along with my XYL, our own business in 1969. I am of the opinion that the origins of all this lay in that copy of Newnes *Practical Wireless Encyclopaedia*, back in the thirties.

Retirement

In 1981 we retired and after a brief period of well earned respite, I felt as if my very life blood had been syphoned off. Depression set in and then, one day, I heard from a friend, a radio amateur, that provided one could prove the existence of previous licensed amateur activity, it was possible to apply for licence reinstatement.

I followed this through, I had my old RSGB Certificate, evidence of past membership of Brit. IRE and Royal Inst. of Navigation, an old QSL card, a photograph of my 150 watt rig and some copies of some patent specifications which I submitted as some kind of identification. I had no idea of what was required after 33 years QRT. They were placed in a large envelope with a covering letter and sent off to Waterloo Bridge House with a silent prayer. This was acceptable to the DTI, the evidence that is, I do not know if they heard the prayer - maybe they did - but I was soon on the air again.

Looking Forward

I look forward to my *Practical Wireless* and my *RadCom*. The depression has long since vanished. I work the h.f. bands, living as I do in the Swaledale Valley. The Morse came back, I still use the key, not all that well perhaps but certainly more than enough to re-pass the test if I had to. A single paddle side-swiper now with electronic keyer, it makes life easier for me, makes better Morse and with luck my correspondents will have a better chance of reading me.

I am an active member of RAFARS, ROATA and supporter of the RSGB and I devour *PW* metaphorically speaking, as soon as I get it from over in Wensleydale, in the certain knowledge that I am safe from a repetition of the same career pattern, I am now too old at 67.

COMMUNICATIONS WITHOUT WIRES

This time and for future reference, Ron Ham identifies the scientists and engineers who, through their respective fields, came together in the 19th and early 20th centuries and laid the foundations for communications without wires.

Practical Electricity

Although the academics knew of a mysterious energy, called electricity, for over a thousand years, the general public had to wait until the 1800s for the production of a storage battery, the voltaic pile, by Professor Alessandro Volta, an explanation of the electric current by Andre Ampere and the development of Michael Faraday's dynamo, before seeing its practical use.

By the end of the century, thanks to the efforts of Alexander Graham Bell, Edouard Branly, Sir W.F. Cooke, William Crookes, Thomas Edision, Oliver Heaviside, Joseph Henry, Heinrich Hertz, D.E. Hughes, Lord Kelvin, Sir Oliver Lodge, Guglielmo Marconi, James Clerk Maxwell, Samuel B. Morse, Dr. Ohm, Alexander Popov, William Preece, Joseph Swan, Sir Charles Wheatstone and others, the beginnings of electric light and power and the ability to communicate along overhead wires (telegraph or telephone) attached to insulators and strung along rows of wooden poles.

The message was sent in Morse code, by a telegraphist with a 'tapper' or 'key', and read from a 'sounder' or later by voice, via a 'mouthpiece' and 'earpiece'. Furthermore and of particular interest to this column, some of the scientists proved, that by using and controlling the electromagnetic waves, it was possible to transmit and receive messages, over short distances, by a wire-less system. Readers interested in the precise contributions made by the aforesaid people should consult a good scientific encyclopedia and/or such books as *Early Wireless* by Anthony Constable (ISBN 0 85936 125 X), *The Story of Radio*, Vol. 1 of 3, by W.M. Dalton (ISBN 0 85274 241 X) and *Sun, Earth and Radio* by J.A. Ratcliffe (SBN 303 17894 9).

Wire-less Communications

After a number of limited-range tests between 1896 and 1900, the big leap forward for wireless communications came on 12 December 1901 when Marconi and his colleagues, Kemp and Paget, successfully received signals in Newfoundland from his 12kW station some 3500km away in Poldhu, Cornwall. Soon after this, wireless installations were in demand for coastal stations, ships at sea, news and weather reports from stations like the Eiffel Tower in France, etc., and of course, for active service by all sides during the 1914/18 conflict.

"Around The World", How?

The 1920s saw the start of local, national and international broadcasting and the opening up of the short-wave bands for wireless (now radio) traffic between government, military and press offices throughout the world. In the early days it was thought that the earth's curvature would limit the range of signals, in fact some said it would carry straight on and be lost in space, however, it was A.E. Kennelly and Oliver Heaviside who suggested, in 1902, that a layer of ionisation in the upper atmosphere could reflect electromagnetic waves. This was found to be true because radio signals at certain frequencies do return to the earth's surface, some distance away from their place of origin and continue to 'skip' between the ionisation and the earth before reaching their intended destination, Fig. 2 'A' and 'B'. Frequent experiments proved that to reliably use this means of radio wave propagation there were a number of factors to be considered such as, the radio-frequency of the transmission, the angle of the radiating antenna relative to the height and state of the ionisation, the season of the year by reason of the earth's orbital position relative to the sun, the time of day and the targeted reception area. In addition, because of the solar influence, the structure of the ionosphere varies between day and night due to the earth's daily rotation on its own axis which leaves approximately half of the globe facing the sun while the rest is in darkness.

Among the first scientists to investigate the suggested ionisation and its effect on the path of terrestrial radio signals were Sir Edward Appleton and M.A.F. Barnett in the UK and G. Briet, A.H. Taylor and M.A. Tuve in the United States.

The Ionosphere

The ionisation must have always been present in the earth's atmosphere but its existence and usefulness to mankind was not fully realised until this century and the advent of radio communications. In April 1946, *Practical Wireless* published extracts from a speech to the Physical Society by Sir Edward Appleton, G.B.E., K.C.B., on the subject of RADAR, or as he preferred to call it, "Radiolocation". He described the frequency-modulation method used for detecting enemy aircraft and shipping during WWII and explained that this system was first used in 1924 to find the position of the Heaviside layer and remarked, "We may therefore say that the first radiolocated reflecting surface was the Heaviside layer." We know this today as the 'E' layer which is one of four areas of the earth's atmosphere ionised by the sun and collectively called the ionosphere. These regions are known in ascending order as 'D', 'E', 'F1' and 'F2' ranging between about 60 and 400km above the earth's surface.

Ionospheric Sounding

Before concluding this piece I checked my archives and learnt that the existence of the 'E' layer was proved by transmitting signals, between 1 and 3MHz, vertically and studying their reflections and later, Fig. 1, increasing the radio-frequency until it penetrated the Heaviside layer. But, instead of this higher frequency being lost in space, as was first expected, it came back and the existence of yet another layer of ionised gas was discovered. For a while this new reflector was called the Appleton layer, until Sir Edward classified the Heaviside and Appleton layers as 'E' and 'F' respectively. Evidently he used such classification because the electric field of the wave reflected from the lower layer, in his first tests, was known by the letter 'E' and when he found the upper layer, the field was given the letter 'F'. This simple idea allowed any further discoveries to be identified by the adjacent letter below 'E' or above 'F' and as we know today, another one, which absorbs some signals, was found underneath 'E' so its ident automatically became 'D'. A text book, published in 1934, describing the method of measuring layer height, first developed in America by Briet and Turve says, "A very short signal is transmitted and received at a station a mile or two away."

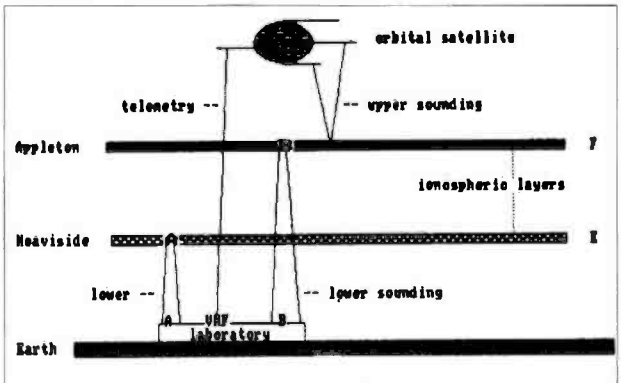


Fig. 1: Using a satellite-borne ionosonde for upper layer sounding.

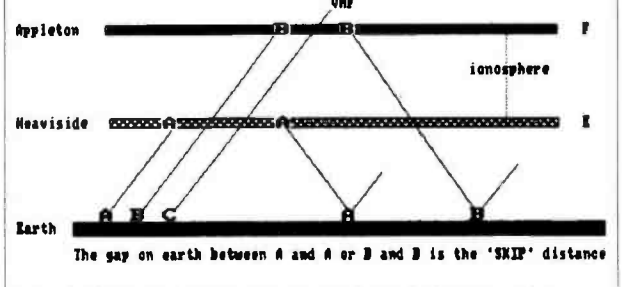


Fig. 2: Ionospheric sounding signals penetrating the Heavyside layer, led to the discovery of the Appleton Layer.

The surface wave is therefore received and also a ray which leaves the transmitter almost vertically and is "reflected" from the ionosphere." Scientists in different parts of the world commenced 'sounding' the ionosphere with an instrument called an ionosonde to learn more about the actual penetration and reflection frequencies. It follows that when an ionosonde is installed in a satellite the ionised layers can be 'sounded' from above and the signal received back by the satellite can be compared with similar tests from a ground station, Fig. 1. Your next obvious question is, "how then does the information gathered by the satellite reach earth if the ionosphere will not let radio signals pass through?" In most cases the information is converted by the satellite into telemetry and carried to earth on v.h.f. or micro-wave signals, Fig. 1, which easily penetrate the ionosphere.

Using the Layers

After all natural changes have taken place and the structure of the ionosphere is normal, terrestrial radio signals transmitted at different frequencies by stations 'A' and 'B' in Fig. 2 will either be deflected or gradually bent back toward earth by the 'E' layer or penetrate 'E' and be similarly returned to earth by 'F' before continuing to 'skip' towards their intended destinations. Of course, if the ionosphere has been disturbed then the signal may be absorbed and lost or sometimes thrown back, but that must be left till next time.

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Feature

This month Glen Ross G8MWR continues the investigation into receiver specifications with a review of what causes all the noise we hear in the speaker

Main Factors

There are two main factors which determine a receivers sensitivity to weak signals. One is the amount of noise which is generated in the various stages of the rig and the other is the actual bandwidth which is used. The greatest noise contribution is normally that of the first stage in the chain. This is because the noise contribution of this stage is amplified by all the following stages. The overall gain of a receiver is not a primary factor in determining the sensitivity, and for this reason adding a pre-amplifier will only produce better sensitivity if the pre-amp is quieter than the existing first stage.

White Noise

The noise generated in a receiver has equal power at all audio frequencies and is described simply as broadband or white noise. Another term you may see mentioned is pink noise which is white noise which has had its spectrum tailored by the use of filtering. Various filters are used in the receiver depending on the mode to be received. These filters limit the amount of noise that appears in the speaker, the wider the filters are, the more noise gets reproduced by the audio system.

Bandwidth

It must be obvious from this that you will get about twice as much noise through a 3kHz filter as you would through a filter with a bandwidth of only 1.5kHz and this is indeed the case. It must also be obvious that if a signal to be received will pass equally well through either filter, then the signal to noise ratio will be better if the narrower filter is used. Because of this it follows that the sensitivity of a receiver improves as the bandwidth is reduced. Using a 200Hz filter on c.w. not only keeps out interfering signals but actually enables you to hear signals that would otherwise be down in the noise. The sensitivity is actually about 6dB better when using a 500Hz filter than when using a standard 2.5kHz s.s.b. type.

Remember when comparing receiver sensitivity figures to ensure that you compare them at the same bandwidth.

Noise Figure

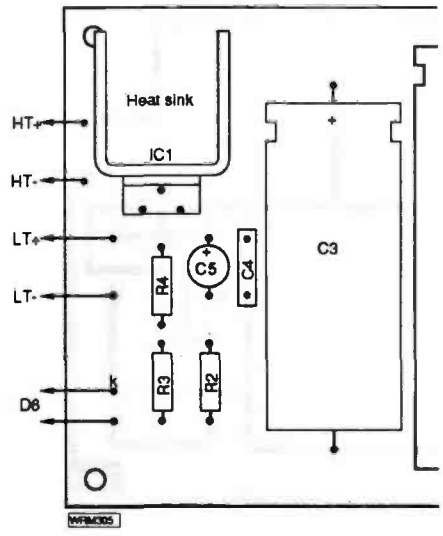
The problem of comparing figures where different bandwidths are employed can be overcome by the noise figure concept which is independent of receiver bandwidth. The type of receiver noise which we are concerned with is caused by electron flow due to thermal agitation. This type of noise is known as thermal noise or, sometimes, Johnson noise. This noise is produced by all the components in the receive system including the antenna and feeder.

Noise Power

The actual power of thermal noise is dependent on bandwidth in the usual way but is also dependant on temperature, hence its name. The hotter the environment the higher the level of noise produced, rather like the spitting of fat in a frying pan. The noise figure of the receiver is simply the ratio of its internal noise floor to the thermal noise floor. To give some concrete examples the thermal noise floor at normal room temperature is about -140dBm when using a typical s.s.b. filter bandwidth. If your receiver is quoted as having 10dB S/N s.s.b. sensitivity of 0.15 microvolt (which is equal to -123dBm), its actual noise floor would be -133dBm and the receiver therefore has a noise figure of about 8dB.

Good Enough?

Are the figures quoted for your receiver good enough to really let you dig into the noise for the weak DX stations? Do not forget that noise comes from other things than just the receiver itself, perhaps we can get away with lower figures than we might think. Next time we look at some of the other noise contributions and provide some figures showing what your receiver really has to produce in real terms. **PW**



Errors and Updates

Power Supply For Battery Radio, May 1990.

The gremlins were at work in the Valve Power Supply by Stefan Niewiadomski in May *PW*. On page 61 the overlay shows IC1 with the mounting tab towards the bottom of the page (Similarly on page 62). The part illustration shown here is the correct orientation of IC1. The mounting tab should be towards the top of the page(s). This means bending the legs of the i.c. (two outer ones forwards, and the middle one backwards) to fit the board layout. **NO changes are necessary to the p.c.b.** Our apologies for any inconvenience caused. We also recommend a 'bleeder' resistor of approximately 100kΩ across capacitor C2.

REVIEW

Mizuho MX-7S 40m SSB/CW Transceiver & Accessories

With the growing interest in QRP operation, together with the ever increasing need for a versatile 'starter' rig, the tiny Mizuho range could have much to offer, giving the facility of home, mobile, and portable operation. Chris Lorek G4HCL took a look at what is on offer.

Packed into a tiny box measuring 65 x 40 x 145mm the Mizuho rig provides a tunable s.s.b./c.w. transceiver, even containing it's own built in microphone, speaker and Morse key! Each of the pocket sized h.f. transceivers are single band rigs, coming in 3.5, 7 or 14MHz band models. Each version costs £189 and gives 2W r.f. output on transmit, combined with a sensitive receiver for weak signal reception work. Tuning is accomplished by the larger of the top panel rotary knobs, this controls a v.x.o. (variable crystal oscillator) circuit to provide a 25kHz tuning range on 3.5 and 7MHz, with 50kHz on 14MHz, and up to two tuning segments may be selected using a 'Band A/B' switch on the top panel, the second position switching in an optionally fitted crystal.

A small switch on the bottom panel selects either c.w. or s.s.b. operation, l.s.b. is provided on 3.5 and 7MHz whilst u.s.b. is fitted on 14MHz, in accordance with normal operating practices. A front panel speaker is fitted for receiver use. Next to this, behind the same protective grille is a sensitive electret condenser microphone for s.s.b. transmit use, a side mounted push-to-talk spring loaded button being fitted for transmit switching. An optional speaker-microphone at £29 may be plugged in also if you wish. Separate top panel 2.5mm and 3.5mm jack sockets being provided for the connection of this. As well as a socket being fitted at the bottom of the case for an external c.w. key, the rig's top panel sports a small push button that may also be used for c.w. keying. For c.w. use, the side-mounted p.t.t. switch acts as the TX/RX control, and although a red l.e.d. lights in sympathy with the c.w. keying no internal side-tone is fitted.

A combined on/off/volume knob is fitted next to the tuning control, the set giving a n adequate amount of audio output for portable use in noisy surroundings as well as for home station use. To compensate for those off-frequency receive signals, a rotary r.i.t. (receiver incremental tuning) control is also fitted, this has a centre 'detent' position for its zero setting. A small top panel meter is fitted which gives relative indications of the transmit power and receiver signal strength, and a switched receive attenuator is provided to give a measure of protection against receiver overload from strong signals. The antenna connector is a BNC type, as well as allowing you to plug in large external antennas the suppliers of the review transceiver also offer a base loaded telescopic set-top antenna at £29 which may be fitted, this being just over 1m long when fully extended.

The set has room inside its case for either seven AA size NiCads, or six dry cells plus a dummy battery (dry cells having a slightly higher voltage than NiCads).A d.c. connector on the bottom of the case doubles up as an external 9V d.c. input and a charger input for the NiCads.

Add-Ons

As well as the options of a set-top antenna and external speaker-mic, a variety of other accessories are available for the rig. For those who'd like a side tone on c.w. combined with automatic semi break-in transmit switching, but who don't wish to build their own circuit, a CW-25 cased module is available at £45 which performs this function.

For those who'd like a little more than 2W output, a matching 10W linear amplifier is available at £129, operating from an external supply voltage of 13.8V. This unit comes with an automatically switched transmit linear amplifier circuit and a 13.8V to 9V d.c.-d.c. converter to allow the transceiver to be powered from an external source. A front panel switch gives either 'Line Off', 'Through', or 'RF High' positions for easy use.

If 2W output is enough but you'd still like to run the unit from an external 13.8V d.c. supply, a small voltage converter at £19.95 is available, and a mobile mount at £27 together with a soft carrying case at £9 complete the accessory line-up.

In Use

The review model tested was the MX-7S which operated on 7MHz, it was supplied with the normally fitted coverage of 7.075-7.100MHz on band 'A' together with an optional crystal giving 7.000-7.025MHz on range 'B', thus providing coverage of both c.w. and s.s.b. segments of the band. The complete line of accessories was also kindly supplied, allowing a good degree of testing flexibility (in other words it let me have a great time trying out all the different possible uses!).

To get used to the set, I first tried it at home using my normal antenna system, here I found the receiver very sensitive indeed and I tended to always keep the rear panel attenuator switched in to give my ears a bit of a rest. The recent h.f. s.s.b. contest gave plenty of opportunities for quick checks to be made on how I

was getting out with the 2W output, unfortunately despite repeatedly calling many stations who were S9++ with me I often had to resort to switching in the 10W amplifier before I was even heard.

During more relaxed QSOs in quiet band conditions, the low output was often quite copyable although at weak strengths, with my inverted 'L' antenna with a large ground plane giving good coverage into Europe. Switching in a Sagant Zepp antenna, this literally being thrown out of my first floor shack window and secured at the far end to a fence post at the end of my garden, gave very impressive results. Eventually this antenna was a little more permanently fitted and excellent results across the band were obtained.

I found the tuning knob was fairly easy to use but only once I'd had a bit of practice, at first I found the control was rather touchy. Apart from that, I found the set very easy to use, and the lack of c.w. side tone was not a great loss as when keying I found I sub-consciously generated a side-tone all to myself. Others may like to either knock up a small circuit or go all the way and purchase the matching sidetone accessory.

Out and About

The same good on-air results could not unfortunately be gained when I tried using the set as a portable transceiver in its own right, with just the set-top whip plugged in. Here I found I could receive many stations but my transmitted e.r.p. was extremely low, with not one QSO resulting. Eventually I found that by connecting a quarter wavelength of insulated wire to the case of the set, this acting as counterpoise ground plane, I gained a significant increase in both receive and transmit signal strength. As trailing out a 10m length of wire wasn't always practical, I eventually used the trick of carrying with me a length of wire terminated in a large crocodile clip, to attach to any convenient ground plane that could be found.

Using a PL-259 to BNC adaptor, I found I could use the SO-239 gutter mount fitted to my car as an antenna mount for the portable whip. Here the car metalwork plus its capacitance to the earth again gave good results, although I felt the whip was a little too fragile to attempt operation on the move with it attached, lest it fractured. The 10W amplifier and the speaker microphone were useful here, the overall arrangement providing me with a handy mobile rig together with the option of a quick transformation into a portable set-up.

In all, I was very pleased with the transceiver in use, the set together with the various add-ons allowing a wide degree of operating modes all based around a central 'building block' transceiver.

Laboratory Tests

A set of measurements were performed to see how the set fared on the test bench, on-air tests by their very nature being subjective with the results gained being determined by propagation conditions, antennas used and suchlike, together with a lot of operator patience and persistence when using low power levels! As found on-air, the receiver was very sensitive indeed, and with the rear panel attenuator switched in the receiver still compared with other sets of normal sensitivity.

On transmit, the harmonics were very well suppressed as the accompanying table shows, this matter is becoming of increasing importance especially with recent proposals of minimum technical standards for amateur radio equipment being put before a European regulatory audience.

Conclusions

The Mizuho MX rig offers a very versatile transceiver system, allowing use at home, out mobile, and indeed portable with a suitable antenna system. As such it is certainly a 'fun' rig to use, and the technical performance certainly should allow the set to hold its own on receive during busy band conditions. The low output level of 2W is ideal for QRP enthusiasts, but in my opinion it is not a perfect 'beginner's rig' to be used with a small inefficient antenna, as disappointment would probably result. However with much patience, operating skill, and an efficient antenna system, great distances can indeed be worked with QRP, and the ease in which the rig lends itself to portable operation allows operation in favourable locations, for example whilst out for a family picnic on the local hill top.

My thanks go to **Waters and Stanton Electronics Ltd. 18-20 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835** for the loan of the review transceiver and accessories. **PW**

REVIEW

LABORATORY RESULTS

RECEIVER

Sensitivity: Input level required to give 12dB SINAD;

Attenuator Out	0.06uV pd
Attenuator In	0.22uV pd

Blocking: Measured as increase over 12dB SINAD level of interfering signal with an unmodulated carrier, causing 6dB degradation in 12dB SINAD on-channel signal;

Separation	Rejection
+/-10kHz	72.5dB
+/-100kHz	76.0dB
+/-1MHz	91.0dB
+/-10MHz	93.5dB

Selectivity

-6dB	2.39kHz
-60dB	4.55kHz

3rd Order Intermodulation Rejection: Increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product, 10KHz signal spacing;

Attenuator Out	53.0dB
Attenuator In	60.5dB

IF and Image Rejection: Increase in level of signals at the first i.f. image frequency, and the i.f. itself (11.2735MHz), over level of on-channel signal to give identical 12dB SINAD signals;

Image	<100dB
IF	73dB

TRANSMITTER

TX Power

Transceiver	2.36W
PL-7S Amplifier	10.9W

Harmonic Levels

Harmonic	Transceiver	PL-7S Amplifier
2nd	-63dBc	-59dBc
3rd	-59dBc	-66dBc
4th	-76dBc	-77dBc
5th	<-90dBc	-72dBc
6th	-82dBc	-76dBc
7th	-80dBc	-76dBc
8th	<-90dBc	<-90dBc
9th	<-90dBc	<-90dBc

Feature

Special Event Stations

We've all seen the callsigns, most of us have worked them. What is a Special Event Station? For that matter, why is it? Michael Lawton GW4IQP explains how to get the best from the occasion.

"Here is GB4... Special Event station at Little Blodsworth in Loamshire celebrating the commissioning of the village duck-pond..." and don't laugh, because special event stations have celebrated odder things than that.

In the last few years there has been a vast increase in the number of summer functions down to, and including, vicarage tea parties where these callsigns may be heard any weekend in the summer. Virtually all special event stations have one thing in common apart from operating and that is - publicity.

