

Practical Wireless

PW

amateur radio & more!

RADIO BASICS



THREE REVIEWS!



ELECTRONICS IN ACTION

August 1998 £2.20





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Amazing Offer!

- * 25 / 12.5kHz Steps*
- * 1750Hz Tone*
- * Scanning*
- * 5W (Ext 12V)*
- * Keypad Entry*
- * Antenna*
- * 12 Month Full Warranty*
- * 130 - 170MHz Rx
- * 20 Memories
- * Battery Save
- * LCD Readout
- * 6 x AA cell case
- * Manual

This really is a superb performer. Don't be fooled by the price. Offers with our usual 10 - Day approval.

Kachina 505DSP HF Transceiver

PRICE DOWN

It's Amazing!
Ask for copy CQ
& QST Reviews



Main Features **£1899** auto atv version

100W HF All bands + Receive 100kHz - 30MHz
Filters for SSB 3.5, 2.7, 2.4, 2, 1.7kHz
Filters for CW 1kHz, 500Hz, 200Hz, 100Hz
Band Scope, DSP filter, Memory keyer, log book,
VSWR meter, Smith Chart, pre-amp, 20dB attenuator, plus many software controlled functions.

SGC-2020 QRP HF Transceiver



Limited Stock
£599

1.8 - 30MHz

0 - 20 Watts SSB and CW with full break-in. Can run from 12 volts or internal pack. Delivery expected at the end of March



£199

AR-146 2m 50W

FULL CTCSS

- 3 Power levels - Wideband receive
- 40 Memories plus call channel AR-446 70cm 35W £269
- 7 Programmable steps
- Channel or frequency display
- The best sensitivity in the business
- Keypad mic and mounting kit
- CTCSS Encode and Decode!



C-408

From **HORA**
70cms
Handheld
Full
CTCSS

£89.95!

FREE Postage

SPECIAL OFFER PRICE

Full CTCSS; 20 memories; 1.6MHz repeater shift; Priority channel; Scanning; Dual watch; Dual mode squelch; PTT lock; 12.5/25kHz steps, 230mW output - all from just 2 x AA cells

YAESU £349

FT-3000M 2m + Wideband RX

Save £50



2m/70cm 70W plus wideband rx including AM aircraft band. 9600 Packet ready. A bargain at this price!

ADI **AT-600 Dual Bander**

New Low
Price **£249**



PW says: "an incredibly well priced radio - amazingly sensitive - audio - worked very well with 12.5kHz channel spacing - An Absolute Cracker"

- * 2m / 70cm
- * CTCSS encode/decode
- * Full DTMF + 1750Hz tone
- * Alphanumeric memories
- * Full duplex
- * CTCSS tone reader
- * 29 programmable features
- * AM airband receiver
- * Rx up to 990MHz
- * Ni-cads and charger

AM Air Band



£1599
1.8MHz to 432MHz
Plus FREE PSU & Base Mic

Includes 70MHz Transcelve

100W 1.8 - 50MHz * 50W 2m/70cm * SSB - CW - FM - AM * CTCSS * Alphanumeric * 0.1Hz steps * Packet ready 1200 & 9600 * DSP filtering * Dual display * squelch * IF shift * Notch filter * Power control * Tx monitor * Electronic keyer * 12.5 / 25kHz switched FM filtering * Switchable pre-amp * Size 260 x 86 x 270mm * weight 7kg

ICOM **Dual Bander** **£215**
New IC-Q7E
2m & 70cms FM & AM Rx
In Stock about NOW
This pocket handheld provides 300mW of FM on 2m & 70cms plus wideband receive FM AM WFM from 30MHz - 1300MHz - no gaps. Runs from 2 x AA cells

ICOM **IC-706 Mk II 1.8 - 146MHz** **£995**
Plus FREE DSP
PRICE MATCH

DSP Module for existing owners **£59.95**

The IC-706 Mk II transceiver as the best compact hf mobile bar none. It out performs and out specifies any other model. The only choice left is which dealer you buy it from! We offer you an unbeatable price and an unbeatable back-up service plus optional extended 5 year warranty for an extra £98!

YAESU **£1299**
FT-920 1.8 - 54MHz
PRICE MATCH
+ Free FM board & AM Filters

* 1.8 - 54MHz 100W * DSP filter * MOSFET PA * Internal ATU * Auto notch * Twin VFOs * Auto glow display * Shuttle jog * Digital voice memory * Electronic keyer * RS-232C converter * Quick memory bank + lots more phone or e-mail for colour leaflet

YAESU **£1899**
FT-1000MPDC (AC £2199)
PRICE MATCH

* 1.8 - 30MHz 100W * SSB - CW - FM - AM * Rx 100kHz - 30MHz * Message memory * Dual in-band rx * EDSP filter * RF processor * RF pre-amp * Electronic keyer * IF shift width * Collins filters * comprehensive menu system * RS-232 interface and more - send for details

KENWOOD **TS-570 1.8 - 30MHz**
PRICE MATCH

Kenwoods new transceiver that is earning a reputation for offering one of the best receivers in the business. If you are looking for a hot little number that is not too expensive (Radio we mean!), send for brochure.

KENWOOD **£279**
THG-71E Dual band Phone

- * Dual Band 2m/70cm
 - * 200 memories
 - * Alphanumeric Display
 - * Full CTCSS
 - * DTMF
 - * Up to 6W out
 - * Wideband Receive
 - * Illuminated Keypad
 - * PC Compatible
 - * Windows Programming
- Send For Brochure

ICOM **IC-746 1.8MHz - 146MHz**
Superb HF Performance
Our Best Seller!
Free PSU **£1595**
Free Base Mic

YAESU **£659**
FT-840 1.8 - 30MHz
Phone for Crazy Price!

If you are looking for a good, reliable 100W transceiver, then this is just the job. Supplied with FREE Base Mic.

Alinco **DX-70 HF Base / Mobile**
£599.95

- * 1.8 - 54MHz
- * SSB CW FM AM
- * 100W HF 10W 50MHz
- * CTCSS Tone unit

YAESU **£399.95**
FT-8100 Dual Bander Mobile
Price Smash

Yaesu's top selling dual band mobile transceiver, very thing you could wish for including wideband receiver

ICOM **IC-207H 2m/70cm Mobile**
PRICE MATCH **£339**

- * 2m & 70cm
- * 50W / 30W
- * Detachable head

YAESU **£239**
VX-1R Dual band
The world's Smallest HT From the UK's Biggest Dealer!
Our best selling dual bander and one we would be happy to own.

ICOM **£269**
New IC-2100 2M Mobile
New Model
With Switched 12.5kHz & 25kHz

The IC-2100 Mobile transceiver from ICOM features switched filtering, 55 Watts with 113 memories. And all this at a very competitive price. In stock NOW

email: sales@wspic.demon.co.uk

Rechargeable Alkaline Cells For Starter Kit
Now **£13.99**
* Rechargeable Alkaline
* 1.5V cells
* No memory effects
* Charge mid cycle is OK
* 5 year charge shelf life
* 3 x capacity of ni-cads
* Very low cost

In stock now! * Note: you must use the special charger supplied with Starter Kit.

Starter Kit: Comprise 4 x AA cells and dedicated AC wall charger **£13.99 + £2 p&p**

4 x AA cells (ready charged) **£5.99** (£1.00 post)
8 x AA cells (ready charged) **£10.99** (£1.50 post)
4 x AAA cells (uses standard charger) **£6.25** (£1.00 post)

ICOM **£319**
IC-T8E Dual Band handy
6m 2m 70cms
PRICE MATCH
All in one small package.
* 5W output (13V)
* 25 / 12.5kHz ready
* Wideband Rx
* Nickel Hydride batt
* Wide FM broadcast
* AM for airband
* Rapid scanning
* Alphanumeric

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1.8-30MHz 300W ATU



- 300 Watts PEP 150W CW
- 1.8 - 30MHz - with ease!
- Wire, coax or balanced line
- Balun included for best match
- 30 / 300W power meter - PEP / RMS
- Antenna selector, by-pass etc.

£129.95



Same as MFJ-948 above but with internal dummy load.

£149.95

New QRN Noise Filter



- Phases out noise at the antenna socket
- Kills local QRN - lets signals through
- No more electrical interference!
- RF sensed for transceiver use (150W)
- Up to 20dB noise reduction
- Recovers signals below the noise!
- Adjust to suit local problems
- Kill that thermostat problem

£149.95

Auto ATU Matcher



Lets your Auto ATU match any coax aerial.

£59.95

Auto-Tuner Extender

Connect between transceiver and antenna - no more problems with G5RVs and all those difficult antennas - 160 to 10 metres

The Best DSP Filter in the World!



Hear those weak signals - Get rid of the QRM - works better than any internal rig DSP - 16 memories - totally programmable

£239.95

DSP Data Audio Filter



£139.95

- CW 50, 100, 200, 500Hz filter
- Suits all data modes
- Full adjustable pass band & filter

The DX Machine Ameritron AL-811X



£799.95

UK's Top-Selling Linear

- 160 - 10 Metres
- 600 W linear 7.5dB Gain
- Like a 3 element Monobander!
- Uses low cost 811A tubes
- Built-in rugged AC Supply
- Instant by-pass switch
- PA V/A meter + Gnd meter
- Over rated variable capacitors
- Fan cooled for long life

Perfect CW Tutor



"It's an Amazing Idea!"

- Displays words, letters and numbers
- 3 to 35WPM with natural CW note
- Various modes including Farnsworth
- Enormous vocabulary of words
- Actually sends QSOs as well!
- Individual characters or groups
- Headphone socket; Power from PP3
- Sends text just like an actual test.
- A tutor that displays what it sends.

Nothing Compares £79.95

The Famous Antenna Analyser

1.8 - 170MHz £229.95

There's nothing else like it!

Connect to aerial or coax and adjust it in seconds. Turns hours into minutes and ideas into antennas! Give your antenna system a complete check out. Over 500 sold so far! A great piece of kit.

- 1.8MHz - 170MHz * Digital Readout
- Resonance * VSWR
- Impedance * AA batteries or 12v external



PRICE MATCH MFJ Ameritron Vecronics

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MFJ USA wish it to be known that only stock imported by Waters & Stanton PLC and supplied to approved dealers carries the official FREE factory warranty.

All future MFJ stock will carry the official UK warranty cards (which have to be returned to us) and serial numbers. If your item does not have this card or serial number, phone us for guidance. If a product is purchased that does not come through the official channel, you could find yourself at the mercy of a dealer who has no service information, is supplying old versions or non European models, has no access to factory parts or the backing of the UK service team!

PHONE FOR FREE MFJ CATALOGUE

Vecronics VC-300DLP ATU



- 1.8MHz - 30MHz 300W ATU
- Balanced, coax, long wire
- PEP, Average and VSWR
- 3-way antenna selector
- Built-in dummy load
- Thru position * Size 257 x 85 x 197mm

£129.95

Data Decoder



- Decodes CW, RTTY, ASCII, AMTOR FEC
- LCD 2 x 16 characters
- 8000 character RAM
- Key Input for CW practice
- Epson compatible printer port
- Requires 12V at 300mA DC

£179.95

Vecronics HFT-1500 ATU



Graphic PEP Meter

- 1.8 - 30MHz * 1kW Power
- Graphical PEP Meter * Roller Inductor
- Wire, Balanced or Coax * 6-way antenna switch * Crosse-needle meter
- Built-in 4:1 Balun

£389.95

Work DX on 50MHz



6M SSB Transceiver £249.95
10W Complete & Ready to Go!

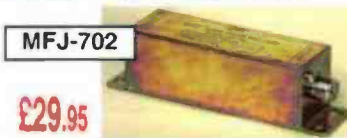
4-Way Coax Switch



£49.95

Rated at 1kW with a frequency range from DC - 1GHz. Fitted SO-239 sockets. Ideal for shack antenna switching.

200W Low Pass Filter



£29.95

- 1.8 - 30MHz 200W PEP
- 50 Ohms impedance
- 50dB @ 50MHz 0.5dB at 30MHz
- SO-239 connectors

Waters & Stanton PLC

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NEW LOOK

PW

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- 17 RADIO BASICS**
Rob G3XFD's popular beginners' series has been extended to two pages from this month!
- 20 WHAT IS A ...?**
Ian Poole G3WYX sets out to answer the question what is an IMPATT diode?
- 24 A FUN TO OPERATE, HIGHLY VERSATILE, FEATURE PACKED RADIO - THE ICOM IC-Q7E!**
Richard Newton G0RSN discovered that size isn't everything when he reviewed the latest in 'micro' hand-helds from the Icom 'stable'.
- 29 ELECTRONICS IN ACTION**
Three packed pages full of electronics hints, tips, ideas and news collated by Tex Swann G1TEX.



- 33 HARDY AND HIS HOME-BREW**
Clive Hardy G4SLU has been busy building and testing two complete project kits from the Ten-Tec range.
- 44 CARRYING ON THE PRACTICAL WAY**
This month George G3RJV shows you how to build a portable 'test-box'.
- 46 ANTENNA WORKSHOP**
Peter McNally E19GT describes his idea for an antenna mast which he thinks is ideal for single-handed raising and lowering.
- 49 RUGGED & READY TO GO**
The SGC-2020 could be useful if you're a keen QRP c.w. operator or



- 52 DUPED BY A DVM**
Ken Lee-Rand shows you how to verify the results given to you by your digital voltmeter.
- 56 LUNDY ISLAND - IT'S A BEAUTIFUL PLACE & RADIO'S ALLOWED TOO!**
Colin Blunn G0IFM recalls his combined holiday DXpedition to the island of Lundy.
- 58 GROUND LEVEL COMMUNICATIONS**
Roger Laphorn G3XBM invites you to go 'underground' with low frequency operating.
- 62 VALVE & VINTAGE**
Ben Nock G4BXD is 'on duty' in the PW wireless shop.
- 64 RALLY ORIGINS**
John Worthington GW3COI delves into the past to try and discover how radio rallies actually began.

REGULARS

- 9 KEYLINES**
- 10 LETTERS**
- 12 NEWS**
- 32 SUBSCRIPTIONS**
- 40 BOOK PROFILES**
- 65 RADIO DIARY**
- 76 BARGAIN BASEMENT**
- 80 BOOK STORE**
- 83 COMING NEXT MONTH**



Going Underground - Page 58



The Beauty of Lundy - Page 56

69 RadioScene

All the regular band reports from your favourite authors.



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100W HF Transceiver plus 100W on 6 mtrs



£775.00
CB P&P

The DX70 TH packs a hefty 100W punch on all Ham bands 1.8 - 50MHz. It is backed by a superb receiver with narrow filters fitted as standard. Make no mistake - this is a real DX operators transceiver ideal for use at home, in the car, or for that portable DXpedition. General coverage receive is included and wideband transmit facilities for export customers. The detachable front panel allows remote mounting and additional security.

- TX - all HF + 6mtr
- RX - general coverage 150kHz - 30MHz 50MHz - 54MHz
- SSB, CW, AM, FM and digital modes
- 100 memories
- Detachable faceplate and remote mounting kit available
- Speech processor standard
- Narrow filters fitted as standard
- 100W output on HF & 6mtrs
- Selectable 4 stage RF gain -20dB to +10dB
- Superb TX audio and RX
- Excellent RX sensitivity
- Full break in on CW
- All mode squelch
- Scan facilities
- CTCSS encoder
- Noise blanker
- Quick offset for DX pile ups
- IF shift control
- Separate HF & 6M antenna sockets



DX-77(E)

£675.00
CB P&P

- Covers all HF Amateur Bands
- General coverage receive (150kHz - 30MHz)
- 100 memories
- 100W, SSB, CW & FM, 40W AM
- Built in speech compressor
- Computer control with optional ERW-4
- Full QSK in CW modes

- QRM/QRN reduction with IF shift, RF attenuator and optional CW filter
- Two VFOs + memory operation mode
- Basic model upgradeable to (T) model with
- EJ33U Electronic keyer.....£29.95
- EJ34U CTCSS.....£19.95
- EJ35U CW filter.....£49.95

Post and Packing £2.75

MICRO SIZED Handhelds

as reviewed in FEBRUARY RADCOM

NEW LOW PRICES

Wafer thin credit card size transceivers 300mW RF output - repeater offsets - CTCSS

£99.95 CB P&P

£99.95 CB P&P

- DJ-C1** 2mtr Handheld **£169.95**
- 144-146MHz TX • Extendable RX 118-174MHz inc (AM) Air band
- DJ-C4** 70cms Handheld **£169.95**
- 430 - 440MHz transmit • Extendable receive 420 - 470MHz.

EMS-49 Speaker Mic

Miniature speaker mic with lapel clip for use with DJ-C1 and DJ-C4.

£22.95 CB P&P



DJ-G5EY Dual Band Handheld

- Spectrum channel display
- Optional extended receive including Airband 108-173.995MHz 400-511.995MHz 800-999.990MHz
- Full VHF/UHF Duplex
- Over air cloning
- Cross band repeat
- Up to 5W RF output
- 100 memories

NEW LOWER PRICE
£269.00
CB P&P

A brilliant twin band handheld that does everything including spectrum display of adjacent channels. The RX has a superb front end that does not suffer with breakthrough like some other handhelds. It has CTCSS/DTMF built in as standard.

DJ-191E 2 Metre Handheld

A new slim line 2 meter handheld that's easy to use and has an enormous clear display.

- Up to 5W output (with 9.6V NiCad pack)
- 40 memories channels
- Cloning capable
- CTCSS encoder
- DTMF fitted
- Battery save facility
- Scan functions
- Time out timer

£169.95
CB P&P

DJ-190E Low Cost 2mtr Handheld

A powerful super slim 2mtr handheld with a huge easy to read display.

- Up to 5W RF output (with opt. EBP-36N battery pack)
- 40 memory channels
- Includes NiCads and charger
- CTCSS tone encoder fitted
- Battery save function
- Scan function
- Time out timer setting

£149.95
CB P&P

DR-610E Twin Band Mobile



£499.95
CB P&P

The DR-610E dual band transceiver equipped with Alinco's Advanced Channel Scope utilises a 'Real Time Monitor' on 11 different frequencies simultaneously giving you quick visual scanning capability and the potential for making numerous contacts.

- 120 memories
- VHF 50W/UHF 35W max
- Channel Scope
- Full duplex
- CTCSS encoder
- AM Airband RX
- Optional extended receive inc airband
- VHF 108 - 174MHz
- UHF 420 - 470MHz

DR-150E 2 Metre Mobile



£279.95
CB P&P

A full featured 50W 144MHz FM mobile radio that's crammed full of extras. The DR-150 takes mobile radios into the 21st century!

- Optional receive to cover Airband, PMR, Marine, UHF, etc
- 135-950MHz (with gaps)
- 100 memories
- Channel Scope
- simultaneously displays 7 channels
- 9600 BPS Interface
- CTCSS encoder
- Time Out Timer
- On air cloning

DR-140E 2 Metre Mobile/Base NEW LOWER PRICE



£219.95
CB P&P

Simple to operate, easy to program and dependable to use. It has optional extended receive coverage for airband, business and marine radio.

- Optional receive to cover Airband, PMR & Marine
- 118-135.995MHz (AM)
- 136-173.995MHz (FM)
- 51 memories
- Time out timer
- Alpha numeric display
- 50W FM output
- Electronic squelch
- c/w DTMF mic

DR-605E Dual Band Mobile



£399.95
CB P&P

Easy to use twin band mobile TX that delivers both high power and performance with user friendly features.

- 50W (2m) - 35W (70cms)
- 100 memories
- Full Duplex
- CTCSS encoder fitted



DR-M06TH 6mtr FM Mobile 50 - 54MHz

£249.95
CB P&P

With the new 6 metre repeaters now up and running, this is the ideal radio for the Band. With an optimised receive front end, CTCSS encode and easy to use controls you will be amazed at the range achievable.

- 100 Memories
- Programmable Repeater Shift

EDX-1 HF Antenna Tuner



The EDX-1 is a coaxial tuner with built in Power and SWR meters. The ATU is rated at 120W and covers 160-10 meters including WARC bands.

£159.95
CB P&P

EDX-2 Auto Random Wire Antenna Tuner



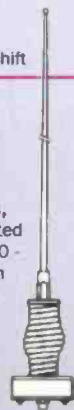
Quickly matches random wire antennas, mobile whips, verticals, inverted Ls. Wired for DX70 - but can be used with most HF Transceivers.

- 1.6MHz - 30MHz
- 200W PEP

£289.95
CB P&P

HFM-1

HF stainless steel mobile antenna c/w spring base. Covers: 3.5 - 30MHz (when used with EDX-2 auto ATU) Length: 2.7 metres



£59.95
CB P&P

NEW SUPER SLIM
micro dual band transceiver

alinco DJ-C5E



The new Alinco DJ-C5E is so slim that it will hide in a shirt pocket and yet it has the power to work repeaters miles away. Clear, clean audio, 40 memory channels plus two call channels, one per band and a lithium ion battery that can be charged hundreds of times without memory effect.



- 40 memory channels plus one Call channel per band, each memory capable of non-standard splits
- CTCSS encode plus tone burst
- 300mW output
- Large capacity internal 500mAh lithium ion battery
- Earphone/mic port
- Built-in loudspeaker
- Includes snap-in battery charger
- Fast 2 hour charging time
- 56(W) x 94(H) x 10.6(D)mm (without projections)
- Weight only 80g
- 144 - 146MHz transmit
- 430 - 440MHz transmit
- Extendable receive 118 - 174MHz including (AM) air band
- Extendable receive 420 - 450MHz



alinco EMS-49

SPEAKER MIC
Miniature speaker mic with lapel clip for use with DJ-C5E

£22.95

only
£189.95
L&P&P

ACCESSORIES

- Soft case
- Earphone
- Two hour charger
- Rechargeable Lithium-ion battery
- Flexible whip antenna
- Speaker Mic EMS-49

ALINCO

innovation • quality • style

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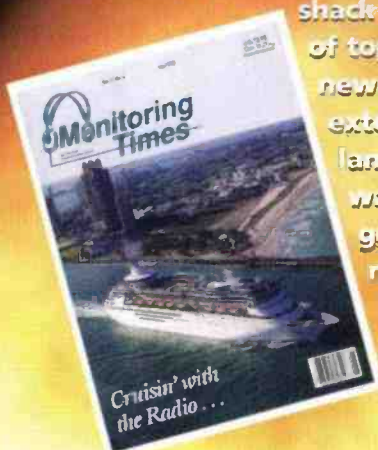
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Keylines

Most PW readers will realise that I'm a keen c.w. operator - not a good one - but someone who enjoys this simple mode and does so every day, even if it's only to get a short break from my magazine work. It has the great advantages of letting me communicate all round the world using relatively low power and simple antennas.

However, even though I am a keen c.w. operator I'm fully aware that although it has a great future for those who (like me) want to use it - as far as the regulating authorities are concerned - **Morse has had its day as a requirement for access to h.f. for Radio Amateurs.** And this statement leads me on to what I think must be one of the strangest decisions ever to come from the **Radio Society of Great Britain (RSGB)** so far!

The strange decision?...it's the RSGB's widely publicised 'Let's do away with the Morse Test...but Let's have another Morse test instead'!

A member of the RSGB I have been concerned at several strange decisions that have been announced from Lambda House this year. But the strangest decision so far has got to be the suggested scrapping of the 12 words per minute (12w.p.m.) Morse test for another - albeit slower test.

As I understand the suggested idea it's regarded as an interim measure - but in my mind it seems very strange indeed! Surely, with the certain knowledge that the regulating authorities would support the replacement of 12w.p.m. Morse test with something regarded as more appropriate - it would have been better to announce the intention to scrap the Morse test altogether and start work on the replacement without introducing 'part-baked' or 'half' measures?

The Future

Personally, I think the future of the Amateur Radio hobby in the United Kingdom depends on many more important factors than a simplified Morse test. The factors include: Better access to the Radio Amateur's Examination, many more opportunities to take the examination throughout the year and a far faster results service.

I also think that the structure of the RAE itself has got to be looked at very carefully because I consider it's not serving the hobby or the candidate very well at all. I say this because whereas the Novice RAE is well structured and seems to produce students who are well prepared and able to operate efficiently (in all senses of the word) - the RAE does not.

If the RSGB considers that they'll generate more money - and members - by making access to h.f. easier by lowering the standards or dropping the Morse test altogether...I think they've got it badly wrong. The problem is far more serious and requires much more than the lowering of (admittedly an



outdated) a higher standard as an interim measure. As far as I can see it - the decision will annoy both the 'must have Morse' camp and others who consider that something more appropriate must take its place.

More Class Distinction?

As I consider England (in particular) to be still riddled with 'Class Distinction' in everyday life I'm loathed to see class distinction to be increased in our hobby. Over the years I've heard and read much disparaging and

Calling Malta GC

In the last two years I've had letters from younger radio enthusiasts in Malta GC explaining the difficulties in getting radio components. I'm now pleased to say there's a possibility I've found a way to help and I'd like to hear from anyone who has written on the subject ...so we can 'get the ball rolling'.

And as I write this 'Keylines' we're inundated with the 'World Cup' football extravaganza. What's the connection with Amateur Radio you may ask? Well, I can answer you by saying that it's a good idea to call 'CQ' on 18MHz on the opening night of the 'World Cup'. I did - and was inundated with calls from stations all over South America who could hear my 5W c.w. signals because the bands were so quiet.

I felt like a DX station. Oh well - for every dark cloud there's a silver lining. Roll on the Olympics. I say!

unwarranted comments regarding 'A' and 'B' licence holders. So, personally speaking I would be very sorry to see a multi-layer American-style licence system introduced here in the UK.

I'm reminded of the possible increase in 'Class distinction' everytime I meet one particular G3??? at rallies. He and I worked together in broadcasting and when I joined the organisation he said "I'm glad you're a G3 Rob and not one of those dreadful G8s". His comment disturbed me greatly - not only because I want everyone to enjoy our hobby (after all - enjoyment is what it's all about!) but at that time most of the Class Bs working with us...were working in the forefront of technology and often had far more important jobs and were better technically than I ever could be!

So, whatever happens in the future regarding h.f. access to those that pass the RAE - whether it be from a specially re-vamped, redesigned and more regularly 'available' examination with speedier results - I fervently hope that our hobby will not continue to be tainted with 'Class Distinction' of any sort.

I'm reminded of the time (as a Junior Boy Entrant in the Royal Navy nearly 40 years ago) when I asked if it was possible for me to study for the RAE at HMS Ganges (the former Navy Training Base near Ipswich in Suffolk). Looking surprised, the Petty Officer Instructor told me "Amateur Radio - that's for officers only my son"! **To encourage more people into our wonderful hobby we've got to lay such attitudes to rest now!**

Rob Mannion G3XFD

Letters

COMPILED BY ROB MANNION G3XFD

STAR LETTER

Practically Interested

Dear Sir

It was 1958 when I looked upon Amateur Radio with nothing more than a cursory interest. But soon I was filled with an enthusiastic challenge to find out more about this hobby and quickly my need to explore the radio spectrum was paramount. Those days most cities boast ex-war surplus shops selling radio sets and it was with such receivers as the CR100 and the AR88D that I tuned the amateur bands within the h.f. spectrum.

The real challenge came when I tried my hand at radio construction and with home-made valve converters I monitored the 2m and 70cm bands, where practically all activity was on a.m. It was here I found my niche in Amateur Radio and my excitement to learn constructional techniques was fired with each successful project.

Today, most amateurs prefer factory made equipment with the challenge to experiment diminishing to all but a few enthusiastic constructors, and with it a declining use of some band space dedicated to the radio hobbyist above v.h.f. 70cm, a band once enveloped by constructional 'know how' and experimentation, is but one.

Now in the quietness of this band, I wonder if we the Radio Amateurs have a genuine need for the 10MHz of band space as we move towards the year 2000, and when frequencies within this band are allocated to users other than the Amateur Radio fraternity who except for the real enthusiast, has long since thought of as simplex challenging.

With today's technology where cheque book radio is surpassing the once viable challenge of table top constructional ingenuity, perhaps we can manage with less band space for our needs above v.h.f. There are still amateur experimenters keeping alive this rewarding part of our hobby, but with the majority of new radio licensees preferring the multi-functional computerised equipment offered by the giants of today's modern electronics industry. But for how long will the spark of enthusiasm hold the fascination and need to acquire the technical knowledge and expertise to enable the Radio Amateur to be builders of the equipment they use, rather than merely operators of someone else's commercially-made grey box?

The self achievement in using a piece of equipment we made ourselves can never be price tagged - and the band space to experiment is there, but for how long, lest we care to use it? Ingenuity is a gift to oneself. Keep wireless practical!

Frank G6TNO
Greater Manchester

What If...?

Dear Sir

It is a commonly accepted theory that nothing in this world goes to waste and that we can see light from the stars that commenced their journey millions of years ago. It is also accepted that everything works on a magnetic and wave principle, right? Just suppose in time our radio knowledge (for it has progressed in leaps and bounds during this century), just suppose we were able to produce a sophisticated piece of equipment that could pluck sound waves out of the ether from years ago. Would we be able to listen to the Battle of Waterloo? An opera sung by long dead singer before recording equipment was even thought of?

Daft idea? Is it? Just think about it for a moment. Does a sound wave ever die or merely diminish in intensity over the years? It may be weak but it's still there. A thought to ponder on maybe?

John Noble
Kent

Editor's comment: I'm not so sure about sound waves John - but I wonder what our nearest neighbours will think if they ever get to hear the long delayed (for example) chaotic signals associated with Amateur Radio contests! I've also heard it suggested that any aliens who might eventually receive TV signals from Earth may think that everyone speaks in what we know as an Australian accent!

Royal Approval For Marconi

Dear Sir

This year is the Centenary of the first use of wireless by the Royal Family. Queen Victoria was so impressed by the achievements of Marconi that she gave orders for wireless communication to be established between Osborne House, her mansion at East Cowes on the Isle of Wight and the Royal Yacht *Osborne* on which her son the Prince of Wales (later King Edward) was sailing. That was in August 1898 and proved a great success, over 150 messages being handled by means of the 10in spark coil

transmitters and coherent receivers.

This truly historical event is being re-enacted in period costume on **Saturday 29th August this year**, the special call sign GB0QV - for Queen Victoria - having been allocated to Douglas Byrne G3KPO (Me!), curator of the National Wireless Museum on the Isle of Wight. It is planned to transmit some of the original messages between Osborne House and a period yacht on the Solent. On board will be **Rod Burman G4RSN**, taking the part of Mr Kemp (Marconi's right-hand man). Unfortunately, I think I'm just a wee bit too antique to pass as a 22 year old Marconi!

Any readers on holiday on the Isle of Wight at the end of August might be interested to know that Osborne House will be open to the public all day on 29 August and might like to witness this historic re-construction.

Douglas Byrne G3KPO
Isle of Wight

Gee - You're Wrong!

Dear Sir

I have read Brian Kendal's excellent article describing Gee, the navigational equipment which assisted Bomber Command in those far off days. I would like to point out an error and suggest a correction to the picture of the Lancaster. The antenna shown and said to be the Gee antenna is in fact the SBA antenna. The Gee antenna on the Lancaster was on the upper part of the fuselage, just above the navigator's position (just forward of the astrodome). It was a whip antenna feeding into an antenna coupler, accessible to the navigator. The coupler contained several switched, slug tuned inductors, in order to meet the wide range of operating frequencies.

The MkII receiver employed plug-in r.f. units. By changing these units, several alternative frequencies were available to the navigator. I recall three such units, RF24, RF25 and RF26, the latter having variable tuning by variable capacitor and slow motion drive, whilst the 24 and 25 offered four or maybe five switched alternatives, tuning was by pre-set LC circuits, the capacitor trimmer being the concentric Pye trimmer still in use today.

The suggestion that Gee

The Bad News...**Blots On Frequency****Dear Sir**

'Keylines' in February 1998 *PW* referred to 'our marvellous hobby', a true description, but like most other aspects of modern society it has blots. One blot exists just above 3.7MHz late at night, where gathers a number of persons with no regard whatsoever for the conventions of normal conversation, both in speech and subject matter.

It is unfortunate that **Esde Tyler G0AEC** in the February 1998 issue of *Radio Communications* has recommended that Novices listen on that frequency and time, one hopes that youthful listeners will not encounter this group of emphatically expressive creatures of the night. A cassette is enclosed, if you can steel yourself to listen to it all and I hope you will come to the same conclusion as the second and third opinion gathered locally here.

Something should be done to end this disgrace on British Radio Amateurs. Please use your influence to this end.

Ray Coley G3IFF
Hampshire

Editor's reply: I did not need Ray's cassette - I've often heard the QSOs mentioned underway in the early hours. Such behaviour does us great discredit and they obviously just do not realise (or even care!) how many people are listening. You can be sure - whatever time of day it is - someone IS LISTENING to you. So please represent our hobby in the best way possible.

became as ineffective as is intimated in the article, is certainly not so. The Mk I Gee, which used VR92 (Mullard EF50) valves was soon replaced by the MkII, which used VR65 (Mazda SP61) valves. The MkII receiver was equipped with several, very effective, anti-jamming circuits. The combination of these together with the range of frequencies from the increased number of chains, considerably extended the useful employment of the system. The MkII was still in use long after H2S was introduced in 1943/44.

