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September 1999 £2.50



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YAESU FT-1000MP 160 - 10m All Mode



Super
Discount
Phone!

The radio that has stood the test of time and used by the worlds top DXers and

DXpeditions. Its excellent receiver combined with its superior transmitted signal makes this a natural choice for the HF enthusiasts. AC and DC versions in stock.

ICOM IC-746 160 - 2m All Mode



~~£1695~~

This base station transceiver offers wide band capability and includes an automatic ATU. Its 100 Watts output on all bands makes this a very attractive purchase and offers full CTCSS, electronic memory keyer,

alphanumeric memories, DSP, Band Scope, VSWR meter etc. Leaflet available.

YAESU FT-100 160 - 70cm All Mode



~~£1259~~
Phone

Now available from stock, this rig is now the smallest all-band-rig available. We

have used it extensively and it is absolutely great. Read Radcom's in-depth review and then come to us for the best deal around.

YAESU FT-847 160 - 70cm All Mode



~~£1500~~
Phone

The FT-847 has firmly established

itself as a true all-band, all-mode transceiver. Loved by the VHF & UHF operators, and superb for satellite operation, it also offers great HF performance. We have sold more than any other dealer, which says a lot about our reputation and our price. Phone for free leaflet today.

ICOM IC-706IIG 160 - 70cm All Mode



~~£1199~~
Phone

The IC-706IIG is the latest model of this classic transceiver. Great for

mobile, portable or base use. Its got a great pedigree and offers 100 Watts on all bands up to 50MHz with 50 Watts on 2m and 20 Watts on 70cm. CTCSS encode and a lovely display with removeable front panel. It's the tops! Ask for leaflet.

KENWOOD TS-570DG 160 - 10m All Mode



~~£849~~

Probably one of the most underrated rigs. We love its superb receiver

and amazing selectivity, particularly for CW. Then look at the price and remember you get a 100 Watts of pure delight. Why not phone for leaflet?

KENWOOD TS-870 160 - 10m All Mode



~~£1495~~

Now offered at a greatly reduced price. This digitally designed

transceiver offers amazing receiver flexibility. Benefitting from the latest DSP technology, you will experience excellent receive performance and crisp clear transmitted audio. Phone!

YAESU FT-840 160 - 10m All Mode



~~£659~~

The FT-840 offers 100 Watts of well engineered RF together with a receiver

that can more than hold its own. The large LCD readout makes for easy reading and the low price makes this the perfect first-HF rig buy. We have used this extensively and nobody will know you are running a sub £1,000 radio except your wallet!

Linear Amp UK "Ranger" HF Linear

160 - 10m 800W Output.

We are now stocking the full range of Linear Amp UK models. Illustrated is the popular 811H 800Watt model covering 160-10m. Using low cost 811A tubes, it is economical to maintain. Up to 9dB of gain is available to you! (Subject to UK 400W licence limit). This desktop model is a great investment and can immediately be switched in and out of circuit as required.



~~£895~~

We will **BEAT** Competitor's Prices

By up to £100

ICOM IC-R75 Receiver

£629

NEW

The IC-R75 has received rave reviews in the Amateur Radio Press. It's a very serious short wave receiver with coverage right up to 6m. What is more, the price is quite amazing compared to the competition. We have never sold so many SW receivers in quite a while!

ADI AT-600

£199

- * 2m & 70cm Handheld
- * 5W Output on 13.8V DC
- * Full CTCSS & 12.5/25kHz Steps
- * 110 Alphanumeric Memories
- * 29 Programmable Functions
- * DTMF Keypad & AM Airband
- * Ni-cads & AC charger



ADI AT-201

£129

- * 2m Handheld
- * 5W Output on 13.8V DC
- * CTCSS Tones Included
- * 25 / 12.5kHz Steps
- * 40 Memory Channels
- * Wideband Receive
- * Uses 6 x AA cells (not inc.)



Hora C-150

£99.95

- * 2m Handheld
- * 5W Output on 13.8V DC
- * 1750Hz Tone Included
- * 25 / 12.5kHz Steps
- * 20 Memory Channels
- * Wideband Receive
- * Uses 6 x AA cells (not inc.)



Hora C-408

£89.95

- * 70cm Handheld
- * 230mW Output
- * CTCSS Tones Included
- * 1.6MHz Repeater Shift
- * 20 Memory Channels
- * Wideband Receive
- * Uses 2 x AA cells (not inc.)



YAESU VX-1R

£169

- * 2m / 70cm Handheld
- * 500mW Output
- * CTCSS Encode / Decode
- * 25 / 12.5kHz Steps
- * 290 Memory Channels
- * AM Airband Receive
- * Lithium Cell & Charger



YAESU VX-5R

£300

- * 6m / 2m / 70cm Handheld
- * 5W Output on 13.8V DC
- * CTCSS Encode / Decode
- * 25 / 12.5kHz Steps
- * Auto Repeater Shift
- * AM Airband Receive
- * Lithium Cells & Charger



YAESU FT-50R

£220

- * 2m / 70cm Handheld
- * 5W Output on 13.8V DC
- * CTCSS Encode / 1750Hz tone
- * 25 / 12.5kHz Steps
- * 30 Memory Channels
- * AM Airband Receive
- * Ni-cad Cells & Charger



KENWOOD THG-71E

£279

- * 2m & 70cm Handheld
- * 6W Output on 13.8V DC
- * Full CTCSS & 12.5/25kHz Steps
- * 220 Multifunction Memories
- * Programmable Features
- * Rugged Construction
- * Ni-cads & AC charger



KENWOOD TH-D7E

£299

- * 2m & 70cm Handheld
- * 6W Output on 13.8V DC
- * CTCSS & 1750Hz Tone
- * Built-in Packet Modem
- * 200 Alphanumeric Memories
- * DTMF Keypad & AM Airband
- * Ni-cads & AC charger



ICOM IC-T8E

£349

- * 6m / 2m / 70cm Handheld
- * 5W Output on 13.8V DC
- * 25 / 12.5kHz Switchable
- * 123 Multifunction Memories
- * CTCSS & 1750Hz Tone
- * Programmable Features
- * Ni-cads & AC charger



ICOM IC-Q7E

£159

- * 2m & 70cm Handheld
- * 300mW Output
- * CTCSS Encoder
- * Rx. 30kHz - 1309MHz FM / AM
- * 200 Multifunction Memories
- * LCD Backlight & Timer
- * Runs from 2 x AA Cells



ICOM IC-T81E

£309

- * 6m / 2m / 70cm / 23cm Handy
- * 5W Output on 13.8V DC (1w23cm)
- * CTCSS & 1750Hz Tone
- * 12.5 / 25kHz Switched
- * 124 Alphanumeric Memories
- * Wideband Rx. FM WFM & AM
- * Ni-MH Cells & AC charger



ADI AR-147

£199

- * 2m 50 Watt Mobile Airband Receive
- * Full CTCSS Encode / Decode
- * 81 Memories 25 / 12.5kHz Steps
- * Keypad microphone & Mounting Kit



KENWOOD TM-V7E

£499

- * 2m / 70cm Mobile
- * 50W 2m, 35W 70cm
- * Clear LCD Readout
- * CTCSS & DTMF
- * 8 Frequency Steps & 280 Memories
- * Includes Microphone & Mounting Bracket



ICOM IC-2100H

£299



- * 2m Mobile 55 Watts Output
- * 50 Alphanumeric Memories
- * Switched 12.5kHz and 25kHz Filters
- * CTCSS and 1750Hz Tone

ICOM IC-2800H

£349



- * 2m & 70cm Mobile
- * Colour TV Screen
- * Full CTCSS and 1750Hz Tone
- * 50W 2m 35W 70cm & Remote Head Unit

ICOM IC-207H

£309



- * 2m / 70cm
- * 50W / 35W
- * 180 Memories and 7 Tuning Steps
- * Detachable Head Unit / Clear Display
- * Microphone, Mounting Bracket etc.

KENWOOD TM-742E

£399



- * 2m and 70cm
- * 50W and 35W
- * Optional 28MHz, 50MHz or 1296MHz Modules
- * CTCSS, 1750Hz Tone and DTMF
- * 101 Memories and Detachable Head

KENWOOD TM-G707E

£349



- * 2m and 70cm
- * 50W and 35W
- * Full CTCSS
- * 180 Alphanumeric Memories
- * Detachable Head with Amber Display

YAESU FT-8100R

£399



- * 2m and 70cm
- * 50W and 35W
- * Wideband Rx AM & FM 208 Memories
- * 7 Tuning Steps DTMF Remote Front panel
- * Very compact, supplied with all hardware.

KENWOOD VC-H1

£299

Full SSTV System

- * Sends & Receives Video
- * Built-in Colour camera
- * Built-in colour Screen
- * Connect to VHF or HF rigs
- * Runs all the popular modes



RF Metering

Avair AV-600 1.8 - 525MHz 400W

£69.95

VSWR and power meter. Reads RMS and PEP. The ideal all-band VSWR meter. Reads up to 400W (3 ranges)

Avair AV-20 / AV-40 Cross Needle

Cross needle meters at a very attractive price. The AV-20 covers 1.8 - 150MHz and the AV-40 covers 140 - 525MHz. Both units have switched power levels of 0-15 / 0-150W. Available during June.



£49.95

Watson VSWR / Power Meters.

£89.95

Measure VSWR and RMS or PEP power. Large easy to read meter. 3 ranges: 5W, 20W and 200W.

W-220	1.8 - 200MHz	£49.95
W-420	118 - 530MHz	£49.95
W-620	1.8 - 525MHz	£89.95

Watson Off-Air Frequency Counters

£89.95

High quality units supplied with antennas, ni-cad packs and AC chargers. They are very sensitive and may be used for near-field checking.

Hunter - 10MHz - 3GHz £59.95
 EC-130 - 1MHz - 3GHz, switched gates, 16 segments. £79.95
 Super Hunter - 10Hz to 3GHz and with signal strength meter. £149.95

W50-RM Dual Band SWR & ATU

What a great idea! A combined VSWR meter and dual band atu matcher for 2m / 70cms. Can be left in circuit. The atu is adjusted with the trimmer tool supplied (controls for each band). Dual power levels of 0-15W or 0-60W can be selected.



£59.95

Antenna Rotators

AR-300XL Lightweight

£49.95

Ideal for VHF and UHF systems of small to medium size. Includes control box, motor and Brackets. Support masts sizes can be up to 50mm

YS-130 Medium Weight VHF

Made in Japan, this rotator will support medium sized VHF arrays. The diecast motor housing will fit masts up to 40mm diameter. Includes motor, control box and brackets.



£79.95

New Create RC5-1 Rotator

NEW

We are pleased to be able to offer one of the most popular rotators from Japan. The RC5-1 will handle 3-4 element HF beams. It has a torque of 6kg (rotation) and 80kg braking. Uses 7-core cable.



£299.95

Yaesu Rotators for HF Systems

G-450C	Smaller Tri-band Yagis etc.	£379.00
G-650C	Larger Tri-banders etc.	£499.00
G-1000C	4 element HF Yagis (cw with 25m cable)	£559.00
G-2800SDX	Really large HF Yagis	£1229.00
G-550	Elevation Rotator	£309.00
G-5500	Az/El Rotator	£569.00

We have extensive stocks of tower mounts, bearings and rotator cables. Phone if you need advice. Leaflets available.

Audio Products

W-184 HF DX Headset

Selected by us as a great value headset for HF base operation. Comprises 8 Ohm dual head unit with dynamic microphone. You just need to terminate the mic cable to a suitable connector. If you don't want to use MOX we can supply PTT box model complete for £42.95



£32.95

WEP-501 Earpiece with adjustable boom

£24.95

Now extensively used in the professional market, the boom is fully adjustable with rotation hinge that permits left or right fitting. Fits neatly over the ear. Fittings available for popular handsets. Models available for Yaesu, Kenwood, Motorola.



HF Mobile Antenna

Texas Bugcatcher

80m - 10m 1.5kW
6dB of Gain!

From USA



£129

NEW

We measured over 6dB of gain on 80m and 40m compared to a standard helical whip. The secret is in the 3" diameter high "O" air spaced loading coil. Measuring a little over 2m tall, it covers all 8 HF bands using coil tap positions. Standard 3/8" base fits all popular 3/8" mounts. Optional base matcher guarantees 1:1 VSWR whilst optional kit adds 6m coverage. Probably the most popular antenna in the USA "I was so impressed I installed one myself as illustrated - G3OJVM"

VHF/UHF Antennas

Base Station Fibre Glass

WVA-100	2m/70cm 2/4.5dB	£29.95
W-30	2m/70cm 3/6dB 1.15m	£39.95
W-50	2m/70cm 4.5/7.2dB 1.8m	£49.95
W-300	2m/70cm 6.5/9dB 3.1m	£59.95
W-2000	6m/2m/70cm 2.5m	£69.95

Mobile Antennas PL-259 bases

W-285	2m 5/8th foldover base	£14.95
W-77LS	2m/70cm 0.39m low profile	£18.95
W-770HB	2m/70cm 1.1m 3/5.5dB	£24.95
W-7900	2m/70cm 5/7.6dB 1.5m	£32.95
W-627	6m/2m/70cm 1.62m	£34.95

Mounts

W-3HM	Hatch / Boot Mount	£14.95
W-3CK	5m low loss cable kit	£18.95
W-ECH	5m RG-58 standard cable	£12.95
WMM6	Magnetic mount	£10.95
WAM-2	BNC window mount	£12.95

Duplex / Triplexers

WD-25	HF-2m / 70cms designed for masthead mounting. SO-239	£24.95
WD-24	As above but for indoor use and fitted with common SO-239 and dual PL-259	£22.95
WD-24N	As above but one "N"	£24.95
MX-62	1.8 - 54/140-470MHz 239/259	£49.95
MX-72	1.8-150/400-450MHz 239/259	£32.95
MX-72N	As above but with one "N" plug	£35.95
MX-2000	6m / 2m/ 70cm Triplex	£52.95
MX-3000	2m/70cm/23cm Triplex	£45.95

160m - 2m "Beam"

As reviewed in "Radio Today"



NEW

£399.95

- 1.8 - 200MHz
- 2 Elements
- 3dB gain @ 21MHz
- 6dB gain @ 28MHz
- B directional below 14MHz
- Side lobes -3 - -20dB
- Daisy pattern on VHF
- VSWR usually less 2:1
- No-critical adjustments

In Stock

Peter Dodd, G3LDO says - - "I could work all the DX I could hear" - - "I had many contacts on 7MHz and 3.5MHz" - - "The DT2 is an ideal antenna for someone who has a restricted size location" All quotes from Radio Today, July 1999 Copy of full review available.

This antenna is manufactured by a company who specialise in military designs. We stumbled across it by accident and were amazed at its performance. The response is flatish across the spectrum. Element length 6m, Boom 2m, weight 8.5Kg, Power 1kW PEP, (500W VHF)

Heil Headsets In Stock

Hear the Difference!



A choice of normal or DX inserts are available when ordering.

Pro Headsets Dual ear	£119.95	HM-10 Dual	£109.95
Pro 54 or 55 (Single ear)	£109.95	CC-1 Adaptor cables Y,L,K	£23.95
Pro Micro Dual ear	£99.95	FS-1 Foot switch	£29.95
AD-1 Adaptors Y, L, K	£14.95	TB-1 Table stand	£22.95
HM-10 Hand Mic.	£89.95	HS-1 PTT switch	£26.95

Motorola Talkabout 200

Licence FREE PMR-446

446MHz 500mW Handy
8 Channels
38 CTCSS Tones
3 Kilometres Range
3 x AA Cells Reqd.
Now you can use a 446MHz handheld without a licence. Ideal for a wide range of uses. The package provides everything you need for personal communications. Just add 3 x AA cells and you are on the air!



£179.95 pair

NEW

Watson Super Searcher

10Hz - 3GHz

The Super Searcher is a frequency counter covering 10Hz - 3GHz with the ability to auto tune most AOR and Icom handheld receivers. Supplied with internal ni-cad pack and AC charger.



£99.95

WSC2 & WSC-3 Hip Handheld Cases

Keep your handheld safe but ready for use with these smart cases. They clip onto your belt and with the elasticated side panels, are able to fit any model. The WSC-2 is for the larger handhelds, the WSC-3 for the new generation of minis like VX-5 etc. Phone if in doubt.

£12.95

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Don't miss your chance to tell us all about that local dealer who you just couldn't do without! *Practical Wireless* are hoping to recruit readers to help locate all those 'difficult to get' components and the local dealers who provide them.

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This month Rob G3XFD describes and demonstrates how you can build yourself a very useful little multi-vibrator signal injector project - ideal for testing from audio frequency right up to high radio frequencies.

20 MFJ-9402X REVIEW

Rob Mannion G3XFD reviews the MFJ-9402X 144MHz s.s.b. transceiver courtesy of Waters & Stanton and lets you into a little secret with the PW Tenna-mat Tenna-Tourer mobile antenna mounting system.



25 LOOKING AT

This month Gordon King G4VFV takes a look at the frequency synthesiser which is now employed in a high proportion of Amateur Radio equipment.

27 MODULATION & RIPPLE LEVEL METER

James Brett G0TFP describes how he built a 'Modulation & Ripple Level Meter' which he says will help you to make many measurements in Amateur Radio and general electronic design work.

30 RAE COURSE LISTING

It's that time of year again and the team here at *Practical Wireless* have done their best to bring you news of RAE, Novice RAE and Morse courses across the country. So, hook out those RAE textbooks which you bought all those months ago and not used, and get studying!

32 THE ICOM IC-706 MkII G REVIEW

Richard Newton G0RSN takes a look at the Icom IC-706 MkII G and says he likes its appearance and layout (but what did he think about its operation)? To answer, he begins with a look at its features, and then describes how effective it was on air.



36 COUNTING UP FROM THE MILLENNIUM

The continuation of Rob Mannion G3XFD's series. But don't forget that the news items on these pages are thought provoking but totally imaginary!

Multi-vibrator signal injector project...Page 16



38 I SPY WITH MY LITTLE SET

Ben Nock G4BXD writes about the 'Spy Set' - a set which, he claims, has been a fascination with "many a collector and radio enthusiast for years".



44 THE PRACTICAL WAY

This month the Rev. George Dobbs G3RJV describes what he says is a "Reliable and stable variable frequency oscillator".

49 ANTENNAS-IN-ACTION

This month Tex Swann G1TEX has three pages of antenna related news and views for you as well as some of your letters.

54 VALVE & VINTAGE

It's Phil Cadman G4JCP in charge of the 'Valve & Vintage' 'shop' this month - and, resplendent in the shopkeeper's traditional sandy brown dustcoat, is that a B9A based valve he's holding in his hand?



58 RED SPRITES & BLUE JETS

Patrick Alley GW3KJW investigates the theory of Sporadic-E, the 'E'-layer and the part played by 'Red Sprites' and 'Blue Jets'.

83 HOW TO CONTACT PW

If you ever wondered who you should contact with a particular query, think no longer! 'How To Contact PW' will have the answers.

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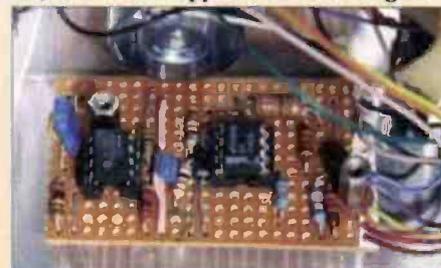
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Modulation and ripple level meter...Page 27



66 RadioScene

Due to his moving house and the preparation of his own magazine, Chris Edmondson VK3CE was unable to prepare an 'Aussie Oracle' this month.



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IC-706G
HF 6m, 2m, 70cm
£999

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IC-746
HF, 6m, 2m 100W, 100W, 100W with tuner built in.
£1395



PCR 1000
Computer driven receiver.



IC-T8E
Triple bander. 5W output. Military spec.
£299



IC-T22E
2m handie 5W.
£185

YAESU



FT-920AF
HF & 6m built-in tuner with FM & FREE AM/FM Filter. £1199



FT-100MP AC
Dual Receiver. Digital 100W Competition radio.
£2199



FT-VX 1R
VHF/UHF Handie. Micro small.
£90A



FT-847
The new mobile-base. DSP HF 2m-70cm 50MHz.
£1499



FT-100
HF 6m/2m/70cm extra small mobile. Information to follow.

KENWOOD



TS-870
Still the only true DSP radio with TX, EQ N/R.
£1499



TS-570DG
Dedicated HF mobile-base DSP with built-in tuner. £899



TH-G71E
Full 5 Watts power. Wide band receive.
£239



TM-G707
The new mobile package with features: High visibility display, 5-in-1 programme memory, memory name function, multiscan facility & built-in CTCSS. £299

ALINCO



DX-70TH
HF +6M £599



DR-M06
6M MOBILE 20W
£215



DR-140
2M mobile 50W
£220



DR-430
Mobile 70cm
£220



DJ-G5
2M/70CM handie
£237

PRICE MATCH

Up to 5% extra discount may be available on selected items.

WE STOCK ALL ACCESSORIES FOR THE MAIN BRANDS DISCOUNTED BY 10%

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SM8 1.3/600 ohm selectable, 8 pin desk mic £100
SM20 600ohm, 8 pin, deluxe desk mic £108

Speakers - Icom

SP20 base station loudspeaker with audio filter £125
SP21 base station loudspeaker £65

Microphones - Kenwood

C-60A dual impedance desk mic internal pre-

amp £106
MC-80 electret desk mic with pre-amp £65
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KENWOOD	TS-690SAT TRANSCEIVER HF +50MHz	£725.00	YAESU	FT-990AC	£895.00
KENWOOD	TS-690 AT HF/50MHz	£725.00	YAESU	FT-920 AF TRANSCEIVER	£999.00
KENWOOD	TL-922 HF AMP	£850.00	YAESU	FT-1000 MP DC AS NEW	£1,400.00
KENWOOD	TS-850SAT TRANSCEIVER 0-30MHz	£895.00	YAESU	FT-1000MP AC	£1,500.00
KENWOOD	TS-790 BASE DUAL BAND	£900.00	YAESU	FT-757GXMK1 TRANSCEIVER	£400.00
KENWOOD	TS-870 SAT 0-30 DSP	£1,200.00	YUPITERU	MTV-9000 AM/FM/USB/LSB/CW SCANNER	£245.00

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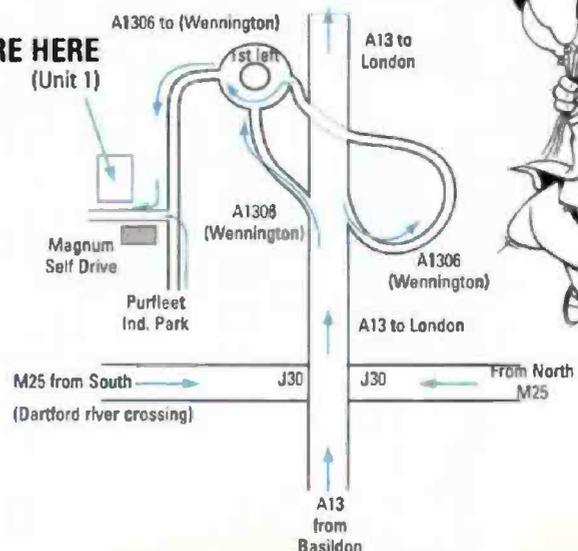
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The pure common sense behind the saying "Never put off what can be done today until tomorrow" was sadly brought home to me recently when **John Newton G8EAM** became

a 'Silent Key' on 15th July 1999. The common sense behind the origins of the saying came to mind because it was purely by chance that John, his sons **Richard G0RSN** (our stalwart mobile and 'hand-held' specialist author) and **William G7GMZ** and their mum, **Ailsa** (she took the photograph) and I met at Longleat with a camera to hand.