Should you or your club be thinking of running a special event station it is important to ask one question at the start; Why? In many cases it is an excuse to spend Sunday operating /P, with a sense of duty to relieve the conscience about not doing the washing-up. Roughly speaking, the reasons for mounting the operation fall into two categories, those of internal and external benefit. In the latter case, it is essential to remember that you are presenting a public image both of amateur radio and of yourselves. The majority of the public have never heard of the amateur service although they may be aware, if hazily, of CB.

Once it is settled that the Little Blodsworth church fete will have a special event station (whether offered or requested), sit down and think about the requirements.

First, an operating centre. Obviously, this must be in reach of a power point if the station is mains supplied, and preferably **not** supplied by a long wander lead. If this in unavoidable, the lead **must** be marked with warning notices and either staked down or slung to prevent it being tripped over.

Other considerations are - available antenna supports if operating h.f., whether a generator, if used, is too noisy and public accessibility. There is no point in having the most professional set-up in the country and a mile and half from the centre of things. If you can also supply a public address facility, so much the better.

What are you going to operate from? Many groups have their own tents or caravans, others make do with trestle tables in the open. Whichever option is open to you, it must have room for an audience. Ideally, if using tables, arrange the rigs along the trestle and provide several chairs for visitors.

What bands are you going to use? Obviously this will be dictated largely by the licence and the rigs available, but there are other considerations. One object of the station is to show radio communication, and people will not be impressed with an amateur shouting "CQ" into the void. So, in order to guarantee contacts, the 144MHz band is probably the best band to use, followed by 3.5MHz and, depending upon your location, 430MHz.

However, mere communication by voice is also not sufficiently impressive to rivet an audience. After all, any CB station can do as much. Since the international aspect of amateur radio is likely to capture the imagination better, it is also useful to have one (and preferably only one) DX band in operation. For demonstration purposes in UK daylight, 14MHz is probably the best prospect, likely to yield East European (always good for the 'international brotherhood' angle) and possibly some better DX as well.

Next item on the list is equipment, and the prime requirement here is reliability. It is absolutely essential to have:

1: A reliable, adequate power source

2: A transceiver or separates of known performance mated to that supply

3: Matching microphone (hands up those who forgot it last time)

4: An a.t.u. if required

5: Known antenna(s)

6: ALL appropriate patch leads and a complete set of spares

THIS EQUIPMENT MUST BE PREVIOUSLY CHECKED AND TESTED IN THE SAME CONFIGURATION IN WHICH IT WILL BE USED; and at least two days earlier, not ten minutes. If possible, back-up gear, should be available.

These precautions will be familiar to most portable and contest organisers, but I offer no apology for emphasising them. This is what people have come to see.

Not as easy as it first looked, is it?

Now we come to the crunch: Information. Your operating centre established, the rig is operating to perfection, you're working VKs like there's no tomorrow. Now's the time to tell people.

There must be one member of your group at any time who is actually talking to the public, telling them what's going on. Make up a large placard for display, in big letters, something like:

AMATEUR RADIO DISPLAY
by
LOAMSHIRE RADIO CLUB

If there are any advertising experts in your club or group, grab them and pick their brains. The first job is to get people into the tent, and the next job is to keep them there. What the average layman will expect to see is probably a black box with someone talking into a microphone, and possibly someone pounding a key. Therefore the minimum equipment will be a voice (s.s.b. or f.m.) transceiver. It is important to show the variety of options available to amateur radio. If you are not a c.w. operator, try and borrow a key (a straight key: easily recognised) and an automatic Morse tutor. Leave the latter running at low volume, to give a constant background of Morse. This helps set the atmosphere, even if it doesn't actually say anything. Connect the key to an audio oscillator and let people have a go with it (well away from an active microphone). This always goes down well, especially with children.

The other modes guaranteed to hold spectators' interest are TV and data. These are much more specialised, and availability depends on getting someone to lend the gear for the day. Fast scan TV, with its possibilities of a roving camera around the event, is excellent, but only for the fortunate few. Slow scan TV is also good but has less visual impact for the layman, and will depend more on getting a DX contact of some sort. Data is another matter, since many people are now running RTTY, AMTOR and packet stations. Any data mode will do. Preferably a simple one, the technology of packet is likely to command respect, but also to scare off potential recruits.

Assuming that you have managed to assemble a station involving c.w., 'phone and RTTY, think about the layout. If you can arrange a visitor flow in one direction, arrange rigs in order of increasing complexity, i.e. c.w. first, then 'phone, then data. The equipment should face the public, the operator would have his back to them. Get hold of as many

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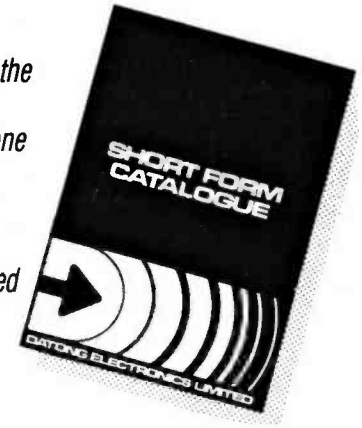

— VISA AND ACCESS WELCOME —

posters, maps, leaflets, QSL cards and the like as you can and arrange them on boards behind the equipment. The RSGB is a good source of material. In addition to the working equipment, beg or borrow some home-brew gear, rigs or peripherals, and have them on display. Arrange them with the lids off (construction standards doesn't matter) and provide clearly-typed labels giving a minimum of information. Nobody will read more than three lines. Avoid jargon where possible.

Get the operator to wear headphones to avoid distraction, but pipe received audio to a loudspeaker. The operator should, as far as he can, work stations that are loud and clear. A confirmed DX-chaser may be able to copy 2 and 2, but nobody else can! Change bands and possibly modes every few minutes, unless you have a pile-up, since people want to hear contacts, not empty CQs. In case you get desperate, a couple of friends wandering round the show with hand-helds can keep a sticky situation going for a while.

Visitors are likely to resolve themselves into two types, those who glance casually and stroll by and those who stay to watch and listen. The aim of the guide is to encourage the latter. Take the initiative by greeting them as they walk in, and offering a personal tour of the station. Few people can resist the impression of privileged treatment.

Explain what is happening without resource to technicalities and use a world prefix map to show the location of h.f. contacts and a European locator map for v.h.f. Have some received QSL cards handy and, if possible, a sample of the special event station's own QSL card. Do your logging manually for show, even if you are computer logging as well, since a written list means something to spectators. Some stations use a blackboard to write up the country currently being worked and this is especially useful if you have a large audience. Every few minutes, or when an interesting contact occurs, pause to allow people to listen to the speaker. Start talking again when the operators changes band or mode, and say what he is doing and why he is doing it. Have simple and encouraging answers to the standard questions of "How far can you get?", "What do you talk about?", "How difficult is it?" and "How much does it cost?". Keep a few radio magazines around (such as *PW*) and, if you can, have printed some cheap leaflets giving details of your club. You never know....

Finally, if you special event station is at a charity event, how about getting people to sponsor you for so much per contact? It makes a change from raffles and certainly livens up the operating!

To apply for a special event station callsign, you must contact the RSGB well in advance. There is normally no problem, but it must be issued at least a month previous to the intended day of operation. If you do not have a special call, your own or the club's call /P is quite acceptable. **PW**

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THE MARLAND SSB TRANSMITTER

Construction

A simple practical s.s.b. transmitter for 3.5 and 14MHz

Over the last several years there has been an increase in the number of signals on the amateur bands generated by homemade equipment. The QRP revival has led to many radio amateurs building simple equipment, and enjoying the satisfaction of being on the amateur bands using the work of their own hands. Usually these have been c.w. transmitters or transceivers because this mode offers the simplest way to put a signal on the bands. Relatively few home constructors have ventured into area of speech modulated transmission.

This was not always so, I well remember my first home-built amateur radio transmitter: a three valve circuit for 1.8MHz. An EF50 variable frequency oscillator followed by an EF50 buffer amplifier and an 807 in the power amplifier. Those were the days. The chief method of speech modulation then was amplitude modulation. I keyed that transmitter in the cathode of the power amplifier which made my first attempts at telephony very simple. I merely inserted a carbon microphone in place of the key and spoke loudly. It worked and I had many successful a.m. contacts until I added more sophisticated modulation to the transmitter.

Why SSB

These days single sideband (s.s.b.) is the more conventional and efficient form of speech modulation applied to amateur transmissions. Single sideband is more complex but has assumed a mystique out of all proportion to its true nature. Very few home built s.s.b. transmitters are heard on the amateur bands and many constructors believe that the techniques involved are well beyond their capabilities. This project will attempt to offer the average home constructor a chance to build a viable s.s.b. transmitter for two amateur bands. Most amateur constructors, even with a limited amount of experience, should be able to duplicate these circuits and enjoy the satisfaction of working single sideband with home-made equipment. The only likely risk is an inflated ego from the praise fellow radio amateurs seem to give anyone who puts out a home-made s.s.b. transmission.

The Marland

The Marland transmitter is designed as a first-timers s.s.b. transmitter. As such it offers the following features;

Single sideband signals on two popular bands: 3.5 and 14MHz.

A useful power output: some 10W peak.

Simple, well proven, circuitry using only discrete components: there are no integrated circuits.

Easy to work, well spaced, board layouts which follow the circuit diagrams.

The project is built in modules, each of which can be tested in its own right: a step by step approach.

No specialised test equipment is required: the prototype was set up using no more than a multimeter, a home-made r.f. probe and a receiver.

The completed transmitter is built into a large case for ease of interwiring and testing and leaves enough space for a possible receiver section.

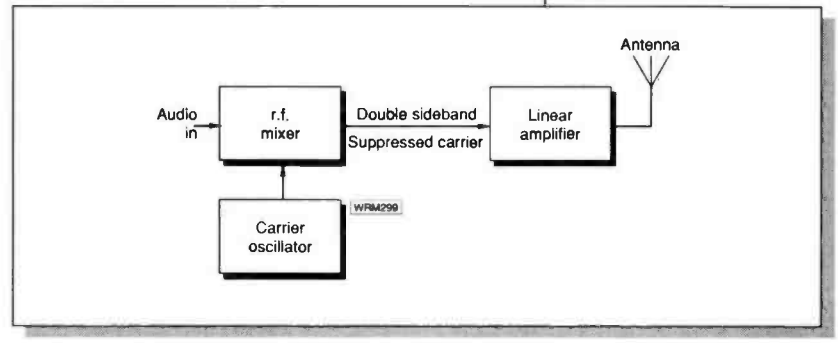
Established r.f. design engineers may smile at the Marland. It is simplistic and it does cut some corners. It may not be elegant or sophisticated but it is very buildable by the amateur. With a little care, the average amateur constructor, with a decent soldering technique, should have little trouble in getting the Marland to work first time. Naturally there are better circuits for doing most of the things that the Marland does. They are more complex, I tried a lot of them in preparing this project but in the end it simmered down to that offered here.

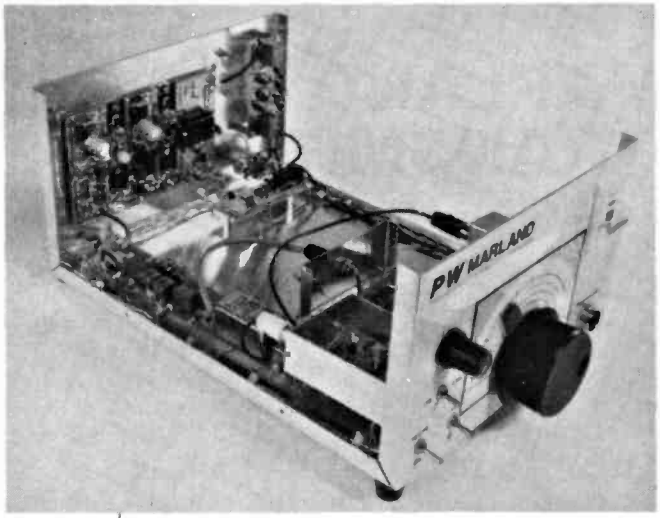
Sideband Generation

Most commercial s.s.b. equipment uses the filter method of single sideband generation. It is probably the easiest method to understand and it is the method employed in this project. Shown in Fig. 1.1 is a block diagram of a sideband generator. The signal begins with a **carrier oscillator** which may be crystal controlled at an intermediate frequency which is later converted to the required amateur band frequency. This feeds into a **mixer** (sometimes called the balanced modulator) together with an audio signal from the **microphone amplifier**. If the mixer is correctly balanced then, when either the carrier or the audio signals are applied separately, there will be no output. If both are applied

Starting in this issue, Rev. G. C. Dobbs G3RJV describes the basics of an s.s.b. transmitter that he will be build in coming issues.

Fig.1.1: A double sideband transmitter circuit.





An inside view of the PW Marland clearly shows room for the future expansion of the basic transmitter.

simultaneously there will be an output from the balanced mixer. The level of the output will depend upon the amplitude of both inputs.

Diagramatically

The diagram Fig. 1.2 shows this mixer and the output is double sideband suppressed carrier (d.s.b.s.c.). In this drawing the two input waveforms are shown superimposed. The shaded area of the drawing represents the actual output if the mixer is correctly balanced. In crude terms we might say that the carrier is only 'released' when the audio signal is present. Half the battle is over, the circuit has produced a d.s.b.s.c. signal. Some radio amateurs use double-sideband signals on the bands.

The next stage after the balanced mixer is the **filter**. This section does what the name suggests: it filters out one of the sidebands of the signal. The mixer output shows the full double-sideband signal with each sideband represented as a 'mirror image' either side of the carrier frequency. The resulting signal is shown on the waveform drawn coming from the filter. The shaded area again represents the ideal output from such a filter. The filter allows the signals on one side of the carrier frequency to pass, but attenuates signals on the other side of carrier. Such a filter is said to have a narrow bandwidth and is designed around a crystal filter centred on a frequency of 9.00MHz with a bandwidth of 2.4kHz.

The design and function of such filters is outside the scope of a practical article but can be found in the amateur radio handbooks.

More Complex

Refer to now to Fig. 1.3. The carrier oscillator has two values (8.9985MHz or 9.0015MHz) which when mixed and filtered produce either upper or lower sideband centred in the passband of the filter. This signal is mixed once more with a v.f.o. of 5.0-5.5MHz signal and passed to one of two bandpass filters. These filter out either the 3.5MHz (9.00-5.5MHz) or the 14MHz (9.00+5.0MHz) band signals.

Power Output

We have now produced the required mode in the required amateur band. The final requirement is to amplify the signal to a level suitable for transmission. This requires a **linear amplifier.** The amplification **must** be linear as the audio content is explicit on the s.s.b. signal. An amplifier with poor linearity would distort the audio information on the signal.

The selected signal is pre-amplified by a Driver Stage and thence to the power amplifier. The power amplifier is a slight cheat as I recommend the use of a commercial kit amplifier. The Cirkit HF linear amplifier is well suited for this application. It offers high overall gain and is suitable for 1.8 to 30MHz. Simple to build, it usually works first time and all the examples I have built have been very stable.

Switched Low Pass Filters are added to reduce the harmonic output of the power amplifier and the transmitter is completed with a transmit/receive change-over board controlled by the press to talk button on the microphone.

The above is a very simplistic explanation of the process, missing out the detail of the theory and the refinements of the circuitry required to generate an s.s.b. signal.

...Enough of the description. In the next part we will look at the actual circuits.

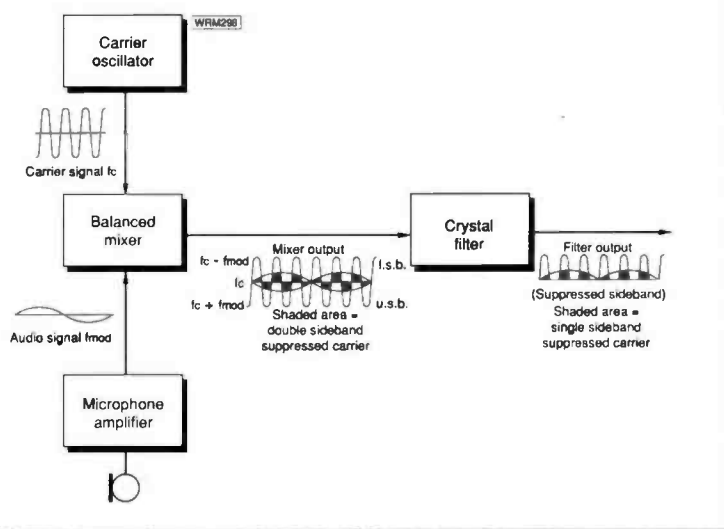


Fig. 1.2: How the s.s.b. signal is developed within the generator, showing the various waveforms.

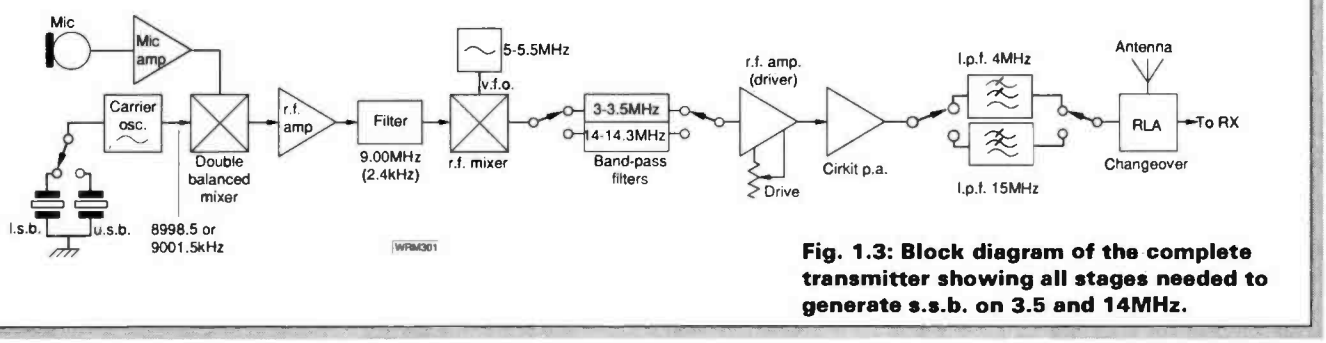


Fig. 1.3: Block diagram of the complete transmitter showing all stages needed to generate s.s.b. on 3.5 and 14MHz.

CB CORNER

Rick Maybury continues his short history of the Citizens' Band contemplating the specifications and attitudes.(MPT1321 - 934MHz the Cinderella band?)

When the original specifications for the UK Citizens' Band service were published in 1981 comparatively little media attention was given to MPT1321 which outlined the provision for a second set of CB frequencies on and around 934MHz. Quite simply the equipment didn't exist, or at least not in a form that was in any way applicable to the concept of a low cost publicly accessible two way communications system. It's been more or less downhill ever since and this technically interesting and innovative system never really achieved the kind of success it deserved. The choice of frequency caught manufacturers at home and abroad on the hop and it took another three years for realistically priced equipment to appear in the specialist CB shops. In retrospect the technical difficulties of producing equipment in quantity, at a price that ordinary CB users could afford, were probably the least of its problems. Ill-informed comment from some surprisingly authoritative quarters didn't help. I can recall reading an article, written by an eminent doctor, in one serious newspaper, respected for its coverage of science, outlining the medical hazards of exposure to sub-microwave rf radiation on or around 934MHz CB frequencies.

Horror Stories

It included a horrific list of maladies. These included cancers and cataracts. Whilst these effects undoubtedly existed, probably quite a few laboratory rats suffered as a result, little account was taken of the actual power levels of 934MHz CB, the intermittent operation and the proximity of antennas to vital organs in normal use. You would have almost had to poke the antenna in your eye, and keep the transmit switch pressed for a week to run any serious risk. At that time very little well researched information had been published so there was plenty of scope for speculation. Even quite serious sections of the technical and scientific press ran occasional scare stories, usually hastily cobbled together fillers that ran along the lines: 'CB will interfere with heart pace-makers, aircraft landing systems, computer terminals, petrol pumps etc etc.' In fact experience has shown it to be the other way around; for the last five years 934MHz users have been under almost constant pressure from cellular telephones; though simple measures, like changing to horizontal polarisation has minimised the problems and under ideal conditions transmission and reception quality is very high.

Notice of Doom

Nevertheless, several thousand CB enthusiasts spent their hard earned money on equipment and many of them persevered with the system, building up a good reputation for their conduct and behaviour that would shame many licenced amateurs. Gradually a reasonable assortment of equipment and accessories became available. Most agreed that it would never be as popular as 27MHz, but a dedicated band of stalwarts kept the system alive, until mid 1988, when the bombshell dropped... Two years ago the Department of Trade and Industry, Radio Regulatory division announced that the 934MHz CB service was to be phased out; no new equipment could be manufactured or imported and suggested that within ten years the band would eventually be given over to industrial interests for a new high quality digital PMR service. It was huge blow to 934MHz users, and whilst the band would be available for CBers, theoretically for the life of their equipment, it was clear that commercial operation would make the frequencies unusable over much of the country. Manufacturers, dealers and retailers were informed and quite substantial stocks of equipment and manufacturing capacity were disposed of, or written off, much of it at a loss.

Notice Rescinded

Now we learn that the idea has been quietly shelved, and according to a DTI spokesperson there are no immediate plans to run down the 934 service, at least for the foreseeable future. The damage has been done though, no new rigs have been available for over 18 months so the system simply cannot expand. The best estimates of the 934 population is between three and four thousand users, and they are mostly concentrated in pockets around the country. Nothing much can be done now to save the system, it is in a terminal state of decline, but one interesting side effect has been to increase the value of those rigs still in circulation. In areas with an active 934 user base they fetch quite respectable prices. An interesting, and a for a while, a potentially useful collectors item.

PW Peanut Transceiver Part 2

Gus Montgomery GM0ATI and Bill Holt G7DHM conclude the PW *Peanut, in this issue they describe its construction and testing*

The construcion of the *PW* Peanut is fairly straightforward as the circuits are assembled on Veroboard, see Fig. 2.1a-c. Begin by winding the coils onto the 4.8mm formers. Oscillator coil L1 consists of one winding of 50 turns, with the antenna tapping made at 30 turns. Continue with the further 20 turns to complete the winding. This may be held in place with a dab of varnish or a suitable glue. Mixer coil L3 consists of single layer of 80 turns on a similar former (4.8mm).

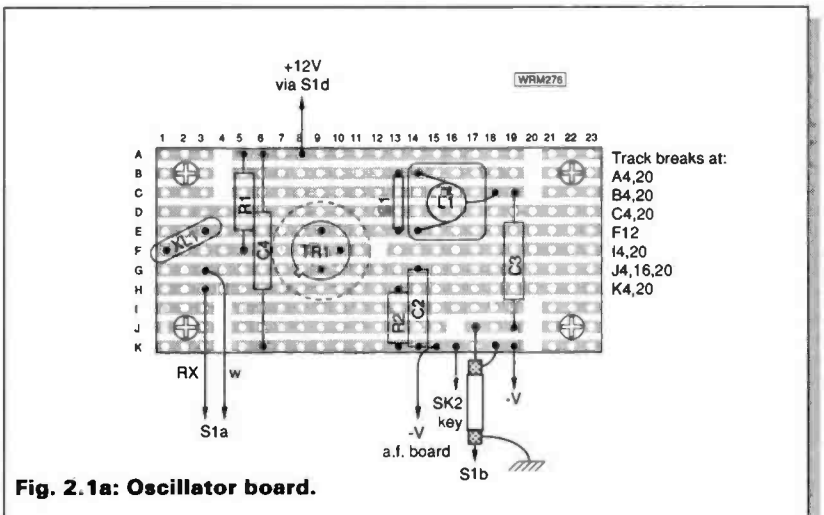


Fig. 2.1a: Oscillator board.