I have included a block diagram of the Gee Indicator Unit which might help readers to understand how the accurate measurements were obtained.

Gordon E. Lumley G3DJE
ex 100 Sqdn. Bomber
Command
North Yorkshire

Editor's comment: Thanks for the correction Gordon. Brian Kendal (the author) was not responsible for the photograph - it came from a separate source. Sorry about the error - and readers who are interested in Gordon's block diagram can obtain a photocopy by sending in an

Followed by the Good News...**The Amateur Radio Spirit****Dear Sir**

How's this for a fine example of the Amateur Radio spirit? Hearing that I needed a p.s.u. for a Russian set **Anatoly UA2AO** wrote to me and said he had just what I wanted and that I could have it free, but postage was very difficult from his location.

We managed to find a German Radio Club going on a visit to Russia. One of the members, **Horst DJ2HN**, was approached and asked if he could help. Despite a language problem, he with no English and my poor German, this was agreed. True to his word, a parcel eventually arrived from Germany containing the p.s.u. which he carried all the way from the USSR.

Now if that does not deserve a medal, I don't know what does! Also assisting in this operation were **Mike G4AYO** and **Arthur PA0AOB**. My thanks go out to all of them.

Ben Nock G4BXD
Worcestershire.

Editor's comment: That's more like it - the true spirit lives on!

The Star Letter will receive a voucher worth £10 to spend on items from our Book or other services offered by Practical Wireless. All other letters will receive a £5 voucher.

s.a.e. to **Donna Vincent G7TZB** at the *PW* offices. **And I don't suppose there are many of us over 50 years old who didn't come across those wonderful RF units - especially those with the illuminated translucent Muirhead dials (the RF27?).**

Amateur Radio Valid?**Dear Sir**

In these days of Global Communications whereby we have instant control and more importantly instant access of both voice and data modes of communication via cellular telephones, Internet, FAXes, etc., is Amateur Radio still a valid and relevant medium? - bearing in mind its various limitations including unpredictable propagation trends, slow and unreliable packet access, etc.

Even the marriage of convenience which seen the dominance of the PC, Interlink with the hobby via SSTV, Packet, etc., seems to have reached its peak with the demise of these modes in favour of Internet subscription. I can recall many weekends whilst living in a

Glasgow flat precariously balanced on a tenement roof and erecting various masts and an assortment of antennae in search of that Holy Grail...the perfect signal.

The wind of change has arrived to effect our hobby in a variety of ways. In order to embrace these changes we should abandon the RAE in its present form and dispense with the Morse requirement which is now of little relevance and serves no meaningful purpose whatsoever in a society versed in digital electronics and communications.

The hobby has come a long way since cosy Sunday afternoon 'rag chewing' on 'top band' and perhaps in many ways technology has left it behind.

S. Adams GM4PGL
Scotland

Letters Received Via The 'Internet'

Many letters intended for 'Receiving You' now arrive via the 'Internet'.

And although there's no problem in general with E-Mail, many correspondents are forgetting to provide their postal address. I have to remind readers that although we will not publish a full postal address (unless we are asked to do so), we require it if the letter is to be considered. So, please don't forget to include your full postal address and call sign along with your E-Mail hieroglyphics! All letters intended for publication on this page must be clearly marked 'For Publication'.

Editor

NEWS

COMPILED BY DONNA VINCENT G7TZB

Another PW Winner!



Pictured here is **David Anger M1ANA** who was the lucky winner of a Kenwood TH-235 in our wordsearch competition as run in November 1997 issue of *PW*. David is a regular visitor to the pages of *PW* and actually holds **three** callsigns - 2E1DXW, M1ANA and MOBMF - the latter being the latest one to be added to his list after recently passing his Morse.

The 'prize' Kenwood hand-held was used extensively by David during a 'Thinking Day on the Air' event held in February. The event was run by the **Sudbury & District Radio Amateurs** in conjunction with the **Boxford Girl Guides** using the special callsign **GB0BGG**.

David also put his new Kenwood through its paces during an even held on March 10 when the Sudbury & District radio club were on air for the Stour Valley Run. So, David is obviously genuinely pleased with his 'PW' prize and this just goes to show that if you enter our competitions you do have a chance of winning and that the prizes are won and used by 'real' people!

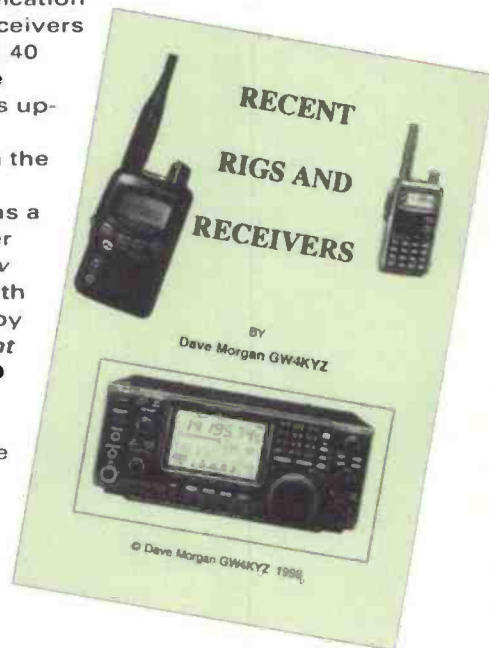
Examination Time!

Next month in *PW* we will be bringing you news of the various RAE, Novice and Morse courses that are due to start from September. So, if you are a representative from a college, radio club, examination centre, or a course tutor please make sure you send full details of the course to me, **Donna G7TZB, c/o of the Editorial Offices** or via **E-mail to donna@pwpublishing.ltd.uk** by **20 July** to be included in the feature.

Recent Rigs And Receivers

Twrog Press of Penybont, Gellilydan, Blaenau Ffestiniog, Gwynedd LL41 4EP, Tel: (01766) 590341 have introduced a new publication entitled *Recent Rigs and Receivers* to their range. This A5 sized 40 page book, written by **Dave Morgan GW4KYZ** contains up-to-date information on equipment manufactured in the last three years.

Recent Rigs is intended as a supplement to Twrog's other publications, the *Rig Review* and the *Receiver Review* both of which were also written by GW4KYZ. The cost of *Recent Rigs and Receivers* is **£3.50 post free** and if you fancy getting hold of Twrog's earlier publications, they are still available at £5 each.



Tom Leaves Leeds

The **Leeds Amateur Radio (LAR) Communication Centre** has recently moved to new premises in East Ardsley. This move has been prompted by the fact that **Tom Beaumont** has now reached 65 and is moving into retirement.

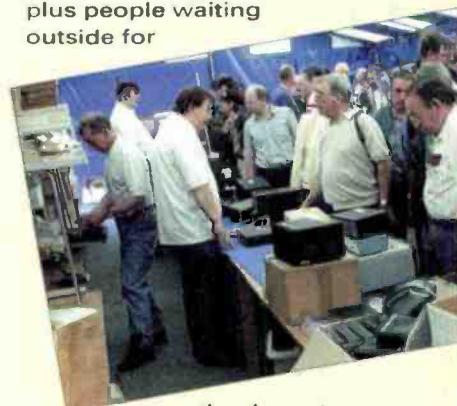
Tom and his wife **Hazel** have been trading at the LAR Communication Centre for the past 22 years and during that time have made many friends, in the trade and customers. They would like to thank all those who have supported them over the years and hope that the same support will be extended to **Steve Pounder** and **David Wood G4TIW**, the new proprietors.

The new location for the LAR shop is **Bradford Road, East Ardsley, WF3 2DN. Tel: 0113-2524580, FAX: 0113-252 4586.** East Ardsley is located between Exit 28 on the M62 and Exit 41 on the M1 and will soon be connected to the new A1-M1 link giving access from all directions.

Trading hours for the LAR Communications Centre are 9.30am - 5.30pm Monday to Saturday (closed on Wednesdays afternoons). There is ample parking on-site and a full range of Amateur Radio products on offer.

Waters & Stanton Open Day

The eighth **Waters & Stanton Open Day**, held on 7 June once again proved to be very successful. There was the usual queue of some 50 plus people waiting outside for



the doors to open.

Free food and drink was on offer throughout the day with two of the highlights of the day being the free raffles with items donated by Kenwood and Icom and the auction held by **Mark Francis** where 20A power supplies fetched around £30 and a video recorder went for

Leicester For The Cup!

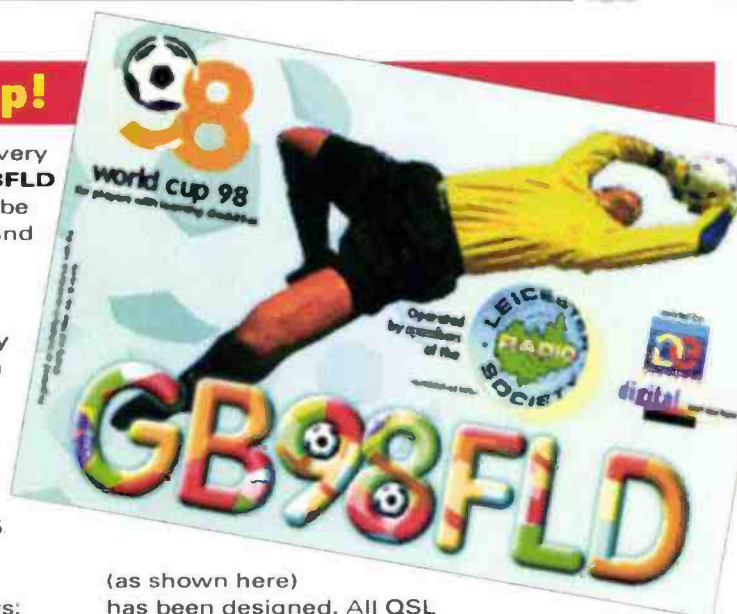
Leicester Radio Society are due to operate a very special event station using the callsign **GB98FLD** from 30 July to 16th August. The station will be put 'on-air' by members of the Leicester RS and is begin run in connection with the Football World Cup for footballers with learning disabilities.

The tournament 'kicks-off' at Leicester City Football Club ground on the 30 July and with 16 countries taking part and matches being played at various club grounds throughout Leicestershire and neighbouring counties until the final on 16 August it promises to be an exciting few weeks. Throughout the tournament GB98FLD will be activated on 3.5 and 28MHz s.s.b./c.w. and also on 144 and 430MHz using as many modes as possible.

The venues for operation will be as follows:

30 July - 4 August	Leicester Radio Society HQ
5 - 12 August	World Cup Village, Victoria Park, Leicester
13 - 16 August	Leicester Radio Society HQ

In commemoration of this Football event and also the unique callsign, the commemorative QSL card



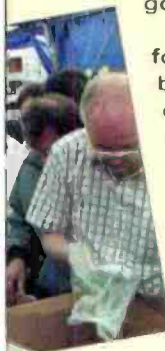
(as shown here) has been designed. All QSL requests should be made either via the Radio Society of Great Britain's bureau or direct to **PO Box 49, Leicester** and QSL collectors and short wave listeners are also welcome to apply for this very special card.

The Leicester RS would like to thank the RSGB and the Radiocommunications Agency for the issue of the Special (Special) Event callsign. Thanks also go to club member **Arthur GOTNI** for his work in gaining the callsign.

just 20p!

The other major attractions of the day were antenna parts, alloy tubing, traps and brackets. Customers were invited to pay £1 for as much as they could carry! You should have seen the rush, not to mention the over-laden cars that left Hockley with the goodies!

The total attendance for the day was believed to be in excess of 400 people and considering the event clashed with National Field Day it was a great turn-out. Both *Practical Wireless & Short Wave Magazine* were represented, as were Yaesu, Icom and Kenwood.



A Digital Helping

The transmission and distributor provider for Independent radio, **NTL**, have launched a guide called *A helping hand into digital radio for commercial radio stations*, which is the first publication of its kind to be written for the commercial radio industry. The digital age is fast approaching and with digital radio being seen as the biggest challenge since the introduction of f.m. broadcasting it was decided by NTL Broadcast Radio that a simple-to-understand, 'jargon' free guide to the complex subject was much needed.

The radio team at NTL has been working on digital radio since 1995 and the new guide *A helping hand into digital radio for commercial radio stations* examines the strategic and business issues involved in migrating commercial radio into it's new digital platform.

The new guide will be distributed to



commercial broadcasters and other interested parties. The team at NTL are also producing a companion publication to *A helping hand into digital radio for commercial radio stations* for engineers. This will be titled '*A helping hand into digital radio for engineers*'.

For more information on how to obtain either of the NTL guides or for additional details on digital radio contact **Emma Bickerdike** on **(01962) 822891**.

Fun Day

On **1 August 1998**, **South Midlands Communications Ltd.**, will be holding their annual Open Day at their HQ in Chandlers Ford, Eastleigh, Hampshire. This year's event marks the 40th anniversary of SMC and the event promises to be a real 'fun day' with a wide range of exhibitors in attendance, a raffle, car boot sale, surplus stock sale and bargains galore. For more information call **Ailsa** on **(01703) 251549**.

FOR A FREE MENTION ON THESE PAGES SEND YOUR NEWS & PRODUCT INFORMATION TO DONNA G7TZB TODAY!

NEWS

Hereford Visit

Rob Mannion G3XFD recently visited the **Hereford Amateur Radio Society (HARS)**, where he was presented with a £50 donation to be passed on to the **Radio Amateur Invalid & Blind Club (RAIBC)**. The money was collected from that evening's meeting, which was also attended by members of the **Abergavenny Radio Society**.

As many of you are probably aware when Rob visits clubs to provide a 'PW talk' he doesn't charge for the privilege but instead asks for a donation to be sent to the RAIBC, so the donation from the Hereford and Abergavenny clubs was certainly well received.



The picture shows (l-r) **Tim Bridgland-Taylor G0JWJ** (Chairman of HARS), **Rob G3XFD** and **Eddie Wyman G0UDF** (Honary Secretary of HARS) during Rob's visit on the evening of Friday 19 June.

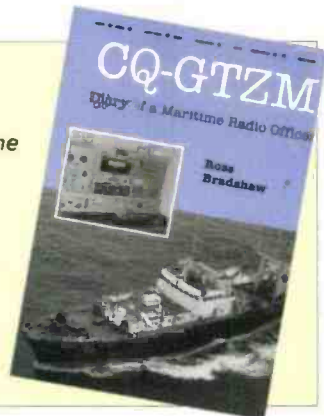
Stockton Celebrates

The Stockton-on-Tees Special Events group (**G3YNB**) will be running a special event station using the callsign **GBOSRF** from **Friday 24 July** through until **Sunday 2 August**. The station is being put on air from Gloucester House in Stockton-on-Tees to celebrate the Stockton International Riverside Festival.

Short wave listening reports are most welcome and QSL is 100%. Any direct QSLs should be sent to **G0DOD (QTHR)** and must include a stamped addressed envelope. More information on the GBOSRF special event station can be obtained by E-mailing **mikeg0dod@compuserve.com**

New Book

Now available from the **PW Book Store** is newly published **CO-GT2M, Diary of a Maritime Radio Officer** by **Ross Bradshaw**. The book, written in a diary format of a radio officer during the period 1973-1979, provides an insight into the activities of maritime radio officers, the equipment that they used together with some technical information. Order your copy now from the **PW Book Store** for only **£12.95 plus £1 P&P (UK), £2 P&P (overseas)**.



Plymouth Radio Club

Den Perryman G7NMA of the **Plymouth Radio Club** has dropped me a line to remind you of some interesting 'talks' that are taking place over the next few weeks. These are as follows:

Date	Talk Subject
August 4 11th 18th	Fort Bovisand Underwater Centre
September 1	National Blood Transfusion Service
	Air Ambulance

The Plymouth club meet in the basement of the **Royal Fleet Club, 12 Morice Square, Devonport, Plymouth** and all meetings open at 7.30pm for a 8pm start except on the occasion of a visit to another location when members are asked to arrive at 6.45pm for a 7pm start. For more information on the club's activities you are invited to contact Den on **(01752) 346158** before **9pm**.

Admiralty list

Just published by the United Kingdom Hydrographic Office in Taunton, Somerset is the **Admiralty List of Radio Signals (ALRS) Volume 3 Radio Weather Services and Navigational Warnings**. This A4 publication is now produced in full colour and has been fully updated to contain a complete guide to Automatic Picture Transmission (APT) and Weather Facsimile (WEFAX) services as well as all maritime radio weather services and safety information broadcasts.



Full, international NAVTEX details are also included as are internet, telephone and telefax marine weather services provided by national Meteorological

Authorities. The information supplied is completed by **SUBFACTS** and **GUNFACTS**, which are broadcasts detailing submarine and practice firing activities.

The ALRS Volume 3 contains over 160 diagrams and tables and is produced in two parts. Part one covers Europe, Africa, and Asia and Part two, the Philippines, Indonesia, Australia, the Americas, Greenland and Iceland. Both parts are available from appointed Chart Agents for the recommended price of **£24**.

Further details can be obtained from **The United Kingdom Hydrographic Office, Public Relations Department, Admiralty Way, Taunton, Somerset TA 1 2DN. Tel: (01823) 337900**.

Free To A Good Home

Mr E. C. Thompson has recently contacted us with the news that he has a mint condition copy of the June 1985 copy of *Practical Wireless* which he'd like to give away free to a 'good home'. So, if your collection is incomplete and you've been desperately looking for a copy of the June 1985 issue then contact **Mr Thompson at 16 Primrose Street, Clitheroe, Lancs BB7 1BZ**. But hurry, it's first come first served!

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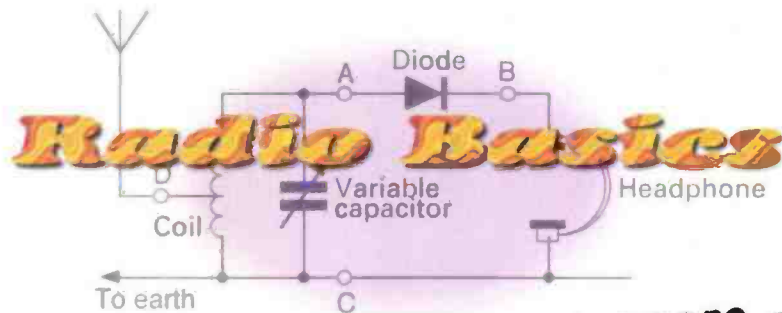
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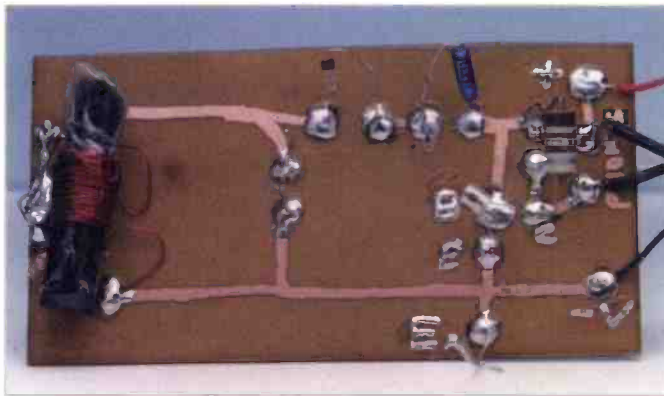


Fig. 1: The p.c.b. partly assembled, the two vertical wires to the right of the ferrite rod are used to connect the tuning capacitor. The coil centre tap can be seen attached to its solder pad, as can the main connection at either end of the coil. Note how the components are mounted directly to the solder pads without using mounting holes. Heat shunting (by gripping the leads with pliers or tweezers) is essential when soldering the diode and transistor.

By now I hope you've had a little practice in designing, drawing preparing and etching some little printed circuit boards (p.c.b.s) of your own. And if you've followed my advice you'll have made the boards shown in Fig. 2 of last month. If so - it's on with the process, if not - make your boards and then join in the fun!

It's very simple to prepare the p.c.b. material - whether epoxy based paper or glass fibre material. And a tip I can pass on is not to cut it with a saw. My method is to use a sharp file to divide the boards, using a 'straight edge' (usually another board) to guide the file.

I think the file method makes a much neater job and there's less chance of damaging the board. Additionally, you don't need a large hacksaw or bench vice to do the job, only something heavy enough to hold the job

down while you file.

The design I'm using for the introduction to p.c.b. techniques, is the simple diode detector and one stage of audio receiver from the April issue. It's a case of 'one step backwards' (by using a circuit you know already) and several steps forward by introducing the p.c.b. technique.

Incidentally, the simple p.c.b. method I'm introducing will be in use throughout this series from now on. However, although I strongly advise you to make your own p.c.b.s it is still possible to use the drawing-pin and board system.

Surface Mounting

I suppose you could call the method of mounting wire ended components - as I'm about to describe - as a crude system of 'surface mounting'.

However, in reality the only real connection is that the components are mostly mounted on the same side as the copper etched track using traditional wire ended components.

The components are directly mounted on the copper tracks, as shown in Fig. 1. This photo was taken during an early stage of assembling the project. As drilled mounting holes aren't used, **larger connecting 'pads' are necessary.** But that's no problem with the 'Dalo' pen method of applying the etch resist because it's easier to make thicker tracks than thinner ones!

From the photograph, Fig. 1, you can clearly see that the stress and loading on the copper track is spread somewhat by the larger surface area of the pads. The stresses involved get even smaller if you use lighter, modern components but in practice I've used many differing types over the years and it's rare indeed to over stress the copper foil

laminates and 'lift' it off the board.

Finished Board

The finished board for the project is shown in Fig. 2. In this photograph the tuning coil (inductance) wound on to a small ferrite rod, is shown mounted (it can be secured with a spot of hot wax or blobs of adhesive at the ends of the rod) on the board with its two 'flying lead' ends soldered to the pads as indicated. The coil centre tap is soldered to the pad marked 'antenna' on the board.

How easy it is to make these boards is shown by the slight variations in the photographs in this issue and from the 'Radio Basics' column from the July issue. This is because I made four boards, in less than an hour, to show the various stages of construction. And because they were all drawn 'freehand' there's bound to be slight differences between them.

The Polyvaricon tuning capacitor - mounted to the

Radio Basics is continued on page 18

Last month Rob Mannion G3XFD introduced you to the techniques involved in designing, preparing and etching your own printed circuit boards. This time, Rob goes one step further by describing a simple p.c.b. assembly technique.

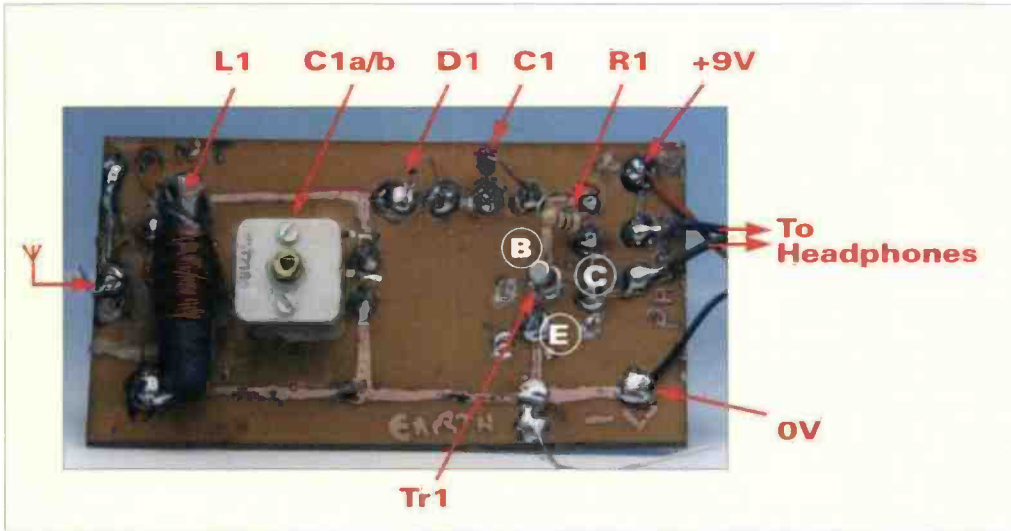
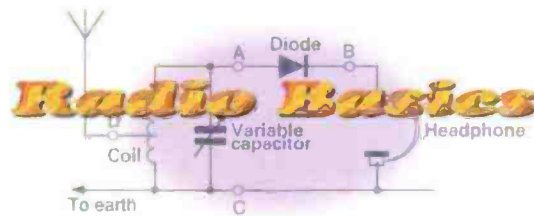


Fig. 2: Annotated photograph showing the completed p.c.b. ready for use. The ferrite rod inductance and the tuning capacitor (left) can be attached to the board with adhesive or by using a small amount of melted wax. Note the connections on the Polyvaricon. (Centre connection is 'common'). The circuit used is the one that appeared on page 22 of the April 1998 issue of PW.

right of the tuning inductance - is secured by adhesive to the board and connected by two vertical wires (see Fig. 1). The tuning knob/dial has been removed for clarity in the photograph.

All the other components to be mounted on the board are straightforward to install. Note however that it's a good idea to mark 'E, B, C' (Emitter, Base, Collector in the case of a simple transistor) on the boards you make. Correct placing of the transistor during assembly is then much easier.

For the 'phones' audio output I suggest you use multistrand wire rather than single core. This reduces wire 'fatigue' breakages at the soldering point.

Switch On

Once you've finished the assembly and checked all the connections, and all is well - you can switch on by connecting the battery supply. A PP3 9V battery is ideal and the 'press stud' type of connector with colour coded leads, connected to the -V and +V pads can be used.

Connect the antenna, and the earth and you're off! If you built the original 'drawing pin' version you won't be surprised at the performance - but if you did - although it performs the same it looks much neater doesn't it?

And of course, if you prefer

to use the 'old fashioned' open framed variable capacitors for tuning - you can easily modify your boards for these excellent components. This system is that flexible!

Next time I'm going to take you on yet another step forward by describing a true

'tuned radio frequency' receiver, which also incorporates a 'regenerative' detector. It will of course be built onto your own 'home-brewed' p.c.b.s! In the meantime - keep practising making your own boards.

PW



Fig. 3: This photograph is included in 'Radio Basics' to illustrate how the p.c.b. material 'chassis' construction technique lends itself to 'quick home-brewing' in a very effective way. The p.c.b. sections can be soldered together to form the 'chassis' and is remarkably strong and lightweight. The photograph shows an 'OXO' 7MHz QRP c.w. transmitter (Designed by George Burt GM3OXX and published in *Sprat* - the G-QRP Club's journal). The versatility - and simplicity - of the technique is demonstrated by the mixture of the variable crystal oscillator (VXO) capacitor which dates from the 1930s, and two solid dielectric variable capacitors for the (milliwatt) p.a. stage and a plastic till-roll centre for the coil! In the final 7MHz version the transmitter has an output of less than 500mW and has provided QSOs all over Europe - from a transmitter built over a weekend entirely from p.c.b. off-cuts!

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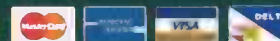


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Ian Poole G3YWX sets about answering the question What Is A ... IMPATT Diode?

The IMPACT Avalanche Transit Time (IMPATT) diode is used for generating radio frequency signals in the microwave region between about 3 and 100GHz and beyond. There are a number of types of diode used for generating microwave signals, but the IMPATT is the most powerful. The basic idea for the diode can be traced back to a

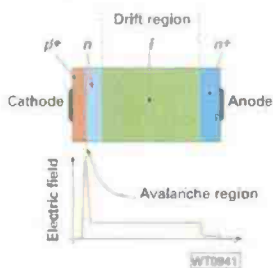


Fig. 1: An example of a typical IMPATT diode.

paper written by Shockley in 1954 where he proposed the use of a *p-n* junction. A further idea for a slightly different type of structure using a *p+n/n/n+* was proposed by Read in 1958. However, it was not until 1965 that a working diode was made and the first IMPATT oscillations were observed at Bell Labs. Since then a number of different types of structure have been used, but all employ the same basic principle of operation.

Different Structures

A variety of different structures can be used for the IMPATT diode. In general they are variations of a *p-n* junction often with an intrinsic area in the structure as shown in Fig. 1. The most common form of diode, the Reed diode is shown here for simplicity as it shows the mode of operation particularly well. Other forms are generally variations of a *p-n* junction where avalanche breakdown is made to occur in a high field region.

The typical realisation of the Reed diode is also shown

in Fig. 2. Here it can be seen that the diode is made in a vertical structure with vertical current flow. Typically the *n* layer is about 1-2mm and the intrinsic layer is between 3-20mm, although thicknesses of 0.5mm may have to be used for frequencies in excess of 100GHz.

A variety of materials can be used. Silicon and gallium arsenide are the most common, although germanium, indium phosphide, and others have been used.

Diode Operation

The operation of the IMPATT diode is based around the fact that there are two basic areas. The first is called the avalanche or injection region. Here the current carriers (electrons or holes) are generated.

The second area is a drift region. Here the carriers move across a region of the diode taking a certain amount of time. The fact that the carriers take time to cross this region is crucial to the operation of the diode.

The IMPATT is operated under reverse bias so that avalanche breakdown occurs in the *p-n* junction. The electric field at the *p-n* junction, formed by the heavily doped *p* and *n* regions, is very high. Here a voltage appears across a very narrow gap.

In this circumstance any carriers will be accelerated very quickly. When they collide with the crystal lattice they may free one or more carriers, which in turn may be accelerated and will collide again freeing more carriers.

Avalanche breakdown due to the impact occurs when one carrier frees more than

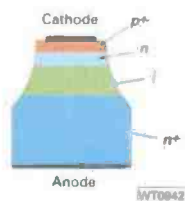


Fig. 2: A vertical IMPATT diode structure.

one other carrier from the lattice. However, for this to occur a certain voltage must be exceeded across the junction. But, this is only the first part of the story.

The way in which an IMPATT operates relies on a phenomenon called negative resistance to cause and sustain the oscillation. This effect occurs when an increase in voltage gives a decrease in current. Normally an increase in voltage would give a corresponding increase in current.

The negative resistance effect does not occur at d.c.

Instead here it's an a.c. effect that is brought about by phase differences that are seen at the frequency of operation.

When an a.c. signal is applied the current peaks are found to be 180° out of phase with the voltage, i.e. when the voltage is positive the current is negative. This results from two delays which occur in the device. These are injection delay and a transit time delay as the current carriers migrate or drift across the device.

The summary of the two effects which cause this delay are seen in Fig. 3. As the voltage rises a point is reached where breakdown occurs.

As can be seen from the diagram, Fig. 3, the rate of breakdown does not occur when the voltage peaks. Instead it is delayed. The reason for this is that the generation of carriers results not only from the electric field that's present, but also from the number of carriers that are already present.

After the field passes its peak value the number of carriers continues to grow. This results in the maximum

generation of carriers occurring about a quarter of a cycle (90°) after the peak of the voltage waveform. Once the field falls to zero and becomes negative the generation process stops and the current starts to fall.

When the charge carriers have been created they move across the *n+* region creating an external current. In Fig. 3 you can see the current takes a finite time to flow across the drift region and it is out of phase with the voltage.

The second delay causes another phase shift of the current of about 90° giving a total delay of about 180°. In other words the voltage and current are out of phase with one another.

The result of the phase difference is that when the correct voltage is applied across the device an oscillation starts and is chiefly dependent upon the delays across the device. In this way the IMPATT diode can be used as a very simple microwave oscillator.

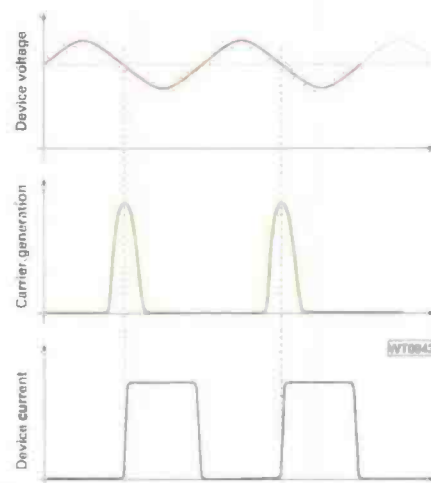


Fig. 3: Examples of IMPATT voltage and current waveforms.

Application Variety

In view of the high power capability of the IMPATT diode when compared to other microwave generators it's used in a variety of applications from low power radar systems to alarms. Its main drawback is the high level of phase noise which results from the statistical nature of the avalanche process. Nevertheless it still makes an excellent microwave generator for many applications.

PW

In October I'll be looking at the Tunnel Diode.

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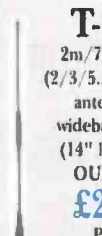
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Richard Newton GORSN tries out the latest in micro hand-helds available on the amateur market and this time it comes from the Icom stables in the form of the IC-Q7E.

"The received audio on the IC-Q7E is really quite impressive"

Power is supplied by two AA cells as there is no provision for external power to be used.