John, despite being very ill with heart problems and advanced cancer was determined to visit the Longleat Rally. Ailsa and family were very concerned that he did so - but as you can tell from the photograph, John (on the right) was very pleased. It was an opportunity not to be missed. **William G7GMZ** (left), myself and **Richard G0RSN** (to my left) will always have fond memories of the occasion. And as it was the last occasion I was able to talk to John - I'll remember it well.

John G8EAM frequently 'got a mention' in *PW* through **Richard's** activities - and was an ambassador for Amateur Radio, his birthplace (Minehead) and for all of the many activities he was involved in.

An idea of the esteem felt for John G8EAM can be drawn from the fact I counted well over 370 people attending the funeral service at St. Michael's Church in Minehead, Somerset on Thursday 22nd July. As John was active in virtually every sphere of community activity - there were large contingents from the RNLI, St. Johns Ambulance Brigade, and so on.

The day of the funeral was beautiful and, although it was a sad occasion - it was also a wonderful tribute to someone we, as Radio Amateurs, should be

proud of. It was a privilege to know you John and to continue to work with your family. My best wishes go to all the Newton family and I ask you all to never let any possible photographic occasion go unrecorded. You



never know if it's to be the last chance you'll get for that special memory. Thank you to Ailsa for being 'behind the camera' - out of shot but not out of mind!

Subscription Problems

I'm sorry to say that some of our - valued - subscribers did not get their August copies of *PW* 'delivered to their door' last month. This was due to a mistake at the postal agency which we used to despatch the subscription copies. The wrong labels were attached and some non *PW* readers got a surprise! This led to some of the magazines going to readers who decided to keep them - further adding to the shortage!

You can imagine how upset and distressed I became on hearing that our valued readers had been let down! The *PW* team did everything possible to alleviate the problem (for a while, as I've mentioned, there were not enough magazines to go round) but eventually with the help of **Kathy, Shelagh and Michael** of the Subscription Department we sorted it all out.

Please accept my most sincere apologies for the problem which

was, as you'll realise, totally out of our hands. However, it's good to know that once readers understood what had caused the problem - those affected were very understanding. Thank you everyone - you're a marvellous bunch of friends!

Multimodes Seized

The letter from **Graham Galbraith M0ADR** ('Letters' page - under the heading 'Multimode CB Seizures' again draws attention to lost

because unless the RA staff can attend every car boot and jumble sale in the land - they're bound to miss equipment which is being offered for sale.

So, how about it RA? Is it not about time that you reconsidered the 'blanket ban' on the possession and conversion of multimode CB transceivers? If you did reconsider there would be a veritable army of keen Radio Amateurs who could ensure that the sets disappeared from general sale very quickly. Just think - even if I had (and I don't!) a multimode in my possession at the moment which I'd like to strip down just for the s.s.b. generator unit - I would be breaking the law. But you could change that couldn't you?

Walk By

At the moment I have to walk by the table containing a selection of CB transceivers, knowing full well that even though I, as a legitimate Radio Amateur, can't buy it - a possible clandestine operator can! I'm also having to write (on a regular basis) to readers who plan to advertise what may be illegal equipment for sale in 'Bargain Basement'.

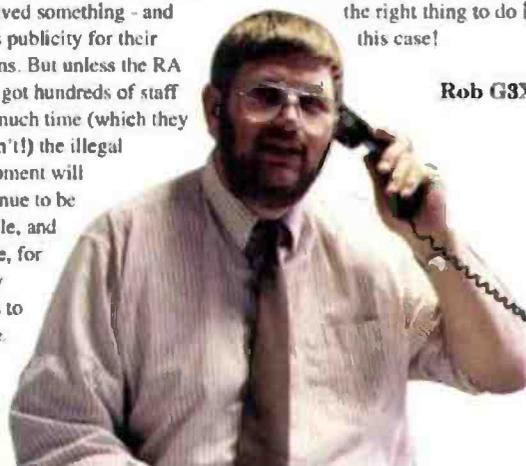
In my letter to the intending advertiser I warn them it's not possible to (legally) possess, advertise, sell or obtain the equipment. Most reply thanking me for the advice - but what happens to the equipment is anyone's guess!

So, as it's not likely that the RA can ever recruit - or even spare - enough enforcement officers to even slightly scratch the surface of this problem - let's hope they see sense. As I've suggested before, RA - we can **work together**, but you must be prepared to be flexible. It is possible to change your decision without losing face because it is the right thing to do in this case!

Rob G8XFD

opportunities by the Radiocommunications Agency in keeping illegal CB transceivers off the market. Lost Opportunities? Yes, I mean just that because despite my pleas to the RA over many years they just don't realise (or seem to understand) that by allowing legitimate Radio Amateurs to obtain and convert these transceivers, they could save themselves much money, time and effort.

Of course, by attending the Elvaston Castle Rally specifically to look for illegal multimode CB transceivers the RA staff have achieved something - and that's publicity for their actions. But unless the RA have got hundreds of staff and much time (which they haven't!) the illegal equipment will continue to be on sale, and in use, for many years to come. I say this



ROB MAKES A PLEA TO READERS NOT TO PUT OFF THE OPPORTUNITY TO RECORD THOSE SPECIAL EVENTS



COMPILED BY ROB MANNION



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

While proceeding down the High Street...

Dear Sir

The cartoon featured in Ed Chicken G3BIK's 'QRP From a Bicycle' - (July 1999) sparked some memories of the first months of my Police service. In those days, foot patrol was the norm for probationary officers and the nearest one got to a car was when the patrol sergeant wound his car window down an inch to encourage another tour of the High Street before the rain let up! It was also the custom to set up, or play a practical joke on, newcomers as part of their character development!

One unsuspecting colleague complained that his one-piece Pye personal radio was always very crackley on receive. It was suggested by some wag that he had a magnetic personality which was obviously interfering with the signal. The idea was developed by more mischievous members of the section and enquiries were made with Chatham Army Barracks to explore solutions.

Sure enough, at the beginning of the next tour of night duty, the patrol sergeant proudly introduced my friend to a huge army back-pack radio complete with a substantial whip antenna



and home-made trailing earth strap! The radio had been adjusted to work on our frequencies and our man was packed off to walk down the A2 and make test calls every quarter of a mile.

The obvious exhaustion of

portable operator did not prevent the Control Room from sending him on two real calls to noisy pubs. Finally, the hilarity brought the Inspector to investigate and relieve our man of his burden!

Ed's early contacts bring back memories too. My first boyhood home-made receiver was a one transistor receiver, later upgraded with a two transistor amplifier and a large red l.e.d. to show the power was on! My Dad joked that the l.e.d. ran more current than the rest of the set! Still, it gave hours of pleasure and my sons now take turns to have a listen to the bands. Recently I passed the RAE and am watching the post for my licence with the same thrill evident in Ed's article!

Steve Seabrook M1??? (Almost)
Kent

Editor's comment: A very enjoyable memory Steve. I hope you can 'Arrest' a good rig (or circuit to build one) when you get your licence.

Thank You SRP Trading

Dear Sir

As a regular reader of *PW* I thought that I would put pen to paper in appreciation of your advertisers, namely SRP Trading in Birmingham. Contemplating purchasing the Realistic DX-394 communications receiver, I phoned SRP Trading and spoke to a pleasant gentleman who openly told me the plus and minus sides of the receiver, i.e. filters/selectivity, etc.

At the price of £99.99 I thought this a bargain price. I posted a cheque on the Tuesday morning and by midday Thursday, the receiver was delivered on the doorstep. First class service from SRP!

As an afterthought, would it be possible for *PW* to publish a review of the DX-394 in a future publication? I read with interest your review of the Roberts RC-828 sometime ago. I bought the Roberts RC-828 based on the review by Peter Shore in *Short Wave Magazine* as stated in your article - very good value for money, for this type of receiver.

I think it was in *PW* a short while ago, the Codar PR30 preselector was mentioned with respect to many years ago of Amateur Radio. My PR30 and Codar RQ10 'Q' multiplier both sit on top of my Trio JR5005 receiver (bought late 1969) an excellent receiver, and Sommerkamp FRDX500 receiver, both used for many years.

D R Varley
Nottingham

The Realistic DX-394 was reviewed in our sister publication, SWM, in the April 1998 issue. Please contact Michael on (01202) 659930 to order a back issue.

New Path Into Amateur Radio?

Dear Sir

How can the RSGB and the RA think that the new changes to the licence will provide a new path into Amateur Radio. Having just failed the RAE and, no doubt, many will fail because nothing at all has been done to help 'Joe Public' get in to the hobby.

The May exam was very hard, not just for myself but for many who took it. I spoke to a tutor who has been teaching the course for many years and had many 100% passes. He was very shocked by this year's paper he told me that he knew that all his students would fail because the paper was very hard. He also told me that he would have great difficulty himself and so would a number of G4s that he showed the paper to. I hope that I can pass in December.

Bob Clements

A Bargain...After Import Duty?

Dear Sir

I write to you in order that others may learn from my experience. After looking through the excellent pages of the July edition of *PW*, my eyes fixed on the first 'Bargain Basement' page. There, my

interest was taken by an advert for a four year old Yaesu transceiver from a reader in the Channel Islands. I then telephoned the chap in Jersey and after some discussion, we agreed the price. I then sent off the cheque.

Can you imagine my shock when the parcel arrived, a week later? The Customs and Excise Parcels Post Depot in Southampton had affixed a duty charge statement to the parcel requiring me to pay £97.47 before being allowed possession. Queen Victoria could not have been less amused!

I have now lodged an appeal with the Customs & Excise. My fingers will remain crossed. The gentleman in Jersey has been very kind and has offered to cover the duty charge, if my appeal fails. Does this import duty only apply to the Channel Islands? I wonder about the current trend towards increasing sales over the Internet? Has any other *PW* reader had a similar experience?

Bill Strickland M1BRB
London

Editor's comment: I telephoned the Customs & Excise Dept. in Southampton and they confirmed that Bill had to pay Duty as the equipment had been 'imported' (even though it had been bought secondhand from the UK by the Jersey resident selling it) from outside of the European Community (EC), as the Channel Islands are not in the EC. The same applies if you buy anything from the USA - as many Amateurs do of course.

I now have the relevant information which the C&E kindly FAXed me - and it appears that the ruling only applies to the Channel Isles (Jersey, Guernsey, Alderney and dependent Islands) as the Isle of Man is within the EU for import/export purposes. We will let you know the outcome of Bill's appeal.

Silent Key Sales

Dear Sir

The purpose of a 'Silent Key' sale is to generate capital for the estate of the deceased. The participants are usually generous and both helpful and co-operative. After reading *PW* Keylines, July, my morale is shattered. The 'Silent Key' sale has now become a little too vibrant. I hope Rob's (G3XFD) unpleasant experience has not become the norm at such sales.

I recall a 'Silent Key' sale at a QRP Rally where a Ten-Tec Paragon was on offer. I anticipated a reserve price and made an initial bid at that price of £200. Having made the bid, I recall an enthusiastic bystander telling me that the set was duly mine (in law) I told the vendor that I regarded the 'Silent Key' sale as sacrosanct and wasn't going to be involved in an auction. I argued the case in favour of the widow of the deceased; should the stakes be raised, I would gladly retire from the fray. My loss was the widow's gain. I wasn't being generous, just co-operative.

I am aware that certain ploys and tactics adopted at such sales are far from congenial and can be upsetting to the organiser even Rob G3XFD. Establishing ground rules is difficult but such sales ought not to resemble war zones. The zeal of collectors and bargain

hunters should not be allowed to disparage the 'Silent Key' sale; exuberance is admissible particularly when accompanied by generosity, but disrespect is inexcusable.

I believe that 'Silent Key' sales can be conducted in a state of resonance, of well being and fitting decorum. The occasion demands nothing less. Please keep up the good work. Rob, and don't ever be discouraged.

Peter Knowles MOBRV
Manchester

Wartime Utility Sets

Dear Sir

I remember, after the war, converting many of the wartime utility sets to long wave, also I still have one unconverted in good condition.

It was made by Cossor, the service sheet states a release date of June 1944 and the price was £12 3s 4d, including purchasing tax - a.c. model m.w. only.

Altogether 42 different firms made these radios. Makers had a unique code, i.e. U3 was A C Cossor Ltd. We could, however, tell some of the makers by the type of knobs they used. The only problems, apart from valves failing, was the speaker transformer going open circuit and faulty electrolytic capacitors. Otherwise they were very good receivers.

John Tye
Norfolk

Multimode CB Seizures

By RA

Dear Sir

Hi, I thought you might like to hear about something I saw at the Elvaston Castle Rally on June 13. On the first walk around I spotted a whole box of 'historically interesting' CB radios dating from around the late 1970s. I had a look through and some of them were in fairly nice cosmetic condition, maybe even collector's items. Nonetheless, I moved on and on the next time around, was fairly bemused to see a gentleman squatting on the ground, flanked by two bored looking uniformed policemen and filling in a form on an Radiocommunications Agency (RA) pad headed 'Notice of Seizure'. Needless to say, the radios were no longer in the box.

At the same time, there were hundreds of ex-PMR radios on show, most undoubtedly still crystallised for frequencies that their owners could not legally use them on, but these did not appear to excite any interest whatsoever. I don't understand the logic behind the turn of the decade decision to completely outlaw non-UK 11m radios even for the legitimate, converted use on 10m. If people are caught using them on 11m, then fair enough, treat them as you would treat someone using a v.h.f. PMR transceiver for unlicensed (or unlicensable) operation. But I see no problem with a set sitting in a box waiting to be converted, or simply not being used.

I strongly suspect that the decision was made because the RA didn't want to spend any more time certifying converted radios. The fact is that they should never have been required to do that in the first place. It should have been left up to us to ensure compliance and to demonstrate it when required as it is with all other kit that we move from other bands to our frequencies.

The ironic thing is that the multi-mode

sets, in particular, are much easier to convert to 28MHz by virtue of their having unrestricted p.l.l. i.c.s - and much more useful to us by virtue of the fact that they are multi-modes. And if we were still allowed to use them, there would be a lot more of them taken out of circulation from 27MHz and put to legitimate use on 28MHz. The first amateur h.f. set I ever owned was a converted UK f.m. CB operating on 28MHz and it got me my first h.f. contact (with HB9IAM, I have the card on my wall in front of me) but, oh, how much better it would have been if it had been a multi-mode.

Graham MOADR

Editor's comment: What a sorry state of affairs eh Graham? Please see 'Keylines' for my latest comments on this topic

Crowborough Reaps Benefits For Novices!

Dear Sir

I'm writing with reference to 'Short Straw for the Novice' - apropos the letter (PW July 1999) with the above heading. Crowborough & District ARS (C&DARS) put out a weekly cordial welcome to all licensed amateurs to join them in their weekly "natter" night on 2m (144.774MHz) on Mondays at 2000UTC. Callsign G0CRWP.

Charles GTDL
Crowborough

Editor's reply: As winners of the PW 'Club Spotlight' Magazine Competition in 1998 with their magazine *Crowtalk* I'm not surprised that the C&DARS radiates such a welcome. More power to your collective elbows and to any other clubs that do the same.

Radio Communications Afloat

Dear Sir

I've just spent ten days as crew, sailing from Oban to Lerwick on a well equipped 44 foot boat. During that time, the v.h.f. transceiver was kept on the listening and calling channel 16 and other channels as required for local weather and harbour information.

It was an education in how radio should be used. Everyone on air from cruise liners to small fishing boats were polite, helpful and used proper procedure. Compared with the garbage and sloppy procedure to be found daily on the amateur bands, I can only conclude that Amateur Radio is becoming a club for misfits and the foul-mouthed.

Incidentally, Rob Mannion G3XFD's comments on his experience in organising a 'Silent Key' ('Keylines' July PW) sale tend to confirm the view that there are a great many selfish and aggressive collectors, dealers and amateurs who have no scruples in getting what they want at the lowest possible price. My advice to anyone faced with selling 'Silent Key' gear is take it slowly and get advice on the value of the gear from someone in radio you trust and don't take the first offer of £50 for something that may be worth £500. I expect the hostility Rob experienced came from those who realised they would have to pay a fair price because the disposal was properly organised!

Tony Hopwood
Worcestershire

Morse Debate - A View From Ireland

Dear Sir

On reading the letters on the 'Great Morse Debate' down through the years in your magazine, I never had the urge, before now, to write to you on this subject, even though there is a history attached to my learning Morse.

In short, last autumn, after many years of struggling on my own, I joined a club in order to have another go at mastering the code. After the Christmas recess, the class was down to one other person and yours truly. We did the test at Limerick Radio Club's rally in March, the outcome of which was a pass for the other person and a fail for yours truly. I was not surprised, but a little disappointed at the result.

However, the best part was that my tutor stayed with me and we persevered at the practice and did the test again six weeks later in May, this time successfully. To my tutor go my heartfelt thanks for all his time, patience tuition and encouragement which, in the end, crowned me with success. Other members of the club also encouraged me to stay and to them I also say thankyou.

An aspect of the Morse debate which has not surfaced is the difficulty which some people have in learning Morse. A recent statistic published here is that 25% of all the students sitting their exams this year have some degree of specific learning disability in reading, writing, spelling, etc.

For them, any form of examination can be a nightmare, for any number of reasons. I do not recall too many letters (if any) from these people, complaining about having to learn Morse.

To me, Morse is a mode of communication like the others in radio. Historically, it was the only mode available and in those days it was part and parcel of the licence. The introduction of the 'B' Licence was to encourage people into Amateur Radio, not to start a war over c.w. The big void is the lack of Morse on the v.h.f. band and the short range simplex channels.

The analogy that always comes to mind is that of a driving licence. Driving for me is only for pleasure, but you still have to do a driving test for various categories of the licence, e.g. motor cycle, car, vehicle with up to eight passengers, etc., even though I never use it commercially. I the people who complain about Morse would apply their minds to learning the code, rather than creating for themselves a psychological barrier before ever attempting to learn it, then they would find that they could master it in about one tenth of the time it took me and others to succeed. If they have a problem like we have then they can still succeed with the help of others and I am sure there are plenty of individuals who would be glad to help.

I do not know whether I will ever be great at Morse but I am going to try and with the help of fellow amateurs on the air, master the art and would love to hear all you reluctant people on c.w.

Michael Kingston-EI6AXB
Limerick
Ireland.



COMPILED BY JOANNA WILLIAMS

Miniature "Micro Commander"!

The *Practical Wireless* news desk received these pictures of the **Yaesu FT-90R** and the **FT-2600M**, along with their specifications, from **Yaesu HK Ltd.** in Japan. These brand new rigs are, as yet (as this issue of *PW* goes to press), not available in the UK and were launched, by Yaesu, at the Friedrichshaven 'Hamfest' in June.

The **FT-90R v.h.f./u.h.f. dual-band transceiver** carries the subtitle of **'Micro Commander'** and Yaesu say that it's the "World's smallest high-power dual-band mobile"! They also state that they feel they've made a "technological breakthrough" with the development of the **Yaesu FT-90R** which provides "50W of 144MHz power output (430MHz: 35W) from a package consisting of just 100mm x 30mm x 138mm and weighing just 644g".

The **FT-90R's** diecast aluminium chassis doubles as the heat-sink. Yaesu says, for the **M67781L** (144MHz) and **M57788MR** (430MHz) power modules, with a microprocessor-controlled cooling fan providing extra ventilation when needed.

All of the above features, Yaesu say, in a package that could fit in your coat pocket! The **FT-90R** is a "high-performance receiver" with "User-Programmable Function Keys", an "Ultra-Compact Remote-Head Capability", a "Versatile Scanning System For Today's Active Dual-Band Operator", a "Direct Keypad Frequency Entry", a "Battery Voltage Meter", "Extended Receive Coverage With AM Detector", "Built-in CTCSS and DCS Encoder/Decoders", an "Auto-Range

Transponder System (ARTS)", "RF Squelch Muting System", "Automatic Power-Off (APO) Battery Saver" and "Time-out Timer (TOT)".

Now, on to the **FT-2600M** which, Yaesu say, is a heavy-duty v.h.f. f.m. transceiver and is "... the most ruggedly built 2m (144MHz) amateur transceiver ever". They say that it provides "60W of power along with Yaesu's renowned 'bullet-proof' receiver front end. Direct keypad frequency entry, Alpha-numeric Memory System, the high output, front-mounted speaker and unsurpassed ergonomics".

Built to the requirements of both the commercial radio industry as well as the US military's **MIL-STD 810**, Yaesu tell us that the **FT-2600M** is also constructed "using an aluminium diecast chassis/heat-sink assembly, providing outstanding mechanical and thermal stability for the internal components".

The **FT-2600M** features, Yaesu say, include "Selectable Power Output", "Extensive Memory System", "Alpha-Numeric Channel Display", "CTCSS and DCS Encode/Decode Built-in", "Versatile Scanning Capability", "Smart Search", "Auto-Range Transpond System (ARTS)", "Excellent Receive Performance", "Easy Packet Radio Interfacing", "Interactive Programming Menu" and "Supply Voltage Display".

For more information on these two products, please contact **Yaesu UK Ltd** on Tel: 0190-286 6667. Unit 12, Sun Valley Business Park, Winnall Trading Estate, Winchester SO23 0LB. Or why not take a look at their Web site: <http://www.yaesu.co.uk>



Roxburgh Subsidiary Acquires Cirkit

Deltron Electronics PLC (through its **Roxburgh Electronics Ltd UK distribution arm**) acquired the **Cirkit Distribution** business from **Bulgin PLC**, so *Practical Wireless* discovered this month. After contacting Cirkit, *PW* received a press release which stated that the acquisition took place on May 17 1999 and that it enables Roxburgh to "expand its ranges of electromechanical products by the addition of new suppliers thus further reinforcing its already substantial UK business".