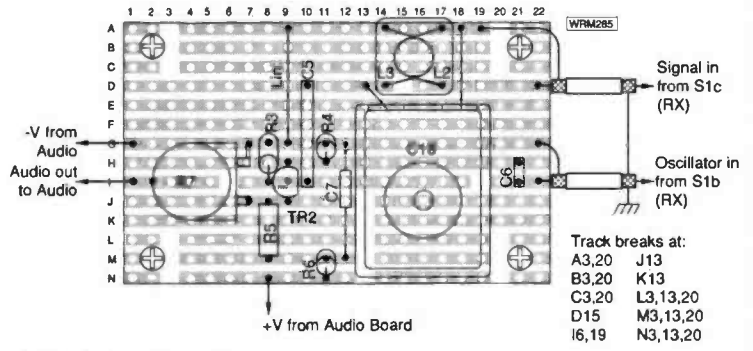


Fig. 2.1b: Mixer board.

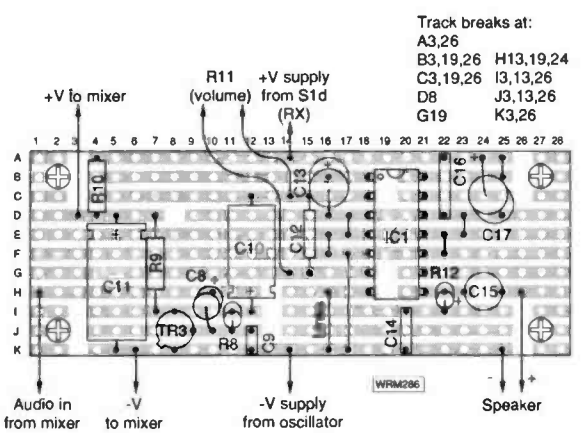


Fig. 2.1c: Audio board.

The 5 turns of coil L2 are wound over the 'earthy' end of L3 after it has been constructed and dried. Taking care with the windingof the coils will not only improve the look, but enhance the performance of the system. The original units were built with coil base pins soldered to the Veroboard with the trimmed off 'legs' of other components. A neater arrangement would be to drill holes in the board to accept the formers directly.

Recommended

After allowing the varnished coils to dry start the construction by assembling them onto the board. It is **strongly recommended** that the layout of the oscillator and mixer boards is adhered to, and that transistor TR1 is a BFY52 and not an equivalent. These stages operate at r.f. and Murphy's Law being what it is, if either is changed then neither may work. The boards for the Peanut built to the layout shown worked:

a) on their own on the benchtop,

b) 'Blutacked'to a chipboard base and,

c) on assembly into the aluminium case, even after closing the lid.

Some layouts we tried were prone to sensitivity of the position of the mug of tea with respect to L1 or L2/L3. Not to mention other strange paranormal happenings. So stick to the Veroboard layout and you cannot go wrong.

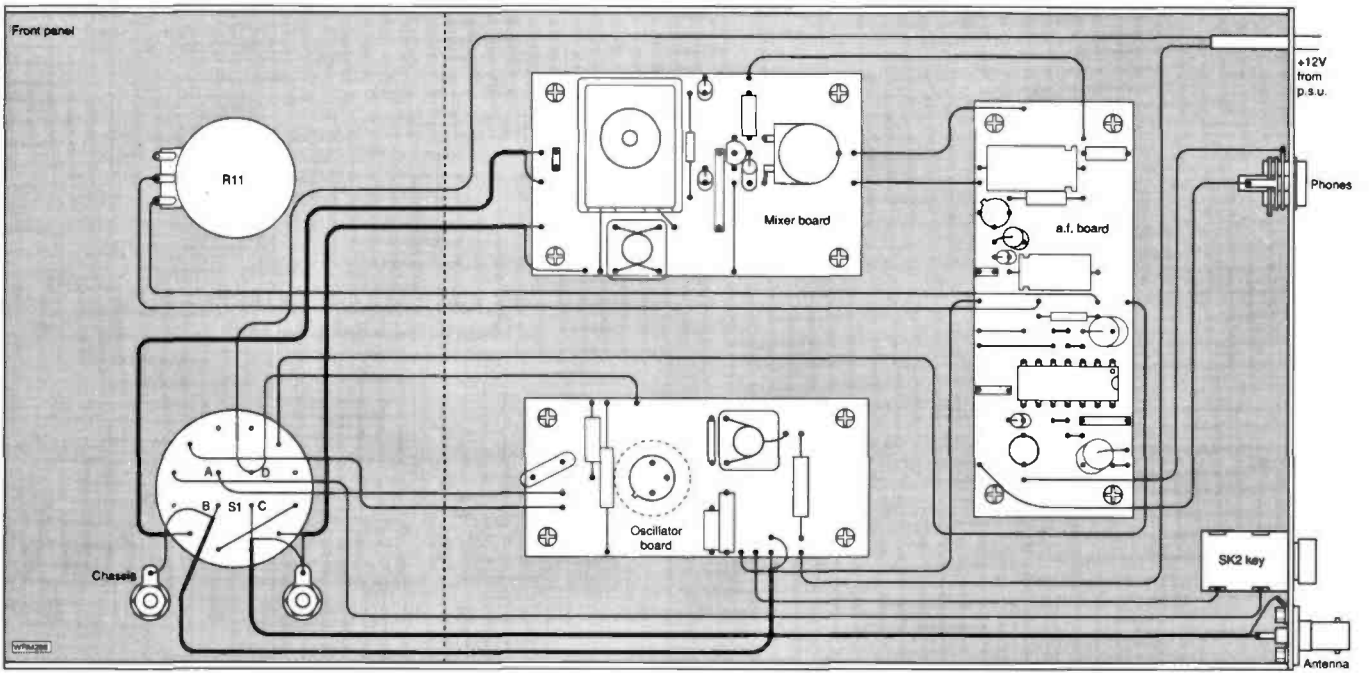
The items used in the design of the Peanut have been chosen to minimise costs. Having built projects like the *PW* 'Severn' previously, I can agree with George Dobbs that the humble standard phono plug/socket is adequate for QRP h.f. and is much cheaper than other options. The original Peanut had a b.n.c. plug for the antenna, rescued from a pile of rubbish destined for the bin. After a shine with metal polish it made a suitable finishing touch for the unit. The other plugs sockets may be whatever is to hand or cheap.

Interwiring

Using the block diagram Fig.1.1 as a guide and the further layout plan Fig.2, interconnect the various boards. With S1, identify the three position associated with wiper A then Fig.2.2 shows the cabling layout.

Finally

The unit is tuned for a reasonable output power by adjusting the slug within coil L1. Coils L2/3 have the tuning slug wound fully home to give maximum coupling between the coils, and capacitor C18 is used to align the receiver. This is best achieved in the evening when within a few minutes something should be heard.When L3/C18 is badly out of tune then only broadcast stations will be heard. The variable resistor R7 is used to set a suitable control range of audio level depending on the antenna in use. The range of control is such that the receiver may be used on a short piece of wire or a full 3.5MHz dipole antenna. The Peanut has been used with all the antennas of our radio club (White Rose Club in Leeds) and this includes an inverted 'V'.



No change of tuning was noted inspite of all these various types of antenna. The note transmitted is very pure, but should 'chirps' be evident this is an indication that Coil L1 is incorrectlly adjusted. More output can be obtained by optimising R1 and C1. The components have been chosen to be 'bombproof', transistor TR1 became only slightly warm with a near infinite v.s.w.r.

Other Bands

The more experienced of you may wish to experiment with other bands, and would be comparitively simple to rework to the 7MHz band. You could fit sidetone with a ceramic resonator connected to the 12V supply and the Morse key input. Making the frequency tunable over a few kHz with a small (10t) coil in series with the crystal is possible. The plastics tuning rod could then be brought out via the front panel as the 'tuning'control. If skilfully built the transceiver can be put into a very small pocket-sized enclosure.

The only time we found that the costs rose sharply was when Morse key had to be bought to work the station, as they tend to be more expensive than the radio!

That in a nutshell...was the Peanut.

PW

Fig. 2.2: Overall interwiring. Note front panel 'bent' for clarity.

Wanna Swap!

Have large stock of components, new and used including ROMS, RAM i.c.s, many transmitter bits and pieces. Would exchange for a simple communications receiver e.g. EC10, Codar CR70, Heathkit etc. w.h.y? Mr B. Sirignano G4FZG (QTHR) Tel: Cheltenham 580329.

Have Marconi QRO a.t.u. Would exchange for KW2000 or w.h.y? Mann. Tel: Cambridge 860150.

Have Minolta Dynax 7000i camera with 35-80mm AF zoom lens, boxed and in mint condition, Also a Spectrum + with p.s.u. and manual. Would exchange for a Yaesu FT-290R or 144MHz base station. Would also consider a good f.m. only mobile rig. Bob. Tel: 0536 711021.

Have *Practical Wireless* from May 1966 to April 1975 and *Practical Electronics* from November 1964 to April 1975. These are free to a good home if new owner collects. C.P. Clark. 157 Coates Way, Garston, Watford, Herts.

Have Pentax Program A s.l.r. camera outfit. Would exchange for a Trio R-600, R-1000 or Yaesu FT-7700 or similar h.f. receiver. Dunfermline 735967.

Have Pye Westminster (f.m.) recrystalled onto 70MHz also 2 very clean Pye Bantam 3-channel; a.m. sets also suitable for 70MHz. Would exchange for Tandy PRO-22 hand held scanner or w.h.y? with cash adjustment to suit. J. Parry GJ8RRP, No. 2 Thornley, Bagatelle Road, Jersey CI JE2 7TB.

Have r.f. unit type 26 and receiver R1147B both rough condition. Would exchange for the main tuning knob and/or other parts for the AR88. I.C. Denham Tel: (0734) 722480.

Have Tandy 1000SX computer with 640K RAM, colour monitor, twin 5.25in. drives, serial plus printer board, mouse, joystick and much software. All in good condition and hardly used. Would exchange for an h.f. rig with digital readout, or w.h.y? Mr V. Lowe. Tel: Doncaster 531927.

Have Trio TR-2200G 144MHz portable 12-channel transceiver, complete with NiCads, charger, mains p.s.u. and handbook. Would exchange for Eddystone EC10 Mk2 receiver with mains power unit., or Yaesu FRG-7 with a cash adjustment. Mr C. A. Collins. 60 Alexandra Road, Skegness, Lincolnshire PE25-3RE.

Have Uniden Bearcat 200XLT hand held scanner in mint condition. Would exchange for a Uniden 300 CB base station in similar condition. Ray Williams Tel: Grantham 66047.

Have Yaesu FT-501 transceiver, Watford Disk interface and SP-DOS, Wafer drive, test ROM and μspeech for Spectrum. Would exchange for a dual disk drive suitable for a BBC computer, an 80 track d/sided drive or a 144MHz hand held suitable for packet radio use. Mr P. O'Brien Tel: (0286) 5468.

Have JVC HR-D750 Nicam stereo video in original packaging, can be demonstrated. Would exchange for a dual band 144/430MHz hand held, or would consider good 144MHz multi-mode mobile. Dave Newman G4CGZ (QTHR). Tel: 01-450 3282 ext. 360 (daytime).

Have 1920's crystal set Gecophone style, working with original cat's whisker and basket wound coil. Would exchange for s.l.r. camera. Mann. Tel: Cambridge 860150.

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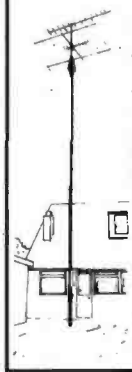

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Back-Scatter

HF Bands

Reports to
Paul Essery GW3KFE
287 Heol-y-Coleg, Vaynor, Newtown, Powys SY16 1RA

This month finds me minus a rig, thanks to a fire in the p.a. compartment. The sight of flames reflected, like a coal-effect electric fire, off the wall behind the rig was somewhat startling! Unhitching everything - linear, outboard v.f.o., earth link, coaxial cable, v.h.f. rig, power supply, keyers, what have you - seemed to take a long time. It is the first time since I have held my A licence that an h.f. rig hasn't been available to use when desired. That sudden change of habit has produced marked withdrawal symptoms! Yakking on a v.h.f. repeater from down here in the valley just doesn't seem to have the same flavour somehow...One lesson I have learned is that I will be spending a lot of time thinking and planning how best I can re-arrange things so that any single item can be extracted from the operating position with minimum trauma and maximum speed. So, this time I am totally in the hands of the kind souls and publications who report what goes on - to all of you as individuals, to TDDXB, DXNS, The DX Magazine and the Canadian Amateur - my thanks. At the time the rig went up, things seemed to have been going pretty well by and large on the bands. Since then I have only had your reports to go by so I will not comment here but let it appear from, as it were, the input terminal.

Top Band

G3BDQ (Hastings) mentions just a single contact, s.s.b. with GU2FRD for Sark. Doesn't anyone work this band these days?

The 28MHz Band

The strange conditions have reduced the possibilities of this band. Certainly we have had the sunspots, but alas it has been quite rare for the A index to be down at a civilised level, so propagation hasn't been all that superb. Mind, the band had its moments.

GW0HWK (Wrexham) uses the v.h.f. repeaters as monitors of propagation, as he can hear some 22 of them under normal conditions and even reckons to have noted me on GB3PW and survived! On 28MHz, s.s.b. accounted for A22AP, A22AK and T77FT, while f.m. raised UA3AFO, G0MUL, LZ1AY, LZ1AI and 4Z4SY.

Next we have **GM4UQD/M** around the Livingstone area; Alistair raised HC1NT, ZS6TJ, W3KDD, W0CG in Ohio on s.s.b. while c.w. managed W9ZVY, NX8X, K9RN/M, NU3Q, W9CDB, UL7ACE and WD8RTW. Incidentally, Alistair makes the very valid point that 99% of his operation occurs when he's stationary - as he says, sending c.w. from the car while coping with traffic is difficult! Difficult, yes, but W6AM/M was often heard on the move with almost as big a signal as the one from Rhombic Farm, operating on c.w. until he passed away in his eighties.

Just a couple of contacts are noted by **G2HKU** (Sheppey) who offers c.w. with ZV7AA and CX5BW.

Now to **G0HGA** (Stevenage) who is back on the QRP rig again; Angie managed TA3D on that band.

Onto G3BDQ who used s.s.b. to UH8ABD, VK6PY, ZS200WOL, 4Z8C, 5B4YC, BY8AC, A41KM, 6W2EX, VP8CDR, G4WYG/ST2, HZ1AB, C53GB, TZ6RC, FT5XH, 9J2FR, VQ9IF and K1VV/IMD for International Marconi Day.

Now on to **ON7PQ** (Kortrijk) who says his c.w. crossed swords with A15AA, V31BB, WL7E, A51JS, UA0/GB4MSS, ZL2VS, 8J90XPO, HL0ORC, XU8CW, 9Y4/JA2EZD, FG5BP, PA3CXC/ST0, VP8BFM and 1S0DX.

The 3.5MHz Band

Doubtless those who hear or work me on this band are all breathing a sigh of relief! Seriously, I must admit to being deprived at sked times, even on a Sunday morning.

No DX this time says GW0HWK who says he raised GW3MEO, GW0LAL, G4DXK, G4UPO, G4NST, G3IKS, G4PUY all on SSTV, plus LA9TQ, GJ4YCR and G3OQD.

G0HGA (Stevenage) has about 20W to 20m of wire on this band and on c.w. she raised G4YNU, DL4KF/YL and G4OPF.

The c.w. of ON7PQ made it across to 6Y5FS, UJ8JI, 5H1HK, V31SW, TR8XX and 4Z7G.

SWL Club

Lee Greaves is a newcomer to the short wave listening game and he is keen to form an s.w.l. club to cover the Northampton area. Any readers who may be interested please get in touch with Lee at 15 Heathville, Dallington, Northampton NN5 7HT. One suspects that perhaps the existing local amateur club will beat a path to Lee's door to enrol him!

Snakes Alive

I have a letter from **Richard Williams** (Deddington) who asks whether anyone in this country knows of the 'snake' antenna? Richard says he was shown it by a VK who used it on 14 and 3.5MHz; it was some 50m long, lying on the ground the 'head' in a plastics box, and the 'tail' into the station a.t.u. What is it and how does it work?

WARC Bands

The prize for this month is the delayed letter, datelined February 7 which turned up here a few days ago. **G4ZZG** used to be a 'regular' many years ago. Charles now uses an Icom 735 and has a telescopic mast bracketed to the wall which normally sits at 5.5m, but can be wound up to 10m. Interest in the goings-on on the WARC bands caused him to put up a ground plane for 18MHz, comprising just a length of 4m aluminium pipe, mounted on the gable end about 5m a.g.l. and a couple of wire radials. Once it was up, the rig was switched on, came up on 18.078 and lo there was 3B8CF waiting for a QSO. On the other hand, as Charles says, the vertical picks up all the noises there are going! Since then on 18MHz there have been c.w. to various Ws, JR5WKQ, VK2AW, JA1IFP, PY1ASN, VE1ETG, IS0FFN, PJ2/OH4XY, VE2PA, ZS8MI on Marion, RV9CFA, LU1QCK, HZ1HZ, VS6BI, EA8BEE and, of course, the Europeans.

Now we turn to **9H1IP** in Malta; Vincent offers on 18MHz, AA2U/QRP at 4.8W, C31LBB, 4N3KW, UA9CBO, EA6VE, VE2RP, ZP5JCY, 7X2AK/3, CO2BB, 9Y4KS, JA3EMU, TA2AK, ZL1BMV and PY5BI. Gotaways hereabouts included 1A0KM, HC2NI and OY9JD. As for the 24MHz collection, JG2TUQ, UA9CBO, LA4XFA, GJ3RAX, GJ3YHU, 7X2AK/3, CN8ST, VK6AKG, RA9UZ, CO5DD and VU2NUD were completed contacts but IS0XV, V51BG, T77T and 9X5NP escaped. Antennas, wire dipoles or a magnetic loop.

Now we turn to a new reporter in **G0IMA** (Clevedon) who ises 18MHz regularly, with an FT-101ZD and a dipole, or a G5RV; the site is 3m below sea level so the antenna is at 3m a.s.l. Operation is s.s.b. and c.w. and Phil notes how the band 'changes its spots' quite suddenly. In the month prior to writing G0IMA had worked the band on 11 days, at times varying between 0800 and 2330 local. The haul included G, I, EA, CU, SP, OE, JA, VK, KP, D66, ES, YL, F, OZ, VA. VB, OK, CT, W 6W7, C31, HA, HB and ZD - which ZD was not specified but a long haul anyway!

Perhaps the best day was April 27, when CU2GE, W2FJ, G3CSK, W1HHY, SV1AWH, SV1ANW, JA7JH, JA6GIJ, VK3AHJ, LU9EHR, KP2BH, W4PEL and YV1CLM.

For a change, ON7PQ made a foray on 24MHz and pulled out 9M2AX.

Still with the WARC allocations, it was a very pleasant surprise to hear from **G3VWC** (Bath), who was many years ago in his s.w.l. days a founder of the Bishops Stortford club. Andrew had been QRT for many moons but is now back on the bands with a TS-680S used mainly on c.w. and mainly on 18MHz, making quite a few transatlantic contacts. The antenna is a 7MHz dipole at 6m which can be loaded up on 14 or 18MHz.

It was c.w. all the way with G2HKU. On 10MHz he raised ZM4HB, on 18MHz EA6ZY, LU9HGW, W6VX, OH2BVQ, N5VV, K2QIL, KF0Z and K4FV; turning to 24MHz there were K7VR, PJ9JT, KB6TOX and UB5LAK.

On 10MHz, says GW0HWK, the score was simply zilch; but on 24MHz, HZ1AB, RB5CP, N9BUU, CT1LN and RB5FF were booked in.

Events

As always, thanks to K1ARs *Contest Calendar DX News Sheet* The *DX Bulletin*, The *DX Magazine* and the CARFs *Canadian Amateur*, plus of course all you good reporters out there.

First the contests. Just about time to mention the All-Asian Phone on June 16/17. Notably the rules lay down strict disqualification clause for taking credit for duplicate contacts in excess of 2% on any band.

The Canada Day Contest is on July 1 for the full 24 hours of GMT time. Exchange name RS(T), QSO number, country. Score 10 points for each Canadian contact, 4 points per contact outside Canada and 20 points for a QSO with the official stations using the VCA or TCA suffix. Classes of entry are single-op all band, s.s.b., c.w. or both modes, single-op, single band, multi-op single transmitter and multi-multi all-band only. The multiplier is one for each Canadian province/territory worked on each band and mode. Frequencies are around: 1.825, 1.875, 3.525, 3.775, 7.075, 14.025, 14.150, 21.025, 21.250, 28.025 and 28.500MHz. Entries to be mailed by the end of July addressed to John Clarke VE1CCM, 16 Keefe Avenue, Sydney, Nova Scotia B1R 2C7, Canada.

Expeditions and things now. As always, many of them are notified and completed before we can get a note to you in this column, alas. Although he starts before publication day, we understand that VK2GJH will be at Tuvalu (T20JH) between June 15-20, and on Nauru at C2INI after June 27; June 20-27 sees him at W Kiribati as T30JH.

At the time you start to read this the Trindade DXpedition will be up and running; the intention is to be there for all of June and July; operators PS7KM (s.s.b.) and PT7AA (c.w.).

The 1990 Malpelo expedition is planned to start in mid-October, with some 15 operators, QSLs being in the charge of HK3DDD; this one is currently well up the 'wanted' list for most people, the last activity having been as far back as 1983.

Now to a spot of history; The Spratly effort by 3W3RR as 1S0XV is aiming for 50000 contacts though there have been breaks while fuel and supplies were fetched.

At the time of writing it is understood the close date will have been May 15. Conway Reef also will be history by the time you read this.

Back-Scatter

However it is understood the Yasme boat will be visiting other hard-to-get spots in the Pacific after this one, so keep an ear open!

PA3CXC/ST0 pleased many a DXer, but alas the Ethiopia stop didn't materialise.

Malawi, 7Q7; it is understood that 7Q7LA is on the bands; he is said to be G3JCJ but at the time of writing it is not known how long he will be there. The QSL route also seems to be a mite vague, more details when I get them!

The 7MHz Band

An early letter from G2HKU (Sheppey) this time as he was sneaking off for a crafty holiday; Ted used his key to raise UA9UPA, YV4AU, N4MQS and K8NW.

G0HGA says her crop this time included VP5VPX, 9H3JR, CT9/OH7XM, N4SF, W1MK, WA1KHR, NX1T, N4ND, WA1KWA, UA9QBA, RA9LD, UA9CAQ and UZ9FWW. At the lower power level, she managed U0AL, UA9TA, W3BY, W2XF, W2RUZ, W1QK and V01BZ. On a different tack, Angie worked G0/N6YBS who is in fact a JA and uses JA4KQG as his QSL Manager; this puzzles her, but after all, if one has a valid US call and comes to this country there is no reason why one shouldn't quote that call to obtain the reciprocal permit.

Just one for this band for G3BDQ, c.w. to ZB2B.

Now to ON7PQ; Pat found A15AA, VK9LE, C6AFV, 6W1QB, 8J90XPO, TA1AZ, W6KP, V73AS, SV5/DK6AS and KH8/VK2EKY.

Late nights over the holiday were tried by GW0HWK; Mike obviously found this ploy profitable since he offers 4S7NMR, LU2BLK, 9K2DB, RA9STK, 4X6UU, 4Z8C, VE1TL, PY6KY and some 47 Europeans.

The 14MHz Band

Noisiness personified!