The Icom IC-Q7E dual-band hand-held is the latest micro hand-held to hit the market. Measuring just 580 x 860 x 270mm it has got to be one of the smallest hand held radios around at the moment. The Q7E appears to be well made, is finished in high impact grey plastic and its rounded edges and ergonomic design give the radio a reassuringly professional feel.

The Q7E is supplied with a belt clip, carry strap and a rather long helical antenna. This antenna looks (and to be frank is) out of keeping with the unit's miniature size. But I have no doubt that Icom have done this to give the customer the best possible all round performance.

Two AA cell batteries are used to power the radio. However, batteries are not included.

The IC-Q7E not only transmits on the 144 and 433MHz Amateur Bands but also has wide-band receive capabilities that include the f.m. broadcast bands. Using the supplied antenna gives a good all-round performance. But you can purchase smaller antennas designed for more specific uses. For all my tests I used the supplied helical antenna, except when I put the Q7E on my external WX1 antenna.

Controls Simple

The IC-Q7E is very simple in design as most of the controls can be found on the front of the radio. Switching between memory and v.f.o. is a one-button process and is as easy as recalling the 'call' channel.

Changing the band and

volume control are also 'instant access' and although adjusting the squelch is a two-button operation, this is not a problem with the Q7E as I found the squelch very reliable and I didn't have to adjust it once.

All the controls on the Q7E are multi function, this means that the radio is simple to use, has the minimum of controls but enjoys an impressive range of options should the operator wish to use them. On the whole I think the controls are well set out and functions easy to access.

Repeater Offset

The one problem I did encounter was selecting a repeater offset in v.f.o. mode. This was, to be frank again, laborious.

Firstly, you have to select the Function Menu, once in the function menu you have to rotate the dial until duplex is found. This in turn then has to be set to plus or minus and then you have to 'exit' back to normal operation. Then you can transmit using the repeater offset.

If you then want to return to simplex you have to reverse the whole operation. (The USA version has automatic repeater shift facility). Icom advertise the IC-Q7E as 'Ideal for short range contacts and repeater operation'.

The only way around the repeater shift problem is to store all repeater frequencies

"... it's highly versatile and offers a wide range of features as well as a wide range in frequencies"



and their offsets into memory channels. Once programmed repeater access is simple as a 1750kHz tone-burst can be transmitted by just 'double clicking' the p.t.t.

I was impressed greatly with the IC-Q7E's versatility. The function menu can be 'expanded' to give the operator greater control over advanced features or can be kept simple for those who do not want 'bells and whistles'. One small point which particularly impressed me was the fact that when in Memory mode, if the **Band** key is depressed for approximately two seconds the memory contents are copied to v.f.o.

Formidable Options

Icom have also given their IC-Q7E a formidable range of scanning options. Up to 20 scan ranges can be programmed; these are likely to be needed by some operators as this radio covers frequencies between 30 and 1300MHz.

The receiver can scan its whole range, it can also scan between two programmed frequencies. The IC-Q7 will also scan memories, either memories in bank 0 - 99 or bank 100 - 199 or all 200. Operators can set any memory channel to 'skip' if scanning is not desired.

The last option in the scanning armoury is the Frequency Skip Scan. I thought this option was great!

The frequency skip scan is used in conjunction with band scan or programmed scan, where v.f.o. frequencies are being monitored. You can also set the IC-Q7E to skip unwanted frequencies in the v.f.o. range that would impede good scanning.

For example when I was scanning the airband frequencies the local airport information service kept stopping the scanning. This is a low power looped transmission and as I live near to the airport it stops me scanning the airband. Not so with the Q7E!

To compliment the already impressive range of scanning options the IC-Q7E has a Priority Watch. This checks for signals on a frequency every five seconds while operating on a v.f.o. frequency or while scanning. There are three types of priority watch, all of which can be used with an audible alert.

The three types of priority watch available on the IC-Q7E are: Memory or Call channel watch, Memory Scan watch and VFO Scan Watch. The memory or call channel watch will check a specific memory or the call channel every five seconds while you are monitoring a v.f.o. frequency.

I found the watch facility very

useful, as there are several local amateur chat frequencies in use near to my QTH, some of which more used than others. I was able to monitor the v.h.f. one on the v.f.o. while keeping half an eye on the u.h.f. frequency stored in the memory.

The memory scan watch is also very useful, while monitoring a v.f.o. frequency the IC-Q7E will check each memory in turn every five seconds. If all 200 memories are full and none are set to skip this will take a long time, however if you configure the radio for this option it could prove very useful indeed.

The final and for me most impressive and useful watch facility was the v.f.o. scan watch. While scanning a v.f.o. range priority watch checks a chosen memory channel every five seconds. This meant that I could enjoy monitoring airband or the 145MHz band while still keeping a watchful eye on the local chat frequency.

Fared On Air

Having programmed the IC-Q7E with the repeater frequencies I decided to see how the radio fared on the air.

First I tuned to **BBC Radio 2** on the f.m. broadcast band, the audio was quite simply wonderful. I was extremely

impressed. Tuning through the broadcast band I compared the Q7E with my dedicated a.m./f.m. Hitachi radio in my kitchen. Considering that the Hitachi was manufactured to receive the broadcast bands the IC-Q7E did very well (the Hitachi did have the edge, but not by very much!).

The IC-Q7E is supplied with a rather long helical antenna which is rather out of keeping with this transceiver's miniature size.



"Icom have also given their IC-Q7E a formidable range of scanning options"

The next test I carried out was with the low power continuous loop information transmission from the local airport. This is my 'yard stick' for airband.

The Q7E received the signal with a fair amount of background noise. (This compares very well with a dedicated airband receiver). For general airband use I found the Q7E excellent, even when using the supplied helical whip antenna.

The IC-Q7E puts out 300mW of r.f. power. I found that when using the the helical antenna this was not enough to open the local repeater from my home address. As I live about 6.4km (as the crow flies) away from the repeater site.

However, I had no problem with accessing the repeater when I put the radio on my WX1 antenna. To do this I had to use a BNC to SMA adapter, which can be purchased as an optional extra.

Audio Reports

The received audio on the IC-Q7E is really quite impressive. So, I wondered what reports I would get on the transmitted audio?

I spoke to **Terry G7VJJ** on a 145MHz simplex frequency. Terry lives quite close to me and gave the Q7E a very favourable report indeed.

"That audio is really good Richard, what radio are you using?"

So, I told Terry about the Q7E, he said, "I didn't think it was your normal one". *Thanks Terry!*

I then called through the local repeater, **GB3SC** but got no reply. However, I knew that my brother **William G7GMZ** was due to be travelling down to Bournemouth.

Eventually, I met up with William on GB3SC, again using the WX1. William gave me a good report and he also mentioned the transmitted audio, giving it a glowing report.

Next we decided to try a simplex contact, William was still about 11km away from my location but by using the WX1 antenna on the IC-Q7E we managed a simplex

contact. Just goes to show that power is not everything - but a good antenna system is! Alas our enthusiastic QRP contact still failed to draw any more interest and I didn't get any other reports.

Considering the very wide frequency coverage of this little radio I was expecting a few break-through problems when I put it on the WX1.

I had none despite being very close to a nightmarish nest of pagers. This impressed me greatly and the IC-Q7E also offers all the modern bits and pieces such as CTCSS and Tone identification.

Next I spoke to **Laurence MOAUY** who actually owns a Q7E. He loves his and has great fun while walking around Bournemouth town centre chatting on the local 433MHz repeater, GB3SZ, which is located in the town centre itself.

Due to the limited time I was able to have the Q7E to trial I was not able to get as many contacts under my belt as I would have liked. Unfortunately I also didn't have the opportunity to monitor the 50MHz band long enough to hear anybody.

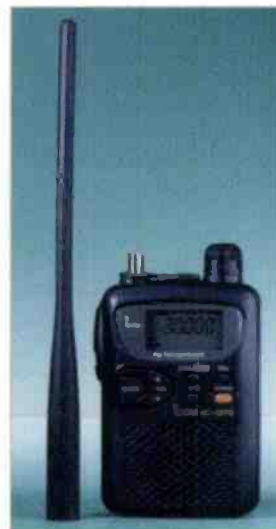
The Q7E has a very good receiver and the battery life appears to be excellent. The radio is powered only by battery and there is no facility for external power to be used.

There are several optional extras available for the transceiver. These include a speaker microphone, VOX head set and soft case.

Fun To Operate

The Icom IC-Q7E is good fun to operate, it's highly versatile and offers a wide range of features as well as a wide range in frequencies. In my opinion it would only serve as a main rig to the most dedicated QRP operators. However, I think the Q7E would be a good choice for an all round second radio for use at rallies, field days and a local community. Even considering the low output power of the radio, I think that it represents superb value for money.

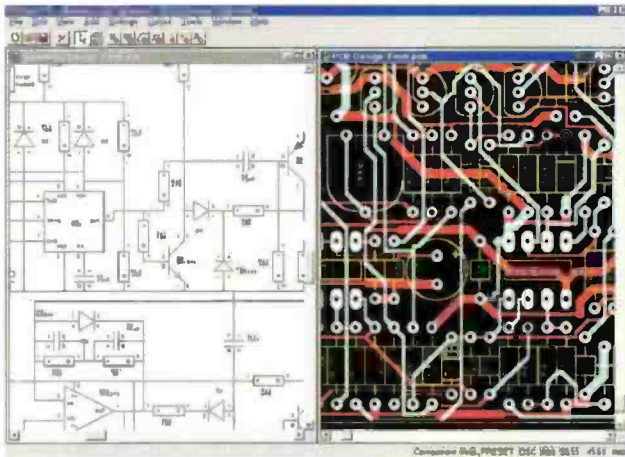
My thanks go to Icom UK for the loan of the IC-Q7E, which is available from all Icom approved dealers for the recommended price of £215.



Manufacturer's Specifications		
General		
Frequency range:	144 - 146MHz 430 - 440MHz	30 - 1309.995MHz
Mode:	f.m.	a.m., w.f.m.
Memory channels:	200	
Useable temperature range:	-10°C to +60°C	
Tuning steps:	5, 6.25, 10, 12.5, 15, 20, 25, 30, 50 & 100kHz	
Frequency stability:	-10°C to +60°C (±50ppm)	
Power supply requirements:	2 x AA (R6) Ni-Cad or alkaline cells (negative ground)	
Current drain (v.h.f./u.h.f. at 3.0V d.c.):		
Max Power:	440mA/380mA (typical)	
Rated Audio:	170mA (typical)	
Standby:	95mA (typical)	
Power saved:	38mA (typical)	
Antenna connector:	SMA (50Ω)	
Dimensions:	58 x 85 x 27mm	
Weight:	170g	
MIC/SP-Connector:	4-conductor 3.5mm 2kΩ/8kΩ	
Transmitter		
Modulation system:	Variable reactance	
Output power:	350mW typ. (v.h.f.)	
Spurious emissions:	Less than -40dB	
Maximum frequency deviation:	±5kHz	
Receiver		
Receiver system:	Triple conversion superheterodyne	
Intermediate frequency:	1st 266.7MHz, 2nd 19.65MHz, 3rd 450kHz	
Sensitivity:		
FM (at 12dB SINAD)	30 - 117.995 MHz 0.32µV 118 - 174.995MHz 0.16µV 175 - 246.995MHz 0.22µV 247 - 329.995MHz 0.4µV 330 - 379.995MHz 0.32µV 380 - 379.995MHz 0.18µV 470 - 749.995MHz 1.0µV 750 - 999.995MHz 0.32µV 1000 - 1199.995MHz 0.79µV 1200 - 1300MHz 0.5µV	
Squelch sensitivity:	0.18µV (144 - 148MHz) 0.22µV (430 - 450MHz)	
Selectivity f.m./a.m.:	More than 15kHz/-6dB Less than 30kHz/-60dB	
Image rejection ratio:	More than 60dB (amateur bands only)	
Audio output power:	100mW typ. at 10% distortion	

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SRP TRADING



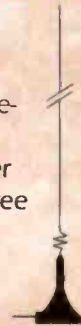
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AG2601 audio signal generator specification

Frequency range : 10Hz-1MHz, 5 ranges + variable
 Frequency accuracy : +/-5% of full scale
 Output waveforms : Sine and square
 Output impedance : 600ohm
 0dB amplitude : >20Vpp no load
 -20dB amplitude : >2Vpp no load
 -40dB amplitude : >200mVpp no load
 Sinewave distortion : <0.05% (500Hz-50kHz)
 Size & weight : 150 x 250 x 130mm, 2.5kg
 Power requirement : 115/230Vac 50/60Hz

SG4160 rf signal generator specification

Frequency range : 100kHz-150MHz, (450MHz 3rd harmonic)
 Frequency accuracy : +/-5% of full scale
 Rf output : 100mV rms no load
 Output control : High/low switch & fine adjust
 Int modulation : 1kHz (AM) 30% approx
 Ext modulation : 50Hz-20kHz at <1Vrms input
 Audio output : 1kHz min 2Vrms
 Crystal oscillator : For 1-15MHz crystal
 Size & weight : 150 x 250 x 130mm, 2.5kg
 Power requirement : 115/230Vac 50/60Hz



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ELECTRONICS IN ACTION

Welcome to 'Electronics-in-Action' (E-i-A), a news and views column where you, as readers, decide the direction. Pose a question and I'll find an answer for you - or if I can't, I'll try and find a person that can. I also hope to publish your electronic tips and tricks and the authors of the ideas I use in any month will get a voucher to 'spend' at our *PW* Book Store. And in each issue I'll have a look at a few books to suit all levels of knowledge and skills.

Tex



Let me get the 'nasty bits' over and done with! With that I mean that I have to make my apologies for the 'clangers' in the June issue of E-i-A. I'll start with **Harry Leeming G3LL**, where in the news section of the June issue of E-i-A I made it appear that Harry (of **Holding Amateur Electronics**) was to stop all work on his retirement.

Harry has asked me to say that, as soon after retirement as possible, and when he has a workshop set up at home, he will start doing repairs again. So, I'm more than happy to oblige and correct the statement, and you can contact Harry (until his proposed retirement) at: **45 Johnstone St, Blackburn, BB2 1EF. Tel: (01254) 59595 on Thursdays to Saturdays only.**

My apologies must also go to Conundrum No. 3 winner **Colin Hawkins G0CEU** to whom I inadvertently gave the callsign **G0CEV**. My apologies to both of you. Ooops 'SRI OMs', and if I've got that bit wrong as well - it's because I'm still struggling to learn Morse - sorry!

I managed to get both the callsign wrong and mis-spell **Walter Farrar G3ESP's** name, for which I also offer

THE ANSWERS TO CONUNDRUM-3 - REVIEWS - SOME BOOKS TO READ AND ANOTHER CONUNDRUM TO KEEP YOU BUSY

my apologies. I was able to give my apologies in person to Walter, when he and his **XYL** made a flying visit to the office whilst in the area. Once again the sackcloth and ashes were being worn openly by **G1TEX**!

Help Wanted

I often get requests for help with a variety of projects and information, and I've had an E-mailed plea from **Eddie Wheaton G7OMK**. Eddie wrote "About four years ago I purchased a 'hands-free' set from **Heatherlite**. On checking it over the weekend I found the tone burst was about 3kHz, thus it didn't open any repeaters! Do you, or anyone at *PW*, know where I can get a circuit diagram of the unit (a **Kenwood** version)?"

Eddie went on to say "I know I could work it out from the components, but I thought I would try the easy way and get the circuit first! The control inside only brings the tone down to about 2kHz so a component must have gone, but which one?" I have to admit Eddie that I have also drawn a blank - can any reader help Eddie with a circuit diagram of the **Heatherlite** hands free unit for a **Kenwood** rig?

Sometimes readers ask for information about projects that have appeared in past issues of *PW* and very often the projects were by **George Rayer G3OGR**. During the 1960s and 1970s there were periods when a project from **George** seemed to be in almost every issue.

It was one of **George's** radios that was the subject of a letter from **John Blaylock**, who asked for a reprint of the **General Coverage Receiver** that appeared in the March and April 1970 issues of *PW*. Whilst I was looking at the article in the archives, I thought that it was a good introduction to the technicalities of a receiver.

Although the components used are now fairly well out-of-date, the layouts and descriptions and sections are simply laid out. The receiver covered medium wave and up to 30MHz with a.m./c.w. and s.s.b. reception. I think it would make good course material for **RAE** students and instructors. With a little research, the circuit could be changed from the *pn-p* Germanium transistor, that it used originally, to more modern *npn* Silicon devices. Anyone keen to try out the idea?

Another request for advice was from **David Clifford**, who been given a **Datong RF Speech Clipper** of about 1981 vintage. He is looking for some information of its method of operating and possibly a circuit diagram of the unit. I was unable to help **David** - can any reader help him with the information he is looking for?

A letter about his '**CR100** needing completely rewiring' was the start point from **Roger Grenville**. **Roger** then went on to mention an article in *QEX* called 'Synthesizing Vacuum Tubes' and asked if it would be possible to replace the valves in his **CR100** with *j.f.e.t.s*?

Roger's question set me thinking about the possibilities, and the problems that might be experienced with such a scheme, as there are many similarities between valves and *j.f.e.t.s* on first glance. Then I remembered the '**Fetron**' that was available in the early 1970s (a special report appeared in the May 1973 issue of *PW*).

The **Fetron** was a direct pin-for-pin replacement for some types of valve, although only a few small signal amplifier devices appeared. The

Fetron was rapidly overtaken by the rush to put integrated circuits into equipment and its general cost.

As the **Fetron** is no longer an

available option for valve replacement I considered **Roger's** idea as an interesting possibility. I've done some of the work towards an article on valve replacement with semiconductors, but it will have to wait until next time due to space limitations (this month).

Signal Generator

Now I'll take a look at a signal generator. One very useful piece of test equipment for anyone interested in radio, is - of course - a signal generator. And I've had the opportunity over the last two months to evaluate the **Loadstar SG4160B** from **Vann Draper Electronics**.

The **SG4160B** covers, with six ranges, from 100kHz to 150MHz on fundamentals and it gives coverage up to 450MHz on harmonics on the upper range. The six ranges are 100-300kHz, 300-1000kHz, 1-3.2MHz, 3-10MHz, 10-35MHz and the top range of 32-150MHz (plus harmonics 96-450MHz).

The unit offers a basic accuracy of within $\pm 3\%$ of the displayed reading, a two step plus variable



Fig. 1: The **Lodestar 4160B** signal generator is the subject of a special offer this month in *PW* (see text).

attenuator, and an a.m. and unmodulated r.f. output. The internal modulating frequency is 1kHz, but the external modulation can be almost any audio frequency at a medium level.

A large semicircular (120mm diameter) dial shown in the front view photograph, **Fig. 1**, allows reasonably easy frequency setting. However, as the scale is analogue, it can be somewhat difficult resetting to a frequency as previously set. But even expensive signal generators

Kanga's Kit

I've been looking at some of the kits that Dick Pascoe GOBPS, supplies as part of the Kanga range. The kit I've had the chance to build is the Kanga Stockton bidirectional power meter. A bi-directional power meter may be used as an alternative to an s.w.r. meter (though it is not an s.w.r. meter) - as it gives a better indication of the actual 'goings-on' between the transceiver and the coaxial feedline. A bi-directional power meter show the real power flowing in both directions (forward and reverse) along the coaxial cable.

The circuit of the, David Stockton GM4ZNX designed, bi-directional wattmeter is shown in Fig. 2 as published in the May 1996 issue of PW ('A Low Cost Bi-Directional Wattmeter' By Ken Fisher GOLKX). In many respects as the Kanga Kit and the PW project are both based on David's work and they may be viewed as complimentary.

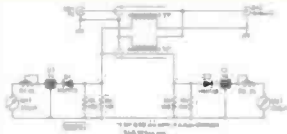


Fig. 2: The circuit of a Stockton bi-directional power meter - as it appeared in the May 1996 PW.

with analogue scales can have that difficulty - so, this is understandable.

I found that for best frequency accuracy a digital frequency counter was the best idea. And I found after a period of 'warming-up' (about half an hour) the signal remained quite stable. I also tried the long term, frequency stability at several frequencies on all the bands and found it very good, given the simplicity of the circuit.

The frequency stability of the unit I tried out was within $\pm 0.05\%$ on all bands and, whilst not up to the standard of modern synthesised signal generators, it was, I thought, more than acceptable. Frequency



Fig. 3: The Kanga kit of parts including the two meters and a variety of resistors to set the maximum measured power.

The Kanga kit itself came in a heat-sealed plastic bag and a separate neutral grey 'painted' aluminium case as shown in Fig. 3. Enclosed in the bag were two edge reading meters, two yellow ferrite rings, two SO239 sockets, two lengths of RG58 coaxial cable, some single strand covered wire. There were insulated stand-offs nuts and bolts and two feedthrough capacitors (which are not needed if it's built as a self contained unit).

The kit also has four 100 Ω 1W carbon film resistor to make up the two 50 Ω pads. Where the kit varied from the PW project was that Kanga supplied a series of resistors to give differing peak power readings on the meters (from 1-100W max). The meters themselves are marked as signal level meters with a 0-30dB scale (so removing the need to have different scales marked depending on the

stability is by far the the more important proviso and the SG4160B performed well in my tests. I set the unit to 10MHz and monitored the output frequency over several hours, and the drift was a little under ± 1 kHz in that period.

The output attenuator is rather simplistic in nature, being a rotary potentiometer and two-level matching pad. At the low level setting, the matching pad gives an output impedance of about 70-75 Ω . The output impedance at the high setting of the level switch is around 150-200 Ω .

The coils used in the oscillator circuit are all air-cored and the double tuning capacitor is a sturdy

maximum power).

The kit is suitable for all levels of knowledge, even though the instructions are a little spartan (contained on three sides of A4). The main requirements are an ability to cut and drill the soft aluminium of the case accurately and, although a layout is given in the instructions (about full size) no dimensions are given for the meter cutouts.



Fig. 4: The layout I adopted for the kit I built up from the Kanga parts.

I marked (on the removable film) the size and oblong shapes needed for the meters. I started the holes with a largish drill and then roughly cut out the holes with a nibbler, before finishing off with a medium-cut flat file. After making sure all the meters and sockets fitted the



Fig. 5: A simple blue colour was sprayed onto the case to finish off the project.

holes, I removed the protective film and keyed the grey surface before spraying it a simple blue colour. The photos in Fig. 4 and 5 show the finished project. In operation it worked well and I found I could get very useable and reasonably accurate readings from h.f. to up into the 144MHz band. I noted though that on the 144MHz band the reverse power readings were higher than they should have been.

The unit failed to work at all well on 430MHz, but there again that was to be expected. All in all a very good projects and kit well worth it - and you have a very useful piece of test equipment afterwards. The Stockton Power meter is available as two options, it's just £19.95 without meters or £32.95 with meters and is available from Kanga at Seaview House, Crete Road East, Folkestone, Kent CT18 7EG. Tel/FAX: (01303) 891106, or E-mail sales@kanga.demon.co.uk Home page <http://www.kanga.demon.co.uk>

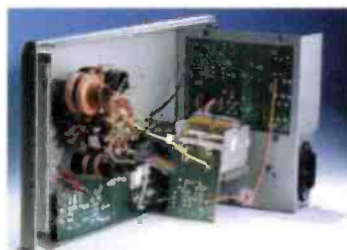


Fig. 6: Inside the SG4160B, the air-cored coils and a sturdy tuning capacitor both aid frequency stability.

framed unit (Fig. 6). Both of these design points provide a degree of frequency stability. The mains input socket for the p.s.u. is on a separate

panel that 'butts' up against an opening in close fitting box. The box was so close fitting, that I had difficulties taking the unit apart to photograph it!

All-in-all the signal generator is a very good value for money unit from Vann Draper. For more details see page 28 for their exclusive offer to *Practical Wireless* readers, offer this month.

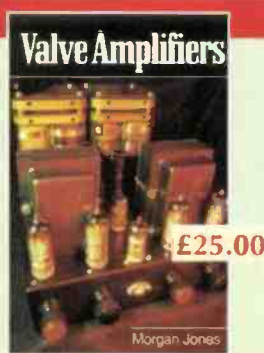
Books

I've been looking at a few books again on your behalf this month and I've found four that I think are very interesting. In the many years I've been in electronics, one book I always wanted to 'get my hands on'

BOOKS MENTIONED THIS MONTH



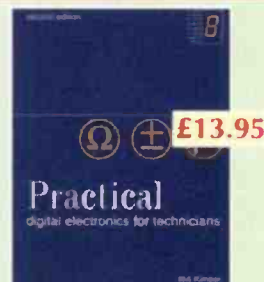
Practical RF Handbook



Valve Amplifiers



Scroggie's Foundation Of Wireless And Electronics



Practical digital electronics for technicians

All of these books may be obtained from the PW Book Store featured elsewhere in the magazine.

Conundrum

Finally, this month I turn to the conundrum corner. There were many correct answers to Tex's Conundrum No 3. (the answer was 4950Ω or $4.95k\Omega$ by the way), and first out of the hat as the winner of the *PW* Bookstore voucher is: **Bill Rowley M1BQZ**

There were many of you trying for the 'brevity' prize with your answers, usually on a postcard. Just a few of the postcards that stood out were: a 'furry' 1950s Robert's radio from **J. Bell**, a Heath Cartoon from Walter Farrar G3ESP (I hope I've got them both right this time), and a rather nice reproduction of an oil painting of 'Miss Anna Alma-Tadema 1883' from **M. Wright G0VWH**.

If you have internet access



A selection of the postcard conundrum answers.

then the answers to all my conundrum questions have been posted on our website <http://www.pwpublishing.ltd.uk> for downloading. An on that subject, I have to give a great big vote of thanks to **Dick Koehl** for all his help, as I passed numerous trial '.PDF' files to him for 'cross-platform' evaluation

If anyone would like copies (on disk) of the answer pages (you will need the Adobe PDF Reader on your

machine) a formatted disk (IBM or Macintosh) to me at the office, along with a sticky self addressed label is all I need.

New Conundrum

This month's conundrum is fairly simple and it again concerns the Wheatstone bridge circuit shown in **Fig. 7**. The question is: what are the two readings on the meter M1 (a centre zero movement, the $10k\Omega$ shown

for R3 is its internal resistance) when Rx is a short circuit, and when Rx is open circuit?

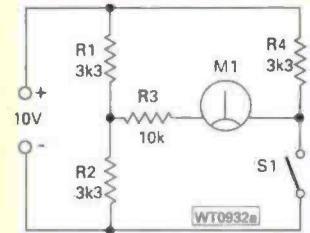


Fig. 7: Tex's conundrum uses the Wheatstone bridge circuit again (see text).

Your answers to me please, at the editorial address (or via E-mail to tex@pwpublishing.ltd.uk) marked 'Tex's Conundrum 4' by **Monday 17 August**. The first correct answer drawn out of the editorial hat wins a voucher to spend in the *PW* Bookstore.

was *Scroggie's Foundation Of Wireless And Electronics*, or more usually just known as 'Scroggie's'.

I was always unable to prise Scroggie's out of the hands of the owners, and had practically given up on ever getting hold of one. Now from Newnes comes the eleventh edition revised and updated by S. W. and R. S. Amos. Published originally in 1936, but updated regularly the latest edition covers all aspects of radio and electronics in 28 chapters and five indices.

Chapters cover topics such as: electricity, capacitance, inductance, alternating current, diodes, tuned circuits, valves, transistors, transmission lines, radiation, detection, amplification at r.f. and audio, the list goes on. Each topic is dealt with in a clear concise manner with many tables and illustrations.

The mathematics used has been kept down to the minimum, being used only where it is necessary for the understanding of any topic. Without a doubt, this is a very worthy continuation of the 'Scroggie' tradition. An excellent book for all levels of knowledge.

RF Handbook

Another book from Newnes is the *Practical RF Handbook* (second Edition) by **Ian Hickman**, who is well known for the quality of his writing on electronic subjects. This 300 page book, that's a little bigger than A5, is packed with information and explanations of such topics as: components (both passive and active), transmission lines, transformers, power amplifiers,

antennas, attenuators and measurements.

There are 14 chapters and 14 appendices in this book that covers each topic in good detail. There are few pages that do not have accompanying illustrations, and in these cases the explanations themselves are easy to follow.

The information held in each appendix is useful on its own, being a compilation of details on such topics, as filters, coaxial cable, crystals, wire gauges, frequencies and so on. A very good first and intermediate level book, that explains many topics of r.f. design and common usage.

Valves Again

I make no apologies for including a book on valves again in this section, as they are fascinating subjects in their apparent simplicity. *Valve Amplifiers* by **Morgan Jones** is aimed squarely at the audiophiles who want to build, or to understand the design ideas used, in valved audio amplifiers.

Broken down into seven chapters and one appendix, the book covers all aspects of designing and building valved audio amplifiers. Chapter one 'Circuit Analysis' is a good treatise about the many aspects of electronic design. The 'Basic Building Blocks' chapter looks at the various type of amplifier and valves and when to apply each type.

After a chapter dealing with components there are chapters about the three areas of an amplifier (pre and power amplifiers and the p.s.u.). An excellent book if you are

interested in valved amplifiers - or just in valves in general.

Final Book

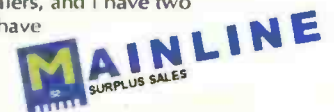
The final book I shall be looking at in this section of E-I-A, is also from the Newnes stable. *Practical digital electronics for technicians* by Will Kimber is a book I wish I'd had back in the distant days when I was struggling with my HND in electronics. It is copiously illustrated with diagrams and truth tables, it makes light going of a somewhat logical(!) subject. There are 12 areas in the book

dealing with Logic gates, Combinational logic, Karnough mapping, Logic (i.c.) families, Flip-flops as well as multivibrators, counters, and display components. Usefully there are many practical exercises that you can carry out to reinforce the explanations within each section. Logically, it's a book well worth reading for beginners-to-intermediate students. That's all I have space for this month in E-I-A, see you again in the October issue.

TEX

Dealers in Your Area

Let me now turn to the section about dealers, and I have two names for you this month. Firstly, if you have been to the Leicester show any time over the last few years then you have most certainly seem a team of hard working young ladies, usually dressed in red, working behind the **Mainline Electronics** stand.



John Higgins of Mainline has sent me another well laid out catalogue of very desirable bits and pieces for radio and electronics and a news release. Mainline are to open (what was originally) the old 'Eley Electronics Component Shop' at 102 Beatrice Road, Newfoundpool Leicester by the middle of July. It's a shop to look out for if you're in the area. For more information contact Mainline at: **PO Box 23, Leicester LE2 9SH. Tel: 0116-277 7648, or FAX: 0116-247 7551.** You could visit their website at: <http://www.mainlinegroup.co.uk>

As I'm mentioning the world-wide-web, just a quick mention this month, of a site I found in one of my 'Web-travls' for information about some older semiconductors. One of the addresses I found was **Mushroom Components** at <http://www.mushroom.co.uk> who deal in old or obsolete semiconductors. Their 'real' address is **Unit 3 Bradfield Road, Finedon Road Industrial Estate, Wellingborough, Northants NN8 4HB. Tel: +44 (0)1933 275345.**

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Hardy and His Home-Brew

COME ON EVERYONE - HAVE A GO AND BUILD YOURSELF A TEN-TEC PROJECT

Clive Hardy G4SLU - well known for his kit building and home-brewing on behalf of PW - takes a look at the newly-introduced Ten-Tec RF Ground Counterpoise & SWR/RF Wattmeter

The two kits I've assembled for *PW* this time are from Ten-Tec, a company famed for the h.f. transceivers so beloved of QRPers. Ten-Tec have their factory in Dolly Parton Driveway, Sevierville, Tennessee, in the good ole' US of A. That must rank as one of the more interesting addresses for an electronic kit maker! In Britain the company's kits are marketed by **Adur Communications**, based in West Sussex.

As it's the more unusual of the two kits - I'll start off by describing the **RF Ground Counterpoise 1251** project. What's that? you may ask - and to find out I suggest you read on!

Artificial Ground

Ten-Tec describe their r.f. counterpoise kit as the most compact and economical approach to 'Artificial Ground' technology, and claim that it will perform "useful functions in apartment, condo, or travel situations".

Still baffled? Then think of the counterpoise as a box full of inductance and capacitance to attach between the ground side of the radio's antenna connection and a short length of counterpoise in situations where it isn't possible to have a full length counterpoise. That's what it does!

In a more ideal situation the radiating section of an antenna will be operating against ground or a counterpoise. And while it's often possible to string up a long radiating wire at temporary operating places such as those encountered on holiday, often there isn't a suitable ground connection available, or room to install a counterpoise.

With the Ten-Tec counterpoise it's possible to make the radio think that there's a lot more counterpoise system out there than there really is.

However.....it doesn't enhance a poor antenna's performance, which is why Ten-Tec say that it isn't a substitute for proper radials or a good ground connection.

What the Ten-Tec counterpoise will

do is provide a route for earth currents that means a suitable load is presented to the transmitter. But enough of the technicalities for now, I'll tell you how it performed later.