Christopher Sawyer, Group CEO, said that "Cirkit is an established UK electromechanical component distributor with a number of leading brand suppliers entirely complimentary to our own and, by combining these with our existing market leading agencies and brands from around the world, we will be able to offer both our existing customers and new customers a more comprehensive range and service ...".

Cirkit will relocate to Roxburgh's modern, purpose-built distribution centre in Scunthorpe, North Lincolnshire. For further information, please contact **Roxburgh Electronics Ltd, Roxburgh House, Foxhills Industrial Park, Scunthorpe, N Lincolnshire DN15 8QJ. Tel: (01724) 281770. Or visit their Web site at: www.roxburgh.co.uk**

Nevada's New Deal

Nevada have been in contact with *Practical Wireless* to tell us all about a new distribution agreement which they have signed with **Grundig** for their range of portable and short wave radios. **John Norton**, Grundig's Director of Sales, said "We are just about to launch an exciting range of short wave and portable radios, Nevada will ensure these are readily available through their Independent Dealer Network".

The first short wave portable to be introduced is the **Grundig YB400** which

covers 140kHz-30MHz and 87.5-108MHz v.h.f., with s.s.b., a.m. and f.m. receive capability and will sell for £120.

Also available from Nevada is the new **Alinco DJ-195 v.h.f. f.m. hand-held transceiver**. It has a full 5W output, CTCSS encode and decode, DCS, repeater tone burst, alphanumeric display for frequency or channel display and even a unique theft alarm which sounds when the hand-held is disconnected from an external power source! The **Alinco DJ-195** will cost £149 and is available from Nevada now. For more information on either the new Grundig radios or the **DJ-195** please contact **Nevada, 189 London Rd, North End, Portsmouth PO2 9AE. Tel: (02392) 662145 or FAX: (02392) 690626.**



International HF & IOTA Convention

The **RSGB** have been in contact with *Practical Wireless* to tell us all about this year's **RSGB International HF & IOTA Convention** which will be taking place on 8, 9 and 10 October 1999 at the **Beaumont Conference Centre, Old Windsor, Berkshire.**

The **RSGB** tell us that there is an "excellent programme of lectures planned" which they say will appeal to "all active radio operators" including lectures on **IOTA**, The **CT1SX** and **C21ZM Pacific DXpedition**, **SD Masterclass**, **Winning CQWW From West Africa**,

Fig. 1: Pictured from left to right: **John Norton**, Grundig Director of Sales; **Debbie Stansfield**, Grundig Regional Account Manager and **Mike Devereux**, Nevada Managing Director.



The LF Scene in the US, Amplifiers, Solar Eclipse 1999 Propagation Experiment - Initial Findings, The Magic Of Six Metres, RTTY & Data Modes, LF Forum, Internet & The Reverse Beacon, DXCC, ZL9CI Campbell Island DXpedition, Young Amateur of the Year Presentation, Antennas and Planning for Topband Contesting, Code-breaking at Bletchley Park and much more.

Martin Lynch & Sons and **Yaesu UK Ltd** are sponsors of the Convention again this year and Yaesu have donated the main raffle prize - an **FT-847 transceiver!** There will also be a varied programme for partners in order to offer an alternative to those non-Radio Amateurs attending the Convention including a planned day trip to Blenheim Palace on the Saturday. Further details on accommodation packages are available from **Marcia Brimson 2E1DAY**, Tel: (01707) 659015 or E-mail: marcia@rsgb.org.uk or see their Web site: www.rsgb.org

Competition Winners!

The Editorial team at *Practical Wireless* would like to announce the winners of the **Morse Letter Competition** which we launched in the March 1999 issue of *PW*. The winner of the best letter in favour of the use of Morse in the Amateur Radio hobby is **Stuart Constable M1BWU**. Stuart will shortly be receiving a gold-plated **Watson Morse Key**



as a prize, kindly donated to *PW* by **Jeff Stanton G6XYU** at **Waters & Stanton plc**.

The winner of best letter against the use of Morse in the Amateur Radio hobby is **Dick King G14167**. Dick will be receiving **£50 of *PW* vouchers** which he will be able to spend on any *PW* service. Congratulations to both winners. We will be printing both letters in next month's *Practical Wireless*.

Vann Draper's Frequency Counters

Vann Draper have contacted *Practical Wireless* with news of two new frequency counters, the **UZ 2400** and the **UZ 2500** which have just been added to their general purpose instrument range, extending and complementing Grundig's Digimess line up.

The **UZ 2500** (see picture) provides three counting channels with a basic sensitivity of 25mV, Vann Draper state. A fully adjustable front panel trigger level control is available as is a selectable $\times 10$ input divider. Signal input is via BNC terminals with 50 Ω impedance and alternating voltage input coupling. The measurement functions include: Frequency channel A; Frequency channel B; Frequency channel C; Frequency response ratio A & B or A & C; Period measurement over A & B; Time interval channel A & B plus Pulse count A & B, Vann Draper say. The **UZ 2500** also incorporates a microprocessor which monitors and controls all functions including an automatic self-test at switch on.



The **UZ 2400** is a two channel version of the **UZ 2500** having channels A & C offering a similar frequency range but with only one low band input. For further information on these two counters, please contact **Vann Draper Electronics Ltd, Unit 5, Premier Works, Canal Street, South Wigston, Leicester LE18 2PL**. Tel: 0116-277 1400. FAX: 0116-277 3945. E-mail: sales@vanndraper.co.uk or visit their Web site: www.vanndraper.co.uk

Haydon Upheaval

Mike Haydon at **Haydon Communications** has been in touch with *Practical Wireless* to tell us about their moving plans. They would like *PW* readers to know that their London Showroom and Mail Order Department will be moving in **September 1999** in order to accommodate their expansion requirements.

Mike says that the decision to move was due to a combination of issues, including lack of space and also parking restrictions recently imposed at their Edgware shop. The London address will remain in

Practical Wireless the new showroom's address and telephone numbers, etc., nearer the time. In the meantime, please contact **Haydon Communications** at their old showroom, **132 High Street, Edgware, Middlesex HA8 7EL**. Tel: 0181-951 5781. FAX: 0181-951 5782.

Poole's National Novice Contest

The *Practical Wireless* news desk received word from the **Poole Radio Society** about the **G4PRS National Novice Contest** which is to be held on **Sunday 19 September 1999**. As Novice Radio Amateurs have recently been given access to the 144MHz band, Poole RS have decided that, for this year at least, Novices who enter the short contest will be allowed to use the band.

If you would like the amended rules of the **G4PRS National Novice Contest**, we have a copy of them here at the *PW* Offices and if you send in an s.a.e. clearly marked for **Poole Radio Society's G4PRS National Novice Contest**, then we will gladly send you them. Otherwise, you can look up their Web site:

<http://www.pawns.demon.co.uk/>

PRAS/prs-start.html by E-mail to tex@pawns.co.uk or via **Packet** to **Graham Barlow G7TCS@G7BNM**. Good luck to all those Novices who decide to take part!

Radio Solutions '99?

The **Low Power Radio Association** have been in contact with *Practical Wireless* to tell us all about the **Radio Solutions '99 Conference** which will be taking place on **20 October 1999**. It will be opened by none other than **Trevor Baylis**, the famous inventor of the clockwork radio. He will also be giving a "keynote speech" which will be entitled 'Batteries Not Included'.

Radio Solutions is the annual exhibition and conference of the **Low Power Radio Association** and it is to be held at the **National Motorcycle Museum** in **Birmingham**. Other topics which will be covered at **Radio Solutions** will include: the future of low power radio in Europe; **TETRA**; the **R&TTE Directive**; receiver performance; **868MHz transmitters**; microwave **Doppler radar** modules; frequencies, power levels & applications for **RFID** and radio LANs. New this year, the **Low Power**



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COMPILED BY JOANNA WILLIAMS

Radio Association say, is a free half-day session where visitors will be given the opportunity to view new products and demonstrations from participating companies. The popular Radio Design Course will also be held with a new section on practical techniques for designing for 868MHz - the new European frequency allocation for short range devices.

Low Power Solution!

Low Power Radio Solutions have a brand new low power radio transceiver with an onboard micro-controller which makes it the "easiest-to-use" device of its type. The STD-402 can be operated manually like any other transceiver, but its micro-controller is programmed with an auto-mode which provides both an automatic link function and an encoding/decoding function.



Manufactured in Japan by Circuit design, the transceiver module measures only 53 x 35 x 12mm and is fully compliant with ETSI standard EN300-220-1 for operation in the harmonised European 433-434MHz band. It incorporates a highly accurate phase locked loop (p.L.L) synthesiser circuit enabling both transmission and reception on 64 preset channel frequencies between 433 and 434MHz and transmit and receive mode settings can be fixed simply by using DIL switches or jumpers without the use of an external micro-computer.

For further information, please contact Low Power Radio Solutions, Two Rivers Industrial

Estate, Station Lane, Witney, Oxon OX8 6BH. Tel: (01983) 709418. FAX: (01983) 708575.

Interactive Internet Ordering

The *Practical Wireless* news desk received an interesting press release from **Maplin Electronics** this month regarding the launch of their new "fully interactive Internet ordering system" - an extension, they state, of their paper-based CDROM catalogue.

Maplin tells *PW* that the site is "hosted on a secure server and provides order authorisation which is flexible and reliable with personalised reference numbers". They say that the reference number system facilitates order tracking by sending an update E-mail immediately. **Nigel Fawcett**, IT Director at Maplin says: "This site encapsulates a brilliantly simple concept that addresses all the major concerns of speed, resilience and security ...".

The site has some unique, "first to market" features, Maplin state, such as a live stock checking facility - so customers know immediately, price and availability - it can also create a back-order if an item is out of stock and despatch as soon as it is in stock, **David O'Reilly** states, adding that customers can actually create their own orders while on-line providing a number of unique benefits, primarily reducing time and improving

efficiency of the internet visit.

For more information on this interactive ordering system, why not contact **Maplin Electronics**, PO Box 777, Rayleigh, Essex SS6 8LU. Tel: (01702) 554000. FAX: (01702) 554001. Or why not visit the site for yourself: <http://www.maplin.co.uk>

'Straight Keying'

Edgware & District Radio Society (E&DRS) have contacted *Practical Wireless* to ask us if we would inform readers about their 18th annual 'Straight Key Evening' (SKE) which will be taking place on **Friday 17 September 1999**.

The evening is intended for all amateurs in the UK and further afield and "provides an event, concentrated in both time and frequency, to facilitate the getting together of all those interested in promoting the use of Morse and specifically to promote the use of the simplest sender of them all - the good old Straight Key".

Primarily set for the evening on 3.5MHz (80m), the E&DRS hope that activity will be able to commence earlier on 7MHz (40m). The callign allocated for the event is **GB2SKE** and will start from 1900, call 'CQ SKE'.

For further details please contact **John Bluff G3SJE**, 52 Winchester Rd, Kenton, Harrow, Middlesex HA3 9PE. Tel: 0181-204 1034.

Conference Open To All

News now from the **World Association of Christian Radio Amateurs & Listeners (WACRAL)** and **Victor Brand G3JNB** tells *Practical Wireless* about the **1999 WACRAL Annual Conference**. It's to be held over the weekend of **8-10 October 1999** and

is an event open to all Christian Radio Amateurs and their families, on a daily basis or for the full residential period.

The Conference organiser, **Geoff Peterson G4EZU**, has arranged a full programme of "Christian and radio lectures, events and fellowship, time on air and the, now traditional, weekend 'Construction Contest'". Visiting lecturers will include **Anita Edgar of the El-Shaddai orphanage project in Goa**, the **Rev. Isaac Mac-Atram, Pastor Evangelist of the United Urban Ministries** and **Glynn Morgan of the 'All Age Christian Ministry'** and 'Millennium Gospel Crusade' plus speakers on a variety of topical radio subjects.

Full details are available from **Geoff Peterson G4EZU**, 124 Darnley Rd, Gravesend, Kent DA11 0SN. Tel/FAX: (01474) 533686. E-mail: geoff.peterson@zetnet.co.uk

Lead-Up To Leicester

The **Leicester Amateur Radio Show Committee** have been in contact with *Practical Wireless* to tell us all about the forthcoming **28th Leicester Amateur Radio Show** to be held for a second time at **Donington Park, Castle Donington** on the **24/25 September**

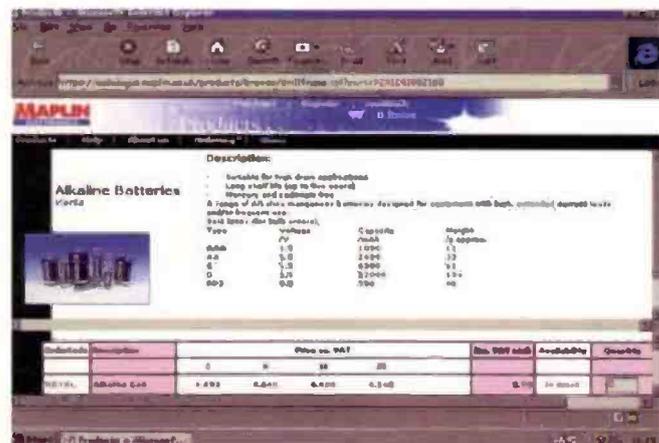


Leicester Amateur Radio Show

1999. The show will feature 150 stands of Amateur Radio, Computer, Electronics and related equipment. There will also be a 'Clubland area' featuring both local and national clubs including the RSGB.

There will also be a large Bring & Buy as well as an outdoor flea market, Morse tests on demand, QSL corner, demonstration h.f. station and talk-in station as well as rig testing service and special event stations run by the **Royal Air Force Radio Society** and **Melton Mowbray ARS**.

The show is easy to get to by road, rail and air. It's five minutes from Junction 23A of the M1 motorway close to where the A42 and A50 join the M1. It's three minutes from the East Midlands Airport and the free shuttle bus will once again run from the airport to the convention and show. The nearest railway stations are Derby and Loughborough.



on the Midland Line - both are on a local bus route.

Admission to the show costs just £3 with reduced admission for Senior Citizens and under 16s (£2.50). Youngsters under the age of 14 will get in free if accompanied by an adult. There are free camping and caravan facilities on site and the Leicester Amateur Radio Show Web site has details of local hotels and guest houses as well as a floor plan of the show.

For further information please contact the organisers direct. Their Web site address is: <http://www.lars.org.uk> General enquiries to Geoff Dover G4AFJ Tel: (01455) 823344. FAX: (01455) 828273 or E-mail: g4afj@argonet.co.uk If you would like to book a table for the flea market please contact John Theorsdan G4MTP without delay Tel/FAX: 0701-0701 300 or E-mail: g4mtp@lars.org.uk

RAS Retirement

Peter Owen G8UUS and Margaret Owen G6XBH of RAS (Nottingham) would like to inform all of their customers that they will be closing down the shop at 3 Farndon Green, due to retirement, after 18 years in the business on 2 October 1999.

Because of this, they will be holding a big Closing Down Sale in the last two weeks running up to the 2 October - ALL stock must go! Peter and Margaret would like to extend a big thank you to all of their clients who have supported them over the years.

If you would like to take a look at what's on offer then why not pop along to the shop at 3 Farndon Green, Wollaton Park, Nottingham. NG8 1DU. Tel: 0115-9280 267.

Electro-Jumble!

The fifth South Yorkshire Aircraft Museum Electro-Jumble is due to take place on Sunday 19 September 1999 and is open from 0800. The organisers tell PW that they've planned the event for constructors, restorers and collectors of electrical, radio and radar equipment up to the 1950s and 1960s (both commercial and military).

People will be able to buy, sell or swap, pieces of kit, transmitters, receivers, components, connectors, cables, handbooks, test gear and all those odds and ends that you've had

Make Contact For Charity

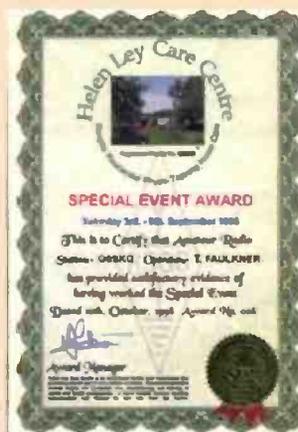
The Practical Wireless news desk received a letter from Tony Faulkner G0SKG regarding a Special Event which he has arranged in order to raise money for sufferers of Multiple Sclerosis (specifically on behalf of Helen Ley Care Centre, Leamington Spa) which will take place on the 4/5 September 1999.

Tony would like to remind readers about the Special Event which he organised in June 1996 when he had 12 stations participating, a raffle was run locally with various radio products supplied by numerous firms. The total raised back in 1996 was £3000 plus and went towards setting up a physiotherapy unit at Helen Ley which has been up and running for 18 months now to the benefit of many sufferers.

Tony is unable to arrange an event on such a scale again, but what he has planned for this year will follow along the lines of the 1996 event - if on a smaller scale. There will be four stations taking part: GB4MSR Multiple Sclerosis Respite (Helen Ley Care Centre) with Tony G0SKG as the main operator; GB2MSR Multiple Sclerosis Respite (Stourbridge ARS); GB4MSH Multiple Sclerosis Help (Willenhall & District ARC); GB2MSH Multiple Sclerosis Help (Sandwell ARC).

The stations will be using 3.5MHz (80m) in the main but they will also be using 7MHz (40m), conditions permitting. For local contacts use 144/430MHz (2m/70cm). There will be a gold award for anyone working all four stations, costing £10 (plus s.a.e.) and a certificate for £3.50 (plus s.a.e.). The certificate will be slightly different from 1998 (see picture) though well worth adding to the shack wall, Tony says.

For more information please contact Tony Faulkner G0SKG either by telephone on (01384) 820616 or by E-mail: tonyhamrad@aol.com



for years and cannot use or do not know what they are for.

The Electro-Jumble will take place at Home Farm, Firbeck (near Maltby, Nottingham) off the A634. For more details please contact Mike Diprose 0143-363 1296.

Another Cry For Help!

Mr Eric Eastwood G1WCQ needs information on *Screenwriter III* and *Triumph/Adler Imperial 510*. He needs a copy of the instruction manual and the two set-up disks for the *Screenwriter III*, manufactured in the UK. He also needs a copy of the instruction manual for the *Triumph/Adler Imperial 510*. If anyone can help please can you either write to Mr Eastwood at 58 The Mede, Freckleton, Preston, Lancashire PR4 1JB. Or telephone him (01772) 688708.

Inflight Special Event?

The Leicester Radio Society (LRS) have been in touch with Practical Wireless to tell us all about a Special Event which they are arranging in support of the Midlands County Air Ambulance NHS Trust.

The Special Event Station GB2CAA will be operating a 24 hour Radio Marathon over the weekend of the 21 & 22 August 1999 - and LRS tell us that they will be trying to raise



money for the CAA through off-air sponsorship.

The Special Event will be operated from the premises of LRS, they say, and it is planned that they will be active on h.f. on the 50/144 and 430MHz bands and a special QSL card (see picture) produced by a member of LRS, Ian M1BUJ, will be available for all confirmed contacts.

Further information about the event is available from Andy Hall M0BWU on (0961) 114623. E-mail: jackie_andy.h@virgin.net Or from Paul Crichton: paul@m1bpt.stayfree.co.uk

Free Publicity!

Please, please, please keep your news coming in to Joanna Williams, PW News & Production Editor, PW Publishing Ltd, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW.

Remember, any mention on these pages is COMPLETELY FREE and I would love to hear from anybody regarding new products or any Club News which you feel would be of interest to other readers! I look forward to hearing from you.

Web Watch

Yaesu UK Ltd: <http://www.yaesu.co.uk>
 Roxburgh Electronics Ltd: www.roxburgh.co.uk
 RSGB: www.rsgb.org
 Vann Draper Electronics Ltd: www.vanndraper.co.uk
 Maplin Electronics Ordering System: <http://www.maplin.co.uk>
 Poole Radio Society <http://www.pawns.demon.co.uk/PRAS/pre-start.html>
 Leicester Amateur Radio Show <http://www.lars.org.uk>

FOR A FREE MENTION ON THESE PAGES SEND YOUR NEWS TO THE NEWSDESK TODAY!

Readers & Their Local Dealers

You can help *PW* to complete a project for the forthcoming Millennium and it could help us to help you get the most from your radio hobby, says the Editor, Rob Mannion G3XFD. Rob says he's hoping to recruit readers to help locate all those 'difficult to get' components and the local dealers who provide them.

'Project 2000' is an idea which came directly from readers who have met me on the many 'club visits' I undertake through the year. On these occasions, readers - in the general 'chat' sessions that often take place - tell me about their favourite local shop. Many of these truly local dealers have stocks of components, rare items and other help and advice that, if we don't support them, will soon disappear from the towns they serve.

Local stockists of components and specialists are becoming more difficult to find and more and more specialised dealers don't have room in their standard advertising to mention the complete range of services they offer. So, the *PW* team are planning a complete 'Directory' of who and where the dealers are, what they do/supply or make and how to contact them. It will cover England, Ireland Scotland and Wales, Isle of Man, Channel Islands and we would be delighted to hear from readers abroad too!

All you need to do is fill out all the information on the local radio shops you use, on the form laid out here. (Any information given will be used in preparation of the Directory ONLY - you have Rob G3XFD's assurance on that). Provide all the details you know - we'll do the rest. You can be sure that we'll produce a directory to help the hobby forge its way into the Millennium. 'Project 2000' is already on its way - with your help!

Name & Address of Dealer

County/Country

Telephone/FAX number

Web site address (if available)

What specialities do they offer?

Is there a mail order service?

Do they publish a list/catalogue of components?

Do they publish a list of second-hand equipment?

What service which they offer do YOU think is their speciality:

.....

Your full name and address:

.....

Interests:

.....

Suggestions for information to be included in directory:

.....

Return the form (by Wednesday September 1) to: Editor *Practical Wireless*, Project 2000 'Freepost', Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW, United Kingdom. (The 'Freepost' facility is not available from addresses outside the UK, but we'll still be pleased to hear from you and would like to receive your information).



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RADIO BASICS

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the PW 'Basi-Probe'**
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G3XFD describes and
demonstrates how
you can build yourself
a very useful little
multi-vibrator signal
injector circuit - ideal
for testing from audio
frequency right up to
high radio
frequencies.

Preparing and building this month's project - a simple transistor multi-vibrator circuit - evoked many memories for me because it's approaching 40 years since I built my first circuit of this kind. The first circuit - from a Mullard transistor manual I think - worked well and continued to do so for many years with the original OC44 transistors which cost me so much pocket money!

Nowadays, transistors for this little project only cost around 10p each - so it won't break the bank! At the same time, you'll have something that can provide signals from around 2.7kHz well up into the v.h.f. range - at your finger tips.