Alistair at GM4UQD offers s.s.b. with 3B8CF (a new one for the score), CN8EC, KF7NP, F/JA2RM, A41JR, 4S7VK and 4S7SW (who was using a three-element beam slung between two coconut trees), CN8EJ, VK2EQ, VK3QZ, IG9/IT9KJY (Lampedusa Is), ED1MDA (QSL via ON4AVL), ER4L for a query, UA0/GB4MSS and UA0FQ (Sakhalin). On the key he managed to find 4X6VH, VK3GY, N3ELN, JH1ADR, JQ7QYL and TK4MC.

Because of the noisiness, GW0HWK steered clear of the band in general, but did manage WA2VUY, NT1I, CN8FZ, plus SSTV to DJ1TV, SP3/DK1ZP/P, HB9AXG, DJ1IJ, HA1ZH, IV3EA and LZ2KAF.

Turning to ON7PQ we find Pat at the key and tangling with EK0DAP/HK4, JG2CLS/JD1, 4K4BDH, CE0ZIG, AH6JF, K9EL/VS6, XV8CW, A51JS, 4K2BDU, UA0/G0KPH, YK1AO, 9N1FOC, FO5BI/P, KH8/VK2EKY, PZ1DY, ZK1XQ, ZK2KK, AH3C/KH5J and PA3CXC/ST0.

It was c.w. all the way for G3BDQ who usually mixes his modes more. VU2SGR, UI8O/UI8IAY, 3B9FR, TK5GT, TK/PA3DQW, UA0/GB4ICE (delightful call that!), EX1A, PA3CXC/ST0 and VK3EGN.

Over to G0HGA (Stevenage) and the QRP; this yielded UA3DKX, UA3ZEK, UA9JH, UB5QSA, LA2OHA, OZ7JR, DL1ZQ, K1DG, K1AR, W2AA, the last three being contest contacts.

The 21MHz Band

Not so much as usual here for some reason. GW0HWK sets off very simply by commenting that he worked nothing on the band.

The 21MHz band is obviously a favorite band with ON7PQ; Pat's c.w. managed 8Q7ZL, 3C1EA, VK9LE, 3D2GB, JG2CLS/JD1, KE9A/DU3, ZL0AIC (Greenpeace at Amsterdam), UA0/G0P, FH5EJ, XU8CW, 9M2VF, JY9LC, UD6ODKW, FR4FD, 7X4AN, 4K3PBD, AH3C/KH5J, ZK2KK, ZK2RW and PA3CXC/ST0.

Over to G3BDQ; John's s.s.b. raised KB6DDV/OU3, while his c.w. made it over to VP5P, YC2NFD, JAs, 4Z4UW, ER4L and IS0XV - Spratly at last, sighs G3BDQ!

Finally G0HGA who persuaded her QRP up the 28MHz vertical and by that means hooked TK5EP, UP2BQH, UC2WO, UB4UFL and UB5HX.

QSL Addresses

G2HKU sent us some to be going on with, namely; FM5FP who is Box 619 Fort de France; 4K2OT, via UB5KW; ZD7KM, via G3JKB; 8J9DXPO, to JA3RL; PJ9JT via W1AX; and VP5P who goes to WN5A.

Bouquets!

The final letter comes from George Senior (Loftus, Cleveland) who notes that he frequently hears ZC4GA on 28.45 or 21.17MHz. This chap, George comments, is a good operator and if the rabble gets to be too much just disappears and leaves the mob alone. The ZC4GA QSLs are handled by GM0ALS who also gets a bouquet for fast service. As a matter of interest George uses an FRG-7 receiver with 7m of wire. What a pleasant change to receive a letter singling someone out as a decent operator! Thanks George.

Final-Final

That's the lot for now. One hopes to be operational again by the time next month's piece comes to be written; meantime the deadlines for the next three months are for your letters to reach me by June 25, July 40 and August 24. The address is at the head of the piece.

FOR UP-TO-DATE NEWS RING 0898 654632
Calls charged at 38p peak and 25p off peak.

Back-Scatter

VHF Up

Reports to
David Butler G4ASR
Yew Tree Cottage
Lower Maescoed, Herefordshire HR2 0HP

During the latter part of March the more active side of the sun was looking our way, causing numerous minor auroras to occur. There were a number of solar flares up to 365 flux units and sudden ionospheric disturbances almost every day. The sunspot count climbed to well over the 300 level, with the solar flux rising to 247 units on March 22. The geomagnetic levels were very disturbed being up to storm level on the previous day. There were proton events on March 28 & 29, together with a flare of 310 flux units. Massive noise bursts were heard up to 10GHz. With all this geomagnetic activity it was hardly surprising that radio auroras continued to be prevalent, especially with stations situated in Scotland or northern England. By the end of March the sunspot count had declined to around 145, the solar flux dropping from 227 on March 26 down to 159 on April 1.

Solar flares continued to be reported, with an X1 flare occurring on April 3 and a class M7 flare occurring on April 4 but nothing appeared to have developed from them. Starting from April 7, solar activity slowly increased every day up to April 11. On April 7 there was a flare of 230 flux units and another flare which caused strong radio noise bursts, ionospheric disturbances and a small proton event. A magnetic storm commenced at 0843UTC on April 9 continuing through to April 11. A series of flares was reported on April 10 followed the next day by another proton event.

During this active period there were a number of auroras, the event on April 10 being particularly good. There was a steady rise in solar activity through to April 19. Sunspot counts rose to over 300 with major flare and magnetic alerts being issued throughout the period. There were ionospheric disturbances on April 16 & 17. As the quiet side of the sun came into view from April 23, so the solar activity saw a general decline. Sun spot counts dropped to the 140s compared to 304 on April 18. Little happened during this period apart from a proton event of 150 particle flux units on April 28. During April the following highs and lows were recorded. Sun Spot Numbers, 327 on the 20th, 116 on the 10th, Solar Flux, 249 on the 20th, 133 on the 30th, Boulder A Index, 67 on the 10 & 11th, 4 on the 1st.

Propagation on the 50MHz band has seen a few months of relative quiet, but recently the band has started to pick up. During April, operators had the choice of working stations via Aurora, Auroral-Es, Sporadic-E, Trans-Equatorial Propagation and even extended groundwave. The month of April also saw the end of the main auroral period. We have now entered into the Sporadic-E propagation season which generally lasts from May through to August.

Aurora

The majority of correspondents writing in mentioned only the excellent aurora that occurred on April 10. However, in a 5 week period from March 18 to April 23, *PW* readers recorded 13 events, most of these admittedly reaching only to the 50MHz band but auroras nevertheless. But first, excellent news of 50MHz QSOs with the North Pole 90 Expedition.

Laurence Howell GM4DMA has reported a number of Auroral-E contacts made whilst operating from UA0/GB4MSS on Sredny Island. Following days of receiving Band I Norwegian television, via aurora, the first 50MHz amateur radio contact was accomplished on April 11. In a brief opening, between 1632 to 1633UTC, OH9NLO (JP26UM) was worked at 559, over a path length of 2364km. The next contact came 4 days later, April 15, between 1648 to 1650UTC when a c.w. contact was made with OH3MF/9 (JP36UN) at an increased distance of

Back-Scatter

2718km. Events on April 16 were even better. At 1728UTC, OH2TI (KP20KE) was worked peaking 559, at a distance of 3024km. A few minutes later a repeat QSO was made, this time signals being exchanged at 599 bothways. Another contact was made with OH3MF/9 at 1734UTC, followed at 1741UTC, by a new country in the form of SM3JGG (JP71). Signals by this time were getting weaker, an exchange of 539/519 being given. No other signals were heard by UA0/GB4MSS until close down on April 21. Following these results Laurence suggests that the best time for contacts into these latitudes via Auroral-E's would be between 1400 to 1800UTC.

QTH Locator Squares Table

Station	50	70	144	430	1296	Total
G3IMV	228	—	430	125	51	834
GJ4ICD	360	—	263	119	59	801
G3JXN	204	22	187	134	88	635
G6HKM	202	—	218	109	46	575
G4KUX	—	—	372	120	—	492
G3UVR	—	—	257	140	83	480
G1KDF	140	—	180	102	37	459
G4RGK	—	—	284	124	50	458
G3XDY	—	—	206	148	91	445
G0DAZ	—	—	277	128	27	432
G4DEZ	55	—	249	49	49	402
G6DER	—	22	183	110	78	393
ON1CAK	48	—	280	53	11	392
G0LBK	—	—	257	89	46	392
G8LHT	79	19	185	93	14	390
G1SWH	153	25	153	58	—	389
G1EZF	—	—	263	93	—	388
G4XEN	—	—	274	111	—	385
G4MUT	82	22	153	93	31	381
ON1COQ	43	—	255	56	7	361
G1LSB	44	—	172	143	—	359
G0EVT	88	—	209	57	—	354
G4RRA	—	—	255	80	—	335
G3COJ	—	—	186	103	44	333
G4SSO	—	—	229	93	—	322
G4FRE	—	—	102	146	72	320
G1OWQ	171	—	142	—	—	313
G4TIF	—	—	200	110	—	310
G4OHF	—	—	307	—	—	307
G1EGC	—	—	198	80	23	302
G8HHI	—	—	148	110	38	296
G8PNN	—	—	129	99	64	292
G4ZTR	78	28	104	50	30	290
G6MGL	—	—	141	89	59	289
G4NBS	—	—	119	105	63	287
OL8FBO	—	—	280	—	—	280
G8ATK	—	—	143	91	45	279
GW6VZW	118	—	143	6	—	267
G8PYP	122	2	106	32	—	262
G4PCS	—	—	258	3	—	261
G1GEY	—	—	168	77	11	256
G3NAQ	—	—	175	80	—	255
G6STI	—	—	152	69	24	245
G6DZH	—	—	154	87	—	241
G3FPK	—	—	241	—	—	241
G4IGO	—	—	238	—	—	238
G0EHV	—	—	160	75	—	235
GM4CXP	—	—	198	31	—	229
EI5FK	—	—	172	56	—	228
G1SMD	115	—	106	—	—	221
G4DOL	—	—	216	—	—	216
G4MEJ	—	—	213	—	—	213
G8LFB	—	—	209	—	—	209
GW4FRX	—	—	204	—	—	204
G8MKD	—	—	150	49	—	199
GJ6TMM	—	—	151	48	—	199
G4YCD	—	—	197	—	—	197
G1TCH	94	—	95	6	—	195
GI1JUS	—	—	192	—	—	192
G1DOX	54	26	73	16	8	177
G6DZH	—	—	156	—	—	156
G7ANV	—	—	153	—	—	153
G6MXL	—	—	91	45	16	152
G4FVK	—	—	78	49	21	148
G4AGQ	—	—	104	42	1	147
G8XTJ	29	—	116	—	—	145
G0FYD	1	—	142	1	—	144
G6MEN	41	2	63	26	4	136
G1WPF	—	—	97	29	—	126
G0FEH	—	—	101	24	—	125
G0ISW	45	—	59	17	—	121
GW1MVL	—	—	109	7	—	116
G1IMM	—	—	98	17	—	115
G7ENF	—	—	86	23	—	109
G7CFK	109	—	—	—	—	109
G1CEI	11	—	77	18	—	106
GM0HBK	—	—	107	—	—	107
GI4OWA	—	—	103	—	—	103
GM0GDL	—	—	81	22	—	103
G7CLY	—	—	100	2	—	102
G1SWH	—	—	148	53	—	101
G4WHZ	—	—	76	—	7	83
G0GTF	76	—	—	—	—	76
G0HEE	—	—	73	—	—	73
GU4HUY	—	—	73	—	—	73
G1NVB	—	—	73	—	—	73
G0HDZ	—	—	64	—	—	64
GM1ZVJ	6	—	48	—	—	54
GM0JOL	—	—	47	—	—	47
G2DHV	—	—	33	7	2	42
G7AHQ	—	—	34	—	—	34

No satellite or repeater QSOs
Starting date January 1 1975

Prior to obtaining this report from GM4DMA I received news from **G3MY** (YSS) that he had positively identified signals from UA0/GB4MSS, in beacon mode, between 2000 to 2043UTC during the big aurora on April 10. The signals, on 50.109MHz, were very weak and fluttery, typically 41A. Unfortunately, any hope of a contact was negated by all the UK lids operating on and around the DX calling window of 50.110MHz. When will you all realise that **50.110MHz** is specifically for **CALLING** between Continents and that the area 50.100 to 50.130MHz is designated for traffic between Continents. Inter-UK or UK to Scandinavia is European traffic and should not be carried out within this 30KHz wide DX window. Your comments please!

Ted Collins G4UPS (DVN) detected a weak 50MHz aurora on March 18, from 1945UTC, in which several Scottish stations were heard on c.w. An even weaker event was noticed on March 21, at 1840UTC, with only GM0GEI being heard peaking 55A. Another event occurred on March 25, stretching to 144MHz. On 50MHz, from 1550UTC, G4UPS worked into Northern Ireland and Sweden, the aurora finishing with him around 1835UTC. **Jim Smith G1DWQ** (DOR) heard some Scottish stations on 144MHz c.w. around 1610UTC but was unable to work any. Also on 144MHz, GM0EXN (HLD) worked GW0KZG/MM on the Royal Research Ship *Challenger* in locator IP71. Other stations situated in Scotland worked into Norway, northern Sweden, Finland and Denmark. G4UPS heard GM0GEI, 55A, on March 26 at 1825UTC but very little else. Weak auroral television carriers on 48/49MHz were heard by G1DWQ on March 27 around 1800UTC but no amateur signals were heard this time. Jim did however hear GM3WOJ on March 29 peaking 55A on s.s.b. at 1530UTC and some weak c.w. on 144MHz around 1715UTC. G4UPS heard two stations on 50MHz, GM0GEI at 55A and GM3WOJ at 44A, both from 1700UTC.

Auroral activity disappeared for the majority of UK operators over the next 11 days only to re-appear with a very large scale opening on April 10. 50MHz operators had a field day with at least 14 countries being available to those prepared to tune around and find them.

Paul Feldhahn G7CFK (MCH) worked many stations, contacts including EI2GB (IO63), G1DWQ (IO90), GI6FHD (IO86), GM1XOG (IO85), OH3AWW (KP21), ON1IM (JO11), PE1LCL (JO21) and SM3JGG (JP71).

Ela Martyr G6HKM (ESX) concentrated on 50MHz rather than going up to 144MHz and was rewarded by working 7 new locator squares when s.s.b. contacts were made with PE1DTU (JO23), PE1JWV (JO33), SM3JGG (JP71), SM3LBN (JP80), SM6ESG (JO67), SM7CMV (JO75) and SM7JUQ (JO65). Many other stations were worked including G, GM, GW, LA, OH, ON, OZ and PA. Ela mentions that she still hasn't worked GD but a letter from **John Heys G3BDQ** (SXE) includes GD3AHV (IO74) as one of a number of stations worked during the aurora. Unfortunately this station prefers to operate on c.w. a mode which Ela does not enjoy. G3BDQ concentrated on c.w. to work OZ1GRS (JO45), OZ3ZW (JO54), OZ6OL (JO65), PA2AWU (JO32), PA0VAJ (JO33), SM7CMV and SM7FJE (JO65), all being new squares.

Steve Damon G8PYP (DOR) shared his operating time with 144MHz working only G1YOA (AVN) and G8GXP (YSW) via the aurora and at 2139UTC, LA9BM (JP40) via Auroral-Es.

G4UPS made the most of the event by working 40 stations in 12 countries. Highlights of the event, between 1254 to 1806UTC, included EI2GB (IO63), EI5FK (IO51), GD3AHV, LX1SI (JN39), OZ1ABE (JO65), SM7AED (JO65) and SM7FJE. Contacts were made via Auroral-Es with LA9BM at 2135UTC and with OH5NQ (KP30) at 2136UTC, the event finally fading out with Ted at 2200UTC.

M. Van de Velde ON1CAK worked 60 stations on 50MHz including GD3AHV, GI8YDZ, GM1SZF, GW3LDH, OH1AJ (KP20), OH2TI (KP30) and OH5NQ (KP10).

The event was also very good up on the 144MHz band. **Dave Brown GD4XTT** (IOM) managed to get on the air at 1646UTC to work DF9QX (JO42), EI8BEB (SGO), F6CCH (IN96), F6EZT (IN97), G4ZML (CVE), G8PYP (DOR), GI4MAC (ATM), GJ6TMM (IN89), OE5OLL (JN68), ON4AYR (JO10) and PA0AKN (JO21). Dave however was upstaged by his wife **Joice GD0ELY** who worked DF5BN (JN59), YU3ES (JN65) and YU3ZV (JN76) among many other stations.

Over in Ormskirk, Bob **Nixon G1KDF** (LNH) was also doing great things. Many German, French and Dutch stations were contacted on s.s.b., including DJ0JI (JN38), DG6HB (JO53), FC1OET (JN38) and F6FET (JN37) who were located in wanted squares. Between 1645 to 1745UTC the longer distance stations were worked, contacts being made with OK3LQ (JN88) at 1498km, SP2MSC (JO92) and SP3MFI.

Ian Wright GW1MVL (CWD) managed a number of useful s.s.b. contacts working DG3BCU (JO43), DG4BE (JO33), DK6LI (JO41), DL1BCT (JO32), EI8BEB, GD6ICR, GI4MAC, GI7EEV (IO74), GW4HDF, GW8JLY and PE1NFN (JO22).

Across in Belper, Vince Shirley G7ENF (DYS) first detected the event on 144MHz at 1230UTC when the German beacon DL0PR went auroral. Stations were then worked contest style until 1945UTC, new squares being worked with DG6HB (JO53), DG8NCO (JO50), DL8PCD (JO40), DL8SCQ (JN48), DG9NOK (JN59), FC1OET (JN38), F6CCH (IN96), HB9DFP & HB9EAH (JN37), OZ1ANA (JO55) and Y25WA (JO64). Best DX of the event was OE5OLL (JN68) but he has been worked on several occasions before. Vince runs an IC251E and mentions that the doppler shift on southerly stations was almost out of the range of the 800Hz r.i.t. control, the two HB9s and F6CCH being right on the limit.

John Lemay G4ZTR (ESX) was only able to come on for little over one hour but seems to have caught the best time as new contacts were made with HG8CE (KN06), I1KTC (JN45) and YU3ZV (JN76).

Down on the Dorset coast, G8PYP worked GD4XTT, GD6ICR and ON2AFT whilst G1DWQ worked FB1LJP (IN77) and a few DL, EI and G stations.

I first heard the aurora, at 1500UTC,

144MHz QRB Table
Distance in kilometres

Station	Tropo	Aurora	Meteors	Es
G0CUZ	2943	1758	1996	2943
G0OAZ	1251	876	2026	2249
G0OKM	2811	1488	—	2203
G0EVT	3080	1640	1808	3080
G0FYO	1315	1624	—	2019
G0ISW	1059	566	—	2057
G0LBK	3060	1755	1876	2350
G1OWQ	1454	1812	—	1836
G1EZF	1730	1757	1920	2375
G1KDF	3023	1421	—	2386
G1LSB	1319	733	1732	2723
G1SWH	3035	1429	—	2372
G3FPK	1835	1686	—	2337
G3LTF	1824	1846	2021	2174
G3SEK	1560	1681	1872	2154
G4ASR	2848	2029	2107	2853
G4DHF	1498	1530	2000	2448
G4JCC	1334	1158	1018	2173
G4MUT	1163	684	1533	2068
G4RGK	1466	1757	1920	2375
G4VXE	2862	1446	1501	2880
G4YTL	1404	1774	2025	2172
G4ZTR	935	1535	—	2130
G6DER	1834	997	1957	2068
G6DZH	2924	711	—	2233
G6HCV	2880	1450	1912	2880
G6HKM	1304	1555	—	2265
G6LEU	2620	910	—	2430
G8HHI	1742	—	—	2058
G8JDX	2667	1368	—	2663
G8LHT	3070	1780	1868	2510
G8MFJ	1209	1210	1329	2168
G8PYP	1083	1451	—	2318
GD4XTT	3053	—	—	1700
GI1JUS	3067	1614	1507	2216
GI8YDZ	1216	1809	1901	2562
GJ4ICD	1620	1100	2050	2090
GM4CXM	1428	1750	2100	2023
GM4YXI	3160	1881	2048	2513
GW6VZW	2830	1473	—	2236
ON1CAK	1420	1166	1948	2725
ON1COQ	1420	1166	1948	2124

Annual c.w. ladder

Station	Band (MHz) 50	70	144	430	Points
G4ASR	11	-	63	—	74
G4OUT	-	2	49	—	51
GD0ELY	2	-	41	—	43

Number of different stations worked since 1 January 1990

Back-Scatter

when I was gain matching the elements of my newly installed 50MHz wide-spaced Yagi with the antenna pointing up at 60 degrees. Once the tower was wound into the vertical position it was obvious that this was a good event and therefore I hastily connected a length of cable to the 144MHz antenna to hear what was happening. Results were very poor. Between 1555 to 1620UTC only 3 contacts were made, G0JNZ (IO70), PA2GER (JO21) and DL1BCT (JO32). Something was obviously wrong with the system and investigations made during the following day showed that the temporary feeder to the 144MHz Yagi was completely open circuit and that all contacts had been made via the earthy side of the cable!

The only reported contact on the 430MHz band was made between G1KDF and GM1SZF (IO88) with signals peaking 52A.

Following the big event of April 10, further auroras continued to be heard during the next four evenings. On April 11, between 1745 to 1815UTC, G1DWQ heard a number of GMs on 144MHz and made contact with GW4VEQ on the same band. GM4CXP (IO85) was worked at 1757UTC on April 12, again on the 144MHz band. Meanwhile, down on the 50MHz band, G4UPS worked GM3WYL (IO75) and GM4DGT (IO86) between 1759 to 1802UTC. During the evening of April 13, Jim G1DWQ heard the 48/49MHz television carriers go auroral between 1830 to 1930UTC but no amateur signals were heard to do the same. Still with the 50MHz band, G4UPS made contact with GM4DGT at 1611UTC via aurora on April 14 and heard GM3WYL at 1615UTC. Ted lost the aurora at his location in Devon at 1645UTC whilst at my QTH in Herefordshire the 144MHz band was still open but only just. Between 1630 to 1650UTC a number of c.w. contacts were made mainly with GM stations in IO85, 86, 87 and 88 but at 1640UTC, YL2MD (KO17) came back to my CQ call giving me a report of 51A.

During the next week there was no sign of auroral activity in central England but on April 23 the v.h.f. bands sprung into life again. Dave GD4XTT had a quick session on the 144MHz band from 1622 to 1643UTC working 10 stations in G and GW. Joice GD0ELY managed to get Dave off the rig to work a number of operators in G, GM and PA.

At my QTH, I made a number of c.w. contacts, between 1630 to 1701UTC, with LA8SJ (JO59), SM0CCM (JO89), SM1BSA (JO97) and a small number of GM stations. G1DWQ heard SM1BSA (JO97) and GM0JOL (IO78) being unable to work either but did work GM8MBP on 50MHz.

The auroral event on April 23 was most likely the last of the season, Sporadic-E now taking precedence.

Annual v.h.f./u.h.f. table
January to December 1990

	50MHz		70MHz		144MHz		430MHz		1296MHz		
Station	Country	Counties	Country	Counties	Country	Counties	Country	Countries	Country	Counties	Points
G1SWH	31	14	24	4	54	9	17	5	—	—	158
GD4XTT	23	3	—	—	57	12	5	2	—	—	102
G6HKM	5	7	—	—	47	10	8	3	—	—	80
G8PYP	12	7	1	1	28	8	9	2	—	—	68
G4ASR	3	12	3	1	27	14	—	—	—	—	60
G4ZTR	—	—	—	—	36	12	—	—	—	—	48
GW4HBK	—	—	24	6	—	—	14	3	—	—	47
G4SEU	—	—	42	3	—	—	—	—	—	—	45
G7CLY	—	—	—	—	41	4	—	—	—	—	45
G7CFK	18	12	—	—	—	—	—	—	—	—	30

The 70MHz Band

The only propagation events to liven up this band were the numerous auroral openings in March and April.