Read The Manual

Of course, being a good constructor you read the manual first as it really is a good idea, and the manuals are very readable documents full of useful information. When it comes to writing instruction manuals the Americans always do a good job.

The breakdown of the instructions and the language make it easy for the novice kit builder to follow without seeming to talk down to the more experienced constructor. The instructions take the builder step-by-step through construction and operation...all helped along by lots of advice.



... the first impression I got was of very professional kits"



There are several very neatly drawn diagrams, with helpful guidance for building and operating the equipment. However, I had to refer to the circuit diagram to be totally sure of what wire to connect to what around the inductor in the counterpoise.

The only bits of information I thought were lacking also related to the counterpoise. One of these was the frequencies it is intended to cover. The other was some idea of the maximum level of transmitter power that the counterpoise could cope with.

Something else that I did like was the drawing of components inside the front cover, and the nice little snippets of information to aid in component recognition on the back cover. Everything was presented in tidy, well written, easy-to-follow manuals. (At least nine out of ten here Ten-Tec).

Very Professional

Having read the manual it's time to unpack the bits and pieces and the first impression I got was of very professional kits. The black metal cases, which are the same size and style for both kits, are robust and the white screen printing on the front panels is very tidy.

For each kit the whole unit is in a vacuum sealed wrapping and all the internal components are neatly packaged in re-sealable clear plastic bags. And apart from solder, tools, and glue, everything else is provided.

Counterpoise First

I decided to build the counterpoise kit first. In this project there's one toroidal inductor, with a 'wiper' in contact with the outside of the winding, and this 'shorts out' unwanted turns and so varies the inductance used.

Seven fixed capacitors are individually selected by a rotary switch. The capacitor and inductor are connected in series between the transmitter ground and whatever length of wire counterpoise can be attached.

The first and major construction task is to wind the inductor. Ten-Tec apologise for putting the builder through the effort, but do explain that it's the only way!

But winding the inductor really isn't that difficult. The wire fits in grooves in a neatly

moulded plastic cover over the toroid. (The grooves keep the wire in the right place around the toroid).

Because the wire used on the inductor is non-insulated (because of the rotary 'wiper' type selector control) the turns can't be allowed to touch. There are suggestions about using your feet, pliers, or a friend to keep the wire tight when it's being wound. I managed alone with my bare hands, but you do need the ability to pull the wire straight.

The rest of the construction is pretty straightforward. Completing the project should be within the abilities of anyone who



Fig. 1: First you start with your bits....

feels themselves to be a 'dab hand' with a soldering iron, pliers, and a small screwdriver.

Apart from having to find two different sizes of Allen key to tighten the grub screws in the control knobs everything went without a hitch. (I would have preferred those grub screws to have simple slots so that they could be tightened with an ordinary screwdriver).

The only very slight modification I made to the kit was to put a couple of strips of double sided foam fixing behind the meter. This provided a cushion to hold it firmly in place against the outer casing.

When completed I think the counterpoise has the appearance and the weight to suggest that it will easily withstand the rigours of being abused by your average Radio Amateur!

Three Controls

When assembled the counterpoise has three rotary controls. One to adjust the inductance, one to select the required capacitor, and another to adjust the sensitivity of the tuning meter.

The meter indicates the relative success of any efforts to arrive at the right mix of inductance and capacitance for the situation at hand. The greater the meter reading...the greater the success.

The SWR/RF Wattmeter

All my complimentary comments about the manual and kit quality referring to the counterpoise also apply to the s.w.r. bridge project. Additionally, in the case of the s.w.r./wattmeter 1202 kit the manual has an additional one sided A4 sheet printed with extra advice about building.

The points covered are some things that have been learned since the manual was

".... these kits are very well made and present no problems in building"

Best Test

Obviously one of the best ways to test the kits is in a real operating situation. And as the counterpoise is specifically intended for use at temporary locations I did my best to set one up.

For an antenna I used 30 something metres of wire antenna strung out from my living room window across my garden. About six metres of wire was connected to the counterpoise and thrown across the floor of the room. But instead of using a transmitter I used an MFJ Antenna Analyser to check the performance of the counterpoise.

What Ten-Tec suggest is that you experiment with the wire lengths connected to the counterpoise to help it create a match to the transmitter. However, I used the wires that I had set up and found that it was quite easy to bring that antenna system into resonance with a v.s.w.r. well below 2:1 on some h.f. bands.

A few bands proved totally stubborn, although on all bands some impact on resonance was made by the counterpoise. I did try connecting the counterpoise wire to a heating radiator for some extra ground, but that proved unsuccessful.

So, rather than juggle with changing the lengths of the wire attached to the counterpoise I opted to use the counterpoise in conjunction with a PI-match a.t.u. connected to the antenna wire. Using that in conjunction with the counterpoise I managed to obtain an acceptable v.s.w.r. on all bands except 1.8MHz. But that was probably more to do with my short (for Top Band anyway!) wire antenna rather than any failings of the counterpoise.

Of course, the more artificial antenna connected to a transmitter rather than wire slung into the air, the less of the signal from

“.... go on
build one ...
or both ...”

printed. Nothing major, more like further hints and tips. The next edition will no doubt incorporate those items.

Much the same general comments apply to this kit as to the counterpoise. Everything went according to plan yet again. The only item worth watching slightly is the hook-up wire between the two p.c.b. sub-units.

The wire is tinned multicore so it behaves mechanically in a similar way to single core. This means that if the wire is moved about a bit too much during construction and soldered to a p.c.b. there's a risk of it breaking off close to the p.c.b. That said, it's probably easier to use than ordinary multicore with the possibility of stray strands causing problems.

Incidentally, the bridge shares the counterpoise's case design. And it looks just as good.

Independent Circuits

The s.w.r. bridge/wattmeter has two independent circuits, one for h.f., the other for v.h.f. Both can be connected at the same time, although only one can be read at a time.

In use the r.f. through the unit is coupled to the detector circuit by striplines at v.h.f., and transformer coupling at h.f. The detected and rectified r.f. voltage is amplified by op-amps to sufficiently high levels to drive the indicating meter to the required full deflection at quite low transmitter powers. (Ten-Tec claim sensitivity down to 2W on 1.8MHz).

Power to drive the op-amps can either be supplied by an internal 9V battery, or an external 9-15V supply. Either option can be selected with a front panel switch. Just as I found with the counterpoise project, the s.w.r. bridge/wattmeter was a pleasure to build. Practical Wireless, August 1998



Fig. 2: And then you end up with your finished kits....(the 'Artificial Ground' & Counterpoise).



Fig. 3: The complete SWR/Wattmeter project.

Power Measurement

Now it's time to take a look at setting up for power measurement - and this is about the only point where I think the wattmeter falls down. I'm not criticising the performance mind you...but the equipment needed to adjust the power readings.

To get it set accurately the unit has to be compared with previously calibrated equipment and adjusted accordingly. Some people may find it difficult to access such equipment and as I think the unit is far more use as a s.w.r. bridge anyway, I wouldn't have lost much sleep if I hadn't calibrated it.

Instead, I did some approximate calibration using transmitters whose power output I was pretty sure of, and then did a more accurate calibration later.

WIN!
 Make sure you buy next month's PW as we'll be giving you the chance to win the RF Ground Counterpoise & SWR/RF Wattmeter kits as built and tested by Clive G4SLU!

DON'T MISS IT!

the transmitter that will be pushed into the 'ether'. As Ten-Tec say, this isn't for use at permanent installations where greater antenna efficiency should be achieved a better antenna. It's for use in temporary locations to make a relatively useless antenna into something that can be used to advantage.

Maximum Reading

To adjust the counterpoise to its best setting all that's needed is to obtain the maximum possible reading on the front panel meter. Using the counterpoise in conjunction with the s.w.r. bridge it proved remarkably easy to match the antenna system to the transmitter.

Having proved to myself that it was possible to match the antenna system I connected an h.f. radio with a 10W transmitter, and used the Ten-Tec s.w.r. bridge to monitor the match between transmitter and antenna system.

The s.w.r. bridge performed exactly as expected. The extra power through the counterpoise was enough to drive the meter. At this point I discovered the connections to the meter had to be reversed. However, I had wired it according to the circuit diagram, so perhaps the meter in the kit was from a different batch from the one used in the original design?

Wired correctly the meter gave a clear unambiguous indication that the counterpoise was doing its job. As its meter reading went up, the relative s.w.r. reading went down.

Well Made

As you'll have already realised, I think these kits are well made and that they'll present no problems in building. The resultant boxes of tricks look excellent and do what the manufacturer claim.

The s.w.r./r.f. wattmeter is useful in any shack. The counterpoise is useful for anyone who operates away from their main station. On its own the counterpoise won't tune a dodgy temporary antenna set up, but used with a good a.t.u it will make a significant contribution to matching it to the transmitter.

The cost for the kits is **£49.95 each plus £5 P&P** (Adur apologise for the high postage costs but stress that it is because of the weight of the steel cabinets). For both items this seems to be pretty good value for money. My advice is go on, build one...or both, you won't regret the decision!

My thanks go to **Phil Godbold G4UDU of Adur Communications, Belmont Buildings, The Street, Bramber, Steyning, West Sussex BN44 3WE. Tel: (01903) 879526** for supplying the kits for review. In addition to supplying Ten-Tec kits Adur offer a repair service for complete project kits in the range.

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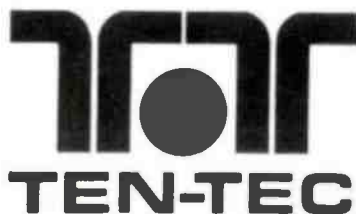


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after the next shipment) "An excellent amplifier in all respects", and he called the no-tune 87A (£5,295) "The Rolls-Royce of all amplifiers". As the 87A interfaces with *all* brands of HF radio (unlike other "no-tune" amplifiers), you can change your radio to *any make* without losing amplifier compatibility.

Antennas? We have a huge choice of both HF and VHF antennas, from HyGain, Cushcraft, KLM, M-squared, Force 12, Eagle Antennas and GemQuad. In stock now, the amazing C-4SXL (£829) from Force 12. This antenna implements 40-20-15-10 yagis on one 24ft boom and weighs only 48lbs.

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6m-5dx	50MHz	5	5.2m	9.0	125.00
6m-6dx	50MHz	6	6.9m	10.3	180.00
4m-3dx	70MHz	3	1.7m	7.0	79.00
4m-5dx	70MHz	5	3.7m	8.0	105.00
4m-6dx	70MHz	6	4.96m	10.3	120.00
4m-8dx	70MHz	8	8.5m	12.2	180.00

GAP verticals-see the glowing review in July PW!

The reviewer bought the TITAN after reviewing it he thought it was so good. TITAN's need no radials, work all bands 80 through 10, (and 6 and 2 metres - see the review!). The TITAN is only 25ft tall and needs no buried earthing system. At only £299 - super value!

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6m	10	375	499	2m	80	350	459
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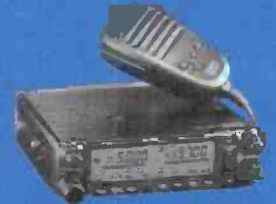
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This month the PW Editorial team have selected a number of books associated with testing and test-equipment. This aspect of the radio hobby is often overlooked by many enthusiasts - so armed with a good book, a test-meter and an oscilloscope that faulty item of equipment can work again if you put your mind to it!

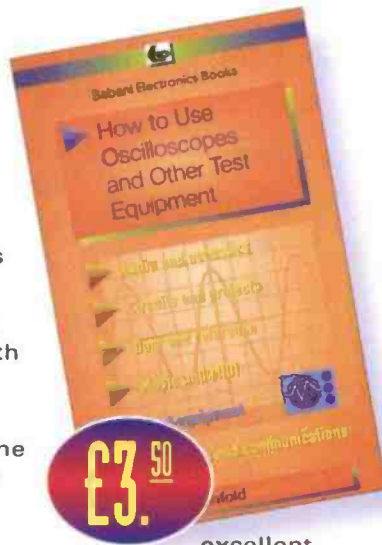
BOOK PROFILES

It's Testing Time!

How To Use Oscilloscopes And Other Test Equipment

Robert Penfold is a prolific writer and has many titles in the Babani 'stables'. This book deals mainly with the use oscilloscope and if you are considering buying one (you'd be very wise if you did!) this slim paperback will introduce you to it in an informal, informative and well-illustrated way. Ideal for the beginner in oscillography.

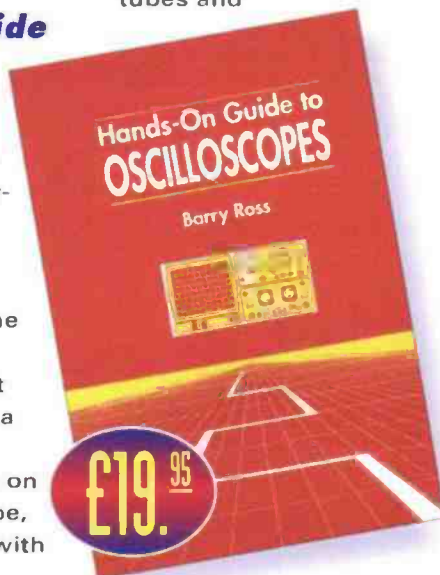
Recommended first book on oscilloscopes.



excellent, practical circuits and drawings). Chapters include vertical amplifiers, probes, trigger circuits, timebase generators, power supplies, cathode ray tubes, measurements, storage tubes and

Hands On Guide To Oscilloscopes

This book provides an excellent 'follow-on' to the Babani publication. With chapters on the various stages of the oscilloscope, how they work and what they do it provides a higher level of 'in depth' descriptions on the ubiquitous scope, and how to use it (with



sampling 'scopes, choosing an instrument, first time operation, calibration. In fact this book can really be considered as an oscilloscope owner's manual. **Highly Recommended.**

Getting The Most From Your Multimeter

The *PW* team have recommended this book on previous occasions to readers. We don't hesitate to do it again because like many relatively simple instruments the multi-meter's capabilities are often overlooked by many owners. There's much more they can do other than continuity testing you know!

The author, **Robert Penfold** discusses how you can choose a meter and the advantages and disadvantages of analogue and digital types, and then leads you through the many tests for individual components and items of equipment. If you're keen to learn more by using your meter - this is the book for you.

Ideal for the beginner this book should be sold with every new

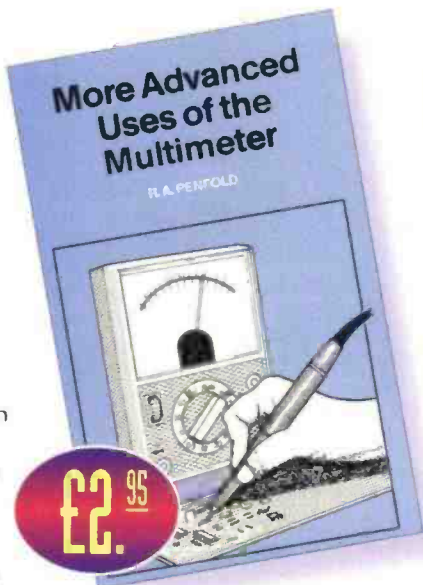


form in this issue or telephone Michael or Shelagh on (01202) 659930.

multimeter. **Highly recommended beginner's book.**

More Advanced Uses of the Multimeter

As the title suggests - this book takes the reader past the beginner's stage and on to the higher levels - including the testing of digital circuitry (including integrated circuits). There's also a chapter which describes how you can extend your multimeter's usefulness by external extensions (r.f. probe, etc). **A useful follow-on to Robert Penfold's beginner's book.**



direct reading capacity meters, signal sources and attenuators and r.f. and antenna measurements. Primarily this is a thoroughly 'practical' book with enough ideas and projects for you to build a complete test-equipment workshop - but it's also a good reference work. It's worthwhile having for the section on wavemeters and analysers alone. **Highly recommended - a thoroughly practical publication.**

Test Equipment For The Radio Amateur

This RSGB book is one of their 'hidden jewels'. It's hidden and not so well known as other publications perhaps because the building, designing and use of test equipment is often mistakenly thought to be beyond the average Radio Amateur.

Clive Smith G4FZH introduces the reader to his eminently practical book with a short introduction before launching immediately into a wealth of projects ranging from simple wavemeters to

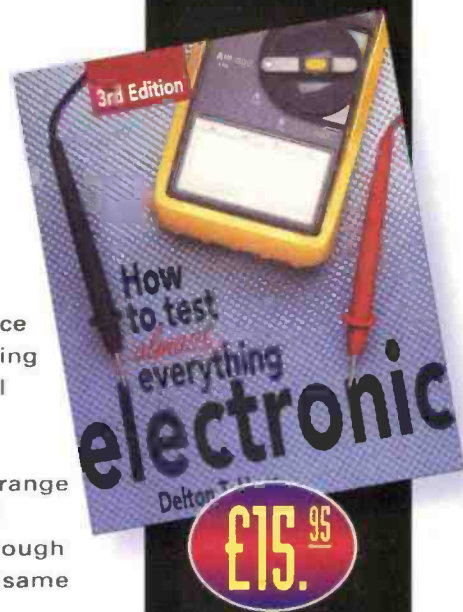


How To Test (Almost) Anything Electronic 3rd Edition

This American book will prove useful both as an occasional reference (when something goes wrong) or as an educational source for readers wishing to extend their 'I can repair it' knowledge on a extremely varied range of equipment and components. Although not written in the same 'chatty' and 'conversational style as the famous 'Smithy's Workshop' from the long closed *Radio Constructor* magazine - the approach and writing style brought back memories to at least one of the *PW* editorial team!

Fault-finding flow-charts and information on using multimeters and oscilloscopes are provided and it can honestly be said that the coverage of this book will be far wider than needed by the average radio enthusiast.

Very readable, informative and in 'bite size' chunks this book will prove very helpful on your bookshelf. **Recommended reference and informative reading source.**



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Summer (hopefully!) is here and the Rev. George Dobbs G3RJV's thoughts turn to the possibility of portable operation. And to help and encourage you to get 'out and about' - there's an interesting little portable 'test-box' on offer this month and a quotation of course!

"Our best is bad, nor bears thy test Still, it should be our very best."

Robert Browning 1812 - 1889

Carrying on the Practical Way

In summer, many Radio Amateurs turn their thoughts towards planning of portable operations...or so they say! Very few things can beat a warm day, a clear blue sky, a makeshift antenna hanging in the trees and some QSOs with a little QRP transceiver. Some operators think about just taking a little transceiver at the bottom of the suitcase on holiday...in the hope that it might rain.

However, just as some holiday-makers are tempted to pack everything including the kitchen sink, it's tempting to pack a lot of 'just in case' items to go with a portable station. Unfortunately it's then all too easy to pack half of the workshop, accessories, tools and test equipment, in fear of an unexpected problem! That's when I thought of the 'Testbox'.

Common Problems

The 'testbox' I'm describing here should provide the means for dealing with most of the common problems that may occur with a

station in the field. It serves as a wattmeter for checking transmitter output, a resistive s.w.r. bridge for matching the transmitter to the antenna, a voltage checker for 12V supplies and a continuity tester.

Hopefully the facilities provided will see off any likely problems encountered far from the home workshop. The circuit is shown in Fig. 1.

The same meter is used for all the tests. I've built the Testbox around the common edgewise reading meters often found on the surplus market, designed as S-Meters for CB transceivers or VU meters for audio systems.

Almost all of the surplus meters I have encountered seem to have a full-scale deflection (f.s.d.) of around 200µA. This was the case in the meter used in my prototype.

If the meter you choose to use has a f.s.d. much greater or much less than 200µA, some of the resistors in the circuit will require adjustment...but I will point these out as we look at the circuit.

Selects Functions

A 3-pole, 4-way wafer switch selects the Testbox functions, so now let's follow the four switch positions in turn. And to help I have separated out each function in smaller drawings, which are easier to follow.

In position 1 (see Figs 1 and 2) eight 100Ω, 1W resistors are connected in series-parallel across the input of the transmitter. This presents the transmitter with a 50Ω load.

The power output of the transmitter can be determined by measuring the r.f. voltage appearing across the 50Ω load. A BAT85 diode and a series resistor allow the meter to read the voltage.

The value of the resistor will depend upon the maximum power level you require to read and the full-scale deflection of the meter. In my prototype I found that a 100kΩ resistor indicated 5W conveniently near the top of the meter scale.

Fortunately, most of the surplus meters open up quite easily and it is worth calibrating the meter scale against another calibrated r.f. wattmeter. I promise myself...will get around to it one day!

Switch positions 2 and 3 (see Figs 1 and 3) provide a resistive s.w.r. bridge for QRP operation. You may remember that I've described such a bridge circuit in this column in the past and it's a very simple way to make an s.w.r. indicator for low power transmissions.

The circuit is based upon a resistive bridge, so beloved and known by physics masters as the Wheatstone Bridge. Three 'legs' of the bridge are formed by 50Ω resistors (two 100Ω, 1W resistors in parallel).

The antenna forms the fourth 'leg' when the switch is in position 3. This corresponds to the **Reverse** or **Reflected** positions found on other types of s.w.r. meter. When all four legs are at the

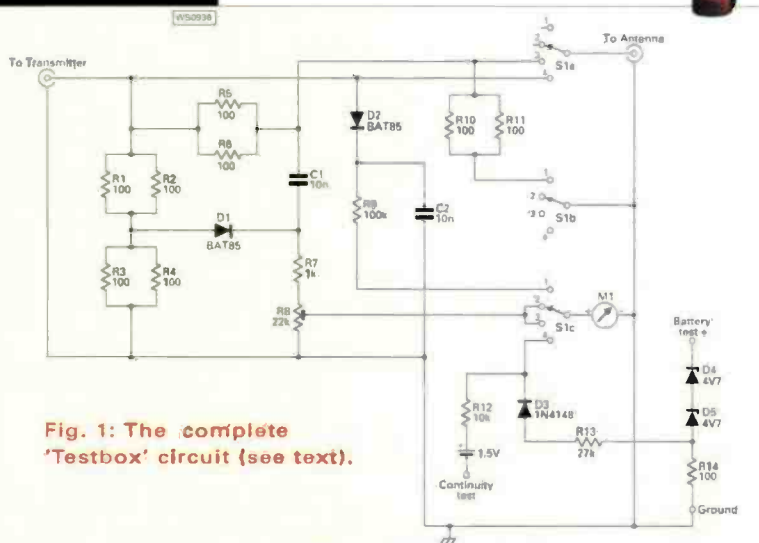


Fig. 1: The complete 'Testbox' circuit (see text).

same resistance (impedance in this case) there is no voltage across the centre of the bridge and a null occurs.

Very often, portable antennas are simply odd lengths of wire tuned with an antenna tuning unit (a.t.u.) to match the transmitter. If the a.t.u. is adjusted so the bridge 'sees' 50Ω, the bridge will null.

The centre of the bridge has a diode with a capacitor which acts as an r.f. voltage detector. The detected voltage is then fed to the meter via a series resistance, part of which is a pre-set resistor. In use the a.t.u. is adjusted for the lowest meter reading.

Setting the meter to read full scale in this position gives a suitable voltage range for the **Reverse** position reading. Incidentally, the pre-set variable control could be an external control potentiometer but in practice I think that most users will be testing with the same transmitter most of the time.

The Advantage

In use the resistive s.w.r. meter has the advantage that the transmitter output is connected to a low resistance the whole time the adjustments are being made. This can be very useful with homebuilt transmitters which may have poorly protected power amplifiers and make-shift antennas which can require a lot of adjustment.

The disadvantage of the resistive type of s.w.r. meter is that the d.c. resistance in the bridge has to be removed from the transmitter output in actual operation. This is carried out by switch position 4 (see Figs 1 and 3) which connects the transmitter output directly to the antenna.

Another switch (SW2) has to be added to remove the resistive load from the antenna. This is a single pole miniature toggle switch inserted at the top of the resistance bridge. This switch must be open for transmitting through the Testbox and closed when making measurements.

Other Functions

The other two functions of the Testbox are d.c. tests and these are performed with the switch in the **Operate** (position 4). These functions are selected by choosing two of three terminals on the Testbox. The three terminals are marked **Ground**, **Battery** and **Continuity** (See Figs. 1 and 4 and 5).

Very often, portable operation requires battery power supplies and probably the use of rechargeable batteries. And as many of will realise...a useful facility is being able to check the battery voltage.

With this project I've assumed that the battery is a 12V type. And although the meter could be configured to act as a voltmeter...the scale on these meters is rather small for a complete 0 to 12V range. So, I've arranged that in the Testbox, choosing terminals **Battery** and **Ground** allows the meter to function as an expanded scale voltmeter.

Two 4.7V zener diodes in series (or a 9V zener diode would also serve) act to compress the meter scale so that it reads from just above 9 to about 15V across the whole range. This is the useful range for checking the state of a 12V battery.

The series resistor (27kΩ in my case) may need adjustment with some meters to set the top Practical Wireless, August 1998

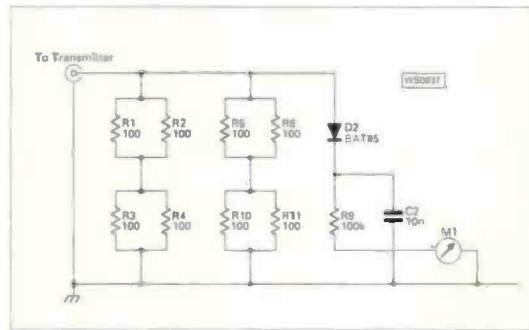


Fig. 2: The Wattmeter circuit (see text).

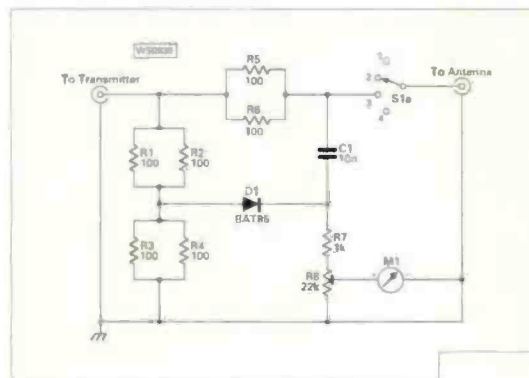


Fig. 3: Calibration s.w.r. (reverse) facilities (see text).

of the range. The diode is added for d.c. isolation from the meter. It's probably enough to make a mark on the meter scale to correspond with a reading of 12V but the more fastidious constructor could add the other voltage calibration points.

Continuity Testing

Choosing the **Continuity** and **Ground** terminals will provide a very crude ohmmeter for continuity testing (See Figs. 1 and 5). For this facility 1.5V battery cell is connected in series with a resistor and the meter.

A direct short between the two terminals gives a full reading. The 10kΩ resistor used in my prototype gave a reading of almost full scale deflection when the terminals were shorted. **This value may require adjustment.**

Those of you who want to 'go to town' with this facility could make the series resistance adjustable to set the f.s.d. on shorted terminals. Others with more patience than me could calibrate the scale to read in ohms.

The zero reading on the meter will correspond to some thousands of ohms and probably give quite a useful range. But my aim was only to have a facility that could check for open circuit and short circuit conditions.

The Testbox can be built in any style, in any enclosure. My prototype has all the parts for the s.w.r. bridge and wattmeter mounted on a piece of perf-board with Vero-pins used as solder terminals. Obviously more or less functions could be included with your version.

So, get busy and be prepared. Pack that picnic box up - load the car up and off you go for portable working. See you on the bands!

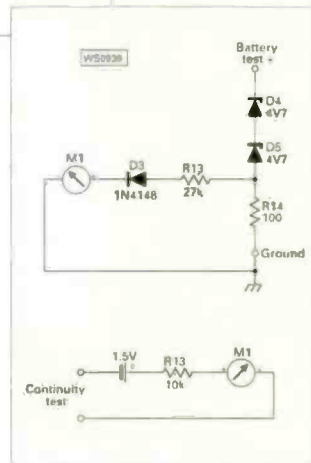


Fig. 4 (Top): The expanded voltmeter circuitry (see text).

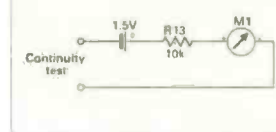


Fig. 5 (Lower): The (very basic) continuity test facilities. See text for G3RJY's notes on expanding this facility to provide individual options.



PW

Antenna Workshop

Peter McNally EI9GT, describes an ideal mast for single-handed raising and lowering that shouldn't cost the earth to make.

When I was constructing my 'antenna farm' I found that I needed a 10 metre mast. Whatever form it ended up in, it had to be simple to construct and materials had to be readily available and relatively cheap. Most importantly, I wanted a mast that I could raise and lower myself.

I wanted the mast mainly to support wire antennas, verticals and possibly a v.h.f. or u.h.f. beam. However, the main task of the new mast, would be to support one end of a G5RV antenna. The other end of the antenna would be supported from a pole attached to the house.

The mast I'm about to describe is the results of my requirements. For ease of fabrication I decided that the mast would be made from three interconnected parts. A five metre base length, a four metre middle section, see Fig. 1. Because I intend supporting a G5RV antenna on the mast, the final upper part is made from wood that has been well weatherproofed.

The installation uses the 'law of leverage' to make the mast easier to erect. I've found that in many commercial tilt-over systems, the pivot point is rather close to the ground, making it quite difficult to raise the mast single-handed.

My mast however, has its pivot point at a height of about two metres above ground. Pivoting at this height gives tremendously improved leverage. It's a simple matter to erect the mast on your own, simply pull on the raised end and the mast will rise easily. Lowering it is just as pleasant with an easily controlled descent.

To Begin

When you begin the installation, for maximum stability of the completed structure, the area

"Pivoting at this height gives tremendously improved leverage"

that you need must be good and firm. It's no good putting a solid concrete base in if the ground is soft and easily dug.

So, after finding a suitable location, I started by digging a hole a metre deep and about 300mm square. However, a hole of this size is rather a difficult job, due to the restricted access the deeper down you get.

The hole can, of course, be wider than the 300mm suggested, although the amount of concrete that you'll need goes up quite alarmingly as the hole becomes larger. It's better to dig the hole just a little deeper, and fill the bottom with old brick rubble (or stones found during the digging). These should be tamped down quite tightly to form a drainage base.

Once the hole is dug out and prepared, the two four metre long side support poles should be placed in the hole. For maximum support strength, these two poles should be parallel (80mm apart) and vertical front-to-back as well as side-to-side, see Fig. 2.

As a limiter to the travel of the mast itself, I placed a piece of pole, 500mm long, 'behind' the support poles, see Fig. 3.

This prevents the mast passing the vertical when erected. It's a good idea to put together a temporary wooden frame to hold them in place until after the concrete has set.

Set Properly

A few days later, after the cement had set properly, I placed the five metre pole between the two uprights. A hole was then drilled through all three poles in situ, and a 250mm carriage bolt was inserted as the pivot (Fig. 2) through the support poles and the lower part of the mast.

The next task was to drill smaller diameter holes through the support poles and the lower section of the mast somewhere just above the ground level. These holes would take the thinner securing bolt, which locks the mast in place (Fig. 3).

With the mast in the lowered

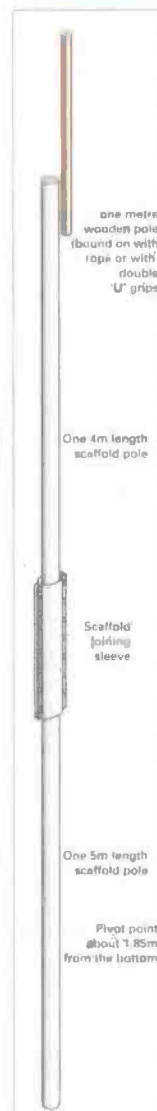


Fig. 1: The 10m length of the mast is achieved by using three lengths joined together.

First Time

For those of you that haven't mixed concrete and made up a base before, just a few words of help. Do get hold of good quality clean ballast mixture and fresh cement to make up the concrete.

Use the minimum amount of water to mix the concrete and add it slowly to the mixture. If you cannot mix the whole amount of concrete in one 'go' then make sure you use the same ratio (as far as possible) of ballast, cement and water each time. The mixture should be firm and not 'runny' or watery in any way.

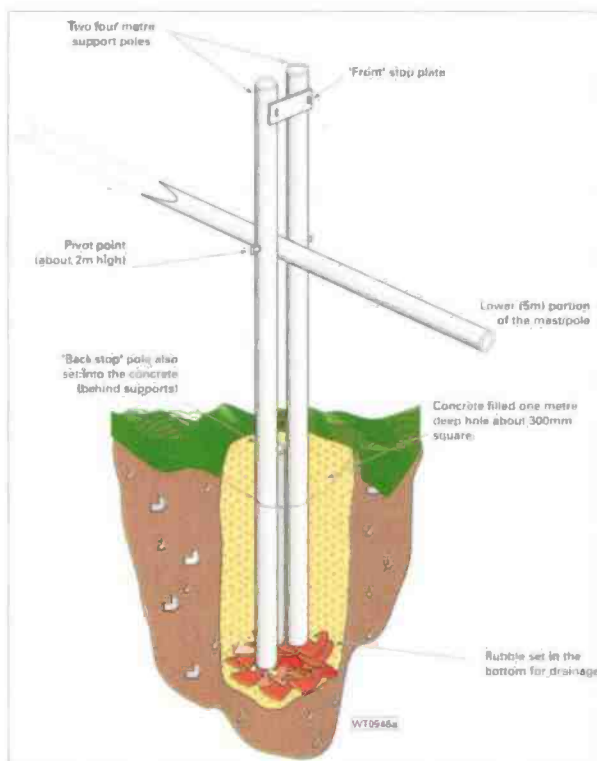
When the hole is about three quarters full of concrete it's time to do a little consolidation or 'settling' of the mixture. Using a long length of wood or alloy tubing about 25-35mm in diameter, push it into the concrete, and with a vigorous up-and-down motion throughout the mixture, work the concrete to settle the ballast towards the bottom.