Based on two BC182 transistors, which switch each other on and off and produce

square wave pulses through doing so, the circuit is both simple and easy to build. Built in the way I suggest the project can also run from the same 9V supply for many years because power is only taken when you need to use the probe.

The Circuit

The circuit, Fig. 1, is simplicity itself and has been around for many years - in various forms. I think it originated as an idea by Mullard but it has appeared in so many magazines and books (with no reference to its origins) that it's fortunate I still have my original Mullard book from the 1950s as evidence!

The transistors operate in a free running multi-vibrator circuit and produce an 'approximate' (as already explained) square wave of just under 9V peak-to-peak at a frequency output of around 2.7kHz that's truly 'rich' in harmonics. So much so, I was able to detect the signal from the circuit up on 144MHz!

Many different types of transistors can be used but I recommend the BC182. However, as the BC182 can

come in several differing 'pin outs', I suggest that you play safe by ordering the BC182 from the source provided at the end of this article. They'll be OK because that's where I got mine from too! (The BC182 transistor pin-out diagram is inset in Fig. 1).

Readers who have followed this series will know that I've concentrated on using synthetic resin paper board (SRPB) to make the projects to make things easier to build (as it can be done with so few tools) and to encourage you to have a go with the 'components on the same side as the track' p.c.b. method. Well, this project uses the same approach!

I cut my prototype boards from the stock I've got - which happens to be from sheets 255mm in width. If you bought yours from the supplier I recommended in the past then you can cut the board out just by measuring off the width of the project (I suggest 30mm) to accommodate a PP3 battery and a possible tube outer casing.

Waste not want not! That's my motto and by saving some of the material cut from the SRPB when you shape the probe to a spear-like point, you can make a simple switch. The switch element is made by carefully sanding the edges clean so there's no sharp copper laminate to cut your fingers - before the copper underside ends are 'tinned'.

Take care not to 'tin' the entire length of the 'switch' element otherwise it will lose the flexibility that's required in this application. Instead, just 'tin' enough of the element to provide enough solder to

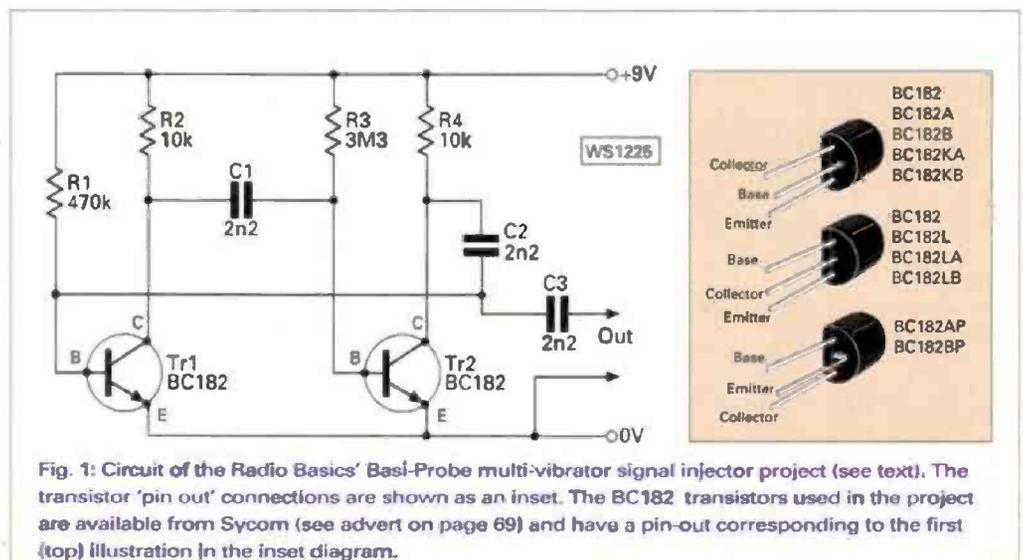
'seat' the switch element on the large solder pad which you will prepare when you apply the etch resist to the p.c.b. (see Fig. 2).

When you've etched the board (make sure you let the resist dry first) assemble the board by following the annotated component photograph in Fig. 3. Take note of the wire link and transistor connections. The completed project shown in the top of the photograph in Fig. 2, was the prototype and, although there's only a very small difference in the etch resist track I prepared, I ask you to follow the close-up annotated photo in Fig. 3. (The two battery connection pads aren't in shot but they can be viewed in Fig. 2 or 4).

Soldering The Switch

Soldering the switch is simplicity itself and, as you can see from Fig. 4, the larger end of the element sits on the larger pad. Before soldering the switch element in position I suggest you tin the large pad next to the 470kΩ resistor (R1) and form a pointed pad (to provide a contact) on the copper of the pointed end.

Next, melt the solder on the larger (+) pad with the (already tinned) copper face of the switch element resting on it. Let it cool and ensure that a good soldered joint is made between the pad and the switch element. Then you should place a match stick or something large enough to lift the sharp end of the switch element clear (open circuit) of the pad next to R1 and then quickly apply more solder onto the (+) pad directly under the



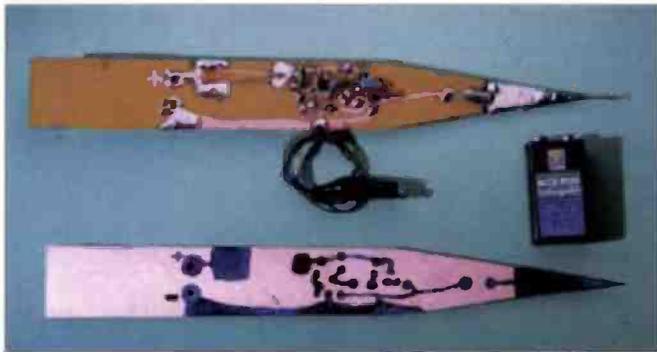


Fig. 2: Photograph of a completed 'Basi-Probe' (top) complete with probe tip (see text) and grounding lead complete with crocodile clip. The capacitor shown at the 'probe' end is C3, the coupling capacitor used to apply the test signal to the unit on test. The narrow (spear shaped) section of SRPB material forms the on-off switch (see text). The lower part of the photograph shows a 'Basi-Probe' before etching. The large etch resist covered area at the probe end will provide a secure mounting area for the probe itself (see text).

switch element on the opposite side to the (+) marker. (This provides 'lift' and a spring effect to ensure the unit is switched off until you require it to be 'on').

probe (with the ground lead connected to the 'chassis' or 'ground') to the input of a small amplifier (any of the amplifiers used in the 'Radio Basics' series will suffice). You should then hear a high

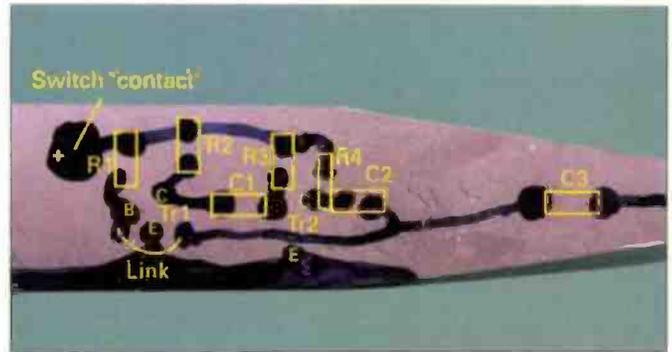


Fig. 3: A photograph showing completed etch-resist track for eventual p.c.b. lay-out. Note the wire link which provides the 'feedback' pathway from the collector (c) on Tr2 to the base (b) on Tr1.

pitched 'buzzing' sound when you gently squeeze the p.c.b. 'switch' element, which should cease when pressure is eased on the switch.

The Basi-Probe can be used left or right-handed, with the battery helping to stabilise the device in the upright position. I suggest you try listening to the signal through an

amplifier and with one of the simple receivers described in previous articles.

Next month I'll go into detail on how you can use this helpful little device to find faults on projects and also describe another project that can also add to your workshop 'armoury' of simple test equipment. Cheerio until then.

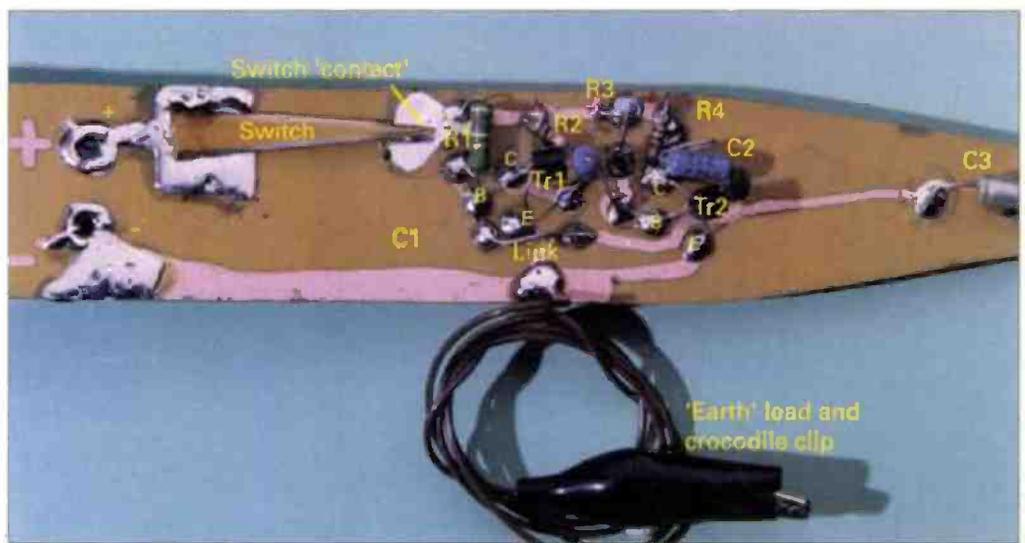
Probe & Uses

For the probe, I tried various pins and needles but found the best to be an old 'Safety Pin' as they're (usually) made of plated brass. Cleaned with a file, they take solder very easily but, for safety, I recommend a sleeve of old coaxial inner core insulation be prepared. Better safe than sorry!

The PP3 battery on my prototype is attached on the underside (opposite side to copper cladding) and is held with adhesive. However, it can also be held with rubber bands or if you mount the unit inside a convenient plastic or cardboard tube - it can be held in place by the outer casing.

Unless you have an oscilloscope, the best way to test the unit is to apply the

Fig. 4: The completed project. The crocodile clipped 'ground' lead is soldered in position and the coupling capacitor (partly in view on the right) is shown soldered into place. Also shown is the simple push-to-operate switch made from a short length of SRPB off-cut material shown soldered to the positive (+) pad (see text). The battery is mounted on the underside (see text).



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Rob Mannion G3XFD Joins In The Fun On...

A Day To Remember!

Rob Mannion G3XFD joined in with the fun during the PW 144MHz QRP Contest, tried out the new PW 'Tenna-Tourer' portable mast base, a Maspro v.h.f. antenna and used the new Yaesu FT-100 and evaluated the MFJ-9402 144MHz s.s.b. transceiver. And there's also a 'special offer' for readers!



On the air with G3XFD/P during the 144MHz QRP Contest. The PW 'Tenna-Tourer' mast base and 8m high mast assembly is seen in action. The tall 'Fir' tree in the background - not quite what it seems - played a part in the day's activities and eventual rescue!

The 'intro' for this article should also have included "He also flattened his car battery, learned a valuable (but embarrassing) lesson and brewed tea for the AA rescue service using a remarkable Irish invention". But in all honesty, Sunday June 20th was a truly remarkable day for me, starting off as it did with the flashes and bang of thunderstorms, heavy rain and ending up being a very beautiful (but exceptionally windy) summer's day.

The Sunday in question was the day of the PW 144MHz QRP Contest and I was looking forward to enjoying myself on the band. But in the end I was exhausted, although I would not have missed it for anything!

Regular readers will remember that I had mentioned in earlier issues of PW that I intended to operate as /P for the QRP Contest from the National Trust (NT) site at Win Green, not far from Shaftesbury in North Dorset. However, although being only a few miles from the famous hill-top town, the actual chosen site is (just) in Wiltshire. But it was not to be and I ended up operating from a site on private farmland approximately 750m from the main road between Shaftesbury and Blandford Forum.

The reason why I ended up on what's now become (thanks to the kind farmer who has also had problems dealing with the National Trust) my regular /P site for both h.f. and v.h.f., is that although I allowed plenty of time for correspondence - the NT (despite telephone assurances from their regional office in Warminster, Wiltshire, that they "saw no problem") only confirmed that I had permission to use the Win Green site on the Friday evening before the QRP Contest.

Unfortunately, as I had written two 'follow up' letters to the NT after my original asking for formal permission to use the Win Green site, I had assumed that I was not going to hear from them and accordingly arranged to use another site. Fortunately I (unusually for me!) had 'fallen on my feet' because the Farmer who arrived on the site just after I'd started operating on the Sunday was very friendly - after an initial 'difficult' meeting!

The Farm Manager who'd given me permission to operate on the site had forgotten to mention it to the owner. However, as I had been told to expect a possible visit from the Gamekeeper, so I wasn't surprised to

see a Land Rover hurrying to investigate the strange vehicle with antenna mast on private farmland.

"Are you the Gamekeeper?" I asked - "No...I'm the owner" he replied with a hint of anger! But, as soon as I explained I was there with permission it was 'All smiles' and I ended up with permission to use any of many possible sites on their farmland overlooking the beautiful Blackmore Vale - complete with superb views over towards Somerset and into Devon.

The moral of the story? Always ensure you do have permission - but be prepared for little 'hiccups' from landowners and the NT. In this case I was really fortunate in that my friendly Farmer knew that negotiations with the NT could be protracted - so he was extra helpful even though he'd been the last to know I'd be there!



Fig. 1: On site at Sutton Hill Farm, with the PW 'Tenna-Tourer' 'drive on' mast base installed and in use (see text).



Fig. 2: A view of the mast base in use, viewed from the front of G3XFD's Peugeot 405 car.

use. All that's needed is to place it so that a front wheel of the vehicle can be driven to the frame. Once the wheel is in place, the weight of the vehicle provides an extremely steady and reliable un-guyed mast base.

The base is made from heavy gauge industrial quality steel and all those made for readers are to be 'hot dipped' galvanised to BS 729. Each mast base will be equipped with four 14mm diameter holes in the bottom plates so that if necessary the assembly can be mounted (on a properly prepared and secure) concrete patio for use in a garden, etc. For this application, the base would have to be secured with expanding bolts or bolts anchored securely into the foundation.

Following trials with vehicles ranging in size from a heavy agricultural type truck to a Reliant three wheel car, PW's Technical Projects Sub-editor **Tex G1TEX** and I have decided, after discussions with Tennamast, decided that there will be two sizes of base available. The

larger size - reference 'XFD' is suitable for vehicles such as the Peugeot 405 (which is equipped with 175/70 sized tyres), Peugeot 306, Volkswagen Golf and similar cars.

The XFD version will in fact suit most larger cars and it has fitted very well under the wheel of all the vehicles I've tried it on. These include (with the permission and help of the owners!) vehicles such as: Ford Galaxy, VW Sharan, and other 'People Mover' types, and larger vans, four wheel 'off road' vehicles including several 'Japanese Jeepy' types, Range Rovers and Land Rovers.

For smaller vehicles another version - reference 'TEX' is available. This size will be suitable for smaller vehicles.

such as the Reliant, Mini, Nissan Micra and many other cars with smaller wheels.

Copes With Slopes

In practice, I've found that even if there's a slight slope to the ground (in other words the site doesn't have to be like a bowling green!) the mast stands up very straight indeed and copes well with slopes. The hinged socket at the bottom of the assembly accepts a standard 47mm outside diameter (OD) scaffold pole and I find it's exceptionally easy to 'walk up' my aluminium alloy 8m high pole assembly (5.5m scaffold pole with a separate extender section making a total mast height of approximately 8m) with antenna and cable.

I don't normally like to draw attention to my disabilities because, quite frankly, I think they're trifling compared to those suffered by others. However, I think in this instance it will be helpful for those who don't realise I use a stick to help my walking and also have an artificial arm - that I still find it very easy to install and erect the mast system.

When not in use, the mast base fits very snugly into the rear of my estate car, Fig. 4, and Tex G1TEX finds that the version he uses also fits well into his Reliant three-wheel car. The photographs in Figs. 5 and 6 show the prototype TEX version in use on the beautiful Purbeck Hills here in Dorset.

Sunny But Windy

The day of the QRP contest turned out to be a gloriously sunny, but very windy, day. In fact, using my Royal Navy experience I estimated the wind to be blowing at Force 4 for most of the times with gusts approaching (and exceeding at times) Force 6 to 7. In fact, the wind force (it was a north-easterly) was such that I couldn't open my car door easily without applying a lot of my own force to overcome the wind pressure (next year I'm hoping to have a remote controlled rotator!).

Although the wind was a nuisance - I'm also hoping to take a wind-driven generator next year - it provided an excellent test for the mast base. Other v.h.f. operators told me that the wind was so strong in their area that they'd not been able to erect their masts to full height or use the full size antenna planned for. So, I wasn't alone in this respect and ended up feeling very confident that the 'Tenna-Tourer' base would be very reliable in windy conditions - after all I'd had first hand experience!

The Maspro 8-element



Fig. 3: The 'PW Tenna-Tourer' mast base. Constructed from sturdy industrial gauge steel, this prototype was finished in heavy grey industrial paint, but all production units are assembled from 'hot-dipped' galvanised steel.

144MHz beam antenna (kindly loaned to us by the Shortwave Shop) had already proved to be an excellent performer, and was also incredibly lightweight - but surprisingly robust - and it has proved very quick to assemble. It's very neatly designed and as it breaks down into two sections (very easy and exceptionally neat) which is ideal because I can then carry it in the back of the car, with minimal assembly time on site.

Bearing in mind I have an artificial arm, I still found the Maspro beam easy to assemble and transport - that's why I've decided to keep it (see details at end of text). The antenna has a very good 'front-to-back' ratio and the forward gain it proved enabled me to work stations much further away than I'd expected with the prevailing 'tropo' conditions prevailing that day.

On The Air

I was on the air from 0900 'clock time' until around 1630 when my car battery went flat, but more about that later! In the meantime I had very many enjoyable QSOs, trying to assist as many contestants to increase their 'score'.

The Yaesu FT-100 which I'd originally had on review was loaned once again by Yaesu UK especially for the contest. In this respect it worked extremely well and I found that working the many EI and Cornish stations pleading with me to "turn the beam towards the west Rob" was remarkably easy from my site with its clear take off. And even though signal levels were often such that my Irish and Cornish friends were right down in the noise - the FT-100's sensitive 144MHz receiver coped well.

However, I ended up in trouble and even though I'm terribly embarrassed at being 'taught out' following many years of portable h.f. and v.h.f. operating I've got to admit I well and truly 'flattened' my (heavy duty) car battery. Yes - I was stuck and I only noticed it when the cooling fans on the FT-100 were obviously running very slowly and the audio output was dropping.

The reason for the 'flat' battery? Well - in answer I have to say that in the same way Richard Newton GORSN comments on his review of the Icom IC-706 Mk IIG (page 34, under the heading 'Gruelling Test'), I agree that when using one of the multiband 'state of the art' transceivers you must be aware that current consumption can be far higher than imagined when you're operating at low output power levels.

On investigation at home I found that when the FT-100 was running on transmit at 3W output level (with no speech into the microphone) it was consuming around 5A. On speaking into the microphone current consumption peaked at over 6A. So, my findings agree to a large extent with Richard's on the IC-706 Mk IIG.

The moral must be: bear in mind that the transmitter might only be running at 3W output but the equipment as a whole unit will almost



Fig. 4: The 'PW Tenna-Tourer' mast base fits comfortably in the rear of G3XFD's Peugeot 405 estate for transport. The base also fits - with plenty of room - in G1TEX's Reliant three-wheel car.



Fig. 5: The prototype 'TEX' version in use with the Reliant three wheel car. The mast is about to be 'locked' into the vertical position with the top clamp (note that prototype was painted, the production version will be 'hot dipped' galvanised (see text)).

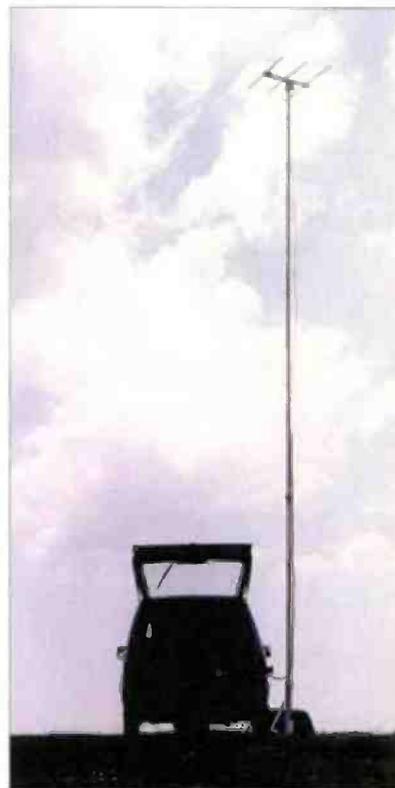


Fig. 6: A photograph, taken on the Dorset Purbeck Hills, showing the 'PW Tenna-Tourer' mast base in use with G1TEX's Reliant three-wheel car and supporting his telescopic 7.5m mast and 3-element antenna based on the HB9CV design.

ROB G3XFD JOINS IN THE FUN ON A DAY TO REMEMBER!

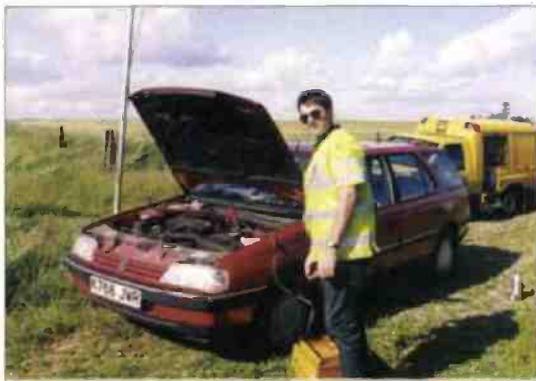


Fig. 7 The AA to the rescue! Patrolman Keiran Collier comes to the aid of an embarrassed G3XFD and shares a cup of tea!

certainly require much more current than you imagine. So keep a good check on current consumption, take a test meter with you and don't be caught out like G3XFD. Take a 'stand by' battery or charging facilities.

Although I was over 750m from the main road - too far for me to hobble nowadays - I was fortunate that my mobile telephone battery was fully charged.

And even though it was a Sunday, with the inevitable 'Sunday only' motorist breakdowns - the AA responded very quickly indeed. (They've done so in the past, and I've had reason to be grateful that I'd registered as a disabled member).