Dave Lewis GW4HBK (GWT) caught the aurora on April 10, managing to work 5 countries and 9 counties in the process. Contacts on s.s.b. were made with EI9FK (Co. Wicklow), GI4ONC (LDR), GM3WYL (SCD), GU2FRO (SRK), G3HRH (LEC), G3ZRK (DHM), G0ING (ESX), G6DER (YSS) and G8GXP (YSW).

Subject to there being no objections from his local RIS Manager, **Dave Austen G1EHF** (BRK) intends operating an unattended beacon on 70.070MHz during the month of June to coincide with the Sporadic-E season. The beacon will consist of a transmit strip from a Storno CQM-632 transceiver, with f.s.k. of his callsign and locator being applied to the crystal oscillator. The transmitter will supply 15W to a gamma matched dipole orientated north-west/south-east. Reception reports, both via Es or tropo would be welcomed.

Mid-Glamorgan is a county that you don't hear much 70MHz fixed station activity from. It is therefore pleasing to note that **GW4NBY**, located in Bridgend, is now active on the band.

Devon is another county with a scarcity of 70MHz operators. However, it is now worth putting the beam in that direction as **G6ZRM**, located in Paignton, can often be heard in the evenings on s.s.b.

The 144MHz Band

A number of auroras, some usable meteor showers, periods of extended tropo and an e.m.e. contest all served to liven the band up during April. And it can only get better!

A number of stations have reported working GW0KZG/MM in various wet squares. G1SWH, G3IMV, G4ZTR and G6HKM contacted Andy whilst he was in JO06, G1KDF worked him in IO56 & IO65 and GW1MVL found him in IO65 & ID75. G1SWH also worked him in IO56 and IO96.

On the tropo front, G8PYP has been making regular s.s.b. contacts into DL, F, ON and PA during March and April. Some of the better QSOs include DL1EFJ (JO31), DJ6LV (JO31) and DF0AA/P (JO32).

G6HKM mentions contacts with LX/ON1KPW on April 1 and GU3EJL (ALD) on April 13.

Having correctly terminated the LDF4-50 Heliax and Westflex-103 patch cable around the rotator to the 18-element Cushcraft Boomer I was determined to try out the system to confirm that it was working to my satisfaction. Contacts via meteor scatter were made during April with SM0KAK (JO89), he getting a 77 second burst from me at S7, SM5MIX (JO78) and IK0BZY (JN61). A schedule with OH5LK (KP30) at a distance of over 2100km was not completed although reports were exchanged bothways. Towards the end of the month the R.E.F. EME contest provided an opportunity to try some moonrise/moonset contacts whilst the moon passed through the vertical beamwidth of the single Yagi. Contacts were made with SM5FRH at moonrise on April 28 and with KB8RQ and VE7BQH at moonset on April 29. Signals were very copyable and readers may care to note that it does not require a super optimised antenna system to hear the larger EME stations off the moon. I was using a 10m boom length Yagi, no pre-amplification, 33m of heliax and an 15 year old FT-221 transciever in s.s.b. bandwidth with no filtering other than the ears! Other stations heard off the moon included UA1ZCL, F8SQ and DL5MAE.

The 430MHz Band

Activity on this band is apparently very low, having received only four reports and of those, GD4XTT mentions just 2 contacts in January, G8PYP reports a QSO with F1ANH (IN98) on March 17 and G6HKM writes to say that no DX has been worked at all.

The only time when there is some life on the band is during scheduled contest weekends. In the event on March 3, GW1MVL made s.s.b. contacts with GW8SJP/P (PWS), G4NPH (CBE), G6UMP (WKS), G0CLP/P (CBA), G0FEK/P (YSN) and G0FRR/P (DOR).

The Microwave Bands

I have received no station activity reports for some time but at least I am getting information regarding stations who are becoming QRV on the microwave bands.

G1SWH writes that he will be on 1.3GHz very soon and looks forward to working G6HKM shortly!

John Eaton GM4LBV (SCD) is now active on 1.3 and 2.3GHz running 200W of s.s.b. on 1.3GHz and 50W on 2.3GHz. He is expected to become QRV soon on 3.4 and 5.7GHz, running about 5W on both bands. Earlier this year John had a good contact, on 1.3GHz, with a station in Paris.

David Mann G8ADM (BKS) is back on 1.3GHz following a house move. He is running 10W into two 15/15 J-Beam Yagis with a GaAsFET low noise amplifier. Contacts are now being regularly made into the home counties but he reports that activity is much lower than in previous years.

VHF News

Following a trip to visit his brother 6Y5IC, in Jamaica, **Neville Bethune G3RFS** has left behind an R & N 50MHz transverter and 5-element F9FT Yagi. Neville reports that the last 50MHz activity from Jamaica was during 1980.

Andy Adams GW0KZG/MM sent in a report whilst he was docked in Dundee at the beginning of April. The severe weather in March was the worst encountered in the North Atlantic for 40 years, causing the first part of the trip to be abandoned. Andy did manage to make a number of contacts however. On March 15, from IO56, he worked G1SWH, G1KDF and G8XVJ, all on s.s.b. and G3UVR on c.w.

G4APA was heard the next day when Andy was in IO58 but contact could not be established. Meteor Scatter was tried for the first time with G3IMV and G0CUZ and although reflections were received no QSOs were made. On March 21, Andy was located in IP71 and trying again for an MS contact with G0CUZ. Unfortunately reflections were still poor resulting again in an uncompleted QSO. Whilst in the Faroe Islands Andy used the callsign OY/GW0KZG/MM and on March 24 when he was in locator IP62, he was able to make a few c.w. contacts during a late night aurora. Stations worked between 2319 to 0050UTC included GM4YXI (IO87), LA5SAA (JO29), LA9T (JO59), SM5DCX (JO89) and SM7GWU (JO78). Results were better on March 25 as an aurora occurred, at 1425UTC, during an afternoon off. Located in IP71, stations were worked within G, GM, LA, OZ and SM. The longest distance during this session was SM5DCX, with G4KUX (IO94) being the best from the UK. Another phase of the aurora was heard between 2320 to 2340UTC, SM4HFL (JP70) and SM5DCX being worked. Another aurora, on March 29, when in locator IO89, gave contacts with several Scottish stations and also G3UTS (ID94), G4APA, G8XVJ (IO83) and GI4KSO (IO64).

If you didn't manage to work GW0KZG/MM whilst he was sailing through JO18, don't worry. It is also possible to work the resident operators in this wet square! Both LA5JEA and LA8AEL are active from a gas platform in this locator, running 25W into a dipole. A beam is expected to be shipped out to them soon. They are mostly active around midday and from 1700UTC onwards.

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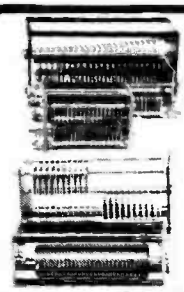

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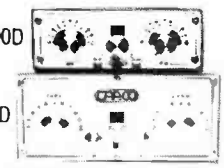

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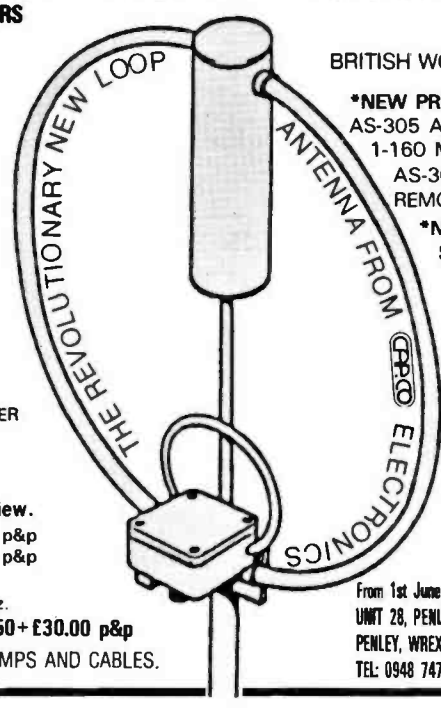

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Beacon and Repeater News

The Northern Ireland 50MHz beacon **GB3NGI** is now restored to service but is running on a temporary antenna. Reception reports should go to Alan Doherty GI8YDZ.

The Icelandic 50MHz beacon **TF3SIX** is now operational on 50.057MHz running 15W into a 5-element Yagi beaming 110 degrees. It has already been heard by many UK stations.

Two new beacons on the 144MHz band have also recently become operational. **TF1VVV** (IP04) is running 10W into a vertical dipole on 144.9705MHz and **TF8VHF** (HP84) is running 40W into a 2-element Yagi beaming at 120 degrees. Reports would be welcomed by TF8FP.

Two 1.3GHz television repeaters have recently become operational. The units are **GB3TN** in Norwich and **GB3RT**, formerly at Rugby, and now in Coventry. Reports would be welcomed by G4WVU and G6IQM respectively. The Hastings ATV repeater has been taken off the air for an extensive rebuild.

The UK's first DX Packet Cluster to become licensed, **GB7DXC** in Cheltenham, is temporarily operational on 144.650MHz until permission is granted by the DTI for a permanent frequency of 70.325MHz.

The Scarborough packet radio node **GB7EY** is now operational on 50.650 and 144.650MHz. The 430MHz port has changed frequency and is now on 432.625MHz. More information on this node and others run by the Yorkshire AX25 Packet Group, YAXPAK, can be obtained from Geoff Smith G4AJJ.

Expeditions

Look towards the Pacific Ocean region if you want to work **PE1MVJ/MM**. Operational now on 50MHz with 10W into an HB9CV, he visits VS6, BV, JA, KH6, KL7, W and XE. The trip ends in September.

From June 21 to July 12, **Trevor Day G3ZYY** will be active from Gibraltar in locator IM76. Trevor will be operating on 28.885MHz and 50MHz, with a modified IC211 and 50W amplifier, mainly at weekends, evenings and occasionally during the day. Callsign in use will be ZB2**HN** but QSLs should go via G3ZYY.

The next voyage by Andy Adams GW0KZG/MM on the Royal Research Ship *Challenger* is scheduled to start on June 21 and end on July 5. I will release information regarding this trip via packet radio under the subject "GW0KZG/MM".

Between June 27 to July 10, the **Square Bashers Expedition Group** will be active from the Island of Gozo, Malta in locator JM76. Activity will be on h.f., 50 and 144MHz. Operating frequencies on v.h.f. will be 50.165 and 144.265MHz, with all the appropriate calling frequencies being used. Callsigns in use will probably include 9H3LF although confirmation of this has not yet been received. Operators signed up for the trip include GW3NYY, G4FRE & XYL G7FRE, G4HGT, GW4LXO, G4VXE, GW8TVX and G0DAZ & XYL Carol.

Thanks are due to Joe 9H1CG and Mans 9H1GB for their help with the organisation of this trip.

Walter Steinwender will be using the callsign **SV/OE6WIG** when he and his family visit Greece (KM19) between July 7 to August 18. Although most activity will be on the 144MHz band, Walter hopes to operate on 50.100MHz, with 10W and a 5-element Yagi, if permission can be obtained. He will also be looking for tropo and Sporadic-E contacts, around 144.300MHz, for most of the time but will operate via meteor scatter during the period August 8-14.

Walter will be active between 0300 to 0700UTC on 144.027MHz, transmitting during the first 2.5 minute period, at a speed of 1200 letters per minute. The equipment will run 100W into a 9-element Yagi, which may be a bit marginal for the 2300km path into England via meteors but should be more than adequate if Sporadic-E is prevalent.

If you need the **Island of Sark** on 50, 70 or 144MHz, keep an ear out for G8BFL, G8UUR and G4ZUR, operating from there between July 21-28. They also plan to operate on the h.f. bands as well.

Between July 21-23, G8BJG and G0FDZ plan to be operating from the **Island of Guernsey** on 10GHz. They will be using both narrow- band and wide-band equipment. Schedules can be arranged by telephoning G2DSP on (0243) 823684.

Another microwaver, G4EFT, expects to operating from the **Isle of Wight** during the contest on July 22. On the same date you can expect to find G3FYX, G3KEU and G3VKV operating from **Hardy's Monument**.

Meteor Showers

The following data, concerning meteor showers occurring in the next few weeks, will help you determine in which direction to beam at specific times and when the shower is below the horizon.

The June Perseids, alternatively called the 54 Perseids, are encountered between June 22-30, peaking on Monday June 25. Between 0700 to 0900UTC beam north-east or south-west, 0900 to 1200UTC beam east or west, 1200 to 1500UTC beam south-east or north-west, 1500 to 1600UTC beam south or north. The radiant is below the horizon from 1700 to 0300UTC.

The Beta Taurids shower lasts for over one month, from June 5 to July 17, reaching a maximum on Tuesday June 26. This shower has virtually the same beam-heading characteristics as the June Perseids, the only minor difference being that the shower is below the horizon from 1700 to 0500UTC.

The Alpha Orionids occur between July 9-15, with best activity being on Thursday July 12. Between 0600 to 0800UTC beam north- east or south-west, 0800 to 1200UTC beam east or west, 1200 to 1400UTC beam south-east or north-west. This shower does not favour the north-south path and is below the horizon from 1600 to 0500UTC.

The Nu Geminids stream is encountered between July 9-18, peaking on Thursday July 12. Between 0600 to 0900UTC beam north- east or south-west, 0900 to 1200UTC beam east or west, 1200 to 1400UTC beam south-east or north-west, 1400 to 1500UTC beam south or north. The radiant is below the horizon between 1700 to 0300UTC.

The L. Geminids shower lasts for most of the month of July, between the 4-29th, the best day being Thursday July 12. Between 0700 to 0900UTC beam north-east or south-west, 0900 to 1400UTC beam east or west, 1400 to 1600UTC beam south-east or north-west. The north-south path is not usable with this shower.

It is below the horizon from 1800 to 0400UTC.

QRZ Contest!

The Scandinavian activity contests will be run on the following dates. Microwave activity, July 2, 144MHz, July 3 and 430MHz activity, July 5.

The RSGB are holding their v.h.f. National Field Day contest between 1400 to 1400UTC on July 7-8. Up to four separate stations may operate simultaneously on the 70, 144, 430, 1296 and 2320MHz bands. The 70MHz c.w. section will take place in the period 1400 to 2200UTC, and the 70MHz s.s.b. section will take place in the period 0600 to 1400UTC, with close down between 2200 to 0600UTC.

The 1296 and 2320MHz stations will also close down for the period 2200 to 0600UTC.

The 6th Annual *CQ*-WW-VHF-WPX Contest possibly takes place on July 21-22 although at the time of writing these dates had not been confirmed. Operation takes place on the 50, 70, 144, 220, 430, 902 and 1296MHz bands over a 48 hour period. The rules are not complicated but with eight classes of entrant it is best to obtain a copy of the rules, either from myself or from someone who subscribes to *CQ* magazine.

Oh, by the way - it stands for *CQ*, World Wide, Very High Frequency, Worked all Prefixes Contest!

Microwave Cumulative Contests, arranged by the RSGB, are scheduled for the following Sundays; July 22, August 19, September 9 and October 6. All or any microwave band from 3.4GHz may be used on these days.

Help

The column works! Following a request, in the May issue of *PW*, for details of 144MHz Yagis designed by OZ5HF, I received a letter and promotional information from Tony Read G0GMS, the UK agent for these antennas. I have passed the information to G0LBK who had originally asked for it. If you want further details of the full range of OZ5HF 144 & 432MHz Yagis, you can telephone Tony on (0403) 55011.

Deadlines

Please send your letters in to me by June 25 at the very latest. The dates for the following two issues are July 30 and August 24.

I am now also able to receive messages via packet radio at my local mailbox GB7TCM. If you have access to the DX Cluster GB7DXC you can also leave messages there but note that GB7DXC is not a mailbox in the normal sense and therefore NTS traffic is not forwarded to it.

IF YOU HAVE HAD DIFFICULTY IN OBTAINING YOUR COPY OF PRACTICAL WIRELESS THEN WRITE TO, TELEPHONE OR FAX , ELAINE G4LFM, AT PRACTICAL WIRELESS, ENEFCO HOUSE, THE QUAY, POOLE, DORSET BH15 1PP.

TEL: (0202) 678558. FAX: (0202) 666244.

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RTTY

Reports to
Mike Richards G4WNC
200 Christchurch Road,
Ringwood, Hants BH24 3AS

I recently managed to find time to have a go in the Alesandro Volta contest on the weekend of May 12/13. This is a very popular contest which usually attracts a world-wide entry making it a good time to catch some rare DX. Because I was working on the magazine stand at the VHF Convention on the Saturday, my only opportunity for any logging was late on Sunday morning. After a quick tune around, it became clear that the best conditions were to be found on 21MHz. There was plenty of activity although the majority was of European origin, the few I logged were: SP9BCH Poland, SM7BGE Sweden, UA4HBW USSR, LZ5W and LZ2KZA Bulgaria. The best DX for me was JA2EJA, again on 21MHz and he was putting out a very good signal indeed. I next had a go at 14MHz but, although there was plenty of activity, there were no signs of any of that tasty DX. After scanning around the other bands, I decided I must have missed the best of the conditions, so I gave up at that point.

I shall await the results with interest as its often very enlightening to see the amount of DX that some operators can pull out of what seem like very poor conditions.

SARTG Contest

Another important contest in the calender is the SARTG (Scandinavian Amateur Radio Teleprinter Group) World Wide RTTY contest. This contest has undergone a major change this year as all the digital modes have now been included. This must be the way forward if the contests are to survive, as many RTTY only contest are tending to suffer a marked lack of interest. Providing I'm not away at a rally, I will be monitoring this contest very closely.

For those of you who might like to try your hand at this contest, here are the details:

Period: Saturday August 18, 0000UTC to 0800UTC and 1600UTC to 2400UTC.

Sunday August 19, 0800UTC to 1600UTC.

Bands: 3.5MHz, 7.0MHz, 14MHz, 21MHz, 28MHz.

Modes: Baudot, AMTOR, ASCII and Packet (digipeaters not allowed). The same contact may be contact once on each band in one of these modes for QSO and multiplier credits.

Classes: Single operator, all band. Single operator, single band. Multi-operator, single TX, all bands. Shortwave listeners.

Message: RST and QSO number starting at 001.

QSO points: QSO with own country five points, with own continent ten points and with other continents fifteen points. In Australia, Canada and USA each call district will be considered as a separate country.

Multipliers: Each country as per the DXCC list will count as one multiplier on each band. Each call district in Australia, Canada and USA will count as an additional multiplier on each band.

Scoring: Sum of QSO points x sum of multipliers = total score.

Shortwave listeners: Use the same rules but based on stations and messages copied.

Awards: To the top stations in each class, country and district providing the number of QSOs is reasonable.

Logs: These must be received by October 10 and must contain: band, Date, Time UTC, Call, Message (sent and received), Points and multiplier. A separate sheet is required for each band along with an overall summary sheet. With multi-operator entries the calls of all operators involved must be included.

All completed logs and comments for future improvements should be sent to: Bo Ohlsson SM4CMG, Skulsta 1258, S-710 41 FELLINGSBRO, Sweden.

ProComm Plus

This month I thought I would feature a particularly versatile communications package for the IBM PC range of computers and compatibles. ProComm Plus is distributed through the Shareware scheme and as such is available in trial version very cheaply. Despite the ease of availability, this package should not be underrated as it is one of the most powerful communications packages on the market.

So what does the package do for me as a radio amateur? First and foremost it's a serial communication package, i.e. it allows information to be exchanged via the serial port. Although this sounds a simple enough task there are in fact a vast number of differing standards in use ranging from the speed of transmission through to the file transmission protocol. In order for a program such as ProComm Plus to be effective it must be able to easily handle as many as possible of the options or standards.

Another area that is very useful in a communications package is the ability to emulate a number of standard terminals. This facility is provided in ProComm Plus and in fact is expanded to include some sixteen different types of terminal. The main difference between the various terminals is the code generated when some of the non-alphabetic keys are pressed. A classic example of this is of course the function keys where some terminals have specific commands or character strings tied to these keys. The other area of difference concerns control functions, i.e. the codes used to clear the terminal screen etc.

Very closely linked to the terminal emulation is the character translation option. This allows the user to change the way in which characters are presented. A common use of this is the ú and # characters which are often required to be reversed so that a key marked ú is actually displayed as #.

With ProComm Plus any received character can be changed to any other character. From a radio point of view this feature can be very useful because you could in fact build up a complete ITA No2 character conversion table which could then be used as the basis of a receive RTTY program.

The only snag from a RTTY point of view is that, in its present form, the lowest speed supported is 300 baud this means that the standard 45 baud is not available. However this is not insurmountable as this type of speed conversion can be achieved with a UART (Universal Asynchronous Receiver Transmitter) which is a basic communications integrated circuit used to convert serial data into parallel data. By connecting two of these back to back and providing appropriate clock signals, all manner of speed conversions can be provided.

An extension of the character conversion option is the key mapping which allows the function keys to be programmed with a variety of short cut commands. These are particularly useful for issuing commands to Packet TNCs or other data controllers.

For the programming of longer messages the keyboard macro facility can be used which allows strings of up to fifty characters long to be stored against the keys ALT 1 to ALT 0. All the emulation translation and macro information can be saved to disk so several differing sets can be built up for specific functions.

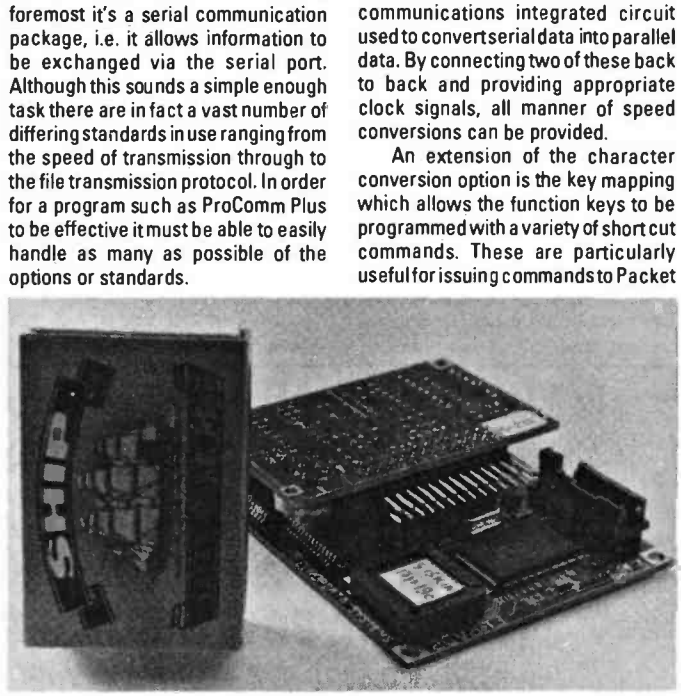
Another very powerful and time-saving facility is provided by the command or script file. These are simple ASCII text files which contain specific commands that control the operation of ProComm Plus. These can be set up to handle all your standard log on commands as the process is interactive with the device to which your computer is connected. Its original designed used was to enable the program to automatically log on to such services as Prestel and Telecom Gold. However the command language is so powerful it can be used to not only to set up the basic communications parameters but also to set the screen, prompt for user input to name but a few.