As the mixture settles, the excess water will come to the surface, and if more than a few millimetres deep, the excess should be skimmed away. Pour more concrete in to fill the hole to the brim, and repeat the settling with the stick or metal tube. If you didn't work up a sweat mixing the concrete you most certainly will at this stage.

To allow the concrete to harden and set takes several days depending on the weather and temperature. I've always found it best to put a piece of sacking or polythene over the concrete for the first day or so to minimise it drying out unevenly before it has set properly. **G1TEX**

position, connect the four metre pole using a correct clamp coupling. To complete the mast, a one metre length of wooden pole was bolted to the top of the four metre pole, to the top of which, I fixed a pulley.

Fig. 2: For drainage put brick rubble at the bottom of the 300mm square hole.



"The solid base and the high pivot point, make the mast quite secure"

A lightweight line was run through the the pulley to raise and lower wire antennas. The guy wires were also attached at this stage. For maximum stability the guying lines, and four are better than three, should be about 45° to the vertical.

To work out how far up the lines should be attached, take the width of the area that is around the mast and divide it by two. This is the optimal height above ground for the lines to give a 45° run.

Pulling Down

Raising the mast is a simple case of pulling down on the base of the pole. It swings up and into position quite easily. A word of warning though; Keep your fingers clear as the mast comes up towards, and reaches the vertical position.

Catching your fingers between the mast and the uprights is painful, as well as dangerous. I did it once and that was a sufficient warning. I certainly will not do it again!

When you have raised the mast to the upright position the locking bolt can be inserted. The mast is now secure enough to stand, albeit slightly wobbly, on its own. All that remains now is to tighten the guy wires, to give the top the final stability as a support point for the G5RV antenna.

Because of the simple, but efficient pivot point design, the mast can be raised and lowered by one person. I had at first thought that when high winds were forecast I'd have to drop the mast but, in practice I've not had to lower it very often at all.

The solid base and the high pivot point, make the mast quite secure. The mast, as I've described it, has stood for more than three years now. It has weathered many storms without mishap.

I consider the mast a great success. A combination of easy-to-erect mast and the pulley system, make changing antennas a simple task now.

The mast I've shown, is quick and easy to construct and it will not cost you the earth! So, go on - get one up!

PW

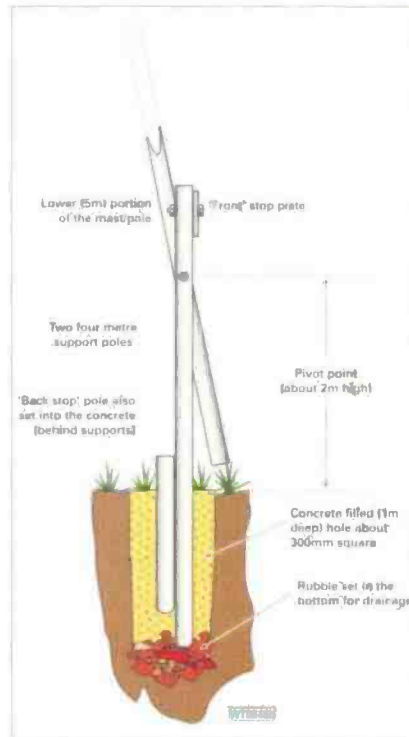


Fig. 3: The two four metre long support poles should parallel and be vertical in both front-to-back and side-to-side directions.

"For ease of fabrication I decided that the mast would be made from three inter-connected parts"

SUMMER IS HERE, AND IT'S TIME TO GET OUT WORKING IN THE GARDEN - PUTTING UP A MAST!

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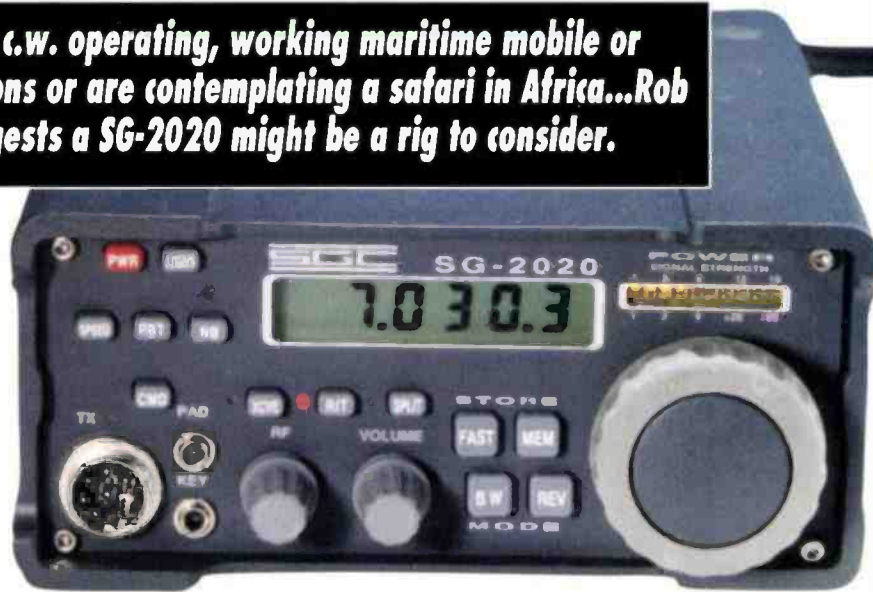
The SGC-2020 HF Transceiver Review

FOR THE KEEN QRP OPERATOR WORKING IN TOUGH CONDITIONS THE SGC-2020 COULD BE JUST THE THING!

If you're keen on QRP c.w. operating, working maritime mobile or portable in tough conditions or are contemplating a safari in Africa...Rob Mannion G3XFD suggests a SG-2020 might be a rig to consider.

The American company SGC Inc. are becoming increasingly active in the Amateur Radio field. Evidence of this is shown by their high profile presentations at the Dayton HamVention in the USA and advertising in Amateur Radio magazines here in Europe. However, even a brief look at SGC equipment will tell even the casual observer that their products were not originally designed for the Amateur Radio market. Obviously styled for professional maritime and Military use, now that their products are being aimed at another specialised sector of the market (Radio Amateurs!) SGC have chosen to continue with the general purpose 'Military & Marine' look and clearly state in their promotional literature that the SG-2020 has been designed "for a whole panorama of h.f. users".

In the past I've had the opportunity to review other SGC products. But this time the arrival of the low power SG-2020 h.f. portable transceiver has been awaited with interest because I'm reliably informed that the designer is the same man who originally designed the Index Laboratories QRP Plus



The SGC-2020... a low power heavyweight!

transceiver, became extremely difficult to obtain before the manufacturers ceased production and the designer was recruited by SGC.

Although SGC make no mention of any connection at all between the previous Index Laboratories transceiver and the SG-2020 in the latter's promotional material, the same designer's hand can be seen at work, particularly in the type of filters used. However, SGC make it clear that they are not, and cannot become involved with the original equipment, repairs or any inquiries regarding the original 'QRP Plus' transceiver.

So, without further ado - let's take a look at the SG-2020 transceiver and see how it performed for G3XFD.

Low Power Heavyweight

The SGC-2020 is most certainly a rugged, low power heavyweight rig. Encased in an extremely robust metal (but not waterproof as it uses an ordinary paper cone loudspeaker) housing it looks and feels like a typical miniature military h.f. transceiver.

Based on a single conversion superhet design, the receiver uses an i.f. of 60MHz. The r.f. selectivity is provided by a 7-pole ladder filter at 60MHz and bi-directional circuitry is used in the i.f. and filter chain. Additional filtering is

"...I had over 300 QSOs - mainly on 7, 14 and 18MHz - and mostly using c.w."



Fig. 1: Reviewed in the February 1995 issue of PW the popular 'QRP Plus' transceiver (formerly produced by the Index Laboratories) comes from the same designer's drawing board as the new SGC Inc. SG-2020 transceiver (see text).

transceiver, Fig. 1.

The excellent, brim-full of 'character' little QRP Plus (immediately nicknamed 'the rig on a leg' in the PW office) transceiver was reviewed in the February 1995 PW by John Goodall GOSKR, but eventually

provided at a.f. with switched capacitor filters (see comment later).

The manufacturers claim that sensitivity is better than $0.55\mu\text{V}$ for 10dB S/N+N with intermodulation better than +18dBm 3rd order intercept. Unusually for today's modern equipment the receiver is provided with a rotary r.f. gain control along with the standard noise blanker. Standard rotary tuning is provided and frequency resolution

is 10Hz.

Incorporating a single loop synthesiser, the SG-2020 uses 10kHz steps with intermediate steps of 10Hz obtained through direct microprocessor control of the reference.

The frequency display is a large easy-to-read l.c.d. type with a separate l.e.d. display for providing S-meter, and relative output indications.

Filtering is provided by front panel selected audio frequency band-pass and provides bandwidths from

100Hz to 2.7kHz in 100Hz steps. The audio output from the top mounted loudspeaker is 1W. General coverage receive is provided from 1.8 to 30MHz and coverage of m.f. is also available (400kHz to 1.6MHz) with the broadcast filter by-passed.

Offering a maximum r.f. output of 20W p.e.p. which is front-panel adjustable from milliwatts to the full output, the transceiver provides s.s.b. and c.w. transmission. The transmitter incorporates r.f. speech processing using a voice operated audio gain device (v.o.g.a.d.) and r.f. clipping.

A built-in electronic keyer is provided and this can be operator adjusted (in IAMBIC 'Mode B') from five to 60w.p.m. I tried the keyer - it works very well indeed but I prefer to use my hand key all my QSOs were achieved using my Kent 'straight' model.

There are also 20 memory locations, some of which have been factory pre-set but all of which are user-definable and can be reset at any time by the operator.

Power supply input is by an unusual rear-mounted plug arrangement and the accompanying plug (supplied made up on to heavy duty cable by SGC) does not 'lock' into place. As a result it can detach itself quite easily and I found that even the weight

of the cable (if it wasn't supported) pulled the plug out on various occasions.

The supplied cable is of a far higher current carrying capability than the pins on the plug and socket arrangement - especially when you bear in mind the SG-2020 is a 20W p.e.p. transceiver. As I've already mentioned, it also 'un-plugs' itself very easily as it does not 'lock'. Definitely a re-think needed here SGC!

On The Air

It's not often I get the chance of a really long review period for a newly-introduced h.f. transceiver - but in the case of the SG-2020 it was in my shack for close on a month. In that time I had over 300 QSOs - mainly on 7, 14 and 18MHz - and mostly using c.w.

With its relatively low r.f. output power I quickly found that the transceiver struggles on s.s.b. Audio reports were good but the QRP level output means that QSOs on the bands are a real challenge - which I know some operators prefer!

Personally I think the SG-2020 could be of interest to the dedicated c.w. operator interested in a rugged portable transceiver because in this mode the QRP is no real barrier to DX. Indeed - I worked into various South American countries on 18MHz using only 5W, and in once case managed to work a PY (Brazil) with only 3W! But of

"The SGC-2020 is most certainly a rugged, low power heavyweight rig"

course....not many people have beams for 18MHz and my long wire antenna seems to do very well on this band.

The frequency display is exceptionally crisp and clear on the transceiver, but I'm afraid I did not like the l.e.d. type of S-meter indicating device. This facility - made up from a series of very bright l.e.d. indicators - is extremely rugged and although perhaps ideal for use in a vehicle - annoyed me very much! Although I should say that **Tex Swann G1TEX**, Technical Projects Sub-editor (and our photographer) said he liked it! So, this must be a subjective point.

On c.w. I found that my signal reports were always T9 and even though I was often operating the transmitter at well below 3W I often got 579 from the other station who could often be running up to 100W. Yes - c.w. in my opinion is the ideal mode for QRP working and my log book - with contacts around the globe on QRP c.w. proves this.

The high i.f. on the SG-2020 provides excellent selectivity for a single conversion superhet and this is further backed by the truly excellent selectable a.f. bandpass filtering. This filtering has to be heard in action to be fully appreciated - it certainly provides the very 'hard edged' extremely



Fig. 2: Inside top chassis view of the transceiver.



Fig. 3: Under view (screen removed).

sharp filtering needed for the busy QRP frequencies.

Tex Swann G1TEX compared the effect of the filtering with DSP - the main difference being that it was slower because the operator selects the filters. It takes some 'getting used to' but left me thinking that I should consider including switched capacitance filtering of this sort in my next home brew receiver!

Tuning on the SG-2020 proved to be very laborious for me - it's certainly a two-handed job! This is because to select the fastest tuning rate the operator has to press the **Fast** button while rotating the main tuning control. I found it to be very difficult and frustrating - and even Tex G1TEX found it frustratingly difficult and slow - especially when changing bands.

In fact many of the control facilities we take for granted - instantly selectable receiver and transmit RIT for example - are set out in a way that reflects the military and marine operating methods rather than Amateur Radio. However, I really appreciated the variable r.f. gain control - the continually adjustable gain often helped me when I was working on busy (and incredibly noisy) frequencies. It's certainly good to have full control!



SG-2020 GENERAL

- FREQUENCY COVERAGE: 1.8MHz TO
- RF LOAD IMPEDANCE: 50 OHM NO
- RF POWER OUTPUT: 20 WATTS
- MODES: LSB, USB,
- AUDIO OUTPUT: 1.5 WATTS
- INPUT POWER CONNECTION: POLARIZE
- INPUT VOLTAGE: 10 VDC TO
- TYPICAL INPUT CURRENT: RX TX @ 5 WA TX @ 20 WA

BATTERY LIFE WILL BE EXTENDED IN PORT WHEN TRANSMITTER POWER IS REDUCED TO

E-MAIL: sgc@sgcworld.com
 WEBSITE: <http://www.sgcw.com>
 TEL: 425 746-6310

General Coverage

The general coverage receiver provided on the SG-2020 works well but because of the laborious tuning and band-changing method I didn't really 'tune about' as much as I would have done otherwise. But the receiver copes very well with a.m., c.w. and s.s.b. transmissions.

Listening to h.f. broadcast transmissions on a.m. requires the use of the 'exalted' carrier technique - and the operator can choose to listen to either sideband. I found this to be quite effective and it's something an SG-2020 owner would soon get used to in practice.

Listening on the m.f. ('a.m.') band requires the broadcast filter to be by-passed and the operator's manual (which is presented in the usual comprehensive easy-to-read and use SGC style) explains how this can be done by re-locating a jumper wire to an alternate position. Sensitivity on the 400kHz to 1.6MHz band is good and more than adequate for broadcast reception use and it's sensitive enough to receive the slow Morse marine/aeronautical beacons.

My Vote?

So, after the many QSOs and a lot of experience with the SG-2020 does it get my vote? In short I have to say no - the rig doesn't appeal to me but the quirky design does have some attractions and in an odd way I liked some of the features. But I honestly don't think it will appeal to many Radio Amateurs.

I really think that this robust little transceiver will find its true home as a professional h.f. rig for use as a low power mobile vehicle-to-vehicle or mobile-to-base radiotelephone operations by relief and emergency organisations, particularly in countries such as Africa, etc.

I think the SG-2020's small size and its facilities will also prove of interest to the maritime mobile radio operator. It's extremely well built inside and is presented in a form where it can be conveniently set-up and left for an operator to use p.t.t. radiotelephony.

PW

Fig. 4; Rear panel view showing power supply plug and socket (see text for comments). The robustness of the external casing of the transceiver can be judged by the thickness of the casting.

Manufacturer's Specifications

General

Operating modes:	c.w., l.s.b. and u.s.b. (see text ref. a.m.)
Receiver coverage:	1.8 to 30MHz (also 400kHz to 1.6MHz - see text)
Transmit frequency range:	1.8 to 30MHz
Operational temp. range:	-30 to +70°C
Microprocessor type:	MC68HC711E9
Freq. resolution:	10Hz
Freq. display:	100Hz
Transmit-receive switching:	<10ms
Battery volt-meter:	digital (l.c.d.) on main display
Dimensions:	70 x 152 x 178mm
Approximate weight:	2kg (approximately)

Transmitter

Output power:	front panel selected 0-20W p.e.p.
Speech processing (r.f.):	VOGAD baseband and r.f. clipping
Transmit current consumption:	max output power, 4A
Transmit Intermodulation @ 20W:	-28dB or better
Transmitter spurious signals:	-50dB on Amateur Bands
Microphone:	Dynamic, fist-held type with p.t.t.
Electronic keyer:	fully adjustable Mode B IAMBIC S to 60w.p.m.

Receiver

Circuitry:	Single conversion superhet
IF Frequency:	60MHz
Sensitivity:	better than 0.5µV for 10dB S/N+N
Intermodulation:	+18dBm 3rd order Intercept
Selectable a.f. bandpass:	100Hz to 2.7kHz
Audio output:	1W r.m.s.
Noise blanker:	Pulse and ignition blanking
RF gain:	front panel controlled
BFO:	Processor controlled
Current consumption:	< than 430mA on receive.

My thanks go to **Waters & Stanton PLC** of **22 Main Road, Hockley, Essex SS5 4QS. Tel: (01702) 206835**, for the loan of the review transceiver which costs **£599 plus £6 carriage.**

Duped By A DVM

They're wonderful things those digital voltmeters (d.v.m.s)! They can show results down to four or five decimal places, but are they accurate? Ken Lee-Rand shows you how to verify your belief in your own d.v.m.

An intermittent problem arose with my TV set a little while ago. On investigation I found that the control over the tuning voltage had been lost. The first thing to do according to the service sheet was to check the high tension (h.t.) line and set it to $145 \pm 0.5V$.

So, out with what I thought was my trusty eastern manufactured d.v.m., and I adjusted the voltage. However, the problem became even worse!

Checking around the circuit I found many voltages appeared to be high. This worsening of the problem set me thinking that the d.v.m. might be wrong. Most unlikely I thought, the figures are there on the screen aren't they! So, I'd better check - but how?

Quick Check

I carried out a quick check with three different multimeters plus an oscilloscope. They were connected in parallel to a variable voltage supply, and showed some interesting results.

The three multimeters used were, a Pullin series 100 $10k\Omega/V$ analogue meter (purchased in 1947), a home-brew f.e.t. $11M\Omega$ input analogue (which I made in the late 1960s) and the three year old $10M\Omega$ input d.v.m.

Taking the 'scope reading as correct, the results were: the Pullin read low by 3-5%, (to be expected as the Welwyn pink 1% 'Histab' resistors are 47 years old), the home-made f.e.t. agreed with the scope. But the real surprise was that the d.v.m. read about **15% high!**

So, the 145V setting on the TV power rail was, in actuality, more like 126V! No wonder the problem became worse. Hard lesson number one, **d.v.m.s are not perfect, they can - and do go wrong.**

Absolute Volt

What is an absolute volt? How was I to check the accuracy of the multimeters? For those who want to be, or must be absolutely correct, (*shame about Heisenberg's uncertainty input*. Ed.), there is only one course of action.

The only course of action for absolute accuracy is to send an instrument to a calibration service test centre. The cost of doing this is expensive and besides, do you really want this kind of accuracy? (In the UK The National Physical Laboratory (NPL) is the defining service).

For my own purposes, the answer is (a definite) No - to a calibration service bill. So, where could I get a reference voltage from?

Simple Answer

The answer is quite simple - use a reference integrated circuit regulator to create your own 'standard' voltage. There are many voltage reference devices on the market with sufficient accuracy for the average hobbyist.

I first considered using an LH070 (LH0070), but the cost, originally, proved excessive. If you want to go this route follow the circuit of Fig. 1, and keep current consumption below 5mA or you will lose accuracy.

A lower cost solution is to use the somewhat older LM369 shown in Fig. 2. Notice that both devices have an output of 10V. In the case of the LM369 regulator the consumption must be kept below 1mA.

The LM369 low power regulator is now difficult to source, and you may have to hunt around to find one. And I note that there are now a series of LH0070 variants with '-0', '-01' and '-02' suffixes in ascending order of accuracy (and price)!

The direct output of the reference circuit may be used to set up the d.v.m. on the 20V range. But how do you maintain comparative accuracy on the lower voltage ranges?

Special Attenuator

The instructions for my d.v.m. called for the setting the calibration at 190mV on the 200mV range that would call for a special attenuator. So I made a single step attenuator, from a 10V input to 0.19V output to do the job. But I was disappointed to find that the other ranges read progressively high.

So, now I had a suitable 10V source, and, as most of the time I use the 0-20V range on the d.v.m. I opted to make this the most accurate using the 10V source. This meant that an attenuator can be dispensed with.

However, as I had an attenuator made-up I felt it was easy to make the circuit of more universal use. But to maintain accuracy, the attenuator had to have a significant loading to 'swamp' any loading of attached meters, that's when I decided that I needed a current booster.

The diagram of the boosted output circuit is shown in Fig. 3. Some readers might find it useful, and I'd recommend it whichever regulator i.c. you use. This circuit keeps the regulator i.c. load to around 1mA, and you should choose resistor R12 to keep the dissipation of Tr1 to a low value at maximum output (I found a start value of 150Ω useful).

Added Bonus

An added bonus of the attenuator network, Fig. 4, is that of the constant load has a stabilising effect on the output voltage.

"I adjusted the voltage - however, the problem became worse!"

Although it looks easy to make up, achieving the correct voltage at each test point takes a lot of patience because all resistors have a tolerance which have to be accounted for in practice.

The resistive equivalent of the network was measured at and found to be 897Ω , so at 10V input, it draws a little over 11mA. This loading means that a current amplifier of Fig. 3 is a necessity rather than a suggestion for maximum accuracy.

Having adjusted the d.v.m. to be accurate on the 0-20V range, wire the attenuator up completely. Due to the way I've built it the 3, 2 and the 1V steps may need a little adjustment.

Start at R1 and adjust add series or parallel resistor so that the 3V test point is 3V on your newly calibrated d.v.m. Then turn to adjust R2, if required, then R3 so that the 2V and 1V test points are correct. At this point you will probably need to go back and check the 3V and the 2V points.

Work Is Over

When the 1V test point is correct, most of the work is over, as there should be little adjustment required on the rest of the resistors. It would be a good idea to draw up a table and note all the voltage changes for every adjustment you make and it will soon become apparent how one adjustment effects all the others.

As an example R1 in my case turned out to be $7610\Omega + 470\Omega$ in series across an 820Ω resistor. Resistor R3 turned out to be a 3470Ω in parallel with the 91Ω . (All the values I've quoted are as marked on the body of the resistor).

For best effects I recommend that you use high precision metal film resistors of the best quality. You won't regret it.

Always Suspect

Why do most of us assume that readings from analogue multimeters are always suspect and those from digital ones are never suspect? (the same assumption is made about watches. Ed.) The Pullin Multimeter that I purchased when I was an apprentice for £10 (about six month's wages at the time) has done well over the years, as the tests proved.

Additionally the home-brew f.e.t. meter is Practical Wireless, August 1998

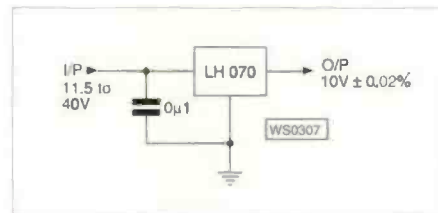


Fig. 1: This circuit proved to be expensive due to the cost of the i. c. although it's able to handle up to 20mA. (The LH070 i.c number has been superseded by LH0070).

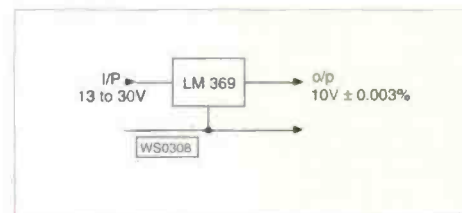


Fig. 2: A cheaper solution, but with a lower current capability. An additional amplifier may be needed. (note the LM369 is becoming more difficult to obtain, as it's an older i.c. G1TEX).

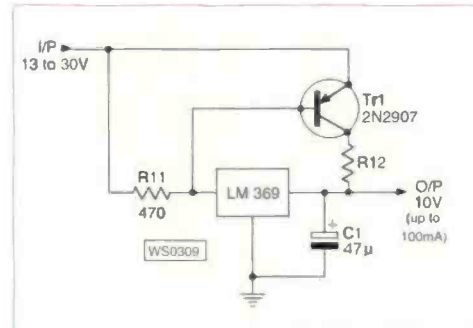


Fig. 3: A few components added to the circuit of Fig. 1 (or Fig. 2) gives greater current capability. In practice, Tr1 and R12 may be changed to reflect the maximum current taken).

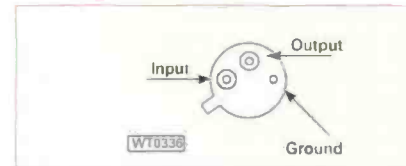


Fig. 5: The pin-out of the LH0070 voltage reference integrated circuit.

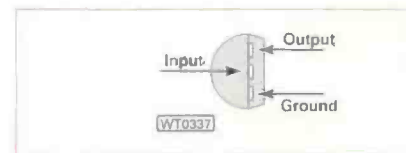


Fig. 6: The pin-out of the LM369 voltage reference integrated circuit.

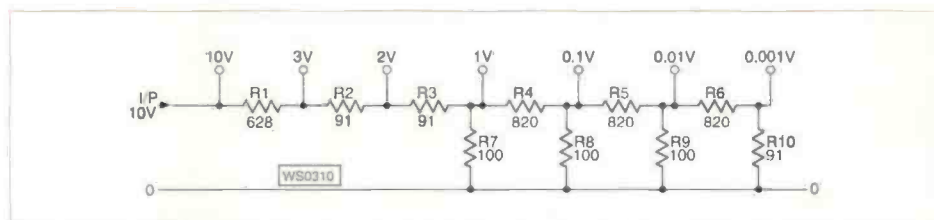


Fig. 4: From a stable and accurate 10V supply this attenuator will give a variety of reference voltages. (If you are using a 2.56V regulator then use the '1V' output as 256mV and the '0.1V' output as 25.6mV etc. G1TEX).

still as accurate as the day I made it. I used Philips MR2 resistors and semiconductors which may have something to do with the successful project. It's only the digital one that has let me down!

The overall accuracy of the f.e.t. meter, through all the ranges, is superior to the d.v.m., which is a big disappointment. I, like many others I suspect, had expected the

"Digital multimeters are not perfect, they can - and do go wrong"

quality, accuracy and reliability to be much improved in this day and age.

The lesson I have learnt is that a d.v.m. may look good and be easy to use, but 'all that glitters is not gold' so do not be fooled. Check your d.v.m. regularly, as in my case it has proved less reliable than a home-brewed instrument.

Maybe I was just unlucky to get a Korean 'Friday machine'. So, as I have yet to see an instrument manufacturer who will guarantee accuracy with ageing on any of their glossy brochures, be warned by this omission.

As the precision reference i.c.s mentioned in the text tend to be more of a 'professional' item you may have trouble locating supplies of them.

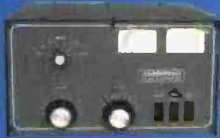
Farnell, can supply the LH0070-0 (order code 411-619 Price around £10.30 each), at Canal Road, Leeds LS12 2TU. Tel: 0113-263 6311.

PW

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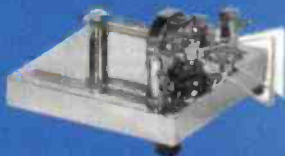
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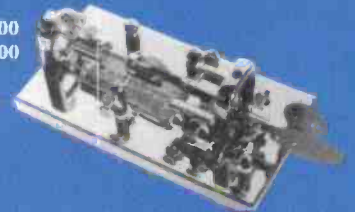
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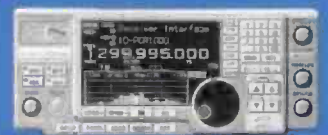
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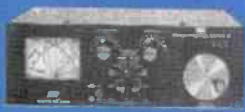
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Lundy Island

It's A Beautiful Place & Radio's Allowed Too!

Colin Blunn G0IFM, having held a passion for Lundy Island, the place that's usually associated with postage stamps and Puffins, finally got to visit in 1995 and during his holiday also managed to make over 400 QSOs.

“Lundy
means
Puffin in
Norse”

The mast and antenna set-up as used by Colln G0IFM while on Lundy Island (see text).

Lundy Island had always interested me from my early years, after hearing its name on the shipping and weather forecasts on long wave broadcast radio. In 1994, I visited St Tudwal's Island (IOTA EU-106) for a four day DX operation with colleagues from the Leicester Radio Society and had enjoyed the experience of being on an island and operating Amateur Radio. This got me thinking - "What do we do for next year's holiday"?

A trip to Lundy Island was particularly appealing to me, because it could be a holiday that I could enjoy a holiday with my XYL, experience lovely coastal walks, observe the wildlife, all in a wonderfully quiet and peaceful environment and operate Amateur Radio as well!

Lundy island is situated in the Bristol Channel, 19.2km off Hartland Point, near Ilfracombe. To get to Lundy, you sail on the *MS Oldenburg*, the island's own vessel.

The *MS Oldenburg*, is a 288 tons vessel and can carry 267 passengers, with 20 tons of freight at 12 knots. Journey time to the Island takes about two and a quarter hours from Bideford or three hours from Ilfracombe.

Outward Journey

Our outward journey provided an eventful start to our holiday. Prevailing easterly winds made it impossible to land at the customary point of Old Man's Cove on the east side of the island and we had to journey around to the west side to be in calmer waters, where we could be put ashore in Jenny's Cove.

We disembarked via a Zodiac inflatable with about eight passengers each time. Getting ashore this way was only for the fit and able, because we had to clamber up a 300ft cliff! This was the first test for getting some of the radio equipment ashore in one piece as I had my keyer, a.t.u. and paddle in my hand luggage! However, with a little help from my XYL and fellow climbers, we managed to get the bag to the top of the cliff intact, (the rest of the luggage from the hold came ashore later, via the island's tender).

Although Lundy Island is perhaps best known for its postage stamps and Puffin birds, the island's history dates back many years. Archaeological exploration has found evidence dating back to the Stone Age.

The fact that Celtic peoples lived and farmed on the island is in no doubt. In her book *Lundy - An Island Without Equal*, **Lois Lamplugh** gives a fascinating and very detailed history through the Middle Ages and up to the 18 and 19th centuries.

In 1969 the island was purchased by the **National Trust**, although it is currently



LUNDY ISLAND



The specially designed QSL card for G0IFM's trip. (The card was designed by Andrew Blunn)

administered and maintained by the Landmark Trust. There are 23 holiday cottages available of all types and sizes (you can even stay in a 19th Century lighthouse - we stayed in a converted stable). Together with a small camp site, there is capability for up to 100 people to stay on the island at any time of the year.

People visit Lundy island to observe the wildlife and generally disengage from hectic

and a paddle key, for my XYL to still be nearby and enjoy reading books and relaxing, without being invaded by me shouting 'GOLF BRAVO FIVE LUNDY ISLAND QRZ' constantly!

The equipment I used was a Kenwood TS-140S with Starmaster memory keyer and Bencher paddle. The antenna was a half-sized G5RV with a single centre support at about 7m high. This set-up fitted nicely between our cottage and a neighbouring one.

When I was putting up the mast and antenna, I experience the usual interest, with our neighbours thinking that I must be (amongst other things) a fisherman, a bird ringer, or a butterfly catcher. Eventually, all was explained.

My operating was confined to early morning, late afternoon, and evening, thus allowing the main part of the day to be spent with my wife exploring the beauty of the island. Morning operations were usually confined to the 7MHz band, while in the afternoon and evening I operated on 14MHz.

I was able to work back to my friends at the Leicester Radio Society on club night via 7MHz and also have regular skeds with some of the same people each morning. After four days, my rigs developed a problem from overheating, because the internal fan had stopped working and the transmit would cut out.

However, if I kept my power output to about 35-40W, the rig kept going with no problems. This I knew would not be too much of a disadvantage because being a regular QRP operator at my home QTH I knew what could be achieved with modest power levels and c.w. mode, and the fact that contact chances were made even better if you had an interesting callsign!

Six Days

In all, over the six days of operating, I made 404 QSOs with 32 countries. Most of the contacts were European of course, with 98 QSOs with Germany, 35 with France and 76 with UK stations.

The best DX I had was with **JA3FYC**. Whilst other notables were **G5RV** himself and a Spanish station working only 800mW which I was still able to hear despite the 'pile-up'.