Locally based AA Patrolman Keiran Collier arrived in less than 20 minutes from his home in Blandford Forum. And despite my site being well away from the road - the largest 'Fir' tree (clearly visible in the heading photograph)

played its part in two ways. It helped as it's now a famous landmark and the fact it's a cell-phone antenna mast and my call for help passed through its 'branches'. (I'd only realised it was a mast that very day when I saw the electronics at the 'roots' end - even though I'd driven by it many times. An excellent 'disguise' job and much appreciated by the local birds too!

As the cell-phone antenna mast 'tree' has featured in the AA staff magazine and Keiran lived locally, I only had to guide him past it and onto the farm track to find me. It was a relief to see the AA vehicle approaching down the farm track!

It only took a few seconds to start the diesel engine on my car, Fig. 7. Keiran said that if it had been a petrol engine I'd have probably started it - this was because the 'glo-plugs' took the 'edge' off the almost 'flat' battery. His special

battery pack did the trick and it was left in place for a few minutes so that the alternator on my car did not have to overwork and cause more problems.

However, while my car was 'ticking over' and re-charging the battery Keiran kindly offered to take the mast and antenna down and help me pack the station up. While he was doing that I decided to do something equally important and brew us both a cup of tea with the help of 'Kelly's Kettle'.

Kelly's Kettle

I'm mentioning 'Kelly's Kettle' (KK), Fig. 8, because I think it's an essential item for anyone interested in camping, going for picnics and portable Amateur Radio operations. The version in the photograph was presented to me by our friends in County Mayo (thanks lads...every cup reminds me of you!) in Ireland. It's made from very sturdy aluminium and in effect is a kettle with a built-in central flu which provides a very large heating surface.

I bought my first 'KK' in County Kerry over 30 years ago when I was on holiday in the South West of Ireland. It was fabricated from standard tinplate and was made for me while I watched by (you've guessed it) a genuine 'Tinker' called Kelly. The 'Tinkers' were renowned then for their work with pots, pan kettles. Unfortunately after many years of use mine literally disintegrated. A replacement came my way after I mentioned the kettle



Fig. 8: The remarkable 'Kelly's Kettle'. Ideal for those /P 'days out' as it can boil water for tea or coffee under the most difficult conditions using a variety of fuel. This one was presented to Rob by the Amateur Radio community in County Mayo in Ireland (see text).



Fig. 9: The 'secret' of the 'Kelly's Kettle' is the remarkably large heating surface area. It will boil your water very quickly and you can soon be back on the air!

to the Mayo lads...little did I know that they were to provide me with a modern version!

In use, the Kelly's Kettle sits on top of its ventilated base, on the right in Fig. 9, and shown here 'upside down' (ready to accept the top section for carrying). The base provides a good air flow for the solid fuel block (which I prefer) or the grass, twigs or paper preferred by the Irish fisherman who favour the 'KK' for their riverside sojourns.

Despite the appearance of just being a tapered flu (left in Fig. 9), the 'KK' has a water 'jacket' that contains approximately one pint (Ireland still uses pints so I'll not translate to metric!) of water. With one solid fuel tablet this will boil in less than four minutes - so you never need to be without hot tea or coffee. (See end panel for details on how you can get your own 'Kelly's Kettle').

The MFJ-9402 Transceiver

As I was operating in the QRP Contest I took the opportunity to try out the MFJ-9402 144MHz s.s.b. transceiver I had on loan from Waters & Stanton. I'd asked Jeff Stanton for this unit, Fig. 10, to try because it seemed very interesting, with possible uses for the QRP or lightweight /P operating enthusiasts and he kindly ordered one from the manufacturers in the USA for me. From this experience, and that gained from using the rig on the air for a few weeks beforehand, I'm presenting a 'mini review'.

The MFJ-9402, Fig. 11, is a very basic (single conversion receiver equipped with a 2.3kHz ladder filter, visible top right) v.f.o. controlled s.s.b. transceiver (with add-on c.w. capabilities) with a maximum quoted transmitter output of approximately 7W p.e.p. It has built-in speech processing which MFJ claims will provide between 4 and 6dB 'added punch' (bear in mind that the rig's claimed output is only 7W p.e.p!).

In appearance, the little transceiver is - quite frankly - quite charming. It looks like a really good quality 'home brewed' job and this impression is supported by the single knob controlled slow-motion tuning drive which is complete with a plastic pointer which moves above the engrave tuning scale.

The extremely basic analogue tuning scale cannot be expected to provide accurate tuning on the 144MHz band and should only be regarded as giving a very approximate indication of 'where you are' in frequency terms. During the tests he carried out, PW's Technical Projects Sub-editor Tex Swann G1TEX discovered that indicated accuracy varied within 5 and 10kHz.

For the 'on the air' tests from my car at various v.h.f. sites high on the Dorset 'downs' - including my PW Contest site - I used the MFJ-9402 in conjunction with the previously mentioned 8-element Maspro lightweight 144MHz beam, my 8 metre mast and the 'Tenna-Tourer' mast base. Power was provided by the vehicle battery.

I quickly found that - as MFJ claim - that the receiver is certainly sensitive as I was able to hear weak signals. Although not as sensitive as the Yaesu FT-100 I had on loan, or the much older Trio 9000 I've got - the receiver proved able to 'winkle' out weak stations satisfactorily although it was fairly noisy*, even when compared to the Trio.

*See comment in paragraph below starting "Audio output level..."

However, selectivity on the MFJ-9402 is another matter! The single conversion receiver is adequate for normal 'hill topping' activities but I think you can forget it for when there's a contest or increased activity on the band.

I can comment on the receiver's performance because my experience during the PW QRP Contest proved that the single-conversion receiver (despite the 2.3kHz ladder filter) just could not cope even with the relatively low level signals obviously associated with a QRP Contest. And yes, I am taking into account antenna gain at the transmitting end which can lead to quite potent effective radiated power (e.r.p.) levels!

Comments on the transmitted audio quality were good, and several stations commented that they immediately

recognised my voice. I had several QSOs during the contest, but most of the activity - for the reasons already mentioned - were during normal 'hill-topping' days.

Audio output level was adequate for operation in the car but for outdoor use I would say that headphones, via the rear panel mounted socket, would be essential. Incidentally, I've already commented on the receiver noise - and its apparent sensitivity - and on reflection (not having had the opportunity to dismantle the receiver) I think most of the noise originates from the audio stages. A check with my workshop oscilloscope and suitable probes backed me up in this thinking, as the noise ('hiss') seems to be associated mostly with the audio output stages.

Simple & Lightweight

The neat little MFJ-9402 is simple to operate and very lightweight. In my opinion it would be ideal for QRP level operation when equipment has to be carried to remote operating sites. (What I would have done to have had access to such equipment years ago!)

In summary, I've got to say that this little rig is a 'fun' transceiver which could easily be taken on camping holidays. For this reason I've no doubt that it will appeal to some operators and with the c.w. option added, the versatility could be increased.

Personally, I feel that if MFJ were to consider making this transceiver considerably cheaper as a kit for home assembly, it could end up being popular as a 'first entry' project for s.s.b. and c.w. on 144MHz. Otherwise, I think it is rather expensive for what you get at the moment. So, perhaps MFJ might take up my suggestion? (Further details, price, etc., at end of article).

Great Fun

So, there you are - I hope I've conveyed some of the enjoyment I get from operating /P, whether it's on h.f. (my mast also supports a wire dipole from a wooden extender section) or v.h.f.

The idea behind this article has been to demonstrate how much more enjoyment we can get from our hobby, and to introduce the PW 'Tenna-Tourer' mast base to you at the same time. It's been developed and



Fig. 11: An inside view of the MFJ-9402. The ladder filter can be seen at the top right (see text).

built from my basic ideas and suggestions by **Norrie Brown GM4VHZ** of **Tennamast**, ably assisted of course by his wife **Rose GM4NHH**.

If you decide to invest in a PW 'Tenna-Tourer' mast base I'm sure you'll enjoy using it as much as I've done. So, good luck with your /P operations and I look forward to meeting you on v.h.f. and h.f. some time!

PW

My thanks go to **Yaesu UK Ltd.**, at **Unit 12, Sun Valley Business Park, Winnall Trading Estate, Winchester, Hampshire SO23 0LB**. Tel: (01962) 866867 for the loan of the **Yaesu FT-100**. (see full review in the July issue of PW).

Fig. 10: The MFJ-9402 144MHz s.s.b. low power transceiver. The size of this lightweight unit can be gauged from the microphone (see text).



The **Maspro 8-element 144MHz** folding lightweight beam antenna was kindly provided by **The Short Wave Shop, 18 Fairmile Road, Christchurch, Dorset BH23 2LJ**. Tel: (01202) 490099. The antenna costs **£37.95** with P&P at **£8**.

My thanks go to **Waters & Stanton PLC**, of **22 Main Road, Hockley, Essex SS5 4QS**. Tel: (01702) 206835 for the loan of the **MFJ-9402 144MHz s.s.b. transceiver**. It's available for **£259.95** with free P&P.

The **Kelly's Kettle** is available here in the UK from: **The Kelly Kettle Co. Ltd., Woolaway, Chesterton Field Farm, Foss Way, Leamington Spa, Warwickshire CV33 9JY**. Tel: (01926) 651460. The 1 pint version costs

£30 plus **£3.50** P&P, the 2.5 pint version costs **£35** plus **£3.50** P&P. (Cooking accessories are available for the larger version).

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The Frequency Synthesiser

In his 'Looking At ...' page this month, Gordon King G4VVF will be taking a look at the frequency synthesiser which is now employed in a high proportion of Amateur Radio equipment - from receivers and transceivers to test equipment and more.

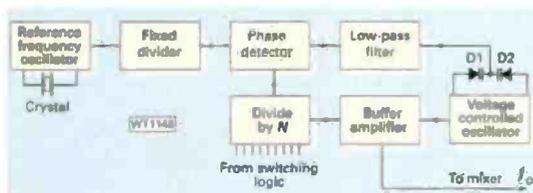


Fig. 1: Block diagram of p.l.l. frequency synthesiser.

The frequency synthesiser, used in many receivers today, fits well into the digital age and, like CDs, there are those who hold it in high esteem and others who still prefer the old way! It's a scheme whereby the frequency of an oscillator can be locked to a stable and accurate reference over a wide range of discrete frequencies.

Not only does it allow both the local oscillator (l.o.) of a receiver and the r.f. output of a transmitter to be of high stability and accuracy, often down to a few Hertz (Hz), commonly aided by a digital display, but it also facilitates switching of the output frequency in predetermined steps, while still retaining these attributes.

Although stability and accuracy can be matched by quartz crystal oscillators, a disadvantage here is that major frequency changes require crystal changes. But such oscillators do have the advantage of low noise and purity of output and it is possible to shift their frequency slightly (the VXO), as was noted when looking at local oscillators in a previous instalment.

Reference Signal

A quartz crystal oscillator commonly provides the synthesiser's reference signal, whose frequency is divided by a predetermined fixed ratio. The synthesiser's main output emanates from a voltage controlled oscillator (v.c.o.), a sample of which is also frequency divided by a ratio selected by digital logic or frequency switching.

A phase-locked loop (p.l.l.), which constitutes the heart of the synthesiser, then compares the phase of the two divided signals. The block diagram in Fig. 1 reveals the primary elements.

Now, should the phase of the divided v.c.o. signal fail to coincide with that of the divided reference signal, the phase detector will respond to the error and deliver a d.c. voltage related to the phase error.

The potentially adverse higher frequency components accompanying the d.c. voltage are eliminated by the low-pass filter. The resulting 'smoothed' voltage is then applied to the junction of the v.c.o.'s varicaps D1 and D2. This is the control voltage which adjusts the capacitance of the varicaps, which form part of the v.c.o. tuning, until the phase and hence frequency of the divided sample of the v.c.o. signal corresponds to the phase of the divided reference signal.

A steady-state situation occurs when the two signals become phase coincident constant at 90° offset, but whenever there's a tendency for the frequency of the v.c.o. signal to drift, then the control voltage will again readjust the v.c.o. tuning slightly until phase coincidence is restored and the frequency drift is corrected.

The capacitance value of a varicap decreases as the reverse bias across it increases. For example, with a reverse bias of, say, 1V, it may be in the region of 80pF, while at 40V, it might have reduced to around 18pF, depending on the type of varicap.

The v.c.o. in Fig. 2 uses an *n*-channel junction f.e.t. (j.f.e.t.) based on a Colpitts oscillator. Diodes D1 and D2 are the varicaps which, together with L1, form the tuned oscillatory

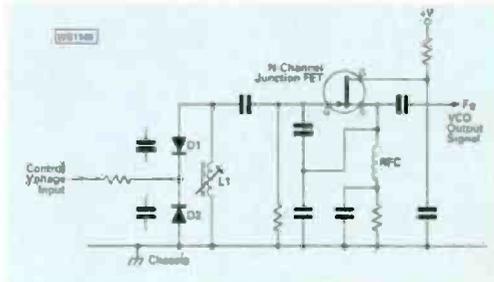


Fig. 2: Circuit diagram of voltage-controlled oscillator (v.c.o.) from which the synthesised signal is obtained. Although the diodes (D1 & D2) are shown as normal diodes they are, in fact, varicap diodes, whose capacitance varies with reverse voltage.

circuit. Because the control voltage is applied to the cathodes of the varicaps, it would be positive-going relative to 'earth' to decrease the capacitance across L1 and hence increase the output frequency.

A pair of varicaps connected as shown in the diagram are commonly used, instead of just a single device, to give the required capacitive swing and to avoid the oscillatory signal from affecting the capacitive function. Output is taken from the source of the f.e.t. and is usually fed to the mixer (or transmitter) via a buffer stage.

Component values depend on the v.c.o.'s operating frequency. Nowadays the phase detector is commonly an integrated circuit (i.c.), which may be a part of the synthesiser i.c. or a more sophisticated device and there are a many such devices around these days!

Output Frequency

The output frequency of a p.l.l. synthesiser can be set digitally, by programmed press-buttons, scanned electronically, or changed in discrete steps by a rotary control. The amount by which the frequency changes per step is established by the division ratio of the reference frequency's fixed divider.

As an example of this, consider a reference frequency of 1MHz and a required synthesised output corresponding to the 144MHz band, from 144-146MHz, switchable in discrete 12.5kHz (0.0125MHz) steps.

The fixed divider ratio would thus be 80 (1 000 000 divided by 12 500), while at 144MHz the frequency select divider ratio would be 11 520 (144 000 000 divided by 12 500) and at 146MHz 11 680 (146 000 000 divided by 12 500).

For 25kHz steps, both the fixed divider and the frequency selecting divider ratios would be half the 12.5kHz step ratios. Each time the ratio is changed one step by the switching logic or programming, the v.c.o. output will change accordingly. The dividers work digitally, rather like counters.

Local Oscillator Application

For local oscillator (l.o.) application, the synthesiser would be programmed to take account of the i.f. offset by onboard logic and it's not uncommon for several p.l.l.s and dividers to be found in latter-day equipment to produce the required frequency ranges with the desired step resolution (right down to 10Hz per step in some cases). Phase noise and undesirable 'spraggies' on the synthesised signal are minimised by careful attention to design and component layout.

This Phase-locked loop (p.l.l.) synthesis is also known as indirect synthesis. There's another approach where the signal is synthesised digitally, which is known as direct digital synthesis (DDS).

While having been restricted to expensive test equipment, owing to its need for elaborate filtering, DDS is now finding its way into Amateur Radio equipment. But that's another story - for another article!

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A Modulation & Ripple Level Meter

James Brett G0TFP shows you how to make a very useful meter that can be used to measure far more than the name suggests. Read on to see what it could be capable of in your workshop.

There are many measurements in Amateur Radio and general electronic design work that normally need an oscilloscope. For instance the radio amateur licence requires that, when using amplitude modulation (a.m. - A3E), the licensee makes measurements of percentage depth of modulation and of p.e.p. in s.s.b. (J3E) 'from time to time'.

When testing modulation depth, the transmitter waveform normally has to be viewed on an oscilloscope and the maximum and minimum amplitudes of the modulated carrier compared with the mean carrier level. For s.s.b. the transmitter output is again viewed and the two tone test used to indicate on the oscilloscope screen the peak power levels permitted.

This article describes a comparatively simple, easily built and calibrated accessory which will enable these and many other measurements to be made. The circuit monitors the r.f. current into a resistive load, rectifying it to produce the characteristic demodulated waveform as shown in Fig. 1.

The second part of the circuit enables measurement of the carrier level V_C shown as V_3 and the modulation peak $V_C + V_M$ (shown as V_2) in Fig. 1. A secondary function, without the r.f. section of the meter, the



measuring circuit allows measurements of ripple superimposed on d.c. supplies and many other useful measurements described later.

James Brett G0TFP's Modulation & Ripple Level Meter.

Circuit Description

The overall circuit of Fig. 2, shows the meter circuit and the sensing unit (connected between the transmitter output and a matched dummy load). Although the sensing head is designed for 50Ω impedances, other values will work. The coaxial inner line current is sensed by the transformer T1 (and its load, R11), is rectified by D1, capacitor C4 filters out the r.f.

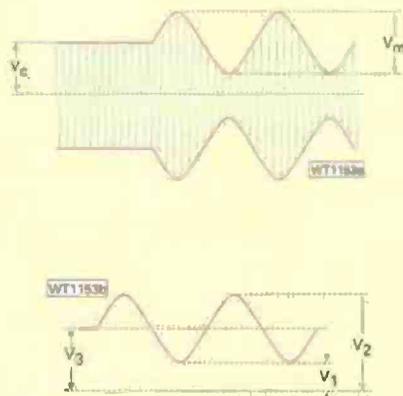
The recovered audio waveform across R12 is of a form, similar to that shown in Fig. 1. The audio signal (or a d.c. voltage with ripple) is applied, via S1 (shown in the modulation position) and the attenuating circuit of R2 and R3 to input pin 2 of the op-amp IC1, the main purpose of which is a gated level sensing circuit.

When the potentiometer R13 is at minimum, IC1 output will be high and D3 will be lit. As R13 is advanced a point will be reached where the level on pin 3 (IC1) will be just positive with respect to the negative peak of the applied waveform. The op-amp output will thus briefly 'pulse low'.

Advancing the potentiometer further will lengthen this negative pulse and D5 will start to glow, and D3 will dim. As the potentiometer is further advanced the point will be reached where pin 3 of the op-amp is just higher than the positive peak of the applied waveform, when D5 will be fully lit and D3 fully extinguished.

As it's difficult to determine accurately when the l.e.d.s are

Fig 1: The modulated 'envelope' and recovered audio signal from an amplitude modulated r.f. signal. See text for more detail.



Power (W)	Reading (V)
1	1.76
2	2.50
5	3.95
10	5.59
25	8.84
50	12.5
100	17.7
150	21.6
200	25.0

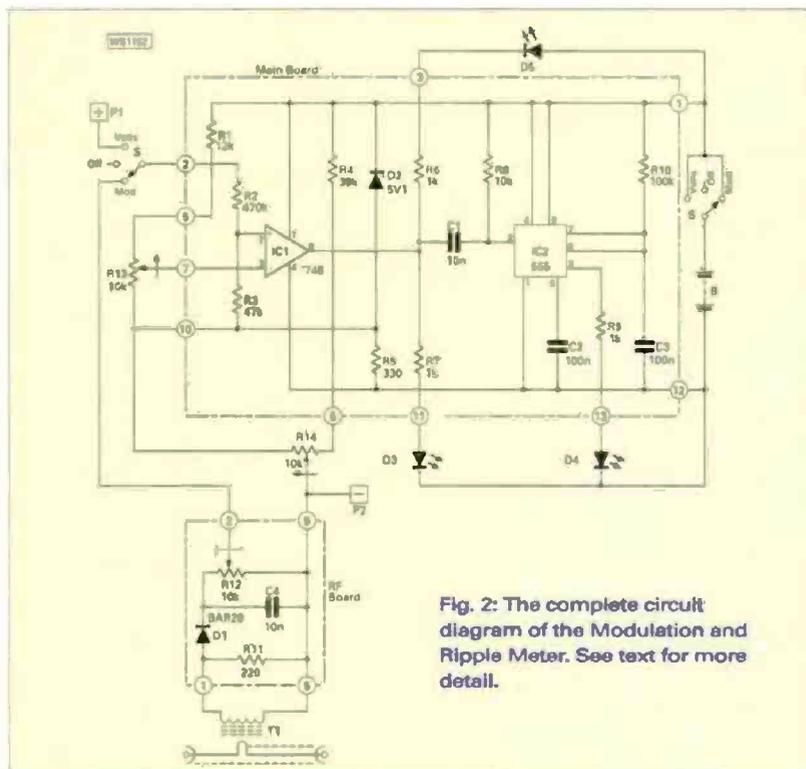


Fig. 2: The complete circuit diagram of the Modulation and Ripple Meter. See text for more detail.

extinguished or fully lit, the positive going edge of the op-amp output triggers IC2, a pulse lengthening circuit based around the 555 timer IC2. The duration of the pulse is set, by R10/C3, to approximately 9ms. Whenever the potentiometers are set in the 'ripple zone' and diodes D3 and 5 are flickering,

Two Main Units

The two main units are shown within dotted lines on Fig. 2, but layout is not critical and my prototype is shown in the annotated photographs. The layout can be modified to accommodate the shape of the box available. A separating screen between the r.f. and the rest of the circuit must be used to prevent possible interference to the metering circuits by the r.f. fields. My prototype is shown in the annotated photographs of Figs 3, 4 and 5.

The sensing transformer, T1, consists of 20 turns of insulated wire wound on a toroidal core, with tails left long enough to connect the r.f. strip board. The inner of the coaxial cable is passed through the centre of the toroid before soldering in place. The toroid and its winding are fixed in place with a generous application of a rubbery adhesive.

Variable resistors R13 and 14 are directly mounted in to the bottom of the box after first drilling the necessary holes and covering the outside with sticky white paper. The strip boards are supported by screws and extra nuts to space them from the box. The mounting holes on the strip boards should be slightly countersunk on the copper side and insulated washers used to prevent any of the strips short circuiting to the mounting nuts.

Test & Calibrate

It's now time to test and calibrate the unit, but first, carry out a careful wire check before connecting the battery. Connect a 'spare' fresh 9V battery to the input terminals (P1 and P2), observing correct polarity, and switch on to the 'Voltage' position of S1. Set R13 fully anticlockwise and R14 mid way, only l.e.d. D3 only should be illuminated.

Advance R13 slowly clockwise about a third of the way, at which point D3 will go out and D5 light. By varying R14 about the mid point, D4 should pulse on in keeping with the movements of R14. Now connect a transmitter and matching dummy load to the coaxial connectors.

Set the potentiometer R12 fully clockwise and switch on the transmitter at a low power level. Set the switch to the 'r.f.' position (as shown in Fig. 2) and check the unit's operation as described for the 'Volts' case. The unit is now functioning correctly.