In order to simplify the use of these files ProComm Plus can even generate its own Script files. This is achieved by putting the program in 'record' mode and typing the commands you want included in the file. ProComm Plus then generates a Script file which not only contains the commands you typed but details of the response from the remote terminal. I can see that this could be very useful for the Packet operator who regularly checks the local mailbox. You can even set the program up to automatically log on to a mailbox at a particular time download your mail and save it to disk!

No comms package would be complete without file transfer options and ProComm Plus is very capable in this area. In addition to basic ASCII file transfers it can handle just about every other common system - you can even set up your own external protocols.

For those of you who regularly have an input to mailboxes, ProComm Plus has a built in text editor and file viewing facility which means that messages can be prepared from within the comms package without have to exit to a separate text editor.

So there we are, an extremely powerful communications package which represents remarkable value for money even at its full registered user price. In this feature I have really only scratched the surface as far as the potential for this program is concerned and I would thoroughly recommend it as the first choice for anyone with a need to use serial communications on an IBM compatible machine. For more information on this program or the whole range of shareware products, contact The Public Domain Software Library, Winscombe House, Beacon Road, Crowborough, East Sussex TN6 1UL.



The new data controller from Siskin Electronics

Commercial Packet Radio

Those of you who have experienced Packet radio may well have realised that the format developed for amateur radio has a lot of potential for commercial use. The ability to transfer data over an error free link using conventional voice radio equipment opens up a whole new area of data communications which could revolutionise the way some companies operate.

One example of this would be a service organisation that uses mobile radio as its method of controlling its field force. The addition of a packet TNC at each end of the link combined the provision of miniature printers in the vehicles and a terminal at the base station would allow the transmission of hard copy direct to the vehicle. This operation could take place even if the service engineer was away from his vehicle clearing a fault. Another advantage is that the control point would also have confirmation that the message had been received.

From this I'm sure that you can see that the potential is enormous.

The problem, up until recently, was that being strictly an amateur communications mode, there was no licensing provision to allow the system to operate over commercial p.m.r. systems.

Fortunately that has now changed and within the UK 500mW can be used on u.h.f. for the transmission of telemetery. Although 500mW is not a lot, it can provide a very useful coverage within an industrial estate.

The key to my mentioning this whole topic is in fact the release of a new data controller from Siskin Electronics who are famous for their excellent service in amateur packet.

The new controller is called EURAD and operates to the EX-25 specification and meets all the regulatory requirements for connection to existing PMR equipment.

Additional protective features include over deviation protection and shutdown in the event of a malfunction.

Interfacing the EURAD has been made as simple as possible and it links with the microphone socket and external speaker for connection to the radio and has an RS-232 configuration for connection to the data device, which could be a computer or perhaps a printer.

The heart of the EURAD is a Toshiba TMP Z84C015 processor and HDLC which is clocked at 6MHz. It also features 32K of battery backed RAM and 32K EPROM.

At present the only speed available is 1200 baud but Siskin, together with its partner Europedata of Antwerp, are developing high speed systems which will handle up to 14400 baud.

The EURAD is constructed using advanced surface mount technology which results in a very compact and cost effective unit which further eases the interfacing of the unit in a mobile radio environment.

Anyone requiring more information on this range of products should contact Siskin Electronics Ltd., 2 South Street, Hythe, Southampton SO4 6EB. Tel: (0703) 207155.

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Amateur Satellites

Reports to
Pat Gowen G3IOR
17 Heath Crescent
Hellesdon, Norwich, Norfolk NR6 6DX

The main ongoing interest at this time is still focussed on the progress of of the new microsatellites, so we commence this month with this news, coupled with an effort to explain some of the complex technology and terminology involved. This is followed up with the latest information on the other current operational amateur radio satellites, plus news of some of those in the pipeline.

UOSAT-OSCAR-14 Status

The command team are planning to load increasingly sophisticated housekeeping software to the PCE. The new housekeeping software includes a 'file system' for storing WOD and data frames from the Cosmic Particle Experiment (CPE). This data will be downlinked using the standard PACSAT Broadcast Protocol, inside AX.25 UI frames. Once the housekeeping software is installed, Jeff Ward of the University of Surrey will begin working on the BBS software, a host-mode BBS designed by Jeff Ward G0/K8KA and Harold Price NK6K, specifically for the PACSATs.

Jeff Ward G0/K8KA, of the University of Surrey AMSAT/UoSAT laboratory, gives details of the latest information on the operational UoSAT, and of the new software now being uploaded into UO-14. He states:

"The past several weeks have seen 9600 baud packet activity begin through UO-14s Packet Communication Experiment (PCE). This week (early May) a much more sophisticated multi-tasking operating system was installed in several stages. The first stage involved the multi-tasking kernel and the Prototype Housekeeping Task (PHT). The PHT greatly facilitates the loading of software into the RAM memory of UO-14. This new software also allows ground stations to digipeat through the PCE. Many stations have been using this digipeating capacity of UO-14 to test their 9600 baud modems. Also added to the PHT software is the telemetry support for the Cosmic Particle Experiment (CPE). The CPE continuously monitors cosmic particle activity and the observations are reported in 53 bytes of data in the telemetry every five minutes".

Jeff points out that to complete the final software load to UO-14 so that its mailbox BBS comes into operation, a great deal more work needs to be done. The software which performs the BBS functions includes a file server system, the AX.25 packet handling algorithms, and more telemetry development to handle the Whole Orbit Data (WOD) tasks. He reports a major programming milestone was reached on April 27 when a partial load of the final flight software was loaded into UO-14.

In addition to Jeff at the University of Surrey, software engineers NK6K and WB6YMH are working very diligently on the other side of the Atlantic to get the message store-and-forward software completed soon.

After just one week of operation, numerous stations have been successful in modifying their equipment to run 9600 baud packets through UO-14. ON6UG, DF3ZL, DF5DU, I2KBD and IW2ECL all connected to stations (other than themselves) in the first few days of the high speed mode.

The level of activity at 9600 baud on UO-14 demonstrates that it is relatively easy to become operational at that speed. A complete list of stations so far logged on the UoSAT-OSCAR-14 MHEARD list includes DF3LZ, DF5DP, DG3LAE, G0BDD, G3RUH, G4WFQ, G8TZJ, GM4IHJ, I2KBD, JA6FTL, JH1LVN, JH3FDA, JH7CKF, JR1EDE, JR1FRF, KA2MOV, KF4WQ, LU1BEE, LU8DYF, N4HY, ON6UG, VK3DTO, and W7KRC. It was reported that KA2MOV was able to connect to N4HY via U-O-3 using 25 watts on transmit and omni-directional antennas for both transmit and receive.

Alberto Zagni I2KBD, reports that the modifications to his FT-736R were very easy and the whole set up was 'plug and play'.

John Branegan GM4IHJ, reports that Uosat 3's signal is the strongest/steadiest of all the packet satellites. He takes the signal from the Icom 451 (pin IC7 RX discriminator), and feeds it direct to the G3RUH 9600 f.s.k. modem. (Note: not the Fuji modem). At TP4 on the modem he sees the signal waveform, but, when these transmissions are 'BERT' (Bit Error Rate Tests), the TP6 output of the modem RX Oata out, shows a d.c. level consequent on the test transmission being a succession of 1s.

John's RUH modem RX data goes to a modified TNC 320 (with its own modem disconnected). He relates: "All you see on the TNC is a steady DCD LED light when signal is present. You get screen print with packet, but not with 'BERT'. One warning - you must reset the Baud command on your TNC BEFORE you start. Some TNCs use manual shift, others use software. Which ever yours is, your receive baud rate MUST be 9600. You can, should you wish, set the Terminal rate to 9600, and set your computer software to 9600 if permissible... BUT... you must remember that your Terminal and your computer must be the same baud rate, or they will not communicate one to the other. Remember to reset to 1200 baud when you go back to using the Fuji modem on 1200 BPSK". John feels that before long you will soon get fed up with all this plugging and unplugging, baud setting and resetting!

GM4IHJ writes: "The Uosat 3 9600 f.s.k. system looks like the one for me. Given the NK6K and G0/K8KA software, it should have few of the problems of FO-20. As is the case with the Microsats, you can digipeat through UoSAT-OSCAR-14 any time you see d:1 at the end of the LSTAT message. For example:

UDSAT3-1>LSTAT I P:0x3000 o:0 I:13037 f:13037 d:1

The uplink is 145.975 MHz, and UO-14 has a.f.c. on the uplink, so doppler tracking is not too critical.

The transmission is not always on 9600b.p.s. UoSAT-3 mainly sends 1200b.p.s. signal (not packet format). When the 9600 baud rate is on, it has usually sent for 1.5 minutes in every 6 minutes. With the receiver set to f.m., the 9600 signal sounds like noise. There is no tuning note, and newcomers can be forgiven for assuming that no signal is present, but, tune your receiver across the signal and you will hear a change as you go from off tune noise, onto the noisy signal. To get properly on tune a centre tuning f.m. meter is

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essential. Modern transceivers and receivers let you to switch between centre tuning and signal strength, and you will need to do this because signal strength is the only guide you have to tell you when your antenna tracking is optimised. Tuning is much less critical than with BPSK packet.

You can tune in 1kHz or 5kHz steps. a.f.c. would be nice, but few receivers presently feature this aid. I use scope eye diagram as tracking aid.

UoSAT-OSCAR-15

The team at Stanford, California, using the big dish, have now succeeded on a number of occasions in detecting local oscillator leakage from the UO-15 command receiver whilst the spacecraft was in eclipse, so indicating that the on-board NiCad battery pack is indeed functioning. Further tests to check the command system are now following, by attempting to change the listening frequency, evidenced by the change of receiver local oscillator frequency that will result when the commands are successful.

Contrary to hearsay, all is not lost with this ailing spacecraft, and the International AMSAT team are quite optimistic in re-setting the system and having the other University of Surrey satellite up and active just as soon as time and energy permit the many serialised functional checks and tasks to be carried out.

DOVE

On the AMSAT-NA Operations Net of 22 April 90, Microsat command engineer Bob McGwier N4HY gave a brief rundown on the current status of the BRAMSAT Project DOVE satellite. After the DOVE c.p.u. crash in March, the primary transmitter on 145.825MHz was locked on in a condition where no data was being transmitted. Routine commanding of the spacecraft was rendered impossible, as commands are sent up on the same band during the 'off' periods. As the DOVE 145.825MHz TX was on continuously, it was 'deaf' to any uplink command needed to assert control.

Eventually, with the help of the big moonbounce array at W5UN and fortuitous circumstances, the c.p.u. was reset and control was regained. On the following day, the two meter transmitter was turned off and the experimental 2401.220MHz 'S' band transmitter was activated, so providing the only downlink available during the interim recovery period.

A decision was made not to resume any DOVE operation on 145MHz until a completely new software load could be accomplished. This meant that return packets from the Microsat Boot Loader (running in on-board ROM) would have to be recovered from the 'S' band transmissions. DOVE's provider, BRAMSAT President Dr. Junior De Castro, PY2BJO, supplied N4HY with an 'S' band receive converter and an antenna system to be used in the recovery effort. When this equipment was installed at N4HY, Bob was able to verify what other 'S' band receiving stations around the world (including ON6UG, K0RZ, and KF4AU) had already discovered, i.e. that the phase shift keying modulation index on the transmitter was much lower than expected. In simple terms, the binary data was not shifting the S band carrier a full plus and minus 180 degrees as it had been designed to.

Listening on a sideband receiver, the signal sounded like mainly carrier, with the data content only at a low volume. Additionally, data being sent via this transmitter was from the MBL which transmits incomplete telemetry packets, and even these only infrequently! Command stations have experience with this data format, but it cannot be decoded directly by regular TNCs, so it was difficult for other operators to participate in data collection even though they may have 'S' band gear.

Since the reset, it has been determined that DOVE is in a safe and stable condition running the MBL firmware. N4HY has developed a DSP (Data Signal Processing) based technique to decode with some degree of certainty the undermodulated packets returned on DOVE's 'S' band during software uploads. He expects to be able to load and verify a new operating system on DOVE (with some degree of difficulty) and then resume 145.825MHz transmissions. A full recovery is expected, and when it returns, if all goes according to plan, the speech f.m. will be active too.

During the time required to get the 'S' band receive gear and demodulation techniques developed, work has been proceeding on the first, rudimentary PBBS systems for LUSAT and PACSAT. After these systems are installed and in use, probably by the time you are reading this information, full attention will be concentrated on the DOVE recovery.

AMSAT-NA and BRAMSAT recognise the popularity of DOVE and regret the inconvenience that these start up delays have caused to educators and other amateurs world-wide who are anxious to see DOVE begin its operational mission. It is, of course, imperative that all facets of spacecraft checkout and operation, including this first crash recovery, be done thoroughly and with the utmost care.

WEBERSAT Update

From **Steve WD8QCN/7** at Weber State University, Ogden, Utah, birthplace of the Weber microsat, comes the latest information on the progress of their microsat.

In late April, after a brief pause for gathering and transmission of WEBERSAT picture data, Whole Orbit Data (WOD) collection and retransmission recommenced.

The telemetry format has temporarily changed to binary, and can handle up to ten channels consisting of the array levels, impact detectors, horizon sensors, etc. according to those selected from ground station command. The data can be collected over a 6.3 hour period, with a sample taken every ten seconds.

WEBERSAT

Preliminary tests have been carried out by G0/K8KA & G3RUH using the PACSAT microsat. The communications experiment used 9600 bps digipeating, and early data has been received from the Cosmic Particle Experiment. They have been working on new data formats for Whole Orbit Data (WOD) dumps, the new formats presenting data in on-board memory by which Bob and Harold can command the microsats to downlink the information stored.

By using this technique, they have determined that AO-16 has achieved magnetic lock with earth's field, which results in the satellites +Z surface pointing toward earth when over the south pole and away from the earth when over the north pole. They feel that there is still some residual wobble, but for the most part, the satellite has stabilized.

As Bob and Harold continue to test this software, the digipeating function of AO-16 will be disabled. To determine if the digipeater is active, check the LSTAT telemetry line. If you see "d:0" this means the digipeater is off, "d:1" means the digipeater is on. The telemetry normally comes down once every 10 seconds, but when a packet is digipeated, the time interval switches to 30 seconds. If telemetry is coming down each 10 seconds, look at the LSTAT line, and if d=0, DON'T TRANSMIT. If you see other digipeat activity, then you will know that the digipeater is on and it is OK to transmit. You must specify the spacecraft callsign e.g., PACSAT-1 to get digipeated. This is because there are multiple spacecraft on various uplink frequencies.

OSCAR 13

The AO-13 transponder operational schedule as from 9 May 1990 (until further notice) is as follows:

Mode 'B': MA 000 to MA 100.

Mode 'JL': MA 100 to MA 125

Mode 'LS': MA 125 to MA 130 ('S' beacon turned ON, but 'S' mode transponder OFF).

Mode 'S': MA 130 to MA 135 (Mode 'S' beacon placed OFF, but 'S' mode transponder ON)

Mode 'BS': MA 135 to MA 140 ('S' beacon still OFF, 'S' and 'B' mode transponders both ON).

Mode 'B': MA 140 to MA 256 ('B' mode ONLY now).

The omni antenna will be used around perigee, from MA 220 to MA 040

In early May there was a transponder and attitude change. During the changing of position by magnetorquing to B.LON/B.LAT 180/0, as all power possible was needed, so the the transponders had to be commanded OFF from MA 200 to MA 060.

AMSAT-NA Operations Nets are now a regular feature, and offer a valuable source of topical satellite and general space information to both participants and casual listeners. Mode B nets are conducted on an AO-13 downlink frequency of 145.950. Mode J/L nets are held a downlink frequency of 435.970. When the h.f.

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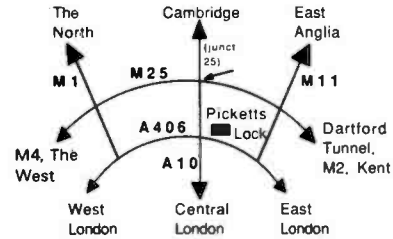
LONDON AMATEUR RADIO SHOW

Saturday March 9th and Sunday March 10th

1991

Make a note in your diary for the next!

Following the success of the first London Amateur Radio Show, the organisers are pleased to announce that the Show will take place once again in 1991 at Picketts Lock Centre, Picketts Lock Lane, Edmonton, London N9.



Traders wishing to book space should contact **The Secretary, London Amateur Radio Show, 126 Mount Pleasant Lane, Bricket Wood, Herts, AL2 3XD. Tel 0923 678770.**

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bands are out, or contests rage and readability is rendered impossible on the 14.282MHz International AMSAT net, the satellite downlink is always dependable. The days and times of these nets are short time fused, and will be given out on the HF AMSAT Nets in advance.

OSCAR-10

Now that the sun angle has improved, a good long period of full time Mode 'B' operation will recommence on A-O-10. Remember that the beacon is a plain carrier, as all IHU operation has long ceased. If you hear f.m. wobble on this carrier, reduce power or stay off until it is heard to be stable again.

G3RUH has calculated that the satellite attitude, found to be at A.LON/A.LAT 28/11 in April will change to A.LON 17 and A.LAT -5 in July this year.

FO-20

Bob G8ATE of Leicester can normally be heard on the satellites most passes, as he is a very active station. Apart from a period of silence following the February high winds, which brought down his antennas, he has made the most of this year, and has worked the following stations on FO-20 mode 'JA' SSB.

HB9CQK, HB9SAE, HB9OAB, IK1FJI, I7LIT, I1YK, I5IT, IW2DMN, IW4ASO, IW1BMJ, IW1PPZ, I6KZR, SM6RS, SM3RF, SM7JIB, DD1US, DL1YDD, DB9DV, DJ2QV, DF2BX, OG6EAS, DK2VLT, DH6YAR, PA0AND, PA0DIL, N2IQU, G3WFM, G4CUO, G4ZHG, G6HMS, G2BFO, EA6IC, OH1AYQ, FC1GTU, YU3BA, OK2VLT and KG6GU/F.

All this was accomplished using 30W into a 145MHz turnstile for the uplink and a 'sundial' hairpin loop (as employed by G4CUO, described earlier in this column) feeding a 435MHz pre-amp to a 435MHz to 29MHz down converter.

RS-10

Bob finds RS-10 to be working very well, although some very strong c.w. and s.s.b. QRO stations cause problems, as does 29MHz f.m. and packet radio uplinks to OSCAR-20 also. Using his turnstile he made QSOs with YO5QAQ, OK1UFC, OK1VVM, SP8RHL, SP9BIF, SP6ASD and SP6LB, plus lots of West European stations. He found and worked two Icelandic stations in the form of K4HPB/TF and KE0YG/TF. One very pleasing QSO was with Lawrence UA0/GB4MSS, operating from the North Pole expedition base camp on Sredny Island.

Forthcoming Satellites

Now for the latest news on the satellites to be. First, the up and coming USSR satellite RM-1

From **Leonid Labutin UA3CR**, at his club station UA3KP/RK3KP, we have been sent the following information compiled by DB2OS, RC2CA and UA3CR on the forthcoming USSR/West Germany AMSAT amateur radio satellite RADIO-M-1, hitherto known as 'RS-14'. RADIO-M1 is an AMSAT-DL/AMSAT-U Joint Project

Linear Transponders and Rudak-II:

RUDAK II (2nd Generation of the earlier problematic OSCAR-13 RUDAK) is now a part of the Russian amateur radio transponder. 'RADIO-M1'. 'M' refers to Molodechno, White Russia, USSR, base of the satellite construction and testing team, whilst 'RUDAK' is the AMSAT-DL acronym for 'Regenerative Transponder for Digital Amateur Radio'.

COMMUNICATIONS: The transponder is a joint project of AMSAT-U-ORBITA in Molodechno, the AMSAT-U-SPUTNIK group, a section of the Adventure Club in Moscow, and the AMSAT-DL/RUDAK group based in Marburg, Munich and Hanover.

LAUNCH: In June, 1990, from Plesetsk, USSR, by a PROTON rocket. The specific date is not yet known, but it is possible that a launch net may be organised for the event. Update details on these will be given out on the AMSAT nets.

SATELLITE: A 'Subtenant' to GEOS, a Russian geological research satellite.

ORBIT: A circular orbit of 1000 Km altitude at 83 degrees inclination. ORBITAL PERIOD: ca 105 minutes.

AMATEUR RADIO PAYLOAD:

Linear Transponder 1:

Uplink: 435.102 - 435.022MHz (80kHz bandwidth)

Downlink: 145.852 - 145.932MHz (inverted)

Output power: 10W maximum. (Very strong!).

Beacon c.w. telemetry (8 parameters): 145.822MHz. 0.2W

Beacon digital telemetry (30 parameters) 1200b.p.s. p.s.k.

R+Scrambler 2kHz deviation 145.952MHz. 0.4W

Regenerative Transponder - RUDAK-2:

Two onboard computers with IPS operating system for packet radio (AX.25) (Mailbox, telecommunications experiment with digital signal processing up to nearly 20 kHz, etc.) 1 Mbyte RAM disk. Four separate uplink channels.

Gain of satellite RX and TX antennas: 2.3dBi each (e.g. dipoles)

Input sensitivity: < -125dBm (435MHz) for a S/N of 45dBHz

SAT-RX-1: 435.016MHz +-10kHz 1200b.p.s., FSK, NRZIC/Biphase-M (JAS, PACSAT)

SAT-RX-2: 435.155MHz +-10kHz (a.f.c.) 2400b.p.s., BPSK, Biphase-S

SAT-RX-3a 435.193MHz +-10kHz (a.f.c.) 4800b.p.s., RSM, NRZIC/Biphase-M

SAT-RX-3b: 435.193MHz +-10kHz (a.f.c.) 9600b.p.s., RSM, NRZI (NRZ-S) + Scrambler

SAT-RX-4: 435.041MHz +-10kHz (digital a.f.c.) RX for RTX-DSP experiments

Output signals of RX-4 are the In-phase and Quadrature components, I(t) and Q(t), which are sent to the DSP RTX immediately after analog/digital conversion with 8 bit resolution. This supports various modulation modes depending on the software. All other receivers provide data (D) and clock (C) at their outputs.

The downlink can be switched to the following operating modes:

Satellite Transmitting frequency: 145.983MHz

Mode 1: 1200b.p.s., b.p.s.k., NRZI (NRZ-S) (like FO-20)

Mode 2: 400b.p.s., b.p.s.k., Biphase-S (e.g. the AMSAT mode for the DSCAR-13 beacon)

Mode 3: 2400b.p.s., b.p.s.k., Biphase-S (as planned for OSCAR-13)

Mode 4: 4800b.p.s., RSM, NRZIC (Biphase-M) (like 4800b.p.s. uplink)

Mode 5: 9600b.p.s., RSM, NRZI (NRZ-S) + Scrambler (like 9600b.p.s. uplink)

Mode 6: c.w. keying (only for special events)

Mode 7: f.s.k. (F1 or F2B), e.g. RTTY, SSTV, FAX, etc., (only for special events)

Mode 8: f.m. modulated by D/A signals from DSP-RISC processor (e.g. speech)

Power consumption: 14V@350mA (max) = 4.9 W;

Standby: 80mA (RUDAK without power amplifier)

Mass: 6.2kg Dimensions: 230 x 320 x 120mm^3

Linear Transponder 2:

Uplink: 435.123 - 435.043MHz (80kHz)

Downlink: 145.866 - 145.946MHz

Output power: 10W maximum

Beacon c.w. telemetry (8 parameters): 145.948MHz 0.2W

Beacon digital telemetry (30 parameters) 1100b.p.s. p.s.k.

R+Scrambler 2kHz deviation 145.838MHz 0.4W.

Beacon digital telemetry (30 parameters) 1100b.p.s. p.s.k.