I hope that you too can one day enjoy the beauty of Lundy Island for yourselves. However, should you decide to give away some QSOs for the Island Chasers and the IOTA award by taking your radio with you, remember to get the necessary permission for the installation of an antenna and for radio operation from the island.

PW



The MS Oldenburg, Lundy island's support ship.

mainland lifestyles. During our stay, we found that there was a visiting group of bell ringers, who gave the church bells regular exercise and put a solid '599' signal around the village for hours on end.

On occasions when I was operating, it did feel as if it was contributing to the QRM and general band noise, to the degree that once I sent 'SRI OM QRM FRM BELLS PSE REPEAT BK'.

Whilst aware that the island is acknowledged as a wildlife setting, I was surprised to learn that Lundy was designated as the first Statutory Marine Nature Reserve in Britain. Washed by the Gulf stream, it has some of the richest marine life to be found outside of the tropics. As many as 2500 creatures can be observed in a single square metre of sea bed and it is the only place where all five types of British coral can be found.

The Puffin bird (Lundy means Puffin in Norse) is perhaps considered the species of wildlife most associated with the island. There are only about 20 pairs now nesting. Apparently Lundy Island is on the edge of the Puffin's breeding area and the species is under some pressure. Their numbers are reducing because of a loss of their sand eel diet and rats taking eggs.

We observed only one Puffin all week. This

COLIN G0IFM HAD ALWAYS WANTED TO VISIT LUNDY, SO HE COMBINED A HOLIDAY WITH A EXPEDITION

“Earth mode operation can be the start of a whole series of experiments”

Ground Level

Roger Laphorn G3XBM discusses real 'ground level' radio by taking a look at 'earth mode' communications using the low frequency Amateur Radio bands. He thinks this fascinating technique, using 'underground radio' has some interesting possibilities.

Although events - such as the introduction of the new 136kHz allocation and the announcement of the eventual withdrawal of the 73kHz frequency - have overtaken this article, one major problem still remains: and that's the size of antennas! For example, on 73kHz a quarter-wave end-fed is over 1km long (!) and not the sort of antenna to fit into a typical 1990s back garden.

Certainly if long distance working is an objective it will be essential to optimise the antennas and earth systems used on the band. However, there's another approach which will be worthy of some experimentation for very local QSOs and that's by using 'earth mode'. Interested? - then read on!

Idea simple

The idea behind earth mode communication is simple. Pass a small electric current into a grounded electrode and current will flow through the earth to the second electrode completing the circuit back to the source. The current path will flow not only by the most direct path between the electrodes but also via a whole range of paths including the path between two more distant electrodes.

If the injected current is at very low frequency (v.l.f.) or low frequency (l.f.), the potential difference can be picked up, amplified and filtered in the distant receiver connected to the two remote electrodes. Notice - no antennas and all very simple.

Long History

The use of the earth itself as a means of propagating a signal by conduction currents has a long history going back nearly 150 years. And in modern times it was seriously considered by the military as a means of providing buried nuclear bases with almost totally secure communications using rock strata as a conductive medium (1). In tests by the US army in the 1960s, ranges of many hundreds of km using earth mode were achieved.

In the late 1940s, trials were carried out to see if earth mode could be used for emergency communications in mines (2). The results were promising but I don't

believe it was then ever used in serious mining or caving applications.

Later, in the 1970s and 1980s a project codenamed Sanguine (3) achieved worldwide ranges at 40Hz (yes 40 Hertz!) to communicate with submerged submarines using the minuscule radiated power of earth mode transmitters.

In the case of Sanguine, the grounded antenna arrays were extremely long and covered vast areas of Wisconsin and the power inputs were measured in megawatts. So, don't get your hopes up!

Amateur Operation

Let's now comeback to amateur operation and amateur power levels. Over the last 30 years or so people have experimented with audio frequencies to communicate over short distances through the ground (4), despite this it has never been too clear whether or not such systems are strictly legal in the UK.

Although radiotelephony (r.t.) is usable, c.w. allows greater range. With hi-fi amplifiers at the transmitting end, and reasonable filters and some gain at the receiving end, ranges of up to 2-3km have been achieved around 1kHz with rod separations of 50-100m.

Even with rod separation as low as 10m distances up to 500m can be achieved. Where the background noise level from 50Hz mains and its harmonics is severe, and the electrical 'smog' is thick, the ranges can be much shorter unless the interference can be removed in some way.

At 73 and 136kHz the attenuation of signals travelling through the earth should be greater than at 1kHz. However, 50Hz mains 'hum' is no longer an issue, receivers with good sensitivity and narrow c.w. filters are plentiful, and phase cancelling units capable of removing local interference sources are easy to make and effective.

So, the achievable ranges on the l.f. amateur frequencies may be no worse than at 1kHz. Also, with the limit on transmitter power being expressed as effective radiated power (e.r.p.) it should be possible to apply a great deal of input power at the transmitting end before the 1W e.r.p. limit is reached.

In practice, it would be hard to exceed the e.r.p. limit with amateur power levels when using earth mode. Attenuation is proportional to distance cubed for conduction currents in earth mode - double the distance and the signals will be eight times weaker.

A very small amount of power will actually be radiated (mW levels at best). So it may be worth experimenting with elevating the wires from the transmitter to the ground rods to see if range increases...the small signal radiated may be

References & Further Reading

1: *Radio Communications at Frequencies Below 10kHz.*

By Roger Laphorn G3XBM, published in *Radio Communication*, April 1995.

2: *Subterranean Communications by Electric Waves.* By H. Paul Williams PhD, published in the *Journal of the British Institution of Radio Engineers*, March 1951.

3: *Long Range Communications at Extremely Low Frequencies.* By Bernstein, Burrows, et al. *Proceedings of the IEEE*, Vol. 62, No. 3, March 1974.

4: *Ground Communication System.* By Robert Penfold, published in *Practical Electronics*, September 1983 (see also 'Communications through the Ground' in *Practical Wireless*, May 1964).

Communications



You too could work some 'Underground' DX!

audible beyond the range of that conducted through the ground.

Equipment Needed

So, if you don't want to upset the neighbours or the Air Ministry by erecting a 1km vertical antenna...think about doing some earth mode experiments!

To operate an earth mode station you will need the following readily obtainable and inexpensive items. Firstly, you'll require a p.a. capable of working at 73 or 136kHz (This should have an upper frequency cut-off just above the working frequency and should have as much power as possible. Fortunately these days power levels of 50W are quite easily and cheaply obtained from good hi-fi amplifiers.

On the lower frequency the p.a. can be driven with a 73kHz oscillator which can be keyed for c.w. QSOs or run from a memory keyer in a beacon mode. A simple way to obtain a stable 73 or 136kHz signal is to divide down the output from a higher frequency crystal oscillator source. You'll need to listen carefully on the precise frequency so it's important to know the exact frequency, especially if the receiver has a narrow c.w. filter.

Ideally, you'll also need some form of power matching from the p.a. into the resistance presented by the ground, this will be worthwhile as the ground presents a much higher load impedance than hi-fi loudspeakers. The objective is to get the maximum current flowing from the p.a. into the ground.

You will also require ground rods, and a minimum of two are needed. These should be as long and as far apart as possible - try putting one at the bottom of the garden and one near the house. One end may be connected to a **metal water pipe (Note water - avoid gas pipes!)** as it enters the house. They need to be switched between the receiver and the transmitter between 'overs'.

At each end, use as many ground rods as you can linked together - the aim is to produce a good

low resistance contact into the ground. Keep losses in the cables carrying the 73 or 136kHz signal to the rods as low as possible as the current flowing into the ground will depend on how effective your ground rods are, the resistance of the wires, and or soil conductivity.

Most gardens and roads are criss-crossed with cables and pipes. So you may need to experiment with rod positions to get the maximum range in any particular direction

The Receiver

Ideally the receiver should be fitted with a good c.w. filter, have accurate frequency calibration (you

may be looking for very weak slow c.w. signals). Ideally, it should also be equipped with an external phasing unit to null out local interference sources. If you don't have an l.f. receiver build or buy an 'up-converter' to feed your h.f. receiver. And even if the receiver is pretty modest you'll still enjoy the experimenting although the results won't be as good of course.

Induction Communications

Notice that the same equipment (except for the ground rods) will also be useful for experiments with induction communications using loop antennas as well as 'real DX' tests using radiated (rather than conduction or induction) signals. So, earth mode operation can be the start of a whole series of experiments.

One particularly interesting experiment could be to compare ranges with loop antennas with the ranges obtained with earth mode. Another experiment will be to see how effective a loop antenna will be at detecting the conduction current flowing in the earth. This technique is, in fact, used to trace buried pipes in the water industry: one side of the transmitter is connected to a water pipe and the other end to a remote ground rod. The signal passing through the metal water pipe can be detected at the surface with a loop picking up the induced field from the signal in the pipe.

Simple & Challenging

Earth mode communications could provide a simple and challenging way to experiment on the l.f. bands. It could be useful for contacts over your very local area, for example around a small village.

It would be a good project to be undertaken by a local club with several members in a very local area trying to make contact with each other. Remember though that new 73kHz band Notices of Variation (NoVs) are not now being issued. But there's nothing to stop you trying earth mode on 136kHz - good luck and you too may work 'underground' DX! **PW**

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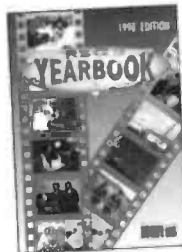
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Edited by Brett Rider, G4FLQ

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Edited by Dick Biddulph, G8DPS

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Valve & Vintage

The brisk sound of marching feet and radio operators in battle fatigues announces that it's Ben Nock G4BXD 'on duty' this month bringing a military presence to the PW vintage 'wireless shop'

Hello once again and I hope you're all enjoying the good weather! So, off we go then with a few more vintage sets out of the collection and I hope they will be new to you and interesting at the same time. Most of us know of the T1154/R1155 transmitter and receiver combination was the RAF's basic Second World War bomber set-up. But how about the opposition...what did 'they' use?

In German aircraft the basic war time bomber set-up consisted of several sets operating on l.f., m.f. and h.f. frequencies. And I'll start off with the EK and SK range of sets as these are akin to the R1155 and T1154.

The Receiver

The EK, the E standing for Empfänger, the German word for receiver, was the h.f. set covering 3 to 6MHz. And as can be seen from the photograph in Fig. 1, the controls were very basic.

Controls consisted of a main tuning knob (the really large one in the picture) a gain control, bottom left and next to it a mode switch that turns the b.f.o. on and off. Then the headphone socket then finally, bottom right, a fine tune control.

The round disk to the right of the main tuning knob and the four small windows at the top right are for four preset frequencies, or 'click stops', such as those used on the old 19 Set. In the aircraft the set was powered from a rotary generator, referred to as the U10/E.

The small 10-pin socket, bottom right,

is for metering purposes. A small magnifying glass over the moving scale provided a good view and reasonable re-setting accuracy.

The set uses eight valves and comprises a standard superhet design. It consisted of a single r.f. amplifier, separate oscillator and mixer, two stages of i.f. amplification, detector, audio and b.f.o. stages.

The matching transmitter, the SK, S for Sender (which is German for, well, Sender?) has even fewer controls. A main tuning knob, bottom centre, and a fine tune knob top left.

Another 10-pin socket allows metering and another small magnifying window views the dial. Again, four preset frequencies can be catered for. The transmitter has only three valves and there's a single h.t. feed of 800V which supplies the v.f.o. and the two parallel p.a. stage valves.

There are no p.a. tuning controls on the SK. Instead, a low impedance feed from the set comes out at the rear which would have gone to a separate antenna matching unit.

The power supply, known as the U10/S, comprised of a rotary generator running from the 28V d.c. supply in the aircraft to provide the 800V transmit h.t., 210V screen h.t. and an amazing -280V grid bias. And although the complete layout for the Fug 10 system as it's known does show a microphone...I find it difficult to see how modulation is achieved.

The screen supply goes to both v.f.o. and the p.a. but there are separate grid 1 connections brought out for keying. So perhaps the p.a. g1 is used for amplitude modulation? If anyone knows for sure, I and other readers would be pleased to hear from them.

Kriegs Marine

It's time to transfer from the German Air Force, the Luftwaffe, to the Navy (Kriegs Marine) now. The photograph, Fig. 3, shows the Hagenuk Ha5K 39 which was used by Naval services on small boats for instance, and in and around harbours, etc. I have also heard of these sets being located and used in Norway and Crete during the Second World War.

A 5W output transmitter, the Ha5K set has a three valve t.r.f. receiver with regenerative detector and a three valve transmitter. Two versions of the set covered 2 to 5MHz and 3 to 6MHz, the latter being the version shown in Fig. 3.

Independent receiver and transmitter tuning knobs are used on the Ha5K with the receiver's on the left and the transmitter's on the right. The socket (bottom left) goes to the power supply which can be used with 110 or 220V a.c. or 12V d.c. supplies.

The meter (top left) allows the various voltages to be monitored and the meter (top right) provides an indication of r.f. output. The set can operate on a.m. or c.w. and I have received good reports on the quality of the c.w. note when I worked Ray G3IFF, on 3.5MHz recently.

Fig. 1: The E10K h.f. receiver, with minimal controls. The main tuning is carried out by the large knob and the four preset indicators are on the top right (see text).



Fig. 2: Photograph of the German S10K transmitter, also showing the lack of controls. The two pins (bottom left and right) hold the equipment into the aircraft's racking.

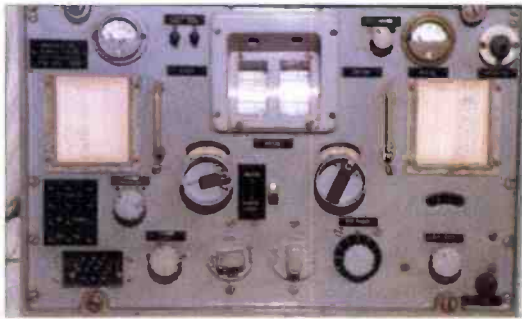


Fig. 3: The Hagenuk Ha5K 39 transmitter-receiver. The receiver section is on the left, transmitter on the right. Power socket bottom left with the microphone, key and phone socket above.

Japanese Version

Now to the land of the rising sun again and a set awaiting the hand of the restorer... How about a Japanese version of the popular HRO receiver? Using very similar plug in coils, see **Fig. 4**, this 9-valved set is very nicely constructed.

Although I've not yet translated the wording on the controls yet...it's probably safe to assume the big knob right of centre is the tuning, and the other controls are for volume, b.f.o., filters, etc. However, whereas the HRO has the coil pack in the centre, the Japanese HRO (or Chi-ich), has its slightly right of centre. Incidentally, there are 9 coils packs in a set.

An interesting feature is that the i.f. transformer assemblies are plug-in types. Apparently there are two sets of i.f. transformers, one using 85 and the other 456kHz (presumably on the lower received frequencies the lower range was used). As with the HRO, this set has an external power supply but you'll notice there's no meter provided for signal strength evaluation.

The Japanese set is of a similar size and weight to the normal HRO. Hopefully, I can get around to cleaning, restoring and getting the set working in the near future.

There's also a German made version of the HRO, I have not seen one yet but hopefully in the future one will come my way. For all I know, there might even be a Russian version?

Another set on the restoration shelf is a further Japanese receiver, **Fig. 5**, which is from a 94 Mk3C station, a Mk 41 Type D receiver. Unfortunately though, this set really has been through the 'wars' and is in a real poor state.

No valves, no knobs and most of the lettering plates missing. But, hopefully with a little help from friends in Japan, these can be replaced or certainly reproduced.

The set uses six valves and once again, a plug-in coil pack. The receiver is a superhet and came with its battery tray which sits in the case beneath the receiver. The receiver itself sat in a wooden chest with its matching transmitter, hand generator and accessories and was used as a field set in the jungle and elsewhere.

Test Meter

Next I've got a neat little Japanese test meter, **Fig. 6**. Though the lettering is in Japanese script, the

numbers are standard Roman numerals. The meter is dated December 1941, a date that will live in infamy, as someone once said (Pearl Harbour attack).

Designated TRA-18 the little test set measures ohms, d.c. and a.c. to 1000V and current to 250mA. Obviously, just what I need to help in the restoration of my Japanese receivers!

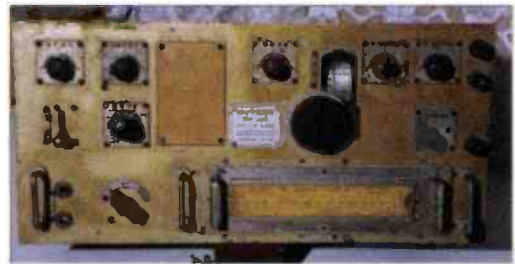


Fig. 4: The Japanese version of the HRO receiver. The coil pack is mounted on the lower right with antenna and earth connections on the right. Headphone sockets bottom left.

Really Advanced!

Now, for the really advanced collector or historian how about: *Funkpeilung Als Alliierte Waffen Gegen Deutsche U-Boote 1939-45*. (Radio Location Used As A Weapon Against German U-Boats) and is also has a sub title of "How it weakened the radio command of U-Boats during the 'Battle of the Atlantic'.

The book, by Arthur O. Bauer, delves into the fascinating world of radio communication during the Second World War as seen from the submariner's point of view. The book gives an in-depth technical debate on the Huff-Duff (High Frequency Direction Finding) used by the Allies against the German U-boat wireless communications. The author also talks about the German Kurier fast transmission system as well as the Giant Goliath VLF transmitter system (100 kW) the world's first megawatt valve transmitter.

Including information on the wireless organisation of the U-

boat's, the book has 323 pages in hard back A4 size format. The printing is first class and the photographic reproduction is excellent.

The author makes a point that, with the exception of two, all photographs used in the book have never been published before. Unfortunately though, from the English reader's point of view, the book is **published in the German language**, which is a real shame as I'm sure many non German readers would like to have read this one in full.

The diagrams, charts and photographs are self explanatory and with a basic understanding of the language, many points can be gleaned from the pages. Priced around **£25** the ISBN is **3-00-002142-6**, and it's available from **Leibich Funk GmbH, D-47486 Rheinberg, Germany, Postfach 301 217**.

That's all for now. As usual, I can be contacted by **E-mail, G4BXD@compuserve.com** or via 'snail mail' at **62 Cobden St, Kidderminster, Worcestershire DY11 6RP**. Have a nice summer and a good read!

PW

Fig. 6: The Japanese TRA-18 Test Set, dated 1941 (see text).



Fig. 5: The Japanese Mk 41 Type D receiver showing the coil pack extracted. The tuning shaft and dial are on the left hand side (see text).

Rally Origins

How did rallies actually begin? John Worthington GW3COI delves into the past to try and find out.

Rallies as we know them today are events which are without any close parallel in any other hobby in the matter of the number held each year. Yet they only started from very small beginnings without any written record of how or why.

There might be someone reading this article who can claim to have been one of the original founders but I am sure it all started when mobile operation was made possible legally in the late 1950s. Up to that time, there was nothing to stop you having a rig in your car and operating it so long as you stopped the car.

I was such an operator and used to pull up in a nice bit of countryside, fire up a rig made of assembled ex-government bits feeding into a surplus army tank whip mounted on the roof, and put out many CQs. I had very little joy as I didn't really understand that such an outfit had only a very short range.

Monetary Reward

At one point I even used to offer monetary reward to anyone who would work me - but still no result until I abandoned the whip and tuned up a long piece of wire. But, being an early user of rigs 'in the field' I was already well versed in such expertise.

However, it was the

compactness of the car-borne rig that I was interested in and I blundered on. I kept trying different matching units and coils at the base of the antenna until one day when I was parked on a grassy heath I was joined by a car sporting a base loaded whip of massive proportions.

The driver/operator of same was soon calling CQ and to my surprise was answered by three stations at once. I soon found out from him the secret of 'getting out' from a whip lay in getting it resonant for the band by fitting a coil you could tap experimentally and get the whip plus coil resonant for the frequency you wanted to work on.

I know this is putting the

technology too simply, but I'm trying to explain how rallies originated. The business of dabbling with different sized coils and whip antennas coupled with time in the open air gradually caught on.

Popular Meeting Place

Soon, in the Midlands, Highgate Common became a popular meeting place to compare ideas and designs - and what designs! A dividing line developed between advocates of the large coil and those who favoured the large whip and to this day controversy on those ideas can be stirred into life by a chance remark.

Some of the long whips had to be guyed to prevent them becoming a public nuisance but eventually it became generally accepted that for 'Top Band' anyway, 2m long whips were adequate for most purposes, and could be mounted on the rear bumper of most cars.

How many mobile radio equipped vehicles made a rally? Well, I think the biggest number I saw was ten and as the Common was relatively small, model aircraft enthusiasts and other games players plus vendors of ice cream, etc., all created an atmosphere which I think spawned the first organised event that grew into the great number of rallies we experience today!

PW



"Anyone who would work me..."

RALLIES STARTED FROM VERY SMALL BEGINNINGS WITHOUT ANY WRITTEN RECORD OF HOW OR WHY

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73 from Dave G4KQH, Technical Manager.

Sunday
2nd August,
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RadioScene

VHF REPORT

REPORTS & INFORMATION BY THE LAST SATURDAY OF EACH MONTH.

DAVID BUTLER G4ASR, YEW TREE COTTAGE, LOWER MAESCOED, HEREFORDSHIRE HR2 0HP

TEL: (01873) 860679

E-MAIL: butlerd2@boat.bt.com

Packet Radio @ GB7MAD

UK DX Cluster @ GB7DXC

THIS MONTH DAVID BUTLER G4ASR HAS NEWS OF ADDITIONAL ACTIVITY ON THE 70MHz BAND AND A NEW 40MHz BEACON BAND. THERE'S ALSO DETAILS OF EUROPE'S LARGEST VHF CONVENTION IN WEINHEIM.

The great news this month is that according to an E-mail received from **Stane S53VV** all Slovenian (S5) Radio Amateurs now have authorisation to use the 70MHz band. The permit came into force on June 13 and allows all licence classes to use the band on a secondary basis.

The Slovenian band plan is virtually the same as ours; 70.000-70.030MHz exclusively for beacons, 70.030-70.150MHz for beacons, c.w. and s.s.b., 70.150-70.250MHz for c.w. and s.s.b., 70.250-70.300MHz for other modes and 70.300-70.450MHz for narrow band modes (presumably narrowband f.m.). The power limits are 100W output for 1st Class operators and 50W output for 2nd Class operators. I wonder who will claim to be the first UK operator to work S5 on the 70MHz band?

Additionally from June 13 (as part of an IARU initiative) a beacon band between 40.660-40.700MHz has been authorised. The beacons must use narrowband f.s.k. with a power limit of 10dBW e.r.p.

On the 50MHz band the power limits have been raised to 100W for 1st Class operators and 50W for all other licence holders and the band has now been made available to all licence classes. (They've also been given access to the 3.4GHz band and 135kHz). Further to this comes news that

the Portuguese station CT1DHM was hoping to receive a special permit in June to allow s.s.b. operation on the 70MHz band. This should be one to look out for if it turns out to be legal.

Frank van Dijk PA3BFM passes on the news that he is now set up for crossband operation between the 50 and 70MHz bands. Crossband operation, for those that don't know, simply means transmitting on one band (50MHz) and listening on another (70MHz) for a reply.

You can use any band you wish but for DX-type contacts it's normal practice to use the 28.50, 70 and 144MHz bands. Popular centres of activity are 28.885, 50.185, 70.185 and 144.185MHz but please remember to move off these specific frequencies once contact is established.

Microwave operators adopt similar practices (called talk-back) by listening on 144.175 or 432.350MHz and transmitting on one of the s.h.f. bands. At the QTH of PA3BFM an Icom IC-706 MkII transceiver and 3-element Yagi are used to receive signals on the 70MHz band. Frank mentions that he is looking for schedules with suitably equipped 50/70MHz UK stations. He can be contacted by telephone at **0031 302287223** or via E-mail at **six@knoware.nl**

DUTCH NOVICES

In 1997 the International Amateur Radio Union (IARU) made alterations to the 144MHz band plan which necessitated v.h.f. beacons moving to the sub-band 144.400-144.490MHz. Unfortunately just prior to this event the Dutch authorities granted permission for Novice licensees (PD) to use the band 144.440-144.490MHz for single-sideband (s.s.b.) and Morse (c.w.) contacts. This was an inopportune coincidence but one which east coast DXers had to live with until the Dutch authorities revised the allocation.

Fortunately changes have recently been made and from June 1 all PD0-PD9 Novice call signs should now use the sub-band 144.275-144.350MHz for s.s.b. and c.w. Additionally Dutch Novices can use 144.110-144.130MHz for c.w. and 144.992-145.795MHz for

data and f.m. telephony. They also have access to the 430MHz band with allocations between 430.000-432.500MHz and 433.392-433.583MHz. In all cases the maximum allowable power is 25W.

WEINHEIM CONVENTION

Wolfgang Mahlke DF1GW has reminded me that this year's Weinheim v.h.f. exhibition and convention (the 43rd) is being held over the weekend of **September 19-20**. The event is certainly the largest specialist v.h.f. meeting in Europe, if not the world, and caters for anyone interested in the v.h.f., u.h.f. and microwave bands.

The venue in the centre of Weinheim (IN49) is easily accessible by road, being situated close to the main autobahn between Darmstadt and Heidelberg. The event last year attracted more than 9400 visitors to a stadium area of some 7000 square metres where a total of 500 flea market stalls and 110 commercial exhibitors were located.

In addition there was a comprehensive series of lectures (36 in total) held in an adjoining school. A large proportion of these were given in English and were aimed at up-to-date aspects of the hobby.

For example **Matajaz Vidmar S53MV** introduced his zero-i.f. transceivers for the 1.3G, 2.3 and 5.7GHz bands and **Stefan Steger DL7MAJ** discussed Amateur Radio via orbital satellites. For many though the event is really about meeting and socialising with like-minded amateurs from all over Europe.

Although you can stay in one of the nearby hotels many people (including myself) prefer to stay in a tent, caravan or mobile home at the **Weinheim Radio Club (DLOWH)** site. Although facilities are basic there are toilet and washing facilities available. There's no formal charge for camping but it is normal to make a donation for its use.

Over 200 people camp on the site (shown in the photograph, **Fig. 1**), many turning up on the Friday afternoon in readiness for the evening barbecue. In my opinion this event is one of the highlights of the trip and it never ceases to amaze me that everyone makes it to the convention on the following day!

On the Saturday evening the German magazine *Dubus* hold a dinner in a local brewery. This is a very popular event and you can meet many DXers that specialise in tropo, meteor scatter (m.s.) or earth-moon-earth (e.m.e.) communication. Then it's back to the camp fire at DLOWH for some more socialising!

Contact me (details at the head of this column) if you want more information regarding this event. Alternatively you can telephone the organisers on **0049 6201592091** or access the Weinheim Convention page on the Internet at <http://www.hamradio.de/weinheim>

ON THE AIR

Following the first real signs of Sporadic-E (Sp-E) propagation in April the season really got going during the month of May with almost daily openings being recorded on the 50MHz band. As expected this band was open to virtually all countries throughout Europe with contacts up to 2000km away being easily made.

According to my DX Cluster records over 44 European countries were worked from the UK during May. It was good to see increased activity from the ex-Russian Republics with stations such as **EK6AD (LN20)**, **ER1AAZ**, **EU1AB (KO33)**, **US5CCO (KN59)** and **UT1PA (KO21)** being worked by many operators. I'm not certain how many of these stations actually have permits though.

On a number of days propagation also extended into the eastern Mediterranean area and the Middle East. Among the stations worked were **JY9QJ (KM74)**, **4X11F (KM72)**, **4Z5IA (KM72)** and **5B4/EU1AA (KM64)**.

The Lebanon beacon **OD5SIX (KM74)** was heard in the UK on May 16, 18, 19 and 29 as was the Cyprus beacon **5B4CY** which was also received on the 70MHz band.

Contacts with stations such as **CN8LI (IM64)**, **CT3FT (IM13)**, **EH8BPX (IL18)** and **EH9AI (IM75)** were also made and all count as Africa of course. A few dedicated enthusiasts also managed to work into deepest Africa during an opening on May 18. The event was caused by trans-equatorial propagation (t.e.p.) assisted by Sp-E. The station of **Z22JE (KH52)** located in Zimbabwe was worked between 1700-1730UTC and the Malawi beacon **7Q7SIX** was also heard around the same time. Another opening to **Z22JE** also occurred on May 20 at the same time. The station of **3C5I (Equatorial Guinea)** was heard by **G3IBI** on May 25 and it is believed a **ZS6** station was also

RadioScene

received in the UK at the same time.

The onset of the Sp-E season has generated a useful number of reports and the first out of the bag is one from **John Hilton GM1ZVJ** (IO86). He has a choice of transceivers, using either a Yaesu FT-726R (10W) or an Alinco DX70TH (100W) into a 5-element 9FT Yagi at 10m above ground.

John caught his first Sp-E opening on May 3 working **CT1DNE** (IN51) for a new country. In the period May 14-16 he found conditions very good to the south working many stations in Italy and Spain.

Noel Moore G17CMC passes on the news that the Belfast Royal Academy M11BRA has recently installed a Yaesu FT-690R transceiver running 3W output and a W2000 vertical antenna in order to permit some novice operation on the 50MHz band. One of the club's novice operators **Jonathan Cummings 211FVN** was pleasantly surprised to make his first contacts from the station during Sp-E openings on May 25-26. Stations contacted by Jonathan included **IK4WTU**, **IW5BML**, **OK1FBI**, **S57CBP**, **S59F** and **9A1CCB**.

Jamie Ashford GW7SMV mentions that at his QTH (IO81) the 50MHz Sp-E season has been very slow to start. However, in a two week period commencing May 15 Jamie made s.s.b. contacts with stations located in CT, DL, EH, I, IS0, IT9, LA, LY, OE, OH, OK, OZ, SM, SP, S5, YO, YU, ZB2, Z3, 9A and 9H so conditions couldn't have been that bad.

Notable contacts included the stations of **LY2BI** (KO14), **ZB2CF** and **ZB2/DL3JMM** (both in IM76) and **Z32MA** (KN02). Jamie uses an Icom IC-575H running 100W into a 4-element Yagi. Andrew Edgcombe **G6TOI** (IO80) has been inactive for a number of years but is once again QRV on the 50MHz band.

Andrew uses a Yaesu FT-221 transceiver into a Mutek transverter running 10W output into a 4-element Jaybeam Yagi at 12m above ground. During May a total of 9 countries (CN, EH, ES, I, IS0, OE, SP, LY, 9H) were worked via Sp-E propagation.

At the station of **Jerry Russell G4SEU** (IO92) s.s.b. contacts were made on May 1 with **CN8LI** and **CN8NK** (both Moroccan stations being in IM64), **EH7AH** (IM67) and **EH9AI** (IM75). Other stations

worked to the south included **EH8BPX** (IL18) and **EH9IB** (IM85) on May 14 and **CT98CIU** (IN61) on the following day.

Jerry was pleased to note increased activity from Romania (perhaps more permits have been issued) making contacts on the 50MHz band with **YO2LAM** (KN05), **YO3ACX**, **YO3AP** and **YO4FRJ/P** (all in KN34) and **YO7CGS** (KN15). During the first 5-months of this year **G4SEU** had worked 31 countries on the 50MHz band. He mentions that he has just received, from the RSGB v.h.f. awards Manager, a certificate sticker for 375 confirmed squares and 90 confirmed countries.

Although no European Sp-E contacts were reported on the 144MHz band during May I have received details of events across central parts of the USA which occurred on May 28-29. **John W4UE** (EM90) believes he may have set a new record when he contacted **KF7UV** (DM08) at 0113UTC on May 29. The contact was on 144.200MHz s.s.b. and calculations give the distance as 3652km, some 157km further than the existing North American record.

AURORAL OPENINGS

As I mentioned last month the beginning of the period saw a large increase in geomagnetic activity which gave rise to auroral back-scatter openings on May 2, 3, 4 and 5. Although all events were relatively weak in the UK the openings on May 2 and 5 did produce some reasonable DX on both the 50 and 144MHz bands.

Jerry G4SEU was active on the 50MHz band during the event on May 2 contacting seven Scottish stations (in IO67, IO75, IO85, IO86 and IO87) and **G10TC** (IO65) between 1512-1653UTC. The station of **GM1ZVJ** also participated in the opening, from 1500-1725UTC making s.s.b. contacts with **E17GL** (IO51), **G0AEV** (IO81), **G0UYI** (IO82), **G3FPQ** (IO91), **GM0GLV** (IO75), **GM0HGF** (IO67) and **GW0GEI** (IO73).

Situated in South Wales the 144MHz station of **GW7SMV** runs 100W from an Icom IC-275H into an Eagle 10-element Yagi. On this band Jamie caught both auroral openings, working four GM stations and **OZ/PE1NGE/P** (JO45) on May 2 and **MM0BQI** (IO85) and



Many people attending the Weinheim Convention choose (like David G4ASR) to camp for the weekend.