To calibrate the potentiometer scales, an adjustable dc supply of 0-30V and a suitable voltmeter are required. Several (9V) dry batteries and a high resistance potentiometer (about 100k Ω) could be used instead.

With the switch set in the 'Volts' position set R14 to mid scale and mark the scale at this point as '0'. Now set the test supply to 2V and adjust R13 to the point where D3 and D5 just change over and mark this point 2. Carry on over the whole range of R13, marking the scale at appropriate points, say every 2V.

To calibrate R14, you use a similar method. Leave R13 somewhere mid scale, and the test supply set to the l.e.d. change over point. Now make small adjustments in voltage of around 0.1V intervals. By referring to Table 1 (see Fig. 1), the power calibrations can be marked around R13's scale.

Now you need to set R12 for correct reading. A 50 Ω dummy load with a calibrated power meter is connected to one of the coaxial connectors and a transmitter with a 50 Ω output is connected to the other.

Set R14 to '0', with the transmitter switched on, adjust its output to a convenient level as indicated on the power meter. Set R13 to the same power indication and adjust R12 to the point where D5 and D3 just change over. That is the calibration done! But what can you use it for? In answer to that look at the following:

Transmitter Power

The transmitter output is connected, via the unit, to a 50 Ω dummy load. The transmitter should operated in f.m. or c.w. mode. With R14 set to the zero point, adjust R13 until the l.e.d.s 1 and 2 change over. Read the power directly of the

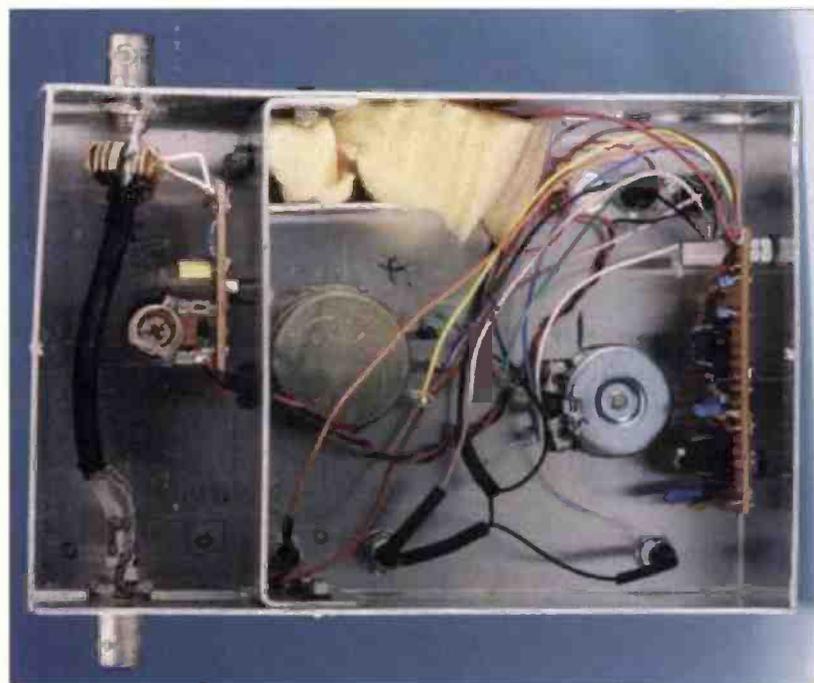


Fig. 3: Looking inside the Modulation and Ripple Meter, where variable resistor R13 and 14 are mounted on the 'front' of the box.

D4 will be brightly lit.

Potentiometer R13 has a dial calibrated in volts equivalent to the input voltage. The positive and negative peaks of the applied waveform are indicated as voltage measurements and will show in relative terms the actual current (and power) in the r.f. load. Operating as a fine control, R14 applies to a small shift to the applied input and is calibrated in fractions of a volt.

The circuit of D2/R5 enables the op-amp to be operated with 'balanced supply rails' from a single battery. The '748 type of i.c. was selected because, although it suffers some loss in performance, it will still give satisfactory gain at this low supply voltage.

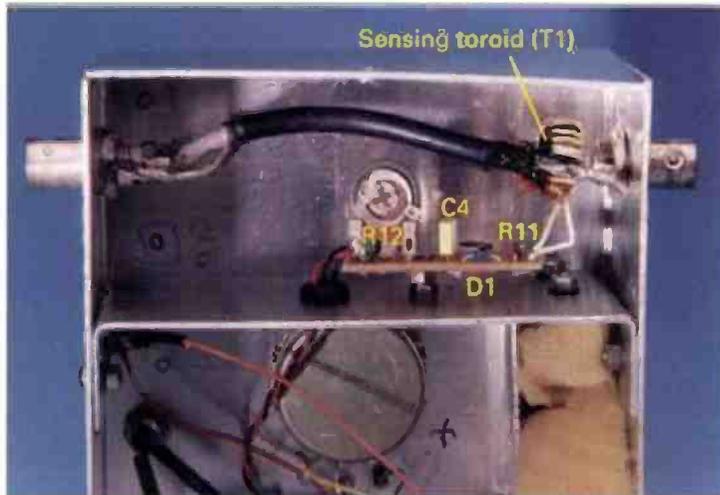


Fig. 4: A closer view of the sensing head.

scale of R14. If the r.f. system is mismatched or, if a different value of load is used, the power reading is no longer accurate, the scale, however can be used to show relative power levels when changes or adjustments are being made to the load or transmitter.

Modulation Depth

For assessing modulation depth you'll need a single audio tone input (an audio oscillator connected to the microphone input or an amplified audio oscillator and loud speaker in front of the microphone). Switch the transmitter to a.m. mode transmit, but without any audio input and measure the carrier level recording the voltage indicated by R13 and R14.

Now bring in the audio modulation and measure and record the peak voltage indicated by D5 being lit and D4 just extinguishing. You'll now have the voltages V3 and V2 as shown in Fig. 1.

The depth of modulation is:

$$\text{Modulation depth (\%)} = \frac{V_m}{V_3} \times 100$$

We have measured V_c as indicated by V3 and V_m which is given by $V_2 - V_3$. Thus the modulation depth is calculated by the formula:

$$\text{Modulation depth (\%)} = \frac{V_2 - V_3}{V_3} \times 100$$

This measurement is also true if the load is not accurately matched or the impedances are not 50Ω .

Peak Effective Power

Peak Effective Power (p.e.p.) is defined as the peak power supplied to the load during one radio frequency cycle at the crest of the modulation envelope. The Radio Amateur licence requires that any transmissions are limited to 400W maximum on some bands, less on other bands. It's recommended that the 'two-tone method' of measurement is employed, where two non-harmonically related equal amplitude audio tones are simultaneously used to modulate the transmitter as measurements are made.

The procedure is to fully modulate the transmitter with the two audio tones that produce a sinusoidal modulation envelope at the difference frequency of the two tones. This signal is fed to a power meter and the transmitter adjusted to show an average power level of 100W for the 400W p.e.p. case.

If monitored on an oscilloscope, the peak point of the signal is marked with a line on the screen. This line

represents the p.e.p. value of 400W and must not be exceeded during normal speech modulation.

Using the Modulation Meter between the transmitter and the power meter, the signal is monitored as already described. With the two tone audio signal applied to the transmitter, the transmitter output is adjusted to indicate 100W on the power meter, then R13 is adjusted until, with D5 lit, D4 just extinguishes in effect this is the line marked on the oscilloscope screen.

Now with the antenna connected and normal speech modulation used, it is only necessary to set the transmitter modulation gain/level control to a position where the D4

does not pulse on even in the loudest speech points. And of course other p.e.p. level may be set by setting 25% of the required power level on the scale of R12

Ripple Measurements

With the switch S set to the 'Volts' position, P1 and P2 can be used to monitor the positive and negative peaks of the ripple in a power supply. The measurement is made by

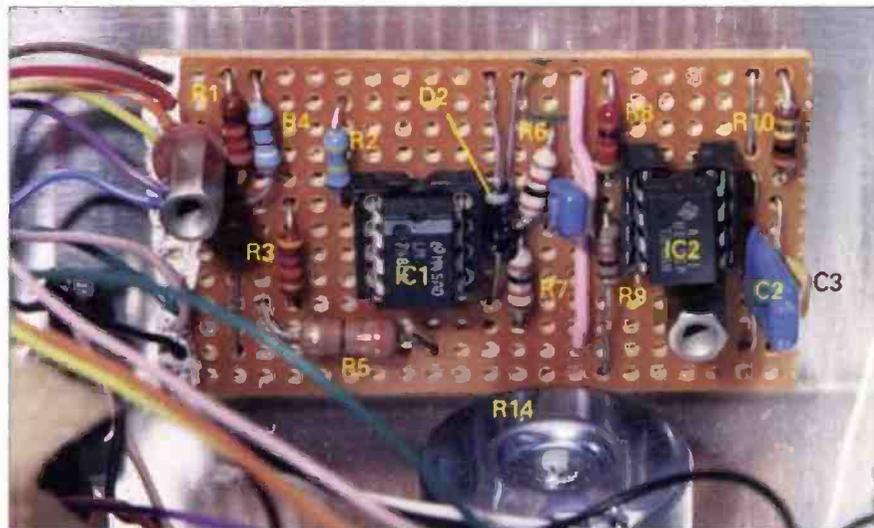


Fig. 5: The prototype metering electronics were mounted on Veroboard for simplicity. Note! Due to the way the photograph has been taken there is some parallax distortion of component connections.

turning up R13/R14 from zero until D4 just lights, for the the lowest voltage (V1 in Fig. 1). Further advancing of R13 or R14 until D4 extinguishes indicates the maximum positive of the supply.

The facility is, of course, an important measurement when considering the design of a power supply on load. The input to the regulator can be checked to ensure that there's always sufficient voltage across the regulator for correct operation whatever the loading.

Other Uses

There are other uses of the meter, when it's used in the 'Volts' position. These include such things as amplifier output (before the capacitor coupling to the loud speaker) can be monitored. With no audio signal the mean voltage level can be determined by noting the readings where D5 and D3 just change over.

By now applying the audio the peak positive and negative excursions can be measured by observing the voltages when D4 just extinguishes. For a good amplifier these voltages should be equally disposed about the mean level previously measured.

Similarly, oscillator outputs and other circuit performances can be checked. There are, no doubt, other useful measurements which can be made, even to using it as a simple voltmeter when the workshop multimeter is not to hand.

PW



RAE Course Listing

It's that time of year again and the team here at Practical Wireless have done their best to bring you news of **RAE**, **Novice RAE** and **Morse** courses across the country, so there's absolutely no excuse now for all you 'would-be' Radio Amateurs! Hook out those RAE textbooks which you bought all those months ago and haven't used, and get studying!

The list which we have provided here consists of those courses which we have been told about and is not exhaustive - there are many other courses going on all over the country that may not be mentioned here. For details of other courses that are running this year, contact the **City & Guilds (C&G)**, 1 Giltspur St, London EC1A 9DD, Tel: 0171-294 2468, FAX: 0171-294 2400.

For more information on becoming a Radio Amateur, contact **Subscription Services Ltd. (SSL)** in Bristol on 0117-925 8333 who act as the licensing issuing point for the DTI and will, on request, send copies of the free booklet 'How To Become A Radio Amateur' and provide other DTI publications associated with the hobby. You could also contact the **Radio Society of Great Britain (RSGB)** on (01707) 659015 or if you have an enquiry regarding licensing, etc., then please get in touch with the **Radiocommunications Agency (RA)** on 0171-211 0211. So, what are you waiting for? Browse through our list, pick a course in/near your area, get enrolled and start studying! Who knows, your name may be among the new batch of Licensees! **Good Luck!**

Bexley College will be running a City & Guilds RAE course from September 1999. The course will run for an academic year finishing in May 2000 with students able to sit the May 2000 RAE. Morse will be taught from May to July 2000. Interested enthusiasts should contact Bexley College's **Guidance & Admissions Centre** on (01322) 404000 or (01322) 404001, leave your name, address and telephone number and an enrolment form will be posted to you in the summer break.

Bishop Auckland RAC (BARAC) which meets at the Stanley Village Hall, Rear High Rd, Stanley, Crook, Co. Durham, will be running an RAE and Novice RAE course starting in September 1999. The club is also a registered examination centre. For further details please contact **Tim** on (01388) 832948 or **Mark GOGFG** on (01388) 745353.

Carlisle College, Victoria Place, Carlisle CA1 1HS will be running an RAE course beginning on **Wednesday 10 November 1999** between 1800-2100. The charge for the course will be £130 plus registration and exam fee of £30 and will last 20 weeks. The tutor will be **Bruce McCartney** and if you require any more information, please contact the **Information Unit** on (01228) 819000.

East Cleveland ARC (ECARC) will be offering a Novice RAE course on **Friday evenings** at the Jubilee Hall, Gurney St, New Marske, near Redcar. Enrolment will be on 3 September 1999. Details are available from **Alistair G4OLK** on (01642) 475671.

Farnborough College of Technology is offering RAE and Morse courses. The courses are held on **Tuesday & Thursday evenings** and start the week commencing **13 September 1999**. For further information please telephone: (01252) 407040.

Foyle & District ARC (F&DARC) will be running an RAE course from **September 1999**. Numbers are limited due to the fact that the lessons will have to be held at the Course Tutor's home in Co. Tyrone, Northern Ireland. Anyone interested should contact either **Terry White G17THH (QTHR)** on (01504) 883461, or the Course Tutor, **Ronnie G10WYO (QTHR)** on (01504) 342636.

Hastings Electronics & Radio Club (HERC) will be running courses for the RAE and Novice RAE this autumn. For details of the RAE course please contact **G Parsons M0AHY** at Gull Cottage, Briar Close, Fairlight, East Sussex TN35 4DP or telephone (01424) 813040. For details of the Novice RAE course (starting on 16 October) contact **D Mepham G4ERA** at 8 The Close, Fairlight, East Sussex TN35 4AQ (where the course will be held) or telephone (01424) 812350. (HERC is an approved City & Guilds examination centre for both the RAE and NRAE).

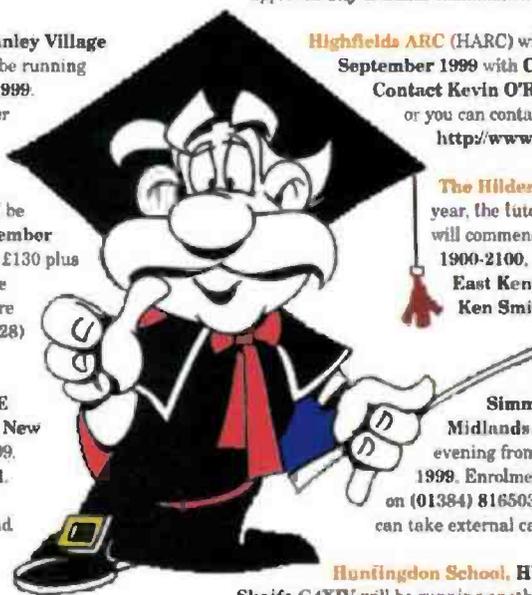
Highfields ARC (HARC) will be running RAE classes commencing in **September 1999** with **Clive GW4YKL**, every **Thursday** at 1900. Contact **Kevin O'Reilly GW0KIG** on Cardiff (01222) 561542 or you can contact the club via their Web site: <http://www.freezone.co.uk/shortwave/>

The Hilderstone RAE Course will be running this year, the tutor will be **Dr. Ken Smith G3JIX**. The course will commence on **Thursday 23 September 1999** from 1900-2100, the venue will be in the **Sandwich area, East Kent**. For further information please telephone **Ken Smith G3JIX** on (01304) 813175 or E-mail: ken.smith@saqnet.co.uk

Hillcrest School & Community College, Simms Lane, Netherton, Dudley, West Midlands are holding an RAE Course, every **Thursday evening** from 1900-2100 starting on the **16 September 1999**. Enrolment from 6 September 1999. Further details on (01384) 816503. Note: this is an Examination centre and can take external candidates.

Huntingdon School, Huntingdon Road, York YO32 9WT: **Tony Skaife G4XIV** will be running another RAE course this year and it will be starting in **September**. Contact **Tony Skaife** on Tel: (01904) 752102, 144 Carr Lane, York YO26 5HG or E-mail: s.duff@huntingdon-ed.org.uk

Keighley College, Keighley, West Yorkshire will be running an RAE course which will be held on **Tuesday evenings** from 1900-2100, enrolment is in the first week of September. The course tutor will be **Ralph Turner G3VRX**. For more details, please telephone the college on (01535) 618555 or (01535) 618625.



Limerick Radio Club (LRC) will be running a course leading to the Irish Radio Experimenter's Examination in October 1999 at the Adult Education Centre, Sexton Street, Limerick. Please contact the Limerick Radio Club on 061-360122.

Maidstone YMCA ARS will be running RAE, NRAE and Morse courses at the YMCA Sports Centre, Melrose Close, Cripple St, Maidstone, Kent ME15 6BD. To enrol please call the Course Co-ordinator, Keith Maskell G4YTU (01634) 831504 or alternatively, you could visit any of the Club nights which take place on Fridays and arrange it that way.

Mexborough & District ARS (M&DARS) are running RAE, Novice RAE and Morse code courses at Mexborough Radio Club, Harrop Hall, Mexborough, South Yorkshire. RAE enrolment takes place at 1900 on Friday 10 September 1999 and then the course will start at 1900 on Friday 17 September. The Novice RAE and Morse code, rolling program, any Friday. For further details telephone Tom G0KSK on (01709) 586329 or Roy G0FYM on (01977) 645691.

Murray Park Adult Education Centre will be running an RAE course from Wednesday 22 September 1999. It will take place between 1900-2100 at the centre, Murray Road, Mickleover, Derby DE3 5LD. General enquiries on (01332) 515922. 24 hour enrolment line on (01332) 518099.

Newstead Woods School, Avebury Rd, Orpington in Kent will be running an RAE course leading to the May 2000 examination which will be held at the school. The course will take place on Monday evenings between 1930 and 2130 commencing 20 September 1999. For further details, please contact the course tutor A E Betts on (01689) 831123. Enrolment should be done through Bromley Adult Education College, Widmore Centre, Nightingale Lane, Bromley BR1 2SQ. Tel: 0181-460 0020.

North Bristol ARC are continuing their RAE and Morse classes and they meet in north Bristol on Friday evenings and contact details are as in the RSGB Callbook or via Dick Elford G0XAY on (01454) 218362.

North Trafford College are running an RAE and an advanced RAE course commencing 13 September 1999. The Radio Amateurs evening course will take place: Monday 1800-2030; Radio Amateurs afternoon course: Wednesday 1300-1615 and the Advanced Radio Amateurs (construction): Tuesday 1300-1615. For further details please contact John Beaumont G3NGD, North Trafford College, Talbot Rd, Stretford, Manchester M32 0XH. Tel: 0161-886 7077 or contact admissions on 0161-886 7000. Early enrolment will be every Wednesday throughout July and August, 1400-1900 and 1 September. Main enrolment will take place on Monday 6 September to Wednesday 8 September 1999, 1200-2000. Details are also available on the Internet: http://pages.hotboL.com/edu/john_beaumont/index.html

Oldham ARC (OARC) will be running an RAE Course commencing at 1930 on the 16 September 1999. The course will be geared to candidates taking the RAE in May 2000 and will be held at Moorside Conservative Club, 633 Ripponden Rd, Moorside, Oldham. Oldham ARC is a fully registered City & Guilds Examination Centre and all candidates can sit the exam at the club. Further details from Geoff Oliver G0BJR on 0161-652 4164 or by E-mail to our@zen.co.uk

Nottingham: A 26 week RAE course starts at South Notts College, Greythorn Drive, West Bridgford, Nottingham on Wednesday 15 September 1999. Class times are 1830-2100 and the Course Tutor will be Alan Lake G4DVW. For further details Tel: 0115-938 2509 or E-mail: radkit@compuserve.com

Plymouth ARS (PARS) will be running a City & Guilds RAE course starting on the first Thursday in September 1999. Classes will be held for one hour every Thursday from 1830-1930 in Room 312 on the third floor of the Smeaton Building of the University of Plymouth. The course will run from September until the first Thursday in May 2000. Full details of the course, fees, etc., from Bob Griffiths G7NHB on (01752) 343177. Practical Wireless, September 1999

For more information
on becoming a
Radio Amateur,
contact
Subscription
Services Ltd.
on 0117-925 8333
or the
Radio Society
of Great Britain (RSGB)
on (01707) 659015
Licensing enquiries,
call the RA
on 0171-211 0211.

Preston Amateur Radio Society (PARS) run an ongoing Novice course which takes place every Thursday evening from 1845-2000. The venue is Lonsdale Sports & Social Club, Fulwood Hall Lane, OFF of Watling Street Road, Fulwood, Preston. The contact for this course is Eric Eastwood G1WCQ (01772) 686708. The cost of the course is approximately £40.

Redborne Community College, Ampthill, Mid Bedfordshire will be offering an RAE course on Monday evenings starting 13 September 1999 for the May 2000 examination. Contact Mr. N Reynolds on (01525) 404412 for enrolment details or the tutor Steve Down G3USE on (01234) 270738 or E-mail steve.down@btinternet.com for course information.

Rugeley Adult Education Centre, Taylors Lane, Rugeley, South Staffordshire - Tel: (01889) 578738 (Term-time only) is running an RAE course commencing from Monday 13 September 1999, from 1900-2100. Please contact

Brian Smith G4EQC on (01543) 683030 for further information.

Sawston Village College near Cambridge will be holding an RAE Course (theory only) starting in mid-September 1999. Contact (01223) 834492, FAX: (01223) 836680. Or E-mail peterbuchan@bigfoot.com

Sharnbrook Community College, Sharnbrook, North Bedfordshire will be offering an RAE course on Wednesday evenings starting 15 September 1999 for the May 2000 examination. Contact Mrs J Barnett on (01234) 782581 for enrolment details or the Tutor, Steve Downs G3USE on (01234) 270738. E-mail: steve.down@btinternet.com for course information.

South Normanton Alfreton & District ARC (Nr Alfreton, Derbyshire) are running a Novice Amateur Radio Examination Course to commence from September 1999 at New Street Community Centre, New Street, South Normanton, Derbyshire. For further details contact the Club Secretary, Russell Bradley G0OKD on (01773) 863892.

South Yorkshire Repeater Group is now a registered test centre for the RAE and the Novice RAE and they will be holding an RAE course starting from Wednesday 8 September 1999. The NRAE course starts from Friday 17 September 1999. Both courses take place at Valley Community Centre, St. John's Rd, Cudworth, Barnsley. For further information, please contact Ernie Bailey G4LUE, Hild Avenue, Cudworth, Barnsley, South Yorkshire S72 8RN. Tel: (01226) 716339. Mobile: (0836) 748958.