R+Scrambler 2kHz deviation 145.800MHz 2W

Total power consumption: 40W (maximum)

Total mass: 22kg. Total dimensions: 480 x 400 x 300mm^3

AMSAT-I satellite

Alberto Zagni I2KBD, reports that AMSAT-IT achieved a major milestone last week in the construction and assembly of their MICROSAT when they successfully tested their new on-board computer (OBC) design. This OBC is based on the design found in the current flock of MICRDSATs today. The biggest difference is that the AMSAT-IT DBC now consists of three printed circuit boards instead of two. With the help of Lyle Johnson (WA7GXD), Harold Price (NK6K), and Bob McGuiwer (N4HY), the OBC worked the first time running the software they had developed. During the same testing, I2KBD also reported that the computer was sending telemetry.

Phase III-D

Amateurs from around the world who are involved in the Radio Amateur Satellite Service are meeting in Marburg, West Germany from May 7 through May 9 to begin work on another major amateur satellite project. The purpose of the meeting is to set specific design goals for Phase III-D. The three days of meetings will cover a wide range of topics. Areas to be discussed will include: launch opportunities, orbit choices and constraints, transponder choices, antenna design, on-board computer systems, and propulsion systems. In addition to setting hardware and software design goals, equally important discussions will focus on labour division between groups, monetary commitment required, and development of a communication structure between groups involved in the program.

AMSAT-NA will be represented at the meeting by Jan King W3GEY, VP-Engineering, Bob McGwier N4HY, Dick Jannson WD4FAB, and Dick Daniels W4PUJ.

Once formal design goals have been determined, they will made available through the AMSAT News Service.

Project OSCAR

Ross Forbes WB6GFJ, reports on plans for the future made during the latest Project OSCAR Meeting.

The Executive Committee met on April 22, and set forth on a number of new projects. Among the items covered was renewed interest to again commence production of the *Project OSCAR Orbital Prediction Calendar Book*. The purpose of this booklet, available until some three years ago, is to provide simple and inexpensive tracking information to anyone interested in the low orbiting satellites. Now that we have the various Microsats, UoSAT, Fuji and the Radio Sputnik series of amateur satellites, a renewed interest is evidenced. It was determined that Project OSCAR members would like to participate in future satellite projects, so, the Executive Committee are submitting their thoughts to the group meeting in Marburg, West Germany in May, discussing ideas on a Phase III-D satellite.

Project OSCAR will look to develop a Mode 'S' receive system from available (and cost effective) modules now available on the market. Project OSCAR members will complete this

project and write up a description of the system for publication in the Amateur Radio media so that anyone interested in Mode S will be able to make the move into this new area of OSCAR communication.

Finally, in response to many who have asked for information, Project OSCAR will sponsor a seminar about operating on all of the available Amateur Radio satellites. This seminar will take place on September 29 and 30 on the San Francisco Peninsula. In addition to a full schedule of talks aimed at the beginning and advanced satellite user, there will be demonstrations available, plus published papers provided to all in attendance. Complete details of this OSCAR seminar, along with names of the speakers scheduled to speak will appear in the AMSAT bulletins, on Packet and phone BBS, and the usual Amateur Radio Media. To receive complete registration information as soon as it's available, send a self-addressed stamped envelope or a self-addressed envelope plus 2 IRCs to: OSCAR Seminar, Project OSCAR, Inc., PO Box 1136, Los Altos, CA 94023-1136, USA.

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Back-Scatter

Propagation

Reports to
Ron Ham
Faraday
Greyfriars, Storrington, West Sussex RH20 4HE

By the time you reach this page and see my propagation column you will be well aware of the fact that this is the 1000th issue of *PW* and, come September 24, our magazine will be 58 years old. I was about 18 months old when this journal was born and my initial steps into radio came 9 years later when I built a one-valve short-wave receiver.

My introduction to *Practical Wireless* came around 1943 and then it was beyond my wildest dreams that one day my name would feature among its regular authors and that radio-astronomy and the natural disturbances to terrestrial radio signals would become my prime interest. The former grew from references to the effect of sunspot activity on the ionosphere in the various technical books that were available in the mid-1940s and the latter was sparked off in 1947/8 after seeing the effect of a Sporadic-E disturbance on the BBCs television service on 45MHz. This interest was further stimulated in the late 1950s when erratic patterning, caused by changes in the troposphere, sometimes obliterated the pictures transmitted by the new Independant Television Authority between 175 and 213MHz. I soon realised that the saying 'one man's meat is another's poison' really did apply to the television bands because, such conditions meant DX for the radio enthusiast, due to the v.h.f. bands being open and misery for the viewing public who could not see their programmes.

Much of the credit for our present understanding of these events must go to the multitude of amateur radio enthusiasts who have worked or heard amateur or broadcast stations over impossible paths or distances, proved that long-range communication can be achieved via auroral and meteor trail reflection, identified bursts of solar noise which often precede an ionospheric disturbance and shown the scientific world the value of the international beacon service. With these facts in mind, I have always been pleased to publish a variety of reader's reports because I believe that by doing so we are providing a catalogue of contemporary observations for the astronomers, engineers and scientists of the future. During the past 14 years, penning this column, I have learnt that although radio to most of my readers is a spare-time hobby their in-depth knowledge of what really happens on specific bands under all conditions is amazing and that their assessments of the abnormal can be relied upon. So now let's see what we have this month.

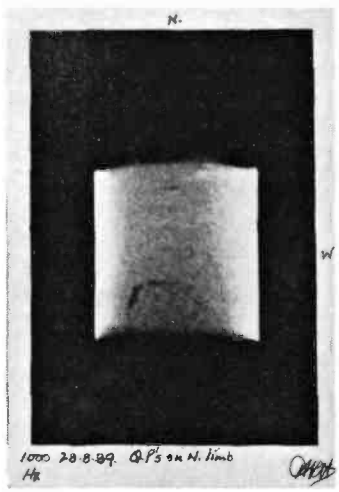

Fig. 1

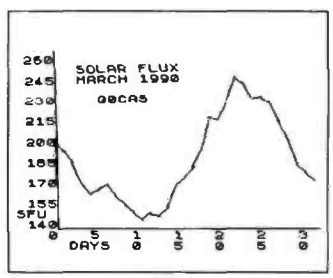

Fig. 2

Solar

Cmdr Henry Hatfield (Sevenoaks) kindly sent a photograph, Fig. 1, showing a large filament and a few quiescent prominences on the sun which he observed through his spectrohelioscope last August 28.

In March **Ron Livesey** (Edinburgh), using a 2.5in refractor with a projection box, located 5 active areas on the sun's disc on the 4th, 6 on the 22nd, 27th 29th and 31st, 7 on the 16th, 21st and 28th, 8 on the 1st, 2nd and 24th and 10 on the 25th.

"The mean solar flux for March 1990 was 188 s.f.u. with a low of 144 s.f.u. on the 11th and then climbed to a monthly high on the 22nd of 274 s.f.u.," wrote **Neil Clarke GOCAS** (Ferrybridge), who shows the daily variations in his computer print-out, Fig. 2. **Ern Warwick** (Plymouth) heard long bursts of noise around 1045 on March 26 and 1700 on April 1. Henry Hatfield located 3 sunspot groups, 17 filaments, 10 very small quiescent prominences and a few spicules on the sun's disc at 1145 on March 30, 2grps, 17f and 13qps at 1132 on April 1, 5grps, 17f and 10qps at 0912 on the 14th, 3 double spots, 19f and 7qps at 1057 on the 29th and 30th and despite poor seeing due to cloud and haze he saw a triple and 3 double spots, 18f and 8qps at 1127 on the 27th. "In general there has been very little activity," said Henry in his report for the month prior to April 30. However, his radio telescope recorded bursts of solar noise at 136MHz on days 17, 22, 23 and 24.

At his observatory in Bristol, **Ted Waring** counted 17, 22 and 24 sunspots on April 1, 8 and 23 respectively and the detailed drawings made by **Patrick Moore**, with his solar projection apparatus at his home in Selsey, are fine examples of the sun's rotation and the apparent progress of the sunspot

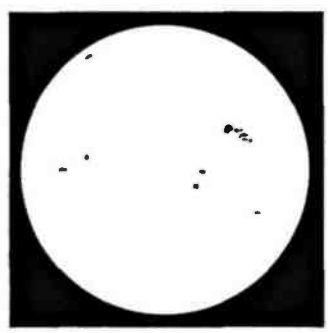
Fig. 3

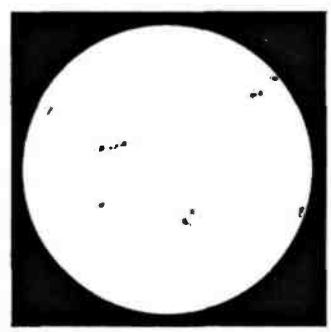
Fig. 4

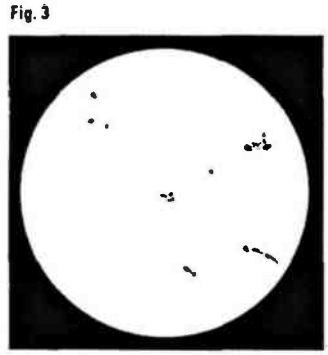
Fig. 5

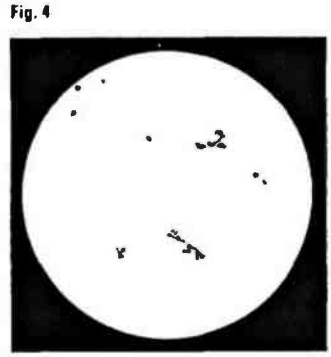
Fig. 6

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groups across the disc between 0750 on April 3 and 1330 on the 6th, Figs. 3 and 4 and 0830 on the 15th and 0800 on the 17th, Figs. 5 and 6.

Auroral

Ron Livesey, the auroral coordinator for the British Astronomical Association, received reports of 'auroral glow, unspecified form' from observers in various places and not all at the same time. Places such as Alness, Colchester, Cornwall, County Clare, Edinburgh, Fraser, Kirkwall, Machrihanish, Peel, Richmond and the weather ship 'LIMA' overnight on March 8, 12, 13, 14, 15, 18, 19, 20, 24, 25, 26 and 27. 'Homogenious arc or band' from Kirkwall and St. Andrews on the 20th and 25th; 'rayed arc or band or veil' from Central Canada and Kirkwall on the 10th and 25th; 'rays' from Beith, Detroit, Dundee, Edinburgh, Glasgow, Glengarnock, Kirkwall, Machrihanish, Pathhead, Nova Scotia and St. Andrews on days 1, 12, 13, 19, 20, 21, 25, 26, 27 and 29.

There were 'active, moving, pulsating, flaming' from North Dakota, Edinburgh, North Finland, Kirkwall, 'LIMA' and Pathhead on days 1, 3, 4, 5, 13, 18, 20, 21, 25 and 26 and 'Corona' from Denmark, Quebec and Nova Scotia on the 12th and 21st.

Among Ron's observers are the Met. offices at Kirkwall, Machrihanish and Wick and the weather ship *Cumulus*.

He also had reports of radio signals suffering from auroral influence from **Tony Hopwood** (Upton on Severn) on days 12, 18, 20, 21, 24 and 27, **Garry Hawkins** (Bristol) on the 21st and 30th and **Doug Smillie** (Wishaw) on the 25th, 27th and 30th.

During an auroral opening on April 10, **Simon Hamer** (New Radnor) received pictures from Ireland's RTE on 5 of their channels in Band III. "Also smeary pictures on Chs. E2/R1 and a short-wave wipeout," said Simon. Ern Warwick heard weak auroral tones on the signals from the German beacon DK0WCY on 10.144MHz between 1720 and 1810 on March 26, 27, 29 and 30 and again during the mid-afternoons of April 10, 11 and 14.

Mark Appleby G4XII (Scarborough) heard signals on 28MHz from the German beacon DF0AAB via aurora and **Fred Pallant G4RNM** (Storrington) reported several 'G' (English) stations with auroral flutter on April 10.

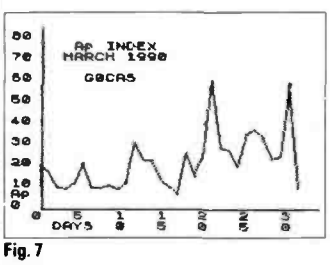

Fig. 7

Magnetic

"March was mostly active and more so in the second half of the month when it became sub-storm with an Ap index of 60 on the 21st and 59 on the 30th. The daily changes of the Ap index for the month can be seen on Neil's chart in Fig. 7. The various types of magnetometers used by Garry Hawkins, Tony Hopwood, Ron Livesey, **David Pettitt** (Carlisle) and Doug Smillie between them recorded storm conditions at some time on March 12, 18, 19, 20, 21, 27 26, 29 and 30.

Propagation Beacons

First, my thanks to Mark Appleby, **Chris van den Berg** (The Hague), Henry Hatfield, **Greg Lovelock G3III** (Shipston on Stour), **Ted Owen** (Maldon), Fred Pallant, Ted Waring and Ern Warwick, for their detailed 28MHz beacon logs from which I compiled this months chart, Fig. 8, of signal heard between 28.2 and 28.3MHz.

Greg Lovelock reports hearing PT8AA sending 'PWR 5W ANT GP LAT 0958S LONG 6748W LOC FI60CA RIO BRANCO AC', on 28.219MHz on April 14 and WJ7X/5 using 10W from Houston on 28.252MHz on the 20th.

However, Ern Warwick also looked for the beacons on other bands and received signals, almost daily, from PY2AMI on 24.931MHz, OH2B, ZS6DN/B and 4X6TU/B on 14.100MHz and DK0WCY on 10.144MHz between March 26 and April 25 and among the infrequent signals he logged for the same period were IK6BAK on 24.915MHz, PY2AMI on 18.100MHz and JA2IGY, KH60/B and W6WX on 14.100MHz.

Tropospheric

My thanks to **Pete Thompson G8DDY** (Shanklin, IOW) for sending me copies of his barograph charts for the periods covering the hurricane on

	March						April																					
Beacon	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
DF0AAB				X		X	X	X	X			X				X					X	X		X	X	X		X		X	X
DL0IGI	X	X		X		X	X	X	X	X	X	X			X	X	X			X	X	X	X	X	X	X		X	X	X	X
EA2HB																													X		
EA3JA				X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		X	X	X	
EA6AUJ																													X		
IY4M				X	X	X	X	X													X			X							
KA1NSV						X	X	X	X				X																	X	
KB4UPI									X																	X					
KC4DPC	X	X		X		X	X	X	X		X		X									X				X					
KD4EC	X	X				X	X		X				X									X			X	X					X
KE2DI				X		X	X	X	X				X													X					
KE5GY						X																									
KF4MS	X	X		X		X	X	X	X		X		X									X			X	X					X
KJ4X																				X											
KM4MY							X																								
KW7Y							X																								
LU1UG	X	X		X		X	X	X	X				X	X	X		X			X		X			X	X		X	X	X	X
NX20		X		X		X	X	X	X				X												X				X		
OH2TEN				X	X	X	X	X	X			X			X	X	X				X		X	X			X	X			
PT8AA																				X											
PY2AMI	X	X		X		X	X	X	X											X	X			X				X	X	X	
SK5TEN				X																				X							X
VE1MUF						X																									
VE2HOT						X							X																		
VE3TEN						X			X				X													X				X	X
VK2RSY					X		X	X	X		X	X			X	X							X	X	X			X	X		X
VK5WI					X			X	X						X	X							X		X			X	X		X
VK6RWA				X			X	X		X	X	X			X	X							X	X	X	X			X		X
WA4DJS	X	X		X		X	X	X	X		X		X		X					X		X			X	X		X			X
WB4JHS						X	X																								
WC8E		X				X	X	X	X				X																		X
W7JPI		X				X	X																								
WJ7X/5																										X					
W3SV					X	X	X	X	X				X																	X	
W3VD		X		X		X	X	X	X		X		X												X	X		X		X	X
W7JPI/B																										X					
W8FKL	X																														
W8UR						X							X													X					
W9UXO				X		X	X	X	X		X		X																		X
YO2KHP							X	X	X																						
ZL2MHF							X	X	X		X				X		X						X		X						
ZS1LA		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ZS5VHF										X	X																				
ZS6PW	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Z21ANB	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
5B4CY	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
5Z4ERR							X																								

Fig. 8

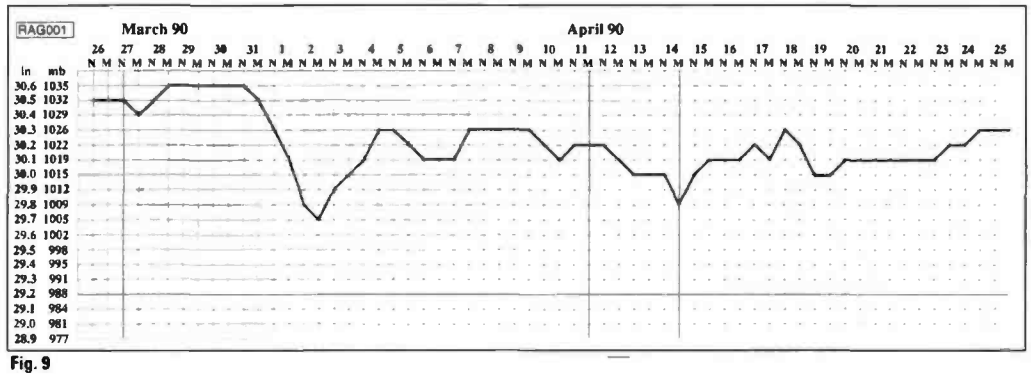

Fig. 9

Back-Scatter

October 23, 1987 and the extreme low and high pressures of February 26, 1989 and March 4, 1990 respectively. Pete compared his charts with mine which he saw in the magazines and made an interesting observation, "looks like you get the pressure 2 hours after me!"

The slightly rounded atmospheric pressure readings for the period March 26 to April 25 were, as usual, taken at noon and midnight from my barograph, Fig. 9. The continuing high pressure and fine warm weather was no doubt responsible for the mild tropospheric opening between April 28 and May 2. During the evening of May 1, I found a variety of continental stations in Band II and in Holland, **Ed Wieringa** (Zandvoort) received BBC Radio 1 on 99.3MHz and 'The Jazz Station' on 102.2MHz, at good strength.

It was necessary for Ed to use the narrow selectivity on his receiver to keep out signals from Belgium's BRT Stad Brussell and Lelystad both on 102.1MHz. **Brian Renforth** (Newcastle Upon Tyne) heard BBC radio from Northern Ireland, plus f.m. stereo from Belgian and Dutch stations on Arpil 30 and, 'Fox FM' (Oxford) on 102.6MHz, 'The Hot FM' (Milton Keynes) on 103.3MHz and 'Jazz FM' and the usual Yorkshire ILRs on May 1.

Brian also received u.h.f. television pictures from Belgium, France and Holland during the 30th and the 1st and

Fig. 10

BBC Midlands from Sutton Coldfield and North from Emley Moor on the 2nd.

George Garden (Edinburgh) went DXing on Cairn O' Mounth on the 30th and logged BBC Radio Cleveland, not often heard there and York and fluctuating signals from possibly Manx Radio on the Isle of Man.

Around 1830 on the 5th, Band II was open again and I heard idents from BBC and ILR stations ranging from Kent to my east Wales, in the west and inland to Birmingham in the north.

934MHz

"Early March brought improved conditions with high pressure peaking 1044mb (30.85in) on fourth," wrote **Terry Wyatt UK-845** (Walton on Thames) which enabled him to make contact with stations in Dorset, Guernsey, Hampshire, Suffolk. On the 24th he exchanged words with the 3KR Boy Scout Group on Dunstable Downs, "who were enjoying their first venture into radio communication."

During the period April 28 to May 2, **Les Jenkins GB-37** took advantage of the high atmospheric and from his holiday home in Deal, he contacted stations in Appleborough, Ashington, Brightlingsea, Chesterfield, Darlington, the maritime mobile, MV 'Canvey', in Dover, Eastwood, Felixstowe, Hastings, Hockley, Ipswich, Leeds, Lincolnshire, Northampton, Scunthorpe, Southend, Tilbury and West Yorkshire. His longest contact was with the station, DL-60, in Darlington, a distance of around 412km.

This list of stations became even more impressive when I learnt that the 11-element Yagi, Fig. 10, which Les built and used to feed his DELTA-ONE transceiver, is only 3m a.s.l.

He further proved that u.h.f. conditions were good when he logged television pictures from Belgium (BRT1), France (Antenna 2, FR3 & TF 1) and Holland (NED 1,2 & 3) on his Salora receiver with a Triax BB Grid antenna, also 3m a.s.l.

Goodbye Old Friend

It is with deep regret that I have to report the death of a friend and colleague, **Gerry Brownlow G3WMU**, from Storrington.

Apart from his war service in the RAF when he entered the world of radio communications, Gerry was a pharmacist for 50 years and the dedication and precision that he needed for his daily work was continued in his approach to amateur radio.

For the past decade, Gerry and his wife Margaret G4LCU were responsible for the installation and running of the amateur radio station, inside the vintage wireless exhibition at The Chalk Pits Museum, Amberley, Sussex.

Gerry and Margaret established a unique style of operating which did them and the museum great credit around the world.

They gave priority to explaining the workings of an amateur station to the museum's visitors and, typical of Gerry was the way he arranged the station, gear and graphics, to enable the general public to get the best from the Brownlow's creation, GB2CPM.

A few weeks before his death he organised and operated a station in the Girl Guides' hall at Storrington for their Thinking Day.

He will be sadly missed by his many friends in the Worthing and District Radio Club and by all of us at the Chalk Pits. We extend our deepest sympathy to Margaret, his daughter Ann and his sons Peter and Richard.

Back-Scatter

Broadcast Round-up

Reports to
Peter Shaw

Czechoslovakia has been the focus of attention in the past few weeks, with Radio Prague disappearing from the airwaves, to return on 7 May with a new name, Radio Prague International, and with a number of regular voices missing, presumed dismissed. Services from the various language sections have been curtailed, it would seem, although programmes in English seem not to have suffered too much. Details of currently audible programmes from Radio Prague International in English are listed in the European news section. It is rumoured that discussions are taking place between Radio Free Europe and the Czech authorities over use of spare transmitter time by the Munich-based station. This has been neither confirmed nor denied by either party, but one cannot but be amazed by the irony should RFE or Radio Liberty start transmissions over Czech facilities.

There appears to be deliberate harmful interference - jamming to you and me - of the frequency 6.10MHz during the evening time. This is the channel used by Radio Vilnius in Lithuania, and it is suspected that the Soviet Union is carrying out this interference. The m.f. channel of 666kHz appears to be unaffected. The jamming does not sound completely the same as that carried out against Western broadcasters in years gone by, but presumably that may be as a result of a lack of dedicated jamming transmitters, many of which were pressed in to service as relays of the Soviet Republican radio services for the Moscow area.

The South African Broadcasting Corporation has made startling reductions to its external service, Radio RSA. Transmissions directed outside the African continent were severely curtailed on 1 May, with services to the UK, Irish Republic, Europe (East and West), the Middle East, Far East, and North America dropped. All that remains now are the Swahili, Lozi, Chichewa services, together with French, Portuguese and English to Africa. A complete schedule appears in the Middle East and African news section.

Thailand has become firm favourite for relay stations for several of the world's international broadcasters. The Voice of America is already well on the way to establishing a new transmitting facility. BBC World Service is examining the prospect and now the news that Australia could soon be setting up a facility there has come our way. Radio Australia has made it clear that the Pacific Basin and the Far East, together with the Australasian area, are its prime targets, and is concentrating resources on achieving much improved coverage in this extensive region. Services to other parts of the world are not in the main scheme of things, although the station will not actively discourage listeners in other parts of the world. More details as they become known, but in the meantime, some new frequencies for Radio Australia in Europe are given in the Far Eastern news section.