MM1BUO (IO87) in the event on May 5. The auroral conditions 27-days later (approximately one solar rotation) on May 29 were much weaker with only stations in the north of England and Scotland reporting any noticeable DX signals.

QUIET CONDITIONS

Nigel Booth, a s.w.l. from Norwich, reports that he found tropospheric conditions on the 144MHz band relatively quiet during April. His receiver is an Icom IC-290E and the antenna is a 5-element Maspro Yagi.

On April 16 he heard **PA3GOX**, his best DX so far. Hopefully, Nigel, you may have heard further afield during this summer's Sp-E openings. Tropo conditions during May were also generally uninspiring but there were some brief enhancements particularly on the u.h.f. and s.h.f. bands.

David Dodds GM4WLL was hoping that conditions would be 'up' for the RSGB 144MHz contest held on May 2-3. Using a Trio TR9130 transceiver into a Tokyo 100W amplifier and an 8-element Yagi he operated as **GM4WLL/P** from an elevated site in the Borders region.

David thought that the hot weather might encourage widespread tropo ducting but all he found was a limited opening across the North Sea to the southern part of Norway. A total of 151 stations were worked in 7 countries, the best DX being **LA2PHA** (JO38 at 639kms), **LA1ZE** (JO28) and **LA6LI** (JO38).

Other notable stations worked included **G0MSA/P** (JO00), **G4ADV/P** (IO70 Cornwall), **GM0HTT** (IO89 Orkney Islands), **GM4CQR/P** (IO67 Benbecula in the Western Isles) and **E13GE** (IO63). One other station worth mentioning was that of **G1WQC** located on the Isle of Wight (IO90). Using only 50W to a Halo antenna Ricky was a clear 52 with **GM4WLL/P** over a path of 577km. David comments that

you don't need a tall mast of multiple arrays to work long distances.

MARITIME MOBILE

Now I'll turn to another update received from **Andy Adams GW0KZG/MM** aboard the Royal Research Ship *Charles Darwin*. During May he was active from a number of 'wet' locator squares in the North Atlantic Ocean mainly to the west and north of the Shetland Islands.

Operation was carried out on the 144MHz band using a Trio TR9130 transceiver and a **3CX800A7** amplifier running 500W output into an 11-element Yagi. Normally whilst carrying out his paperwork duty Andy has been monitoring the s.s.b. calling frequency on 144.300MHz but apart from receiving 'pings' of signals via meteors that frequency has generally been dead.

Several weak tropo signals have been received from Dutch stations being worked on m.s. around 1000km distant but these have not been of sufficient strength to be able to try for a contact. Apart from one QSO on May 30 with **LA2BR** (JP20) whilst Andy was in locator **IP81** no other tropo signals have been heard.

Andy did manage to catch a brief auroral opening on May 29 between 1615-1700UTC whilst in locator square **IP80**. Two contacts were made on c.w. with the stations of **DL9MS** and **OZ1BUR** and one on s.s.b. with **OZ6ABA**.

As there was no Sp-E propagation on the 144MHz band during May most of the contacts from **GW0KZG/MM** have had to be made via high speed meteor scatter (h.s.m.s.). Contacts via this mode were made with **LY2WR**, **OH5IY** and with 18 stations in DL and PA.

UK stations didn't miss out as **G0CUZ**, **G0FIG**, **G3IMV**, **G4FUF**, **G4PIQ**, **G4YTL** and **G4ZHI** all appeared in the log book. **Collin Morris G0CUZ** (IO82) reports that he was very pleased to work Andy (whilst in

IP91) as he was using a small make-shift antenna at the time.

WEST COAST PROPAGATION

Although it's early days yet for F2 propagation, now might be a good time to remind operators that Europe is still 'rare' on the West coast of the USA. Art KB7WW (ex-WA7RTA) sent an E-mail mentioning that many (W6 and W7) operators active on the 50MHz band during the last solar cycle still need Europe for the Worked All Continents (WAC) award.

Art reports that one of the problems is that there are few active operators between central USA (W0 call area) and the West coast. He thinks that most European operators left the band far too early after an opening instead of waiting another hour or so to see if propagation moved further west.

Art reckons you really must stick around, listen and make some noise after you think the band has gone dead. He also makes the point that many W6/W7 operators are proposing to operate on c.w. below 50.100MHz to get away from the QRM of the East coast operators.

During the last cycle a number of UK stations (including myself) did work into the W7 call area. Looking back at my records for 1989 showed that the best time for this area was between 1700-1830UTC.

If you want to work into W6 (propagation permitting) you might have to wait to 1900UTC or later. Unfortunately this will be mid-morning in Los Angeles or San Francisco and most operators will probably be at work. If the band does open up then it's more than likely that contacts will be made on c.w. I suggest you start to get some practice in now.

EXPEDITIONS

Keep a look out for the Jersey Amateur Radio Society who are planning to go to Maitresse Ile located on the Minquiers reef (IN88). Joe Bette-Bennett GJ0NYG reports that they will be there to operate in the Islands On The Air (IOTA) contest during the period July 25-26.

When Joe is not operating in the h.f. contest he will be active on the 50MHz band. Equipment will be a Yaesu FT-650 transceiver and a 5-element 9FT Yagi. The society also plan to go to Maitre Ile on the Ecrehou reef (IN99) on September 5-6 and will be QRV again on the 50MHz band. All of this activity is very much dependant on the weather since the group must use a dingy for the last 100m or so.

DEADLINE TIME

That's it again for another month - it's deadline time. The summer Sp-E season is now at it's peak so don't forget to pay close attention to the 50 and 144MHz bands.

I want to hear what DX you've been working so please forward any reports, news, comments or photographs to the address and by the date given at the top of the column.

THANKS FOR YOUR LETTERS AND GOOD LUCK WITH THE SUMMER DX. SEE YOU AGAIN NEXT MONTH.

73 David GAASR

HF FAR & WIDE

REPORTS & INFORMATION (AND PHOTOGRAPHS) BY THE 15TH OF EACH MONTH PLEASE.

LEIGHTON SMART GW0LBI, 33 NANT GWYN, TRELEWIS, MID-GLAMORGAN CF46 6DB, WALES

TEL: (01443) 710749 (9AM - 6PM)

FAX: (01443) 710789 (9AM - 6PM)

LEIGHTON REPORTS THAT DESPITE BAND CONDITIONS RANGING FROM 'MEDIocre TO PATCHY' SOME EXOTIC DX HAS BEEN WORKED AND OUR HF REPORTERS HAVE BEEN BUSY!

We're leaving the month of May behind as I write this month's column, and our reporters say that band conditions have ranged from mediocre to patchy, and even non-existent! Not a very merry month of May for some eh?

Certainly, the great deal of solar activity that's been taking place has had a very detrimental effect on the high frequency bands. On some days conditions were so bad that people even admit to checking whether their antennas were still connected to their radios!

We all expect some sort of disturbance when the sun becomes more active, and we tend to learn to live with it. But nevertheless, a fade-out can literally wipe out amateur activity on the bands sometimes for days on end, and can be a pretty annoying event!

However, it's not all bad news, as our reporters show, with quite a bit of exotic DX being worked despite the poor propagation conditions.

Really speaking, these sort of conditions are where a beam

antenna has a very noticeable edge over those of us who use simple wire antennas, but having said that, **don't give up if you are using such simple antennas!** Very often it pays to persevere, and as all amateurs know - and certainly as our reporters show this month - **being in the right place at the right time is what it's all about!**

YOUR REPORTS

Space is at a premium this month, so I'll delve straight into your reports, starting with the 7MHz band.

First up comes Ted Trowell G2HKU from the Isle of Sheppey in Kent. Ted says that poor conditions and fine weather for gardening means that radio has taken a back seat, but offers two 7MHz c.w. contacts in the shape of V31HE (Belize) and CO2HT (Cuba), both at 0600UTC.

Sean Gilbert G4UCI in Milton Keynes, just using 3W of c.w. worked HB0/N7OV (Lichtenstein) at 2300, while 30W brought contacts with T15NW (Costa Rica), and NP3G (Puerto Rico) at midnight, while operating at 2000UTC gave him a contact with JW/DJ3KR on Svalbard Island.

THE 14MHz BAND

The 14MHz band was where most of our reporter's DX traffic took place this month. Our intrepid Yeovilian reporter, Don McLean G3NOF has been rather busy here, working on s.s.b. to contact BY1QH (China) at 1451, FM5DN (Martinique Island) at 2300, FR5HA (Reunion Island) at 1618, HS1RU (Thailand) at 1749, KG4WD (Guantanamo Bay) QSL via W4WX at 2300, VP8CTU (Falkland Islands) at 2042, QSL via Christine, PO Box 260, MPA, Falkland Islands, and 3B7RF (St. Brandon Island) at 2000UTC, (QSL to HB9RF).

Also busy on '20' this month was Carl Mason GW0VSW of

Skewen in West Glamorgan. A low power buff, using just 4W of c.w., Carl worked ZL4SEA (New Zealand) at 0600, T9/G0AYD (Bosnia) at 0900, HP1AC (Panama City) at 2200, while 4W of s.s.b. brought in ZB2FX (Gibraltar) at 0900, FG5FC (Guadeloupe) at 2137, and V44KMC (Nevis Island) at 0043UTC.

Being in the middle of exams doesn't give one much time to play 'wireless' but Eric Masters G0KRT, of Worcester Park in Surrey, another arch-QRPer, managed to hook up with RV3YW and RU3WS (Russia) with just 5W and a wire antenna.

Meanwhile in Milton Keynes our cheerful 'mobileer' Charlie Blake M0AII has been taking advantage of the fine weather to work the bands from his mobile station. Charlie latched on to CT3/DL6NBR (Madeira Islands) at 0930, RA2FI/MM (somewhere in the Baltic Sea) at 1052, K1UA (USA) at 1125, and 3V8BB (Tunisia) at 1048. Fixed operation gave him contacts with JY4MB (Jordan) at 0500, and SV1TP/P (Poros Island) at 1432UTC.

THE 18MHz BAND

On the 18MHz band, Don G3NOF again used s.s.b. to hook up with AP2KSD (Pakistan) at 1748, BD4ED (China) (QSL via PO Box 085 299, Shanghai). Also worked were TF3FK (Iceland) at 0930, HL3VQ (South Korea) at 1245, 9V1ZB (Singapore) - QSL via JL3WSL, and VP9KK/M (Bermuda) at 2056UTC.

Out of the garden and on 18MHz, Ted G2HKU swapped c.w. with no less than EA8TB (Canary Islands) at 100, OM3TBC/MM (off the coast of Algeria), W7DUD (Utah) JY9QJ (Jordan), and CT3FT (Madeira Island) at around 1500UTC.

THE 21MHz BAND

Still bashing away at the low

They made 75,000 QSOs in a fortnight! Leighton GW0LBI's QSL card confirming his 1.8MHz c.w. QSO with the 4th Malyj Vysotskiy Island (MV Island) DXpedition in 1992. The venture was a joint effort by the OH2AQ, OH1AF and UZ1AWT Club Stations.



RadioScene

power c.w., though this time on 21MHz, Eric G0KRT hooked up with UA3GO (Russia) at 1926, and UT5USO (Ukraine) at 1945, and a rare QRP s.s.b. contact for him, TA2DS (Turkey) at 0800UTC.

Working on the 15m band enabled Sean G4UCJ to hook up with W6GV (California) at 1603, BV4HB (Taiwan) at 0900, VU2BK (India) at 1250, XV7SW (Vietnam) at 1000, UT5FB/MM (off Senegal) at 1611, and 3B8/K5KG (Mauritius) at 1050UTC, all on c.w.

Using 80W of s.s.b. this time was Carl GW0VSW, who logged contacts with 5N8SHE (Nigeria) at 1600, and 5A1A (Libya) at 1740UTC.

While again from his mobile station Charlie M0AIJ reports working 7X2ARA/P (Algeria) at 1100, 9A3NC/MM (off the coast of Western Sahara) at 1330 and EK1X (Armenia) at 1300. Finally from Charlie comes 4X50AT (Israel) celebrating 50 years of Israel's existence.

THE 28MHz BAND

Finally, just enough room for a brief peep at 28MHz. Ted G2HKU reports working ZS6ME (South Africa) and 5B4/DL1CW (Cyprus) around 1500, while Don G3NOF logged OD5PN (Lebanon) at 1617UTC.

Sean G4UCJ hooked up with a string of stations including VP8CXV (Falkland Islands), R1ANL (Antarctica), and 5X1T (Uganda). He also logged TR8XX (Gabon), and LU9AUY (Argentina), all between 1200 and 1600UTC.

SIGNING-OFF

That wraps it up for this month folks! As you can see, poor conditions don't necessarily mean no DX!

Some of our reporters use high powers and beams, while others use simple antennas and relatively low powers. All have one thing in common - they all work the DX to some degree, and as that's the name of the h.f. game, all of them come out as winners!

THANKS TO ALL REPORTERS FOR YOUR SUPPORT FOR THE COLUMN, WHICH KEEPS IT A LIVELY FORUM FOR OUR READERS, ESPECIALLY THOSE NEW TO OUR HOBBY. CHEERIO UNTIL NEXT TIME!

73, Leighton G4WOLBI

RADIO 'SCAPE

REPORTS & INFORMATION TO ME PLEASE.

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MIKE RICHARDS G4WNC OFFERS SOME POINTERS ON HOW TO GET GOING ON THE INTERNET CHEAPLY AS WELL AS LOOKING AT THE INTERNET RELAY CHAT SERVICE.

If you're not already on the Internet you've probably been put off by the potential cost of getting going and the complexity of deciding which of the 1001 service providers to try. So, I thought it might be useful if I gave you a few tips on how to get started on the cheap.

One of the first points to consider is the capabilities of your PC. If you have less than a 486DX33 then you will probably struggle with most of the commercial software packages as they all demand lots of memory and processing speed. This doesn't mean you can't get on the Internet - you just need to be more choosy with your Internet Service Provider (ISP) and the software you use.

You'll therefore need some expertise to make it all fit together. If you've got this expertise then you will no doubt have got yourself a faster PC! If you're lucky enough to own a suitably fast PC then getting on the Internet is really quite easy - let's face it the ISPs have to make connection simple in order to keep new business rolling in!

With a suitable PC to hand, the next item you need is a modem and a 'phone line. Choosing a suitable modem can, in itself, be difficult due to the huge choice available. But there are some really good prices around at the moment. If you want to keep the cost

right down you could try looking out for a second-hand 33.6k modem. The 33.6k represents the modem data rate and equates to 33,600 bits per second. Whilst not the fastest, this is about the minimum speed you should be using.

You should be able to pick-up a second-hand 33.6k unit reasonably cheaply. The local free advertising paper is usually a good place to find bargains, and it's often a good idea to see if the seller will give you a demo before you part with your cash.

If you want to go for the fastest modem technology you will need to get one of the 56k modems that you'll find advertised in all the PC magazines. At the time of writing the general VAT inclusive price for these was around £80 with special offers at around £60.

The best offer I could find was the Aries Global Commander 56k at £58 internal and £75 external. My personal preference for modems is to use external models for a number of reasons.

The most important thing to consider for radio enthusiasts is that the use of an internal modem ties-up a valuable serial port. This creates a problem if you want to connect decoding systems for data modes i.e. Packet, Pactor, FAX, RTTY, etc.

The solution I use is to always buy external modems and use a manual data switch that connects between the required com port and the modem, decoder, etc. Don't be tempted to use any form of automatic data switch - it won't work. This is because most decoders use the serial port wires in a non-standard way which will confuse any form of automatic switch.

The use of a manual switch is by far the easiest way to add serial devices to your PC. Connecting your modem to the 'phone line is dead easy - all you need is a spare line-jack socket.

However, if you're anything like me, every available jack is either in use or in the wrong place! The easy answer is to get a simple two-way adapter.

If you've bought a new modem you will usually find that this adapter is included. If not, you can get one from almost any electrical or d.i.y. shop. If there isn't a handy socket you can use standard telephone extension leads to reach your modem.

The next step is to choose

your service provider. If you want to just get on the Internet at minimum cost, by far the best way is to take advantage of the 'free' offers that seem to come with just about every computer or Internet magazine.

Most computer magazines give away around a month's worth of access which is often unlimited. Whilst you usually have to go through a registration routine and give credit card details, there's no charge providing you cancel by the due date.

I ought to clarify a couple of terms at this point. While most service providers provide basic Internet access along with some Web space and E-mail accounts there is another breed of service provider. These are known as OSPs or On-Line Service Providers.

In addition to the basic Internet access, these providers have their own on-line services that are only available to their members. This usually includes lots of special interest areas as well as useful extras such as general news, weather, travel, etc. Some of the major players in this area are CompuServe, AOL and Line-One.

All the ISPs and OSPs are obviously hoping that their free offers will persuade you to stay with them. The cheap access trick is to cancel in good time and move onto someone else's free offer!

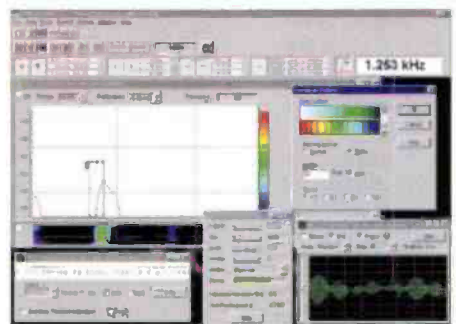
There is a snag of course. When you change ISPs you will generally have to uninstall their software and reinstall the new ISP/OSP package.

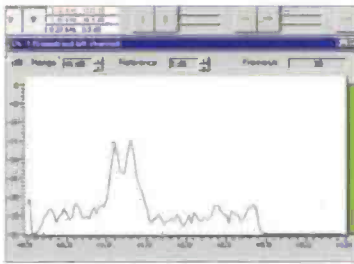
Perhaps the main snag is that you will have to keep changing your E-mail address. The advantage of using these free offers is that you can take your time to see what the Internet has to offer for you and compare the range of services offered by the various suppliers.

UPGRADES

If you've got a flash upgradable 33.6k modem, K56flex or x2 don't forget to keep an eye on the 56k Web site at <http://www.56k.com> to check for the availability of upgrades. Alternatively you can check your manufacturer's Web site.

The Analyzer 2000 program main screen.





An example of f.s.k. analysis using Analyzer

CHAT WITHOUT RADIO

This month I've taken some time out to play with Internet Relay Chat or IRC as it's more commonly called. This extremely versatile service allows you to chat, via the keyboard, to other Internet users all over the world.

The system originally started back in 1988 and was pioneered by Jarkko Oikarinen in Finland. The wider potential of the system was soon recognised and it rapidly spread throughout the Internet community.



Waterfall f.s.k. analysis.

The great thing about IRC is that you can quickly set-up a topic of conversation and start chatting. So, let's start with a look at just how you can get started with IRC.

The first thing you need is a client - this is just the software package that runs on your PC. Like most things on the Internet there's plenty of free/demo software around so it won't cost you anything to try it out.

There are around three or four main clients for the PC but by far the most popular is mIRC. This can be found at FTP sites all over the Web or on their home page at <http://www.mirc.co.uk/index.html>

The download file is around 1Mb so it should only take 5 minutes or so to download. Once downloaded installation is dead easy thanks to the built-in installer.

However, before you can start chatting you need to enter a few details via the set-up menu. You will need to enter your name, E-mail address, nickname and an alternative nickname.

The nickname is required to help make chatting easier. When you look at an IRC screen you will see that the comments from each user start

with the nickname.

Now, if you had to put your E-mail address or your full name at the start of each message your screen would soon get totally cluttered-up. To overcome this IRC systems now work with short nicknames.

These nicknames can be up to any nine alphanumeric characters long. You can also change your nickname at anytime by returning to the set-up screen. With all this complete you can now get logged-on to a server and start looking around for an interesting channel.

Selecting a server is done through the set-up screen. All you have to do is choose a local server from the drop-down list. Next you need to 'hit' the log-on button and you're in business.

When you first log-on you will be presented with a screen showing the currently available channels. Channels in this context are virtual places - you can think of them as being a bit like a room that you can enter to chat on a particular subject.

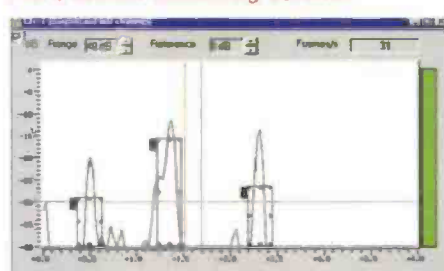
If this is your first time on IRC start by joining one of the newbies channels. These are specifically designed for new users so you can ask all the basic questions you like.

If you have a particular interest, i.e. radio, you can go to the Channel List button and start a search for a channel by using the Matching Text field. This could be just Radio or maybe antennas or QRP - whatever you like really. I tried this and came up with around 15 radio related channels.

I ended-up chatting with an advisor from Tech Radio in Virginia US. They operate a help service for computer problems which looks very useful. In fact there were, not surprisingly, lots of channels dealing with different aspects of computing. I suppose the only thing you need to be wary of is the unsavoury element, but this exists throughout the Web and it's the price we pay for free speech.

If you find that there are no

Pic 4 Morse decoding screen.



channels for your particular interest all you have to do is start one! When mIRC asks what channel you want to join all you do is type in the name of the channel you want to create.

Once it's been set-up the channel starts with you as the only user. You then have to wait to see if anyone else wants to join in.

When you start your channel you can also right click your mouse to set-up the conditions for the channel. A good thing to do is to add a topic - this saves having to explain the purpose of the channel to everyone who joins. From this screen you can also set-up lots of other options including banning anyone who's causing a problem.

That's about it for this quick insight to IRC - maybe I'll meet you there. When I'm on I usually start a new channel called shortwave. If you've found any particularly good channels why not drop me an E-mail?

SIGNAL ANALYSIS

As my mention of Spectrograph a few months ago caused such a lot of interest I think it's fairly safe to assume that many of you are interested in signal analysis tools.

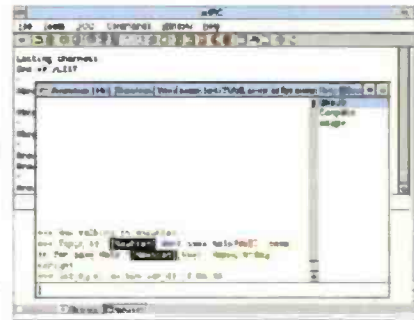
The latest signal analysis to hit the streets is *Analyzer 2000* from Brown Bear Software. This is a comprehensive analysis tool that provides high resolution time-frequency analysis using your PC's sound card as the input device.

The analysis is very quick and allows real-time processing with sample rates from 8kHz through to 44.1kHz. However, where the *Analyzer 2000* program really excels is with its multiple display and measurement options.

The multiple display and measurement options can have the main screen set-up as a spectrum analyser with a waterfall type spectrogram running immediately beneath it. The benefit of this is that you

can combine both tools to speed-up analysis of a signal.

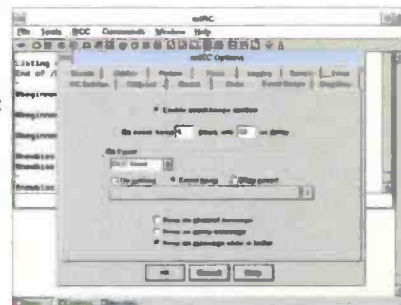
If you want to run *Analyzer 2000* you will need a reasonably fast PC and the authors recommend a 486DX100 as an



The mIRC main screen.

absolute minimum spec with a 166 Pentium recommended. For the operating system you will need *Windows '95* or *Windows NT 4.0*.

You will also need a 16-bit sound card with the appropriate Windows drivers and a 256 colour graphics system capable of 800 x 600 pixel resolution. Like most *Windows '95* programs, installation was very straightforward and the *Analyzer 2000* program comes



The comprehensive options from mIRC.

with a comprehensive help file to get you out of trouble.

Once the system is up and running you just have to connect the signal to be analysed to the microphone input on your PC and the display will burst into life. If it's some form of data signal you're analysing I would suggest you go to the Tools menu and select 'Average'.

This will cause the display to average the incoming signal and has the effect of reducing the deflection caused by noise whilst increasing the deflection due to the coherent wanted signal. It's also worth adjusting the Range and Reference levels to secure the clearest view of your signal.

Once you have the signal trapped you can use the powerful markers and rulers to make some precise measurements. The provision of two markers is just right for data signals as you can use one for each tone of the signal.

All you have to do is dab a marker on the top of each of the two signal lobes and you then get a read-out of both the frequency and the signal level. An alternative is to use the ruler system to measure and set both

RadioScene

frequency and level. This was particularly handy as the ruler lines ran through both the spectrum display and the waterfall making it very easy to both spot and measure the signal.

If you want to use the program to analyse data signals you will find the adjustable time rulers a real asset. With these you can spot the elements of a data signal and then use the rulers to measure the time difference between two points.

If you were doing this with a RTTY signal you could use it to measure the width of a signal mark and so easily work out the baud rate of the signal. As you can see this has lots of potential for checking and analysing all types of audio signals.

If you don't want to operate in real time *Analyzer 2000* can also record and analyse standard .WAV files, making it extremely versatile. You can also use the built-in recorder to save snap-shots or longer signal bytes.

And if this was not enough the review version of *Analyzer 2000* included an automatic Morse decoder. A look through the help file revealed that there are a number of tasty enhancements planned for the near future which include: Low i.f. input on 11.025kHz \pm 5kHz for real i.f. analysing capability; TCP/IP server for remote controlled operation (via LAN/WAN) with multi client capability; Baseband analysis with constellation diagram, phase diagram, frequency diagram for signal classification; Demodulation of FSK/PSK signals with bit analysis.

Not surprisingly the package is not free. The demo version has a self extending start-up delay and the program automatically shuts down after 15 minutes of operation. However, this is plenty long enough to decide whether or not you like it - especially as you can immediately re-start the program.

For the full version you need to register with **Brown Bear Software** at a price of \$98 US or DM180. For more information you can contact Brown Bear at: **Brown Bear Software, Thomas Braunstorfer und Martin Hisch, GbR St.-Sylvester-Str. 15A 85661 Forstinning, E-mail: MHBAER@AOL.COM or BTF1@AOL.COM**

If you want to give the demo version of the *Analyzer 2000* program a try you can

download your copy from: <http://member1.aol.com/btf1/Analys2000.html> (Note the last character of btf1 is the number one not an l or I!).

SPECIAL OFFERS

If you'd like a copy of Hamcomm/JVFX, etc. I've arranged a very special offer with the **Public Domain and Shareware Library (PDSL)**. They have put together a library set of all five disks for just £12, all inclusive.

Using PDSL also makes ordering simpler as they accept all the usual credit cards so you can order by phone - you don't even have to write a letter! Please direct all orders and enquiries about this disk set to: **PDSL Winscombe House, Beacon Road, Crowborough, Sussex TN6 1UL, Tel: (01892) 663298** and request library volume: **H008739abcde**.

The software is only available as a set of five disks as follows: IBM PC Software (1.44Mb disks): **Disk A - JVFX 7.1, HAMCOMM 3.1 and WJFX 3.2; Disk B - DSP Starter plus Texas device selection software; Disk C - NuMorse 1.3; Disk D - UltraPak 4.0 and Disk E - MScan 1.3 and 2.0.**

THAT'S IT FOR THIS TIME, SO UNTIL NEXT MONTH HAPPY 'SURFIN' AND DON'T FORGET TO LET ME KNOW OF ANY INTERESTING RADIO SITES YOU FIND WHILST WANDERING AROUND THE 'WEB.

73 Mike G4WNC

FOCAL POINT

REPORTS & INFORMATION TO ME PLEASE.

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THIS MONTH GRAHAM G8EMX HAS NEWS OF SEVERAL NEW FM REPEATERS THAT ARE CURRENTLY IN

THE PLANNING STAGES.

It was good to see several Amateur TV stations during the Summer Fun contest in June, as mentioned in the last 'Focal Point'. Next month (September) sees the International, followed by the Autumn Vision contest in November. But it's back to familiar territory this month, with developments on the 10GHz (3cm) and 1.3GHz (24cm) bands.

The New 10GHz ATV repeater **GB3DJ** is located at St. Georges, about 1km north of Telford and became operational on May 7. This repeater was built by members of the **Shropshire ATV Repeater Group**, with **Dave Hall G8VZT** as Group Secretary and holder of the Notice of Variation (NoV).

Dave says: "GB3DJ is entirely home-brew, even down to the p.c.b.s. The 3cm transmitter achieves around 100mW at 10.135GHz and the repeater has been seen at Stoke-on-Trent and even as far north as Manchester. The 'DJ' repeater receives at 10.425GHz and has around 12 regular users."

While the Telford repeater was being switched on in May, another new 10GHz ATV repeater was being granted approval. "GB3BG will be at Sedgley, in the West Midlands", says **Alan Kendall**, who is Chairman of the **Beacons Repeater Group (BRG)**.

Alan continues: "I will shortly be applying for a NoV to my licence, and expect the repeater to be in service by mid-summer. The GB3BG repeater will use an input of 10.425GHz, transmitting on 10.135GHz".

Meanwhile, the Beacons Repeater Group is slowly progressing its 1.3GHz project to the north of Birmingham. At the site, the BRG needs to achieve either a safe access to the top of an existing high structure, or provide a new means of mounting the dual-slot antenna. So, a scaffold tower system has been erected, which should at least provide a working platform and stable

mounting for a length of mast and the dual Alford-Slot antenna during test transmissions.

More permanently, three sections of triangular mast structure are also available - these can be supported from within the scaffold before tethering to the ground. Quite a mechanical and transportation task ahead, because the sections are each 3 metres long, quite heavy and need taking to the site.

The opening statement of a letter by **Roger Glover G8IUC** and **John Douglas G4DVG** reads: "It seems odd that there is, as yet, no 1.3GHz Amateur TV Repeater operating in the London area". Roger and John together with a number of other keen ATV operators, have formed the **North London Television Group** to try and remedy this situation.

Creation of the North London TV Group (NLTG), with Roger as chairman and John as secretary, is the latest move in a number of schemes for an ATV repeater that have been put forward over a period of time. Most recent of these has been the preliminary work by the **Cheshunt and District Amateur Radio Club** - indeed, members of the Cheshunt ARC built a lot of the repeater hardware.

However, a licence application was never submitted, so no substantial further progress was made. The NLTG aims to build on what already exists and progress the essential administrative details.

The proposed site for the north London ATV repeater is atop the Enfield Civic Centre. Using back-to-back bow-tie antennas, line-of-sight path predictions indicate that these will provide a good service to inner, north and south London, with topography and radiation pattern preventing interference to neighbouring ATV repeaters **GB3TV** (Dunstable) to the north west, **GB3HV** (High Wycombe) to the west and **GB3KT** (Kent) towards the south east.

LOCAL SUPPORT

Please remember that all

Mike Sanders G8LES with the 1.3GHz ATV repeater **GB3HV** (High Wycombe).



Repeater Groups - ATV or voice - need ongoing support from the local Amateur Radio community. The initial work, and in many cases finance to put a repeater on air may very well have been provided by just a few people, who were prepared to make this commitment in order that the project would be completed.

However, ATV repeaters 'grow' as facilities are added, and also 'grow old' and so need replacements and additionally there are the running costs of insurance and, usually, electricity. So, don't leave all this to 'the few'; repeaters are provided for the 'many'.

After all the reports this month of new and planned f.m. repeaters on 10 and 1.3GHz, it's easy to forget that a.m. ATV on 430MHz continues to be available. Okay, so there are some limitations - no inter-carrier sound, and a relatively narrow band with many other users (so ATV operators are encouraged not to transmit colour and to limit their monochrome bandwidth).

But vision on 70cm has an appeal of its own. From the transmission viewpoint, higher r.f. powers are more easily attainable - there is still room here for valve techniques and there is substantial personal satisfaction in achieving a correctly modulated vision carrier. Receiving 70cm ATV is very simple - all you need is an up-converter into a domestic u.h.f. TV set.

Incidentally, New Zealand certainly has an active 70cm ATV scene, as my overseas correspondent **Michael Sheffield ZL1ABS** reports: "The monthly 70cm ATV Net on the 70cm National System was held on May 27. This ran from before 8pm until after 9pm, with a Conference award Net in the middle. "The 70cm Net controller was **Grant ZL1WTT**, handicapped a bit by an 'iffy' 70cm rig".

THE BRITISH AMATEUR TV CLUB

The **British Amateur TV Club (BATC)** was due to hold its biennial general meeting next month (September). Instead, the BATC Committee has decided to move the meeting to September 1999 and make the event a major promotion of Amateur TV to mark the 50th anniversary of the BATC. Date and venue will be announced in 'Focal Point' and on the BATC Web site, which can be found at: <http://www.batc.org.uk>

Membership of the BATC is not restricted to licenced Radio Amateurs. Anyone with a technical or artistic/production interest in TV is welcome to join.