The Flight Refuelling ARS at Wimborne in Dorset will be running an RAE course starting on Tuesday 14 September 1999, new members would be welcome. Contact Tony Baker G3PFM on (01202) 622262 for full details.

Tile Hill College, Tile Hill Lane, Coventry CV4 8SU will be running an RAE course this year leading up to the December 1999 and May 2000 examination. For further information, please contact Student Services at the above address, Tel: (01203) 694200, FAX: (01203) 464903 or E-mail: info@tilehill.ac.uk

Widnes & Runcorn ARC will be running an RAE & Novice RAE Course at the Beacons, Simmons Lane, Frodsham, Cheshire. Enrolment takes place on Friday 3 September 1999 from 1930. Further details can be obtained from Course Tutors Dave Bibby G1PIX on (01928) 591401 and Dave Wilson G7OBW on (01270) 761608.

Ynys Môn Radio Users Group will be holding its annual RAE course at the Llangejni Scout Hall, Llangejni in September (times and dates to be verified). Any persons wishing to attend can contact the group on either (01407) 832197 or E-mail: TonyAnziank@gofree.co.uk

PICK A COURSE IN YOUR AREA, GET ENROLLED AND START STUDYING!

The Icom IC-706 MkIIIG

Richard Newton GORSN, our keen h.f. mobile operator, takes a look at the Icom IC-706 MkIIIG and says he likes its appearance and layout (but what did he think about its operation)? To answer, he begins with a look at its features and then describes how effective it was on air.

I have always been a keen h.f. mobile operator and, in particular, have a fascination with small h.f. radios. Whenever I think about small h.f. transceivers, the IC-706 always springs to my mind. This 'little bundle of fun' started out a few years ago by astounding the market with its features - mainly, all the h.f. bands, 50 and 144MHz and all in one little radio! Icom didn't rest on the laurels of its success where their IC-706 was concerned though, they've been improving its excellence ever since. Now they've added another string to the 706 bow, the Icom IC-706 MkIIIG, which includes 433MHz!

What's The Fuss?

So, what's all the fuss about? Just what is the Icom IC-706 MkIIIG? Well, to answer, it's a very smart 'box', measuring a modest 167mm wide by 58mm high and 200mm deep (not including its projections) and inside this relatively small 'box' is packed a veritable arsenal of functions and features.

As well as general coverage (g.c.) receive from 30kHz to 199MHz and receive from 400 to 470MHz, the IC-706 MkIIIG has an all mode transmit capability on all the amateur h.f. bands, 50, 144 and 433MHz. The '706 MkIIIG delivers variable power settings of up to 100W on h.f. and 50MHz, up to 50W on 144MHz and up to 20W on 433MHz, although transmit powers on a.m. are somewhat reduced on all bands.

Where do I start? Well, let's try taking a look at an overview of the radio itself. One of the first things which you might notice about the IC-706 MkIIIG, is that it has a detachable front head and **all the controls** of the transceiver are on this head. (See Fig. 1). The head is very easily detached (and reattached) and, when used with the optional cable, the radio can be boot-mounted and the head easily mounted in the front of a vehicle. Whilst trying out the transceiver I found that, because I was able to remove the head so easily, it was also a good security feature, even when not using the separation cable.

My first impression of the Icom IC-706 MkIIIG was its appearance - I thought that it looked very good. The controls are well laid out and Icom have made the best of space, allowing easy access to controls along with a decent size display. The radio appears to be well made and is professionally finished. The '706 MkIIIG has a quality and an attention to detail which immediately gives you confidence in its ability.

One example of the quality of this rig would be the rubberised ring which is situated around the outside of the tuning knob, making it a pleasure to tune. In contrast to the IC-706 MkI, I am pleased to say that **most** of the more important controls on the front panel are now backlit. (See Fig. 2).

Fig. 1: The Icom IC-706 MkIIIG has a detachable front head - all the controls of the radio are on this head.



To mention all the controls for the radio would be both pointless and laborious. I will, however, mention a few. The 'Phones' 3.5mm jack socket can be set to output either for headphones or for a speaker. (See Fig. 1, on the bottom left hand side of the front panel). The a.f. (volume) and r.f./Squelch controls are on one set of rotary controls whilst the Memory channel select and the i.f. shift controls share another. Both are well spaced and of a good quality.

The extensive v.f.o. range of the IC-706 MkIIIG can be accessed in several ways. The first way is by tuning up and down in varying steps using the tuning knob and the 'TS' (Tuning Step) button. The main tuning knob has a convenient friction brake which increases the tension on the knob. (See Fig. 3). I found this to be very useful when I was using the '706 MkIIIG in the car, as it was less likely to slip off frequency. The radio can easily be 'locked' to a given frequency as well.

Alternatively, you can navigate by amateur bands by use of the band keys which will take you up and down through the bands. Another improvement which, I feel, has been made over the MkI is the tuning. I found that the MkIIIG was a lot easier to operate as far as tuning was concerned.

Advanced Functions

The advanced functions on the IC-706 MkIIIG are accessed by means of a two-tier menu system. The more frequently used functions, such as setting transmit power, microphone gain, VOX, and CTCSS tones for repeater access, can all be done easily by pressing the 'Display' button for more than two seconds.

More advanced parameters are set by turning the MkIIIG on while depressing the 'Lock' key which will give you access to a large menu of features and parameters which include: setting the off set for repeater operation on 144, 433 and 50MHz and h.f.; tone search during CTCSS operation; c.w. settings and many more.

The operating controls and features are cleverly accessed via three buttons on the front panel called 'F1', 'F2' and 'F3'. The designation to these buttons is displayed above them on the l.c.d. - the designation can be changed fairly simply by toggling through different menus which gives the operator a larger number of features accessed only by a few button presses.

The features under each set of controls also change depending on the mode you are using. For example, in c.w. mode the controls under the 'M4' set of commands are like this. 'F1' is - (this gives extra fine-tuning) 'F2' is BRK (this selects semi or full QSK break-in facility) and 'F3' is the automatic gain control (a.g.c.). Changing the radio to side band operation automatically changes the 'M4' set, 'F1' becomes VOX, 'F2' becomes COM (speech compressor) and 'F3' remains the control for the a.g.c. circuit.

Do not be put off by my rambling about menus and F buttons. It's so difficult to try and explain, in words, how the functions are set up, the IC-706 MkIIIG is very easy to



Fig. 2: Most of the more important functions of the IC-706 MkIIIG are backlit.

of days playing around and you will be well up to speed!

Other features of the radio which I found useful include: the ability to change the Meter function so that you could choose between seeing output power, s.w.r. and ALC ranges on transmit; split v.f.o. function (where you can transmit on one frequency and receive on another, even cross band); a quick band change set, where 'F1' gives instant access to 7MHz, 'F2' gives instant access to 50MHz and 'F3' is assigned to 144MHz. These designations can be changed to any band so desired by the operator.

Another little thing that I would like to mention is that you can set the UP/DOWN keys on the microphone to be a Morse code paddle key. I'm not sure what an experienced c.w. operator would make of this but it was great fun trying it out!

The IC-706 MkIIIG also has a pre-amplifier facility.

Now, I didn't think that this would have much effect on h.f., to be honest, I don't think that the '706 MkIIIG needs a pre-amplifier on h.f. However, it was a must on 144 and 433MHz and I found it a useful tool when operating 50MHz.

The MkIIIG now comes with Digital Signal Processing (DSP) as standard. I first encountered DSP when I borrowed a Kenwood TS-870 for a few weeks and fell in love with it then and there and actually bought an MFJ DSP unit.

The DSP on the '706 MkIIIG is basic but extremely effective. The Noise Reduction function was useful in side band working and, if used at the correct level, could enhance a side band signal wonderfully well but the function can also be used to great effect in any operating mode. Another function is the 'Auto Notch Filter' which eliminates tones such as those caused by people tuning up, it will identify a signal and then null it out - I found this very useful on 7MHz.

**Dale Blackman at Icom UK Ltd. told PW that the Icom IC-706 MkIIIG also has got a data socket added which is a new feature. Ed*

The MkIIIG On Air!

I decided that it was time to get the '706 MkIIIG on the air. My first QSO was on 51MHz with Peter 2E1HFJ. He was only about 16km away from me and was using his Icom IC-746. He was kind enough to give me a report on both 50 and 433MHz and his report on the '706 MkIIIG audio was very favourable.

Peter told me that the MkIIIG was, "Beautiful modulation, BBC quality". I received him very well on 433MHz and felt that the '706 MkIIIG had passed its first u.h.f. test very well. Norman G7VIK, who was situated just up the road from me in Bournemouth, joined us. He also gave the '706 MkIIIG a good report on the transmitted audio.

The first report that I got on 145MHz was via a repeater - I spoke with Terry G7VJJ via GB3WR. Terry is my father-in-law and was on his happy holidays somewhere in Devon. He informed me that the repeater was clipping my audio and so, by holding the microphone further away and turning the microphone gain down, I managed to improve things, however the '706 MkIIIG still kept tripping what I assume is an over deviation trap on GB3WR.*

**Editorial comment: Having worked through the GB3WR*

use. Yes, it does take a little bit of getting used to but what radio doesn't? Icom have done an excellent job in getting the most out of a small space.

Give it a couple

(near Wells, Somerset) repeater recently, I can confirm that this installation has been modified recently. My transmissions - using the Yaesu FT-100 - had the same effect. The deviation limits for n.b.f.m. are very well defined on this repeater. G3XFD.

John G8EAM*, my Dad, was next with some side band contacts on 50 and 145MHz. Dad and I don't have a good path between us at all - he lives in Minehead, Somerset and there's a lot of rather large hills between us. The IC-706 MkIIIG linked to my log periodic, which works on both bands, did a good job. We held down good quality contacts on both bands, largely thanks to the DSP functions making the side band contact a pleasurable experience. Dad reported that the signal and audio quality were very good. We even managed to drop power levels and go f.m. horizontal for a bit of a change. **Editorial comment: I'm sorry to say that since this article was written, Richard's father, John G8EAM, has become a 'Silent Key'. Please see 'Keylines' for an appreciation. G3XFD.*

The contacts on 50, 145 and 433MHz started coming in thick and fast and my thanks go to Ernie 2E1FRY in Fordingbridge, a trip of about 24km for a nice report and a pleasant chat. One of the best contacts I had, proving the receive capabilities on 145MHz, was a simplex contact with Dave G3ZXXM (near Wincanton). He was on the way home from doing more work to the new 50MHz repeater GB3WX near Wincanton - good luck with that one Dave. I was very pleased indeed with the '706 MkIIIG's performance on this contact.

I was joined in the shack by my two sons, four year old Oliver and five year old Thomas. I can only assume that Oliver was prompted by all the contacts I was getting, but he made a completely unsolicited remark that I just had to quote. He said: "Works fine doesn't it Daddy?" "Yes Oliver", I replied, "it does".

On The HF Bands

The IC-706 MkIIIG had done well on 433MHz, I'd had some good reports and managed to work both the Salisbury and the Weymouth repeaters. Content that the '706 MkIIIG had proved itself on the higher bands and being particularly impressed with the newest band of 433MHz, I decided to try out the radio on the h.f. bands.



Fig. 3: The main tuning knob has a friction brake which increases the tension on the knob which Richard GORSN says makes a big difference when you are operating from the car.



Fig. 4: Rear panel of the MkIIIG showing the two antenna connections, microphone and key connections and 'EXT' speaker connector.



Fig. 5: Inside the top of the IC-706 MkIIIG.

I'd hoped that my good friend, **Hank K2HJB**, from New Jersey would be able to help me, so I arranged a sked at very short notice and we tried for a contact on 21 and 18MHz. I've only got a 20m long wire, poorly positioned in the back garden at the moment and it was to

prove insufficient to be able to have a contact with Hank. Again the '706 MkIIG receiver proved itself, I could hear Hank reasonably well on both bands, he, alas could not hear me.

I tried on the lower bands and got the following report from **Derek G3NKS** (well known for his work on *Four Metre News* for 70MHz fans) on 7MHz. Derek was situated in Cheltenham and gave me a 5 and 9 report and said, "It sounds very good, natural, crisp and clear."

It was with this excellent report still ringing in my ears that I then had a multiple contact with **Dave G6BDV/P** in Milford on Sea, using his IC-706 MkII, **Colin G3EIG** in Ringwood, **Ron G6FBR** in Bournemouth and **Ernie 2E1FRY** on 50MHz f.m. To my dismay and amazement, I was told that the audio was abysmal, it was sounding overdriven and distorted!

After much worry, I noticed that the speech compression was still activated from when I was on s.s.b. At first, I dismissed this as a possible cause as I didn't expect this to be activated when in f.m. mode. However, in desperation I reverted to side band, turned off the compressor and went back to f.m. and was informed that the audio was now excellent!

The receiver on the IC-706 MkIIG on the h.f. bands was quite impressive, I heard **Aki 9J2AM** from Zambia romping in on 18MHz one evening, but alas my antenna system was not enough to break the pile up!



Fig. 6: Inside the underneath of the '706 MkIIG.

is also 7A - no wonder the battery pack failed!

My little hand-held takes approximately half this current to generate 6W, twice the output power on the '706 MkIIG. In order to have a comparison, I checked the Icom IC-706 MkI, owned by my brother, **William G7GMZ**. This too only took a few amps and compared almost like for like with my little hand-held. So, should you be operating the '706 MkIIG/P using your car battery, be warned - you may need a push!

The IC-706 MkIIG is designed for mobile/portable use, but it's just as capable of being a reasonable base station. In my opinion, its greatest strength has to lie in the size-to-performance ratio! If you have a small shack, do most operating mobile or portable, if you go camping or want an excellent all round radio to put in the car, I suggest you.



Fig. 7: The EMC filter box of the Icom IC-706 MkIIG and (inset) the inside view.

Gruelling Test

The most gruelling test I put the IC-706 MkIIG through was when I decided to use it to have a go in the **PW 144MHz QRP Contest**.

Terry G7VJJ and I

set up a portable station on some high ground between Yeovil and Dorchester. We had a 9-element beam on Terry's rather splendid portable mast and the loan of a caravan and were using 3W on 144MHz and got some good contacts, one of the furthest being **F/M0AFC/P** in **IN88RK**.

During the contest, though, we noticed something rather disturbing - we'd taken a portable 'power station' that normally keeps my 145MHz hand-held running at about 6W for a whole day of operating and had run this pack dry within a few hours. We were then offered the use of a heavy duty camping battery by our kind hosts on the caravan site which we depleted after about four hours and eventually had to give up early!

Unsure of what had gone wrong, I checked the current drain on my power supply back at home. Incredibly, the Icom IC-706 MkIIG consumes about 2A on receive only and on transmit at 3W output on 144.300MHz s.s.b. it draws 5A with no speech modulating the signal, on speech peaks the current drain goes up to 7A! In f.m. mode, transmitting 3W, the current taken



Specifications

General	
Frequency Coverage	30MHz-199.999999MHz (Transmit on Amateur bands only)
Mode	s.s.b., c.w., a.m., f.m., RTTY, w.b.f.m. (receive only)
Memory channels	107 (99 split memories, 6 scan edge memories, 2 call channels)
Antenna connector	2x SO239 (h.f./50 and 144/430MHz) 50W
Usable temperature	-10°C to +60°C
Frequency stability	Less than ±7ppm from 1-60 minutes after power on, after that less than ±1ppm/hour at +25°C
Power supply	13.8V d.c. ±15% (negative ground)
Current drain	Transmit 2.0A Receive (squelched) 1.8A Max audio 2.0A
Dimensions	157 x 58 x 200mm (w-h-d)
Weight	2.45kg
CV connector	2 connector 3.5mm (d) 8W
ACC connector	13-pin
Transmitter	
Output power	
RTTY SSB, CW, FM	5-100W (1.8-50MHz bands) 5-50W (144MHz band) 2-20W (430MHz band)
AM	2-40W (1.8-50MHz bands) 2-20W (144MHz band) 2-8W (430MHz band)
Modulation system	
Mode: s.s.b.	Balanced modulation
Mode: a.m.	Low level modulation
Mode: f.m.	Variable reactance modulation
Spurious emissions	Less than -60dB
Carrier suppression	More than -40dB
Unwanted side band	more than -50dB
Microphone connector	8 way modular 800Ω
Key connector	3 connector 6.35mm (d)
RTTY connector	3 connector 3.5mm (d)
Receiver	
Receive system	
SSB, CW, AM, WFM, FM	Double conversion superheterodyne
	Triple conversion superheterodyne
Intermediate frequencies	1st 2nd 3rd (kHz)
On s.s.b.	89.0115 9.0115 -
On a.m.	89.0100 9.0100 -
On a.m. (narrow)	89.0115 9.0115 -
On c.w.	89.0106 9.0106 -
On RTTY	89.0106 9.0106 -
On f.m.	89.0115 9.0115 455
On f.m. (narrow)	89.0100 9.0100 455
On v.h.f.m.	70.7000 70.7000 -
Sensitivity (pre-amplifier ON)	
Frequency range	SSB/CW AM FM WBFM (µV) (µV) (µV) (µV)
0.5-1.8MHz	- 30 - - -
1.8-28MHz	0.15 2.0 - - -
28-29.7MHz	0.15 2.0 0.5 - -
50MHz band	0.12 1.0 0.25 - -
75-108MHz band	- - - - 30.0
144/430MHz bands	0.11 1.0 0.16 - -
Squelch sensitivity (Threshold pre-amplifier ON)	
s.s.b.	Less than 5.6µV
f.m.	Less than 0.3µV
Selectivity	
s.s.b., c.w., RTTY	More than 3.0kHz / -6dB Less than 4.0kHz / -80dB
a.m., f.m. (narrow)	More than 8.0kHz / -6dB Less than 30.0kHz / -40dB
On f.m.	More than 12.0kHz / -6dB Less than 30.0kHz / -60dB
Spurious and image rejection	
On h.f.	More than 70dB
50MHz	More than 65dB (except I.L. through)
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73 from Dave G4KQH, Technical Manager.

Counting Up From The Millennium!

Most of us are somewhat tired of the various 'count downs' to the coming Millennium. However, Rob Mannion G3XFD is doing something quite different by 'counting up' from the Millennium! Rob is letting his imagination run wild with 'cuttings' of imaginary Amateur Radio 'news' item which (might) appear in the magazine in future years. They're intended to be thought provoking, sometimes controversial and interesting but above all ... totally imaginary!

Mystery Objects - A Radio Connection?

Half a dozen or so 'mystery objects' have been unearthed from below what appears to have been a workshop in a garden in the town of Poole, formerly in the old county of Dorset. The Federated English States (Wessex Region) industrial archaeologists were called in to examine the - mostly well preserved - items which were complete with what appeared to be connecting wires.

Speed was of the essence if the remarkable find was to be fully explored before work on the new Eurolink-Freeway from the West Country starts. And as the Freeway - especially designed for guided multi-trailer 200 tonne lorries is due to open in 2110 they had to be quick!

Experts believe that the objects are actually electronic components dating from the mid 1960s which, if true, are a remarkable find as they are around 150 years old. Preserved in dry, salt-free sand under an old-fashioned plastic membrane (once commonly used to keep the damp out of buildings) even the colours are easily indistinguishable. Additionally, one of the specialist team (a bio-chemist) states that "Some even appear to have a thin coating of a wax-like substance. What this could mean we don't know" he told our reporter.

Colour Coding?

The largest items found have coloured bands marked on them and it seems - from references to old electronics manuals that the colours refer to numerical codes. Nowadays of course,



A remarkable find in the sandy soil. An electronic mystery?

all electronics - including active multiprocessors - are organically grown by genetic engineering. There's no need to wire up (in those days they used metal wire to provide interconnections rather than the present day electrically conductive vegetable fibres which are of course now 'grown' to order)

components, all that's needed in the assembly units today is for the relevant genetic information to be fed to a bio-computer and it will produce the vegetable protein circuit required.

One or two of the items were broken, and this led to another mystery! Some appear to be made up of fine metal strands, using alloys that have

disappeared into the mists of time and some contained carbon. Holo-Spectrographic analysis even identified (from very old records) one alloy called 'Constantin'. Next job is to find out what this material was used for.

Three Pins

One - rather rusty - three pinned device appeared to contain layers of silicon with the addition of other materials. Further investigation showed traces of the long since banned alloys of lead and tin often referred to as 'Solder' in the history books.

In the next issue of *Industrial Archaeology Today* we hope to bring more news of the interesting objects found in Poole. Much more has to be unearthed yet!

PW

(Reproduced with permission of the English Federated States Government from *Wessex Industrial Archaeology Reports*, January 2108).

Dialling Up Components

Since the final demise of commercially made wired-ended components (finally made illegal in 2025 by the EU for safety reasons) modern Communications Practitioners who still enjoy making their own radio equipment have had great difficulty in obtaining suitable Resistance Units (RUs) - formerly known as resistors and Capacitance Units (CUs) - formerly known as capacitors. But the ingenuity of modern day hobbyists - passed on by our ancestors - Radio Amateurs - knows no bounds especially as the EU rules do not apply to hobbyists.



Fig. 1: The Resistance Unit (RU) 'pen' in action. The fluid flows through minute holes from the 'nib' onto the copper (see text).

Some Communications Practitioners even resorted to making their own by attending evening classes in ceramics, so they could manufacture their own carbon RUs. The CUs were sometimes a little more difficult to make - requiring the use of small glass plates, aluminium foil and even corrosive etching of foils and metals to increase electrical capacity. These 'electrolytic' CUs can go short circuit and explode!

Fortunately though, a new invention using an old idea has come onto the market in the form of 'Dial Up' Resistor and Capacitive Pens. These clever units, shown in Fig. 1 and 2, being demonstrated on the new chemically grown alginate circuit board (similar to the old fashioned copper clad circuit boards) deliver specified amounts of resistive-gel. The user 'dials up' a standard



Fig. 2: The Capacitive Unit (CU) 'pen' in use (see text).

resistance unit, applies the 'pen' applicator to circuit board 'pads' between which the 'resistor' is to be formed and gently squeezes down the applicator knob on the top.