European Stations

All times GMT/UTC. All frequencies in MHz unless otherwise specified

The new schedule for Radio Prague International broadcasts in English is,

to North America:

0000-0015 on 11.99, 11.68, 7.345

0100-0130, 0300-0330 and 0400-0415 on 11.68, 7.345, 5.93

to Europe:

1710-1727 on 11.99, 7.345, 6.055, 5.93

1830-1845 on 7.345, 6.055

2000-2030 and 2100-2115 on 11.99, 7.345, 6.055, 5.93

Listeners to Radio Denmark's transmissions via Radio Norway's facilities are being urged to send in reception reports to the Copenhagen station, with a request that English programmes be restarted. The Danish Shortwave Clubs International, OSWCI, is encouraging all its members to do this, in the hope that once-a-week broadcasts, perhaps following Radio Norway's English half-hour on

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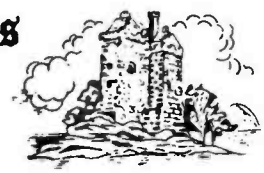

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Thank you John and Adrian the Sorcerers Apprentice!

Back-Scatter

Sundays, could be started. A good channel at the present for Radio Norway and Danmarks Radio is 11.755 at 0900.

Radio Finland's English service at 2100 is clearly audible in the UK on both the MF channel of 963kHz, and on short wave on 6.12MHz. At 1030, 15.40MHz provides good reception.

Deutsche Welle in Cologne does not transmit to Europe in English, but is usually audible during some parts of the day. Some frequencies for the Australasian services are:

0900-0950 on 21.68, 21.65, 17.82, 17.78, 11.74

2100-2150 on 15.435, 13.78, 11.381, 9.765, 9.67

At 2025, RAI from Rome is heard on 7.235 in English to Europe. Meanwhile, the Italian Radio Relay Service, IRRS, has a new schedule, operating on Sundays at 0700 in Ukrainian on 9.815, with English from 0815. At 0900, the frequency changes to 9.86 with English at 0915, and again from 1200 onwards.

At 0730, Radio Netherlands English programme is audible on 9.63 from the Bonaire relay station.

Radio Polonia at 2000 is heard with good reception in English on 11.84, with 9.525 in parallel.

Radio Romania International, the new name given to Radio Bucharest, is heard at 2100 on 11.94, 11.81 and 9.69 with the highest frequency offering best reception when checked shortly before preparation of this column.

Radio Moscow has moved up to the very highest parts of the short wave spectrum, noted at 0900 on 25.78 with variable reception of World Service in English. This particular frequency is most probably beamed towards Asia. The channel of 9.45 is used throughout the night by Moscow in English noted at 1700, and again at 0500.

At 2100, the English World Service is audible on medium wave at 1.143MHz, whilst at the same time, Radio Station Peace and Progress is in English to Europe also on medium wave at 1.386MHz.

It is reported from the United States that the medium wave relay of Radio Moscow's English services to North America via Cuba on 1.04MHz have ceased, and have not been heard since early March.

Radio Tashkent has a new schedule for English broadcasts of:

1200-1230 on 17.745, 15.47, 11.785, 9.64, 7.325

1330-1400 on the same channels.

A reminder for those who are interested of the frequencies for transmissions from the Baltic Republics of Lithuania, Estonia and Latvia:

ESTONIAN RADIO, Tallin

English carried on Mondays at 2130 on 5.925 and 1.035. At other times, 5.925 carries Estonian, Finnish and Swedish language programmes, and relays of the Estonian Radio First Programme.

LATVIAN RADIO, Riga

No English language broadcasts are scheduled, but 5.935 carries Swedish at 2030 and 2230 on Tuesday, Thursday and Saturday.

RADIO VILNIUS

English is heard at 2230 on 6.10MHz and 666kHz daily to Europe, with the North American English service on the air at 2300 on 17.69, 17.655, 15.18, 9.765, 7.40, 6.10MHz and 666kHz.

Middle East & African Stations

Radio Baghdad has started using the new channel on 13.66 for its English language broadcast at 2000 until well past 2100. The channel is received well in the UK, and programmes consist of the usual rhetoric and threats from the Iraqui President.

Meanwhile the Voice of the Islamic Republic of Iran is heard from 1930 to 2030 on 6.035 and 9.022MHz, both affording reasonable reception.

English from the Voice of Israel in Jerusalem is at:

0000-0025 on 15.64, 11.605, 9.435

0100-0125 on 15.64, 11.605, 9.435

0400-0415 on 17.63, 15.64, 15.485, 12.077, 11.655, 11.605 & 9.435 [Domestic service programme]

1000-1030 on 21.78, 21.745, 17.59, 17.575, 15.65, 15.485, & 11.585 [Domestic service programme]

1700-1715 on 11.655, 11.585 [Domestic service programme]

1900-1930 on 17.63, 17.59, 15.64, 15.485, 12.077, 11.605

2130-2200 on 17.63, 17.575, 15.64, 12.077, 11.605

For Tropical Band listeners, Radio Rwanda seems to be audible on 3.33 at 1700 with vernaculars, and French programmes at 1900. Radio Bertoua in the Cameroon has been noted on 4.75 at 2130 in parallel with Yaounde on 4.85MHz.

The revised English language schedule for Radio RSA in Johannesburg looks like this:

1100-1155 on 17.835, 11.90, 11.805, 9.555

1200-1255 on 17.835, 11.90, 11.805, 9.555

1400-1455 on 17.835, 11.925, 9.555

1800-1855 on 17.765, 15.27, 7.23

This column would be interested in reception reports of the new services from Radio RSA.

Radio Tanzania is reported to be testing a new transmitter on short wave using 5.985 at around 0830, and from 0900 on either 5.985 or 6.015MHz. It is reported that the station is seeking reception reports from listeners which should be sent to the Chief Engineer, Radio Tanzania Dar es Salaam, PO Box 9191, Dar es Salaam, Tanzania.

Asian & Pacific Stations

Radio Australia has been inaugurating new frequencies, but seems reluctant to tell the world about them. No new schedule has arrived from Melbourne, so it has been a case of scanning around the bands until the station is heard. Some frequencies to try at the present are 21.775 during the morning period, with reasonable reception noted at around 0900; 13.70 from at least 0800, again with passable reception; 13.745 from 1930 sign-on (also try this during the mid-afternoon period). It would be interesting to hear from readers about their suggestions for where to find Australia these days.

Radio Beijing has a new evening frequency for English to Europe at 2000 and again at 2200. 11.50 is now in parallel with 9.92 (which is fractionally behind the 25 metre band channel), and both offer reasonably pleasant reception.

Trans World Radio in Guam has English at 0830-1000 to Asia on 11.805 (including the Pacific DX Magazine on Sunday at 0900); 1500-1635 on 11.65 to Asia (including the Pacific DX Magazine on Sunday at 1515); 1600-1700 to Africa on 11.91 and at 1635-1700 on Sunday to Asia on 11.65.

At 2045, All India Radio signs on with frequencies of 11.62, 7.412 and 9.91MHz, with the 25 metre band giving best results.

English programmes from the Voice of Indonesia are directed to Europe at 2000 on 9.675. This frequency opens at 1730 with Spanish, followed by German and French. The English broadcast lasts sixty minutes.

The North Korean Radio Pyongyang is another station to have moved into the new 13MHz band, using 13.65 for English transmissions at 1300.

North, Central & South American Stations

HCJB in Quito, Ecuador was in the wars recently when armed bandits attacked the transmitters putting a number out of action. After some breaks in transmissions, all are now back on the air. The morning transmission at 0700 in English now uses 15.27, replacing 6.13MHz.

WCSN has been heard at 0800 on 9.84MHz, whilst in the evening, 13.77 is on the air from 2000 with reception improving from 2100.

WHRI has been noted on the 13MHz band, too, using 13.76 from 1700, heard here in the UK at 2000. Other frequencies announced are:

0600 on 9.62

0800 on 7.355

1100 on 9.465

1500 on 21.84

Back-Scatter

ATV

Reports to
Andy Emmerson G8PTH
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"As you have recently been extolling the virtues of the Amiga for video work, we thought you might be interested in our long established range of products for the various Acorn computers to turn them into 'video tools'." So ran a letter I received from VEL or Video Electronics Ltd of Atherton, near Manchester.

Well, I am delighted to give them a mention, even more so that someone is reading this column! Yes, it is true I have been giving the Amiga a bit of a plug, mainly because I have had the information about it. But I'll print anything which would interest ATVers (other firms please note - free advertising!) and the VEL products fit this category as well. As a company, VEL goes back some way and their professional products (such as the Mini-Mixer) are well known and liked in the business. These add-ons for the BBC computers deserve more publicity as they, too, are good, especially the products for the Archimedes, since this computer is so powerful. VEL sent me a demo disk of some of the effects which the Archie can produce and very capable these are too. Indeed, a small video facilities or production house or a cable TV system could make very good use of the facilities offered by the Archie and the VEL add-ons.

Arvis is the name VEL have given to their product range for the Archimedes machine and these hardware boards and expansion cards are designed to interface the Archie with colour video signals from cameras, video tape and

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Here is a brief rundown of some of the products on offer from VEL.

Archimedes Products

ARPE1. PAL ENCODER BOARD, £139. Encodes RGB signals to composite PAL standard. Colour subcarrier can be locked and phased to external colour burst. Enables Archimedes or ArVis video controller output to be recorded onto tape or fed to other video equipment.

ARVC1. ARVIS VIDEO CONTROLLER BOARD, £279. Full colour genlock and video decoder. Video Mixing system with both 'supremacy bit' key and unique 'shadow' key. Provides additional RGB output which displays both video picture and Arc. graphics on a standard Archimedes monitor.

ARDG2. ARVIS VIDEOGRAPHICS EXPANSION MODULE, £877. Expands the Archimedes for complete videographics applications. Includes a full colour real-time digitiser, 384Kbytes x 16 bit framestore and a dedicated 32000 colour display output. Used with the videocontroller board to combine live video with digitised images and the Archimedes graphics. Complete with ROM software module and OSCAR image editing disk.

DEMDISC, £8 (including VAT). This ArVis demonstration disk contains a number of digitised and edited pictures created using the ArVis Videographics system. Cost is refunded against subsequent hardware purchase.

ARVC2, £279 + ARPE8, £139. A new expansion module version of the video controller board with optional plug-on PAL decoder and other additional features. Occupies a single podule slot and directly interconnects with the Videographics expansion module. Designed for 4-slot backplanes and recommended for the new Acorn 410, 420 and 440 machines.

VEL also offer A3000 products and can send you details of these and other expansion modules for the Archimedes 400 series.

Genlock & Mixing Systems for Model B 7 Master Series Computers

The VEL BEEB-LOCK range provides a variety of genlock and other facilities for the earlier series of Model B and Master computers.

BL1, £290. BEEB-LOCK genlock and PAL encoder (vision mixing requires external equipment). Powered direct from micro.

BL2, £370. BEEB-LOCK with genlock, PAL encoder and power supply. No mixer but can be converted to model BL2K with addition of MX/K1 board (£137).

BL2K, £489. BEEB-LOCK with genlock, PAL encoder, and internal vision mixer - complete with power supply. This unit is a complete system for the mixing and keying of computer graphics over live video pictures. Can also be used as a 'down-stream' mixer in studio systems.

BL3, £369. BEEB-LOCK with decoding function. For interactive video and direct display applications. This unit decodes the incoming colour video prior to mixing with the computer graphics. Output is RGB LINEAR to drive a monitor or video projector. (For videotape use model BL2K).

SOFTWARE: The Fontmaster caption generator software package is available for BBC micros, details on request. VEL also manufactures video mixers, switchers and distribution systems etc. Prices shown above are exclusive of VAT & carriage. For further information contact Video Electronics Ltd., Wigan Road, Atherton, Manchester, M29 0RH. Tel: 0942-882332.

Vorsprung Durch Digital Sound

If the previous piece on desk-top video interested you, then you'll agree with my theory that many ATVers find producing their own video tapes an absorbing hobby in its own right. Of course, by the time you have set up an editing station and perhaps added desk-top video facilities for adding those post-production effects you'll have spent quite a bit of money. That, however, is not the end of the story, because by the time you've edited up the original recordings and added the special effects you'll be at least one generation - and probably several - down. Each time you re-record you tend to lose some of the fine detail of the picture, while the audio gets mushier too - at least with the kind of video recorders most of us have access to. How can we make this more professional and get the kind of results we expected when we laid out our cash (or plastic)?

By the way, when I say we, don't look at me. I'm afraid I haven't graduated to my own studio yet, so I don't speak from my own experience. That shouldn't worry you, though - it's never worried me yet! I learn from other people's experience and so can you. But let's get on with the story ... what's wrong with, say, a twin VHS deck editing system and how can we upgrade? Well, there's nothing wrong with it as such, and it is probably the best that most of us can aspire to. But it does impose some limitations: it can be difficult to make precise video edits (accurate to one or two frames, that is), while dubbing on new sound may be impossible. As we said before, when you've made your final edited version and then wish to duplicate it to hand out copies, you may find that the picture and sound quality are just not good enough.

As far as audio dubbing is concerned, well you'll have to look out for machines which have this facility. Many of the older, better quality recorders did possess this, and a used model with audio dubbing may be within your budget. External edit controllers capable of making sharp edits with two VHS machines are now being offered by Panasonic. These work (so far) only with certain Panasonic recorders but if precise editing is high on your list of priorities, this may influence the choice of your next machine.

To produce recordings which will withstand several generations of editing you had up to now to go to a more robust, professional recording system. The 3/4in U-Matic machines were - and are - very practical and on the second-hand market, cheap. The snag is their size; they tend to overpower the small rooms we usually end up inhabiting. The new alternative is S-VHS (it was new in 1986 actually but still has not come down to Dixons or Comet prices!). If you have the equipment though, you can master on S-VHS and then duplicate on normal VHS. I'm told the picture quality is pretty good like this, although you still lose quality on the audio. A new development, announced but unlikely to reach the shops for a year or two, is the addition of digital sound to the S-VHS recording process. This will preserve the same excellent sound quality as the pictures. At the same time it will probably put the final nail in the coffin of U-Matic, which in turn will release onto the surplus market all the U-Matics previously used for corporate video production in big firms!

More Commercial News

Doing on a budget what the commercial boys do for thousands is what we amateurs are rather good at, as we have just seen. You may also remember that a radio-controlled model helicopter with on-board TV camera and radio link to base station was demonstrated several years ago at the British Amateur Television Club's annual convention, when this was still held at Crick. Now the same kind of devices are in commercial production and are being used for news gathering, also for more covert surveillance purposes.

Once again we are being imitated (!) and the Northamptonshire-based firm TV2 has just launched its miniature, portable, microwave link system for television. Working on an approved 3.5GHz frequency, it is said to link sites up to 108km apart, either line of sight or using mid-point relays. The system works from 12V d.c. and has already been used on a Royal Mail commercial, where it provided a helicopter-to-ground vision link. No doubt similar systems are used by the police for their eye-in-the-sky, heli-telly operations, although these probably use their normal, lower frequency.

PCB SERVICE

We apologise for the lack of the full PCB Service page which is due to the lack of space in this 'bumper' issue. To help readers who are wishing to check prices on the latest boards, a shortened list is provided below. Readers may obtain a free photocopy of the full service page with latest prices by sending a stamped self addressed envelope to the address on the contents page. We plan to publish the full, up-dated PCB Service page in the August issue of PW.

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You can only wonder in amazement at how scanners are getting smaller with more features than you ever dreamed of, such as hand helds with 1000 memories, 25 to 1300MHz etc. I must admit to being very sceptical with the specs of some of the latest, and as to whether the term 'author's licence' had been in force. There is only one way to test the pudding and to try the 'newest kid on the block' the FAIRMATE HP-100E. Starting in reverse order from 99% of our customers and radio amateurs I waded through the owner's manual (9 A5 pages of information in English) and decided to compose a Charlie Chaplin (less words and more pictures) instant simplified operation sheet to make life easier for our customers, one will be with each set. The scanner is FANTASTIC! Unbelievable performance from a hand held, even a frequency lockout in Search mode, a truly practical scanner for Practical Wireless scanner listeners, £299 including carriage from RADIO SHACK. FAIRMATE HP-100E £299.

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IC-735 Compact HF.

As predicted the Icom IC-735 has rapidly gained the reputation it deserves. This compact transceiver is ideal for mobile, portable or base station operation. It has a general coverage receiver from 0.1Mhz to 30Mhz with superb sensitivity in all modes, SSB, CW, AM and FM. Spectacular specifications are also achieved on RF Intercept, Dynamic Range, Reciprocal Mixing and I.F. Blocking. As HF conditions improve over the next few years it is equipment like the IC-735 that will provide clear reception even under the worst pile-ups.

The IC-735 has a built-in receiver attenuator, preamp, noise blanker and RIT passband tuning and a sharp IF notch filter ensures clear reception. The twin VFO's and 12 memories can store mode and frequency. Scanning functions include program scan, memory scan and frequency scan. The HM12 scanning microphone is supplied.

RF output is approximately 100 watts and can be continuously adjusted down to 10 watts. The IC-735 is one of the first HF transceivers to use a liquid crystal display, which is easily visible under difficult conditions. Controls that require rare adjustment are situated behind the front cover but are immediately accessible.

Options include the PS-55 AC Power Supply, AT150 Automatic Antenna Tuner, AH2a Automatic Antenna Tuner, SM6 and SM8 Desk Mics, SP7 External Loudspeaker. Why not find out more about the IC-735 contact your local ICOM dealer or contact ICOM (UK) LIMITED.

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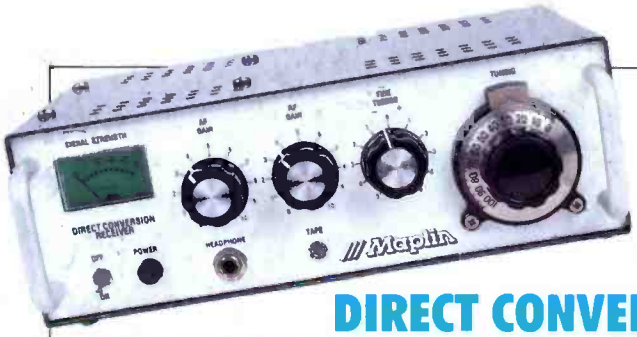


DIRECT CONVERSION SHORT WAVE RECEIVER

★ **Receives speech (SSB, DSB, AM) and morse (CW)**
★ **Choice of amateur band, 160 – 10 metre**
★ **On-board voltage regulator and audio power amplifier**

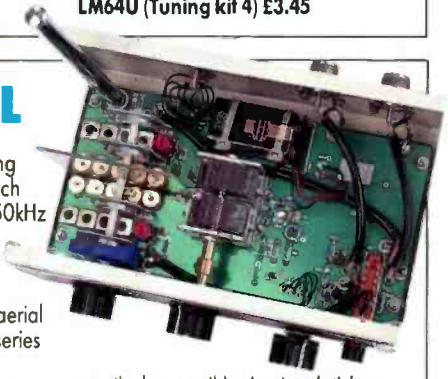
Sophisticated ready-made short wave receivers, often cost hundreds of pounds. Now, you can build a receiver of the direct conversion design that has the advantage of simplicity of construction and ease of alignment, with the minimum of test gear, for a fraction of the cost of a ready-made model. The amateur bands are: 160m, 80m, 40m, 20m, 15m & 10m. To include all these bands on one receiver would present switching & tracking difficulties, for this reason the receiver covers only one band (which needs to be decided upan before construction). The choice is up to you, but do not forget to order your tuning pack when ardering your receiver kit.

AMATEUR BAND	RECEIVER TUNING RANGE	TUNING PACK
160m		
1.810–2.000MHz	1.800–2.010MHz	1
80m		
3.500–3.800MHz	3.490–3.810MHz	1
40m		
7.000–7.100MHz	6.690–7.150MHz	2
10.100–10.150MHz	10.000–10.500MHz	2
20m		
14.000–14.350MHz	13.990–14.400MHz	3
18.068–18.168MHz	18.000–18.500MHz	3
15m		
21.000–21.450MHz	20.990–21.500MHz	3
24.890–24.990MHz	24.540–25.000MHz	4
10m	A, 27.975–28.525MHz	4
28.000–29.700MHz	B, 28.475–29.025MHz	4
	C, 28.975–29.525MHz	4
	D, 29.475–30.025MHz	4

A kit excluding the optional items, Box and Chassis, Pot Mounting Bracket, Front and Rear Panels and Tuning Kits is available. For full list af optional extras see Maplin Catalogue.

LM60Q (Dir Conv Rx Kit) £64.95
LM61R (Tuning kit 1) £3.45
LM62S (Tuning kit 2) £3.45
LM63T (Tuning kit 3) £3.45
LM64U (Tuning kit 4) £3.45

ACTIVE AERIAL



An active aerial pre-amplifier having five selectable tuned RF ranges which cover a total frequency range of 150kHz to 30MHz. The unit includes a gain control operating on the MOSFET amplifier, and a low battery LED warning indicator. Connections to aerial and receiver are made using UHF series connectors, with a direct, straight through or 'by-pass' mode operative when the unit is switched off.
A telescopic aerial is included for use where a proper outdoor aerial is not practical or possible. A printed stick-on front panel for the active aerial project is available as an optional extra.

LM05F (Active Aerial Kit) £52.95
Optional items:
FA99H (Active Aerial f/panel) £3.95
XY45Y (Case 222) £6.45

Photo shows Kit with some optional extras, see Maplin Catalogue for further details.

THE MAPLIN CATALOGUE

Further details and specifications on all the items shown on this page are to be found in the Maplin Catalogue. Over 580 pages of electronics ideas from Projects and Modules, Tools, Components, Books, Connectors, Batteries and Power Supplies to Test Gear, Audio, Video and Computers and much, much more.
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DXer's AUDIO PROCESSOR

★ **No modifications to receiver**
★ **High filter attenuation rate** ★ **Easy construction**
The processor features a low-pass filter giving a 36dB per octave attenuation under 150Hz and an expander which severely attenuates noise during pauses in the received speech. The unit is especially suited for SSB & FM CB reception and simply fits between the receiver's audio output and the headphones, thus no modification is necessary to the receiver. The single PCB makes construction very simple.

LK05F (DXer's Processor Kit) £11.95
Optional items: **HB26D (Knob (3 off required)) 68p each**
XY45Y (Case 222) £6.45 FM03D (9V PP6 Battery) £1.98

SW/MW AERIAL TUNING KIT

Given that the aerial impedance of most communications receivers is 50, unless the impedance of the aerial matches this exactly all of the RF energy will not be efficiently transferred from the aerial to the receiver. The greater the mismatch, then the weaker the signal will appear, and under adverse conditions it could vanish completely into background noise. This aerial tuning unit comprises two variable tuning capacitors and a tapped inductor in a passive 'T' configuration. This arrongement covers approximately 600kHz to 30MHz, and matches the aerial load impedance to the input impedance of the receiver. The ATU can also be used for transmitter aerial matching in the same frequency range, including the 27MHz citizen band, up to a power rating af 10 Watts. A printed stick-on front panel is avoilable as an optianal extra for the aerial tuner unit.

LM06G (Aerial Tuner Kit) £36.95
Optional items: **FD11M (Aerial Tuner f/panel) £3.95**
XY45Y (Case 222) £6.45 FW38R (Pkt Stick-on Feet) 24p

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