If you are handy with a camcorder and keen to extend

or use your creative skills, contact the BATC membership Secretary **Dave Lawton** at 'Grenehurst', Pinewood Road, High Wycombe, Bucks HP2 4DD or via E-mail to memsec@batc.org.uk

CHEERIO FOR NOW, KEEP SENDING ME THAT ATV NEWS, FROM WHERE EVER YOU ARE, TO ME (ADDRESS AT THE TOP OF THE COLUMN).

73 Graham G8EMX

BROADCAST

REPORTS & INFORMATION TO ME PLEASE.

PETER SHORE, C/O PW EDITORIAL OFFICES, ARROWSMITH COURT, STATION APPROACH, BROADSTONE, DORSET BH18 8PW

E-MAIL: petershore@pwpublishing.ltd.uk

The output of **BBC World Service**, along with domestic radio and television services, was disrupted in early June during a 24-hour strike by members of the technicians union, BECTU. The union was protesting about the transfer of all technical staff to a new wholly-owned subsidiary, BBC Resources, which it was claimed was the first step towards privatisation of the Corporation.

Negotiations at the conciliation service, ACAS, prevented a second 24-hour stoppage, although it failed to resolve all differences between the two sides. World Service news was severely curtailed, with programmes like *Europe Today* off the air, replaced by repeats of *Outlook* and other feature material.

Faring equally badly at present, though as a result of political rather than industrial action, is **Radio Australia**. When problems flared up in Indonesia in May, there were calls for the Darwin transmitting station to be reopened to allow Radio Australia to beam news and information to the country with better reception.

However, **Richard Alston**, the Australian government minister who helped to slash the Melbourne station's budget, refused, saying that neither Indonesians nor expatriate Australians "need a unique Australian perspective on their own difficulties, and that 'they can get it [the news] from the BBC'".

A few thousand miles to the

south-east of Australia, **Radio New Zealand International** has been more successful in its dealings with its government. The station's budget is being maintained at the same level as last year, meaning that no cutbacks are necessary. And if you've been trying the frequencies I published last month, can I suggest that early in the morning, maybe around 0400-0500UTC, is the best time to catch the Wellington-based broadcaster.

Sri Lanka is back on the air on medium wave after a brief break. The Sri Lanka Broadcasting Corporation took the decision in April to move all its services to the f.m. band, but was met with howls of protest and by the end of the same month, m.f. senders were on the air once more.

An hour of English-language programmes from the **Voice of Russia** disappeared on 1 June as a result of budget cuts which also led to the end of Nepalese programming. The English-service at 1800UTC has now gone (which seems to me to be a peak listening time for the station's European audience), as has an hour of Arabic, Spanish and Portuguese plus 30 minutes of Hindi and Bengali, and 15 minutes each of Czech and Hungarian.

FREQUENCY ROUND-UP

On now to a round-up of frequency news from around the world, starting with Mongolia. The **Voice of Mongolia** (formerly Radio Ulaanbaatar) has English at: 1210-1240 on 12.085; 1430-1500 on 9.72 and 12.085 and 1830-1900 on 9.72 and 12.085MHz.

Radio Havana Cuba has English: 0100-0500 on 6.00, 9.82 and 13.605 (usb); 0500-0700 on 9.55, 9.82 and 9.83 (usb); 2030-2130 on 13.715 and 13.75 (usb) and 2230-2330 on 9.55MHz.

Voice of Turkey in English can be heard at: 0300-0400 on 7.27 and 9.655; 1230-1330 on 11.995, 15.185 and 15.29; 2030-2130 on 7.21 and 2200-2300 on 7.19 and 9.655MHz.

Pakistan, along with India, has been in the news a great deal in the early part of this summer. You can tune to **Radio Pakistan** in English at: 0230-0245 on 7.485 and 13.61; (dictation speed news) 0805-0810 on 15.53 and 17.835; 1105-1120 on 15.53 and 17.835 (dictation speed news); 1400-1410 on 11.57 and 9.65 and 1600-1630 on 9.65, 11.57, 15.17 and 17.72MHz.

The **Voice of the Mediterranean** is now broadcasting on short wave from Italy and Russia, despite its base on the island of Malta. English is on the air daily except Friday 0500-0600 on 711kHz

from Libya, Sundays at 0800-0930 on 9.60 from Italy and daily except Friday 1900-2000 on 12.06MHz from Russia.

United Arab Emirates Radio Dubai airs English at: 0330-0400 on 12.005, 13.675 and 15.40; 0530-0600 on 17.83 and 21.70; 1030-1110 on 13.675, 15.37, 15.395 and 21.605; 1330-1400 on 13.63, 13.675, 15.395 and 21.605; and 1600-1640 on 13.63, 13.675, 15.395 and 21.605MHz.

Radio Almaty International from Kazakhstan has English at 1100-1120 on 9.505MHz and via Ukrainian transmitters on 9.62 and 11.72MHz on Tuesday, Wednesday, Friday and Saturday only.

Radio Tashkent in Uzbekistan broadcasts in English at 0100-0130 on 7.19, 9.375, 9.53, 9.715; 1200-1230 on 7.285, 9.715, 15.295, 17.775; 1330-1400 on 7.285, 9.715, 15.295, 17.775; 2030-2100 on 9.54 and 9.545 and 2130-2200 on 9.54 and 9.545MHz.

Radio Romania International has English at 0200-0300 on 6.155, 9.51, 9.57, 11.94; 0400-0500 on 5.99, 6.155, 11.74, 15.335; 0600-0700 on 5.965, 6.095; 0640-0700 on 7.105, 9.51, 9.625, 11.775; 0700-0800 on 15.365, 17.775; 1300-1400 on 15.25, 15.39, 17.735, 17.745; 1700-1800 on 9.69, 11.94; 2100-2200 on 5.99, 5.995, 6.175, 7.195 and 2300-2400 on 5.995, 7.195, 9.57, 11.83MHz.

OVERNIGHT RADIO

Finally, if you live in or plan to visit the USA this month, tune in to the local National Public Radio (NPR) affiliate station in the town or city you're in. From 1 August, **World Radio Network (WRN)** is providing an overnight radio service to NPR affiliates between midnight and 0500, Eastern Time (that's New York time).

The WRN service includes a mix of the news, current affairs and feature material which is heard on the world-wide English service, WRN1, repackaged with a five minute NPR national news bulletin at the top of each hour.

If your local NPR station doesn't carry the service, ask them why - after all, we need to spread the word about international radio to people who have never even heard of short wave, and this seems one of the best ways to let them hear the fantastic programmes international stations produce.

THAT'S ALL FOR NOW SO, UNTIL NEXT MONTH, HAVE A WONDERFUL SUMMER (IF YOU LIVE IN THE NORTHERN HEMISPHERE, THAT IS!), AND GOOD LISTENING.

Peter

FREE ADVERTS

Now's your chance to send in a photograph of your equipment (a good idea if it's really unusual) to accompany your advert. Please note that all photos will only be published at our discretion and are non-returnable.

When sending in your advert, please write clearly in **BLOCK CAPITALS** up to a maximum of 30 words, plus state your contact details. Please use the order form provided.

Bargain Basement

Advertisements from traders or for equipment that is illegal to possess, use or which cannot be licensed in the UK, will not be accepted.

No responsibility will be taken for errors.

You should state clearly in your advert whether the equipment is professionally built, home-brewed or modified.

The Publishers of *Practical Wireless* also wish to point out that it is the responsibility of the buyer to ascertain the suitability of goods offered for purchase.

For Sale

10m (28MHz) multi-mode professionally converted Superstar 2000 with RA permit, boxed and with manual, £90 plus postage. Tel: Boumemouth (01202) 420909.

30ft galvanised antenna tower - free to good home. New owner to dismantle and collect. Tel: (01280) 813794.

Alinco DJ-GS dual-band hand-held with S mic, and 9.6V NiCad, unused, £225. Yaesu FR-101 receiver, good condition, £75. Tel: Putney 0181-785 7314.

Alinco DR140 2m (144MHz) mobile, boxed as new, £150 or p/lex PK232MBX with cash adjustment. Peter G0BAG, Hampshire. Tel: (01705) 412187.

Amstrad multi-band portable receiver, long wave, medium wave, f.m. marine band, aircraft and two short wave bands from 2.5 to 22MHz, mains or battery, £25. Buyer collects or pays postage. John Noble, 1 Mierscourt Farm Cottages, Mierscourt Road, Rainham, Kent ME8 8PJ. Tel: (01634) 233058.

Antique valves: GEC CV 1040/PX 25, Mullard AC 042, ECC 32, YL 1240, STC 4304 CB, 4033 L, 4242 A, RCA 76, 805, 801, 2 A 3, KEN RAD 6 A 3, TFK EM 35, EBF 15, EAA 11, MOV N T 40 (Globe), ML 6 (ceramic base), OSRAM KTW 74M, MX 40. Peter Fernando, 87 Church Road, Kandana, Sri Lanka, lamronr@sit.lk@sit.lk

AOR 2002 plus power pack, etc., top brand scanner, £185. Norelco Philips large short wave portable lots of buttons, much chrome, needs attention to v.h.f. dial, suit collector of quality portables, £30. Tel: (01244) 310267.

AOR 7030, excellent condition with Collins s.s.b. filter and Murata data filter, boxed with manual, remote, power supply, £495 o.n.o. Yaesu FT-221R MuTek /e, but faulty p.l.l., hence £95 o.n.o. Mike G8RCG, Knutsford. Tel: (01565) 722262.

AOR AR8000 scanner with CU823R computer interface and DOS and Windows software, as new, boxed, with all manuals, £300. Tel: Scunthorpe (01724) 852991.

AR88 comms RX, 535-32000kHz, complete with original speaker unit and copy manual, in good, clean condition, £85. Mullard high speed valve tester, complete with manual and test cards, £40. G4FZG, QTHR. Tel: Cheltenham. Tel: (01242) 254634.

Attenuator, switchable 0-121dB, 600Ω, excellent condition, £35. Tel: E. Yorks (01482) 653200.

ATU s.w.l. omni-match made by LAR Modules Ltd., Leeds, range covered 200kHz to 30MHz, as new, rarely used, in heavy steel and all case, £20. Buyer collects or pays postage. John Noble, 1

Mierscourt Farm Cottages, Mierscourt Road, Rainham, Kent ME8 8PJ, Tel: (01634) 233058.

Automatic antenna tuner Heathkit 2500 (2kW), £420. JM Nunes CT1BRM, Portugal. Tel: 351-1-7577786, cmb@mail.telepac.pt

Butternut HF6V vertical, complete with TBR-160 conversion kit for top band, £100. J-Beam VR3 vertical, 10-15-20, £30. Datong r.f. processor, £20 + carriage. Derick G4XKF, Brighton. Tel: (01273) 418713.

CapCo mag loop, 10m, 15m, 20m (14/21/28MHz) + rotator, power supply, etc., £50. Tel: Suffolk (01284) 768084.

Codar CR70A in v.g.c., works well, £55 o.n.o. Tel: (01450) 379217.

Collins KWM2 516F2 p.s.u., 30LI linear, spare tubes, £650. Atlas 210X with mains console, £250. TS-50S, boxed, like new, £500. KW-202, KW204, £125 pair. Roller inductor a.u., £125. 7030, £500. Tel: (01925) 225067.

Decoder MCL1100 Easyreader, with auto baud rate, auto align lock, normal and auto mode, auto speed, RTTY, c.w., NAVTEX, FEC, ARQ, SITOR, AMTOR, with Reuters, monitor, only, £120 includes post. Frank on (01295) 670108.

Drake TR7A, PS7, RV7, RV75, new, MS7, SP75, Drake desk mic, FL2 filter, insect filter, MFJ-949E, new, manuals, w/shop manual, n/blanker, all filters, nice. Tel: Beds (01234) 743175.

Dremel Multi 395/3950, drills, grinds, polishes, engraves and much much more, forty tools included, one only used, as new cost, £84, will accept, £50. Instruction manual, etc., in heavy duty plastic case, runs from mains, collect or postage extra. John Noble, 1 Mierscourt Farm Cottages, Mierscourt Road, Rainham, Kent ME8 8PJ, Tel: (01634) 233058.

DXTV multi standard v.h.f. u.h.f. 22in colour with audio offsets, old but works well, best offer secures, buyer inspects and collects (an, Walsall. Tel: (01922) 630668 after 5pm.

FC-902 a.u., good, £85. Kantronics Plus, boxed, manuals, leads, £185. Tokyo line 1-60W, 50MHz, new and boxed, £85. Mutak 144MHz pre-amp, £15. All plus carriage or collect. Joe, Nth Wales (01341) 250750.

Ferranti 146, £10. Melody Maker 494AC, £20. Deutscher Kleinempfänger, £95. Bush DAC90A, £30. Rhapsody deluxe, £45. Morse buzzer key 10F/4067, £25. NO48 battery box, £10. R208, £50. Ericsson crystal set, £50. Tel: (01326) 241054.

Four Icom H16 transceivers, high-band v.h.f. use, batteries, two microphones and two wall chargers, three aerials, £175. Tel: (after 5pm any day) Swansea (01792) 416089, ask for Mr Hibbard.

FT-757GX, boxed, manual, excellent condition, £420 plus postage. G4YRY, Bournemouth. Tel: (01202) 420909.

FT-940R multi-mode, v.g.c., £215. Standard C8800 2m (144MHz) mobile, £105. Instant Morse CD ROM, all postage paid. PMR a.m. mobiles, convert 4m (70MHz), £5 each. A200 amps, 4.6m, £10 plus post last two. Tom G1LXU, Cleethorpes. Tel: (01472) 602335.

Goldstar oscilloscope dual-beam, current model OS 9020G, 20MHz, with built-in wave generator, sine square tri d.c.-100MHz, consider exchange FT-747GX, etc., £295 o.n.o. Trio R2000 comms receiver with v.h.f. converter fitted, wide coverage, £295 o.n.o. Grundig Satellit 650 comms receiver analogue and digital read out, top of the range, £165 o.n.o. Tel: 0181-308 1704.

Heathkit SB101 transceiver, SB610 oscilloscope, SB600 speaker, SP23 power supply (faulty), no mic, p.w.o., v.g.c., unknown value, open to offers, buyer uplifts or pays P&P. Tel: (01383) 831714 leave message.

Howes DXR20 multi-band receiver, covers 20-40-80m (3.5, 7, 14MHz) amateur bands, additional bands can be added, p.c.b. module professionally built, 'S' meter fitted, as new, excellent working order, £70. Check Howes price list and you will see you are getting a bargain, if not collected, postage extra. John Noble, 1 Mierscourt Farm Cottages, Mierscourt Road, Rainham, Kent ME8 8PJ, Tel: (01634) 233058.

Howes TRF3 short wave broadcast receiver, tuning range 5.7MHz to 17MHz in three switched bands, p.c.b. was professionally built. CSL4 dual bandwidth filter fitted, good solid little receiver in g.w.o., £40 o.n.o. Buyer collects or pays postage. John Noble, 1 Mierscourt Farm Cottages, Mierscourt Road, Rainham, Kent ME8 8PJ, Tel: (01634) 233058.

Howes XM1 crystal calibrator with work sheets, £12. Buyer collects or £2 postage extra. John Noble, 1 Mierscourt Farm Cottages, Mierscourt Road, Rainham, Kent ME8 8PJ, Tel: (01634) 233058.

Icom 737 h.f. with auto a.t.u. and general coverage, as new, unmarked, boxed, first mic., £600. GOMKA, 17 Trevor Road, Swinton, Manchester M27 0YH.

Icom IC-PCR1000, three months old, as new condition, reason for sale, intend purchasing h.f./6m transceiver, price, £300 or vary near offer considered. Tel: (01405) 860704.

Icom IC-R71E receiver with IC6X257 f.m. unit, boxed with manual, mint condition, £425. Icom IC-R10 all-mode scanner receiver, mint, boxed, £185. Kenwood TH-22E trans/rec. hand-held, mint condition, boxed, £150. Graham after 6pm on (01634) 717365.

Icom IC-R71E RX plus joymatch, a.t.u., £400. Tel: (North Hampshire) 0118-981 2476.

Kenwood R2000, fitted with VC10, like new, boxed with manual, only, £340. Also MCL1100 decoder with Reuters monitor, only, £90. Howes a.t.u., £20. Frank on (01295) 670108.

Kenwood TR851E 70cm (430MHz) multi, 5-25W, as new, £425 o.n.o. Kenwood TS-530S h.f. TX/RX, WARC bands, AT230, SP230, £400 o.n.o. Kenwood TS-711E 2m (144MHz) multi, 2.5-25W, 13.8V only, hence, £350. All good condition. G4KIT, Worthing. Tel: (01903) 766418.

KW2000A transceiver, p.s.u., manual, £150. Kenwood RA17L receiver (2 available), £130 each. Racal RA137 I.f. adapter, £85. Hallicrafters S37 receiver, 128-214MHz, £125. Genuine R1155 transit-case, £40. HRO receiver, (no case), working, coils, £50. Tel: Yorkshire (01482) 869682.

Midland CB transceiver, model no. 77-095, complete with microphone, antenna, s.w.r. meter, manual, brackets (for mobile use), 40 channel, 12V d.c., cost £60, will accept, £30. Brand new, used once, buyer collects or pays postage. John Noble, 1 Mierscourt Farm Cottages, Mierscourt Road, Rainham, Kent ME8 8PJ, Tel: (01634) 233058.

NAG 2m (144MHz) amplifier, 4CX300F 250V out, £210. Jaybeam two 14-elle parabees, new, boxed, £32 each, all plus postage. G4YRY, Bournemouth. Tel: (01202) 420909.

Pair of Ross mono or stereo earphones, adapter supplied with individual volume control on each phone, brand new, £5, postage extra. John Noble, 1 Mierscourt Farm Cottages, Mierscourt Road, Rainham, Kent ME8 8PJ, Tel: (01634) 233058.

PRO2039, as new, boxed, handbook and external speaker, £80 p. paid. John G3OAZ on (01256) 465126.

Psion palmtop PC3A 2Mb computer with 1Mb RAM disk, 2Mb flash disk, mains adaptor, printer cable, stand, PS WIN and money applications, all as new, £80 o.v.n.o. Paul on (01234) 240877 anytime.

PW Meon 50MHz transverter 28MHz i.f. 1W, £50. 10m s.s.b./f.m. rig, £55. Tel: Beds (01525) 630259.

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RadCom/Practical Wireless, 1982-1995, Short Wave Magazines 1982-1990s plus Ham Radio Today, Amateur Radio, best offers secures, buyer must collect all. G4YRY, Bournemouth. Tel: (01202) 420909.

Radio Shack DX394 s.s.b. short wave receiver, direct access, tuning memory and search timers, dual time, scans, 150kHz to 30MHz, 14 international short wave bands, brand new, boxed, £100, genuine reason for sale. Tel: (01243) 268816.

RN transverter, 6m (50MHz), 28MHz in, 50MHz out, 1-3W drive, 25W out, £105 plus postage. G4YRY, Bournemouth. Tel: (01202) 420909.

Roberts 861 short wave radio, new, all-wave bands, perfect condition, accept, £100 (new £185), reluctant sale. M. Allen on 0114-246 4186.

Search9 RX 2m (144MHz), £25 o.n.o. Icom IC-HM10 scanner microphone with pre-amp, £15. Icom HM-46L speaker microphone, £5. Variable amplified speaker with built-in scanning f.m. radio (broadcast), £10, all plus P&P. Tel: (01603) 478941.

Short Wave Receivers. Past & Present, second edition, £10 + post. Tel: Leics (01530) 228480.

Sony CRF-320 world zone, 32 bands, classic radio, £350. HF-150, like new, £200. Sony 2001D with airbuds, £150. Trio 9R-59, v.g.c., b.i.o., valves, £100. Drake 8E, like new, £600. Grundig 320 (16 bands) trawler, like new, £50. Toshiba, 11 bands, £50. Grundig Trawler, £30. Tel: London 0181-813 9193.

Sought after JRC h.f. station separates, NRD-515 TX, p.s.u., NRD-515 RX, NDH-518 memory unit, NCM-515 controller, matching loud speaker, excellent condition, boxed manuals, sell, £900, possible exchange for classic British motorcycle. Tel: Sarffs (01538) 360760.

Superb radio QTH Eastbourne, two bed det bungalow, GCH, SU0G, see PW Dec 1998, £75k or exchange similar property near Headingley. Eric Gray G3CPS on (01323) 643172.

Tagra 2m (144MHz) 16-element Yagi beam antenna, £50 o.n.o. Tel: 0113-217 8661 after 4pm.

Trio R1000 communication receiver, g.w.o., with manual, £150. John Davies, Morecambe. Tel: (01524) 414820 after 5pm.

Trio TS-9130 2m (144MHz) multi-mode v.h.f. transceiver, never used mobile, £250. Kenwood TS-940AT h.f. transceiver, slight fault sub panel not working, plus Yaesu base mic, MD1B8 and dummy load, £700 o.n.o. Tel: Caernarfon (01286) 674455 evenings.

Two sectioned 25' steel mast, rotator and control unit, two 8 element 2m Yagis, £75. DRAE power unit, Microwave Modules 30W pre-amp, v.s.w.t. meter, £75. Yaesu 290R case, charger mic., £100. John Mirams, 33a The Moors, Kidlington, Oxon DX5 2AH, Tel: (01865) 374888.

Viceroy power pack, £10. Boxed valves, 50L6, 35L6, 25L6, many others, mainly American WW/II, some UX bases, WW/II valve tester, case shabby, £10, s.a.e. for valves please. G3HW/D, 1 Alan Road, Padstow, Cornwall PL28 8DS, Tel: (01841) 532723.

Wharfedale Linton receiver, four, Wharfedale Linton 2 speakers, Linton DC9 tape deck for sale, what offers? Please ring after 6pm. Tel: (01200) 42378.

WS19, from, £150. RA10B, £40. R1155A int. needs attention, £50. R1155 p.s.u./a.f. amp, £30. Edystone 400 coils DD/CC, £10 ea. Bird TS-2609 s.w.r./p.w.r. meter, £30. Minimeter a.m./c.w., 160-40, £40. Command racks MT-63, £35. MT-65, £40. MT-69, £30. 52 Set a.t.u., £40. Fullphone (part), £15. Ten way SWBD, £25. KW2000E p.s.u./mic., £145. Ben on (01562) 743253 or E-mail 106312.1035@compuserve.com

Yaesu FL/R400 h.f. transmitter receiver, £150 with manuals. Racal RA17L, £100. Scanner PRO-2035, £180. Connoisseur turntable, £25. All clean and g.w.o. Tel: Lowestoft (01502) 560869.

Yaesu FROX400 with external speaker and workshop manual, very good on s.s.b., c.v. on 20-40-80m (3.5, 7, 14MHz), needs attention but overhaul works quite well, heavy, buyer will have to collect or pay carriage, £35. John Noble, 1 Mierscourt Farm Cottages, Mierscourt Road, Rainham, Kent ME8 8PJ, Tel: (01634) 233058.

Yaesu FRG-7700 h.f. RX with FRA-7700 and FRV-7700, £250. Ainco DR-110 2m (144MHz), £110. Icom IC-228A 2m (144MHz), £100. Kenwood TM-741E 270/6 triple band, £375. Chris. Stoke on Trent. Tel: (01782) 319316 or E-mail g6tpi@aol.com

Yaesu FT-1012 MkII, WARC, g.w.o., 500Hz c.w. filter, spare p.a. valves, mic., manual, £250 o.n.o. Jim G4ITB on 0116-276 6405 or mobile on (0831) 148876.

Yaesu FT-102 h.f. transceiver, needs attention, £200. Yaesu FL21002 linear, never used, £300. MM 2m transverter, £20 or £500 the lot. David on (01706) 371352.

Yaesu FT-290RH 144MHz multi-mode, still boxed, £250. Remote s.w.r./power meter, £25. Fibreglass ohm antenna, £15. Five element Yagi, £25. Light use rotator, £15 or £300 the lot. Ian, Suffolk. Tel: (01787) 281913 after 7pm.

Yaesu FT-707 h.f. s.s.b. transceiver plus digital v.f.o., power supply, antenna coupler, complete base station. FT-290R portable transceiver + FL-2010 linear amplifier, also manuals, books, s.w.r. meters and extras, genuine sale reason, £700 the lot. Chns, Norfolk. Tel: (01953) 885647.

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Yaesu FT-736R, 2m/70cm/6m (50, 144, 430MHz), one and a half years old, hardly used and as new, boxed with manual with FIF-232C computer interface and CFX-514 triplexer, £1250. Tel: Scunthorpe (01724) 852991.

Yaesu FT-747 h.f. station, p.s.u., a.t.u., vertical antenna, speaker, odd bits, £550 o.n.o. Transverter 2m in, 10m out, £30. Also wanted working or scrap CB rigs for spares. Tel: 0117-963 3306.

Yaesu FT-757GX transceiver + GC receive, £400. Matching FP-757HD, £80 or £450 pair. Yaesu FT-221R 2m (144MHz) all-mode, £200. Sommerkamp FT-307CBM (similar Yaesu FT-107 plus CB), £300. Yaesu FT-227R mobile, £60. More items. Tel: Leicester 0116-288 2618.

Yaesu FT-840 h.f. base/mobile, mint, fitted f.m. adapter, 6kHz a.m. and 500Hz c.w. filters, £500. Tel: (01252) 890283.

Yaesu FT-840, fitted f.m., general coverage with microphone, boxed with manuals, as new, £500 o.n.o. Tel: Sidcup (0956) 208003 or 0181-308 0051.

Yaesu FT-840, mint condition, £550. 486DX2/50 computer, mini tower, 12Mb RAM, 520Mb HD, 10 x CD, 28 800 Internet modem, Sound Blaster sound card, new Tatung SVGA monitor, regret sale, first £300. Tel: Northants (01536) 522007 or (04325) 226289 and leave message.

Yaesu FT/7B TX, 80/10, complete with manual, in very good condition, £250. GW00SQ, Pontypool. Tel: (01495) 757221.

Exchange

70cm mobile rig, ex p.m.r., w.h.y.? for repeater use 10Wv or above, exchange for Kenwood TR2300, Yaesu FT-709R or back to back u.h.f. handies, can be crystalised for 70. N. Martin, Chichester. Tel: (01245) 771829.

Exchange for v.h.f./u.h.f. ham gear, 1 Bekeite TV (Bush make) with magnifier Viemaster model B home constructors TV with plans in large wooden case, various old radios and lots of 'old' radio magazines. Tel: 0121-355 0236 after 6pm, ask for Gordon.

Olivetti P100 lap top computer, 16Mb RAM, 1 Gb HD, 6 x CDROM, 16-bit sound, Windows 95, a.c. power/charger, all as new with box. Wanted h.f. with built-in a.t.u. Tel: (01443) 772387.

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Tec X2000 professional reel-to-reel tape recorder, excellent condition, boxed, manuals, 150 tapes, exchange for Racal 1772, JRC 505 or Collins 75A-4 or w.h.y.? Tel: (01685) 377512.

Yaesu FT-1012D (f.m.), Icom 505 6m, all-mode, both v.g.c., swap TS-680S or 430S + 430 matching a.t.u. + p.s.u., must be v.g.c. Andy on 0115-930 8096.

Wanted

All early wireless gear, crystal sets, valves, horn speakers, top prices for items made by Marconi, Burndept, Pye, BTH, Gecophone, Ericsson, serious collector, will pay well and collect any area. Jim Taylor G4ERU, 5 Luther Road, Winton, Bournemouth BH9 1LH, Tel/FAX: (01202) 510400.

Bush mains table radio, model VHF64 or Telefunken Opus studio tuner amplifier, model 2650MX and Pye Cambridge International model J.PE80 or model H.PE60, H. McCallion, 8 Strathard Close, Coleraine, Co. L. Derry, N. Ireland BT51 3ES. Tel: (01265) 43793.

Circuit for Edystone 640RX Jim on (01232) 283789.

CobbWebb h.f. aerial wanted, any condition, willing to refurbish. Chris G4LDS, QTHR. Tel: (01621) 785704 or G4LDS@GB7DXM

Delta 1934MHz or similar transceiver in working order, £25 paid. Tel: (01905) 421638.

Denco coils, green No. 4, No. 5 and any others might interest me for s.w. v.h.f. Dave on 0121-504 3142 day or 0121-427 3307 evenings.

Diamond antenna W-8010 double dipole, info. on rigging and tuning please, I only have the Japanese version. MW0BLQ/DA18LS - 49 2163 32590 or DAJONES@aol.com

Does anyone have Quickroute 3 designer special computer software they could sell me? I have contacted the manufacturer, but they tell me that this particular version of Quickroute is obsolete and are thus unable to satisfy my request. D. Allen, Gloucestershire. Tel: (01242) 511750.

Drake FS-4 syn. w/manual, working or non working, good price paid, also 6kHz or 5kHz a.m. filter. Bill on 0141-562 4571.

Edystone 900A or 960 wanted, any condition. Tel: (01686) 630255 or E-mail forwym@aol.com

Edystone, still seeking models 380X, 960, 890, 930 and scrap sets for spare parts, collection is possible, please look

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Grundig Satellit stereo short wave radio, model 2400, professional Lw, m.w., 7 s.w. and v.h.f. stereo or Grundig Satellit model 1400 or Sony short wave radio, model CRF160 in p.w.o. Hugh McCallion, 8 Strathard Close, Coleraine, Co. L. Derry, N. Ireland BT51 3ES. Tel: (01265) 43793.

HRO 100-200kHz coil wanted, will buy or swap 14-30MHz coil in v.g.c. Derek, Bexhill-on-Sea, Tel: (01424) 225872.

HRO receiver, especially HRO-5T but anything considered, including incomplete or rough one. Also HRO coils, selling AR880 in fine condition, £70. AR88 spare case, £10. RAF PSU234A for R1132, R1392, £10. Peter, St Albans. Tel: (01727) 839988.

Info on conversion of CB transceiver to 10m or title of book on subject Roy GW4KGD on (01758) 712108.

Instruction book for Kenwood 930S wanted, will pay what you want. Old age pensioner would very much appreciate. Wanted Vectronics VC300DLP a.t.u. or MFJ-948. Tel: (01283) 221870.

KW77 receiver, would John who 'phoned last month with KW77 receiver please 'phone me again, thanks. Ken G3RFH, Blackpool. Tel: (01253) 341074.

Manual or circuit diagram for Drake SSR-1, also manual or circuit diagram for Edystone EC10 MkII. Brian G4FQW on (01254) 391682.

Manual/circuit for Cambridge audio P40 amplifier, Dell NL25 floppy disk drive, considering machine for breaking but FDD must work, circuit/alignment data on Mende MS216W table radio, photocopy ok. W. Milne, SW London, Tel: 0181-543 9542.

Marine d/t B-TDSI loop, g.w.o., very cheap, also man/CCT for Ajax marine R/T, photocopy ok. G3ICB, QTHR. Tel/FAX: (01635) 864345.

Power supply for Collins TCS TX 400V plus 200V at approx 1A (home-brew no problem), w.h.y.? Peter G4VUN on (01287) 634397 9-5pm, will ring you back.

R1154 transmitter, complete, in good condition, with no mods and any

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Turner table microphone, any type. Steve G4MJV, Essex. Tel: (01376) 584799. E-mail: skyvites@aol.com

Tutor for intelligent teenager wishing to take RAE in few years time, must be qualified or experienced and living near SW London. Lessons at student's house in evenings or weekends. Jonathan Hunt, Elbury House, 37 Blenheim Road, Raynes Park, London SW20 9BA.

Wanted for new station cheapish test equipment, GDD(S) wavemeter(S), etc., v.h.f./h.f. ranges (home-brew fine if good). Howard, Notts. Tel: 0115-970 4184.

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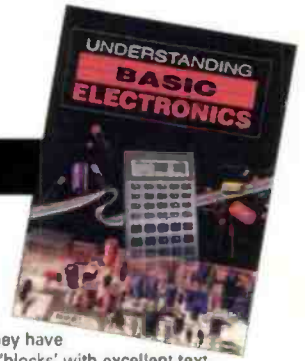
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Index to Advertisers

Adur Communications.....	37, 79	Icom UK	85	Radioworld	6/7
AKD.....	48	Interproducts.....	61	RAS Notts.....	79
ARC.....	60	J Birkett.....	16	RSGB.....	60
Castle Electronics	48	Lake Electronics	16	Short Wave Magazine	83
Centre Electronics.....	79	Langrex	79	SMC.....	8
Chelmer Valve Co.....	16	Leicester AR Show.....	19	SRP Trading.....	27
Chevet Supplies	79	Martin Lynch & Son.....	42/43	Sunrise Electronics	15
Colchester AR Rally.....	19	Monitoring Times.....	7	Syon Trading	16, 79
Electromail.....	19	Moonraker.....	61	Vann Draper Electronics.....	28
Electrovalue	16	Multicomm 2000.....	38/39, 54/55	Vine Antennas.....	37
G3RCQ.....	16	Nevada Communications.....	4/5	Waters & Stanton	IFC/1, 2
Haydon Communications	21, 22/23	No Nuts.....	16	Yaesu.....	86
Howes C M.....	68	Number One Systems	27		

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