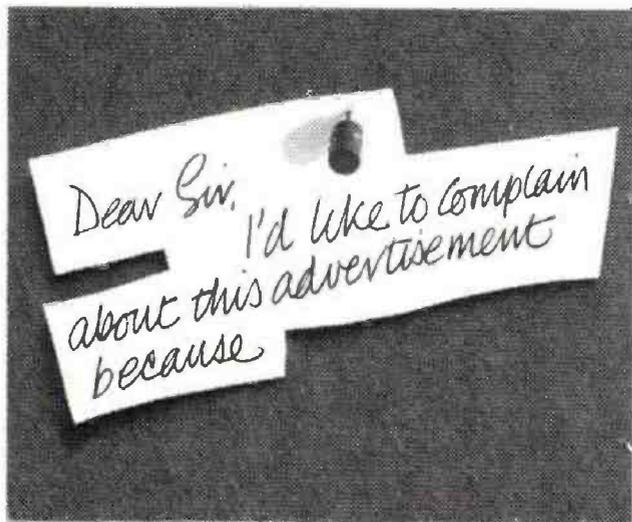
When dry, the resistive unit is gently 'baked' under a low power heating element (old fashioned soldering 'irons' do the job in seconds). However, the 'capacitive' version has to be 'aligned' before baking, by using a permanent magnet so that the magnetically sensitive bacteria coating the minute metal globules contained in the gel can migrate to either end of the unit (to form the capacitive 'plates') leaving a 'gap' in the centre thus forming a CU of anywhere between 1pF and 50µF at up to 50V d.c. working (larger CUs can be formed by successive layers of gel).

The pens are on sale now at 10 Euros each, and contain enough gel for up to 1000 RUs of 1MΩ (correspondingly more for smaller 'resistances' or 1000 CUs of up to 100pF.

PW

(New product 'mention' from *Practical Wireless* in March 2030).

Please direct any correspondence or comments to the PW office in the correct year - remembering to add the relevant space-time-warp code.



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HUNTER/SIX

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I Spy With My Little Set

Ben Nock
G4BXD, one of
our resident
'Valve &
Vintage'
authors,
specialising in
military
equipment,
writes about the
'Spy Set' a set
which, he
claims, has been
a fascination
with "many a
collector and
radio enthusiast
for years".

The 'Spy set' has been the fascination of many a collector and radio enthusiast for years. The idea of operating a clandestine set, hidden from detection, running off batteries with a bit of wire as the antenna, while working the world, is a great attraction to many.

As with most things however, the reality is not as attractive. Operating low power (usually crystal controlled) from batteries, with a bit of wire as the antenna, usually results in frustration and depression when very few, if any, stations are contacted.

The romance of operating as a spy greatly exaggerates the practicality of such operation. It's true that, way back in the dark days of the early 1940s, the operator in the field had less QRM to deal with, less interference from other radio traffic, a nice big home base signal to listen to and the knowledge that their crystal controlled transmissions were being monitored by decent receivers with great big antennas, both his own and the enemies. Their chances of success were a lot higher than someone operating on today's crowded, noisy bands.

However, pushing aside the problems of practicality, let's now look at a few 'spy' sets that you can still press into service and possibly get a contact on these days.

The No. 121 Set

I'll start with the No. 121 set, but I have to admit that I know very little about this set (see Fig. 1). Upon acquiring the example shown, I did ask (in the appropriate circles) for any information anyone else had. I received one reply, from that well known collector **Bob Warner**, who gave me a circuit diagram and a snippet of information about the 121 and the 122 set.

Apparently, the 121 and the 122 set are nearly identical in layout with the slight electrical difference that the 121 is a single band set while the 122 is a three band set. The 121 was supplied in five different versions covering 2.9-6MHz, 4.4-9MHz, 6.6-14MHz, 8-17MHz and 9.4-20MHz. The version I have (the one pictured) is the first model and so covers 3.5MHz with ease. The 122 set covered the range 2.5-20MHz in three switched bands.

The receiver uses three valves in a standard single conversion superheterodyne design, with an i.f. of 470kHz. The transmitter uses two valves, a crystal oscillator and a class C p.a. stage.

In addition to the set box there's a vibrator supply unit operating from 6V, luckily I acquired the vibrator supply at the same time and was surprised to find that, after so long, the thing fired up on application of the 6V. There's also a

hand cranked generator and a spares box containing the usual assortment of accessories, neither of which I have (hint, hint)!

The layout of the 121 is that the receiver is on the left, a multi voltage power supply is in the centre and the transmitter stage is on the right. The p.s.u. can run off 100 to 250V a.c., selectable in 10V steps and over a range of frequencies from a supply of between 40-400Hz.

The 121 in the photograph, though not in its original case, is fairly complete. The case was found at a rally and had once housed a domestic radio. It just happened that its dimensions were correct with about a quarter of an inch extra, so it was purchased, much to the surprise of the trader, to house the 121.

It appears that someone has done a modification to the p.a. stage but this could be undone with ease. With the 6V6 in it at the moment, I get about 11W r.f. out on 3.5MHz into 50Ω.

The date of the set is difficult to guess, though the few printed sheets sent by Bob are dated January 1960. The style of the set does look dated, though I guess that as it was conceived towards the end of the 1950s perhaps that does explain it.

The Blue Brick No. 123

Although the number is amazingly close to the previous set, the two could not be further apart in style and appearance, the 123 far surpassing the 121. The Mk 123 set (see Fig. 2), tuning 2.5-20MHz, bears more than a passing resemblance to the 121 though, it to has its receiver on the left, its multi voltage p.s.u. in the centre and the transmitter on the right.

The receiver this time is a much improved seven valve superhet with an i.f. of 465kHz. An EF72 acts as the r.f. amplifier feeding, along with the local oscillator signal, an EF73 mixer valve. The local oscillator utilises another EF72 in tuned-grid configuration and operates on the high side of the antenna signal.

A stabiliser valve, a QS1202, is utilised in



Fig. 1: The No. 121 Set. Receive tuning dial top left, transmitter on right, Morse key lower right.

Fig. 2: The No. 123 Set. Receive on left, p.s.u. in centre, transmitter on right, Morse key lower right of set.



Fig. 3: The No. 128 Set in a canvas carry case.



Fig. 4: The No. 128 carry case, pockets at each end hold headphones, microphone and leads. Crystal are held in little pockets behind front flap.

the i.o. circuit. The i.f. signal is amplified by an EF73 and fed to the detector valve, an EA76. The bfo, uses an EF73 and the audio output stage an EF73 with a resistive load giving output suitable for high impedance phones. A 'crash' limiter comprising of a pair of semiconductor diodes wired back to back is fitted across the phones connections.

The receiver has a quoted i.f. response of around -10dB at ± 5 kHz. Sensitivity is quoted as around $3\mu\text{V}$ at 2.5MHz, falling to $30\mu\text{V}$ at 20MHz.

The transmitter is a two valved unit, a 5A/163K oscillator/doubler and a 5B/251M or 254M p.a. valve giving up to 25W. An OC71 transistor operates as a side tone generator, the only mode of operation is c.w.

The No. 128 Set

Obviously designed by the same team as the 121/122, the No. 128 set comes in separate units, though. The receiver and transmitter are housed in their own little cases, the various power supplies being external as well.

The usual configuration for the 128 is in its green canvas carry case as pictured (see Fig. 3), the side pockets holding the batteries, headphones, microphones and key. There was also an arrangement where the 128 was housed in a wooden box affair.

The photograph of a 128 installed in a brown leather suitcase (see Fig. 5) is my idea of a spy set and would not have been seen in service. It's just easier and less conspicuous to carry a suitcase around than have a green pack on your back.

The B2

The B2 spy set, or more correctly the No. 3 Mk II, the idol of so many spy films, came in an infamous leather case. This, or so I've been told by an ex-agent, was so self-evident that landladies in the south immediately knew who the clandestine operators were awaiting transportation to a mission.

In addition to the suitcase, the B2 was also supplied in a metal case, ideal for transporting through thick jungle or over mountains after being parachuted in. The transceiver and receiver were in one box, the p.s.u. and spares in another. (See Fig. 6).

As can be seen in the pictures, with the suitcase version the power supply is on the right, spares box on the left and set in the middle. The transmitter has plug-in p.a. coils and the receiver's dial is viewed through a tiny fish eye lens, not the easiest set to use.

While not actually a miniature set, the B2 was however extremely compact, being about 450mm wide by 300mm deep and about 100mm tall, a completely equipped case weighed about 15kg (32lbs), not exactly light. The receiver uses four valves in a superhet circuit while the transmitter uses two valves, crystal oscillator and p.a., a good 30W of r.f. being available.

The power supply was able to run from a.c. mains, between 90 and 250V, or 6V d.c., a vibrator being built in to the p.s.u. chassis.

The vibrator was useful in the event of the enemy cutting the domestic supply in

order to locate the site of the transmitter. Switching over to the d.c. supply could fool the enemy into thinking the set was elsewhere.

Odd Little Receivers

Every now and then, there appears on the surplus market, these odd little 'spy' or clandestine receivers. Little is known about them and little is published, making it doubly difficult to write any really helpful material.

The Mk 301 (see Fig. 8), as it's apparently called, is a real tiny and compact set, this being the right hand one in the photograph. The open box by its side with the battery showing holds that and another battery, about 67.5V or so, supplying the h.t. This box also holds the earphone and antenna leads when not in use, while the lid of the box has a frequency scale set against the dial numbers seen on the set.

The mid 1950's Mk 301 tunes 500kHz to 18.5MHz in four bands, the band being selected by pulling off the coil pack and either reversing it or turning it over. The set has a b.f.o. and provision for attaching a wire antenna and ground lead. Five valves of the D variety are used, one B7G the others being the miniature wire ended type.

A 'drop in' replacement a.c. power supply is available that replaces the batteries in the spares case. In addition to the h.t. voltage, the l.t. is generated and developed across a miniature battery. When not in use, both the a.c. is turned off and the on/off switch on the receiver set to off to stop this cell discharging.

The other set in the picture, Receiver Radio Mk 328 as it is referred to, is a far more modern looking set, actually using transistors this time. This set covers 2.5-30MHz in five bands, has a b.f.o. and a 1MHz and 250kHz calibrator built-in.

A 'screw-in' whip antenna can be used or an external antenna and earth attached. Power comes from a couple of penlight cells, though 6.75V externally, held inside the set or again, an externally connected 10.5-16V supply can be used.

The set is tuned using a rolling film scale which is visible through a small perspex window in the bottom left of the set. A sliding cursor allows accurate frequency setting using the calibrator. It's not known how many of this set, and the 301, were made but this 328 has the serial number 297. PW



Fig. 5: The No. 128 installed in a suitcase, "an ideal spy set"...says Ben.

Fig. 6: The B2 spy set, the transceiver is top centre, the receiver is below, the p.s.u. is on the right side, spares box on left. (Photograph B. Warner).



Fig. 7: The B2 in its metal box version, both boxes had close-fitting lids and were suitable for a parachute drop. (Photograph B. Warner).



Fig. 8: The Mk 301, receiver in the centre, p.s.u. on the right. The Mk 328 receiver on the left with whip antenna.

Many Other Sets

There are many other small, clandestine sets still to mention. These include for instance the MCR1, another receiver only, the 53 Mk 1 receiver, the 51/1 transmitter, the A Mk II and Mk III suitcase sets, the Polish AP4 and BP3 transceivers and the Mark XV receiver and transmitter to name but a few.

There are, of course, many more from other countries. Hopefully, I can continue my research and bring you further information on these and others in the near future.

My thanks go again to Bob Warner for his photo of the B2 and his help in verifying the information used in this article.

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RADIO DIARY

August 13: The Cockenzie & Port Seton Amateur Radio Club are holding their 6th Annual Radio Junk Night at the Cockenzie & Port Seton Community Centre, South Seton Park, Port Seton, East Lothians, Scotland, from 1830 to 2130. Bring along your own junk and sell it yourself. Tables will be provided on a first come first served basis - with no charge for the table. There will be a raffle at approximately 2100 and refreshments will be available. Disabled access. Entry fee is just £1 all persons, with all money donated to the British Heart Foundation. **Bob Glasgow GM4UYZ @ GB7EDN** on (01875) 811723, E-mail: r.glasgow@x400.wins.icl.co.uk or bob.gm4uyz@btinternet.com

August 22: Telford Rally & Computer Fair will be held at Telford International Centre. Opening at 1000 there will be Morse tests (Inc A/B), Bring & Buy, flea market, licensed bar, catering, disabled facilities, special interest groups and trade stands. Exit the M54 at Junction 4 of 5. Talk-in on GB4TRG on 145.550 (S22); GB3TF (RB B) (07887) 893296 (new). Further information from jim@weeddale15.freereserve.co.uk Tel: (01952) 684173 or (01952) 770922. Web site: www.telford-rally.co.uk

August 29: The Milton Keynes ARS Annual Rally & Car Boot Sale is to be held at the Bletchley Park Museum, Wilton Ave, Bletchley, Milton Keynes. Open from 0800 for traders, 0900 for buyers. Museum open with tours. Morse test on demand (bring two passport size photos). Talk-in on S22. Contact **Dave G3ZPA** on (01908) 501310.

August 29: The Torbay ARS are holding their annual rally at Churston Grammar School near Brixham. A wide variety of traders will be present and food and refreshments will be available. Doors open at 1000. Further details from **Peter G4VTO** Tel: (01803) 864528.

August 29: The Coleraine and District ARS will hold its annual Radio Rally in the Bohill Hotel, Cloyfin Rd, Coleraine, Northern Ireland. Full catering facilities available in Hotel. Why not stay overnight and visit the famous Causeway Coast? Doors open midday. All enquiries to **G1BLTB** on (01265) 82393 or **G17TMQ** on (01265) 822502.

August 30: The Huntingdonshire Amateur Radio Rally are holding their rally at the Ermlf Community School, St. Neots, Cambridgeshire (near Tesco Superstore on the A428). Doors open 1000 till 1400 and admission is just £1. Hot and cold refreshments will be

available. Features hall and car boot sale on hardstanding. Talk-in on S22. **David Leech G7DIU** on (01480) 431333 (between 0900 and 2100).

September 5: The Andover Amateur Radio Club are holding their annual Radio Rally and Boot sale at Middle Wallop Airfield near Andover, Hants. Talk in on S22. Tables and further information available from **Jim G4NWJ** on (01980) 610594 or E-mail: liz@countrypursuit.freereserve.co.uk

September 5: The Bristol Radio & Computer Rally is to be held at the Brunel Centre, Temple Meads Station, Bristol. Doors open 1030 till 1600 (disabled entry from 1015). Admission is just £1, accompanied children under 12 free. Features include 150+ tables, large Bring & Buy, under £30 Bring & Buy, refreshments, on-site parking £3.50, also NCP £1 opposite, ATV demonstration and a raffle. Details from **Muriel Baker G4YZR**, Rally Manager, on (01275) 834262 (24hr answerphone).

September 11: The Reddish Rally is to be held at 1000 at St Mary's Parish Hall, Reddish, Stockport. More information from **G4ILA** on 0161-477 6702.

September 12: The Lincoln Hamfest will take place at the Lincolnshire Showground on the A15, five miles north of Lincoln. There will be extensive free parking and overnight facilities for tents and caravans by previous arrangement. There will also be a licensed bar, catering on the day, trade stands, flea market, Bring & Buy, car boot sale and Morse tests. Talk-in on 2m. Other 'non radio' attractions. Admission is £2 per person (under 14s free). **Bob G3VRD** on (01522) 533325.

***September 25/26:** The Leicester Amateur Radio Show will be held at the Castle Donington International Exhibition Centre at Donington Park, Castle Donington, Leicestershire. The hall itself is purpose built and features a floor area approximately one third larger than the two Granby Halls combined, and the car parking is unlimited and free.

October 3: The Great Lumley Amateur Radio & Electronics Society are holding their rally at the Great Lumley Community Centre, Front Street, Great Lumley, near Chester Street. Doors open 1100 (1030 for disabled visitors). There is free parking and easy access, with good, inexpensive food and drink. There will be radio, electronics, computer, satellite and component stalls, plus a Bring & Buy in two sections - junk and good buys. Admission is just £1, free of charge for under 14s if accompanied by an adult. Talk-in. More information on 0191-384 2803 or (01228) 401201 or from the Rally Organiser, **Nancy Bone**, 49 South Street, Durham City DH1 4QP.

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The Editorial Staff of *PW* cannot be held responsible for information on Rallies, as this is supplied by the organisers and is published in good faith as a service to readers. If you have any queries about a particular event, please contact the organisers direct.

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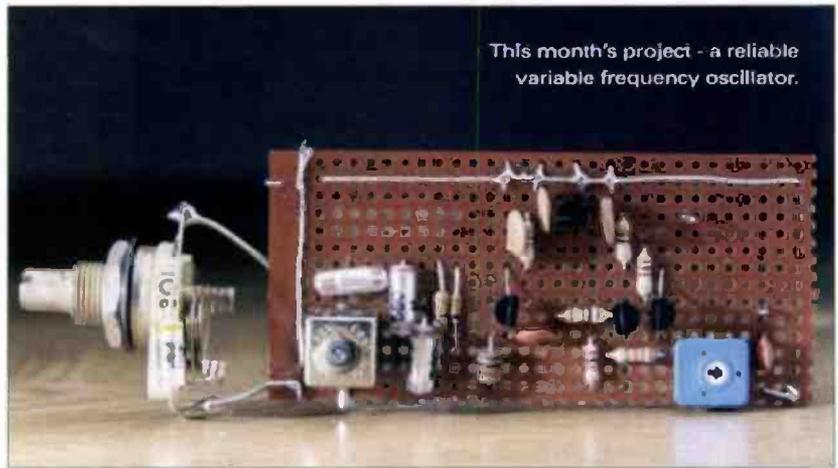
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Don't forget! Morse Tests last Saturday of every month.

Practical Way



This month's project - a reliable variable frequency oscillator.

"A device without an oscillator either doesn't do anything or expects to be driven by something else ... which probably contains an oscillator"
Horowitz and Hill, from their book *The Art of Electronics*

After his usual appropriate quote the Rev. George Dobbs G3RJV describes what he says is a "Reliable and stable variable frequency oscillator".

As the quotation from *The Art of Electronics* suggests, oscillators are a key part of electronics and an essential part of radio communications. We have to get a signal from somewhere! Many simple low power transmitters use a crystal oscillator as their frequency source. Although a crystal controlled oscillator can be varied in frequency as a VXO (Variable Crystal Oscillator), the amount of frequency shift is limited.

Effective transmitters and receivers really require a variable frequency oscillator. These days, in commercial equipment, it's likely to be some form of synthesised oscillator but most home constructors will use a form of free running high frequency oscillator.

Building a stable high frequency v.f.o. is usually recognised as one of the more difficult tasks for the radio constructor. Despite this, it's simple to get a circuit to oscillate at a high frequency, in fact we often struggle to prevent this happening in some circuits!

Stable Enough?

Obtaining a high frequency signal that's stable enough for a transmitter or receiver application is more difficult. After many years of building v.f.o.

circuits, some successful - some not, my conclusion is that the type of circuit used is only part of the answer to stability.

I suggest that:

- A:** Most experienced radio constructors have a favourite v.f.o. circuit: most of these circuits will work well.
- B:** The choice of components for a v.f.o. is important. You should use the best quality parts for the frequency determining parts of the circuit.
- C:** The way the oscillator is built is as important as the choice of oscillator circuit. A v.f.o. must be mechanically stable to be electrically stable.
- D:** There is a limit to the frequency that you can expect to build a free running v.f.o. To this end, I suggest that about 10MHz is the highest frequency the constructor can expect to build a stable v.f.o. Bearing the points A, B, C, D in mind, let's now look at a suitable circuit.

My Favourite Circuit

The circuit of Fig. 1 shows my favourite v.f.o. circuit. Readers who have followed my writings in the past will recognise it. The circuit is the adaptation of the Seiler-type, a parallel tuned Colpitts circuit, oscillator developed by George Hanchett W2YM, in the *QST* for December 1966. It has stood the test of time. In the

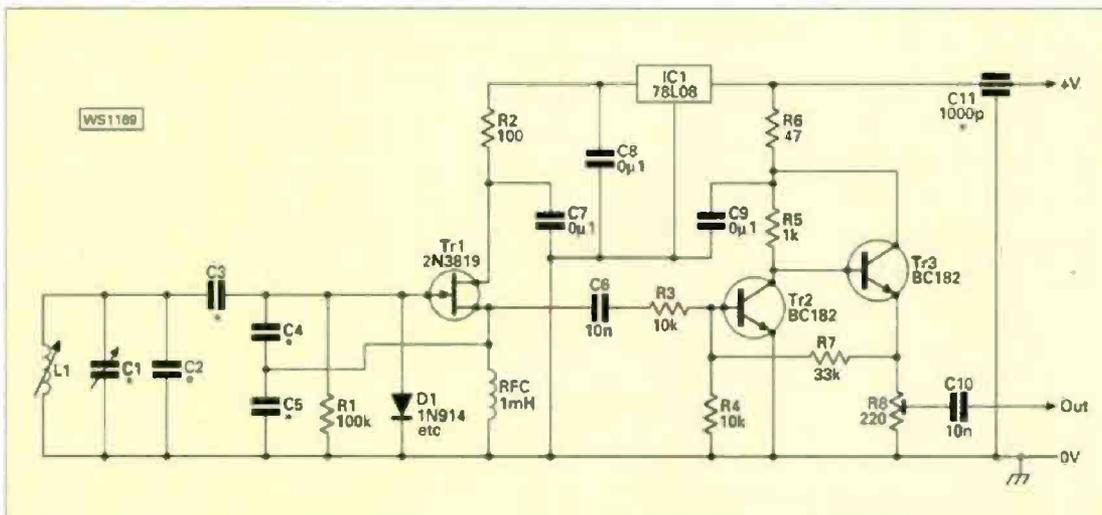


Fig 1: The diagram shows G3RJV's favourite v.f.o. circuit. George says "Those who have followed my writings in the past will recognise it. The circuit is the adaptation of the Seiler-type, a parallel tuned Colpitts circuit, oscillator developed by George Hanchett W2YM, in the *QST* for December 1966. In the original version W2YM used a dual-gate m.o.s.f.e.t. but the circuit works well with a j.f.e.t. as shown here".

original version, W2YM used a dual-gate m.o.s.f.e.t. but the circuit works well with a j.f.e.t. as shown here.

The j.f.e.t. oscillator, Tr1, uses capacitive feedback via C4 and C5, the frequency being determined by the tuned circuit, L1, C1/2. A diode is added to the gate input to provide some automatic bias to aid stability. Any common silicon diode will serve this purpose.

The transistor, Tr1 is provided with a stabilised supply from a three-legged regulator chip. I used a 78L08 type regulator to provide 8V but a 6V supply would also do the job. A 1mH r.f. choke provides the r.f. load in the source of Tr1.

It's essential to use components capable of good frequency stability for those parts which influence the frequency of the oscillator. To this end, C1 needs to be a good quality variable capacitor, perhaps of the sort mounted on a ceramic plate. (The cheap polyvaricon variable capacitors of the type used in domestic transistor radios rarely give good results in a v.f.o.).

Capacitors C2, C3, C4 and C5 need to be temperature stable capacitors. Many books urge the use of NPO types but these are difficult to obtain. Others suggest silvered-mica capacitors, again difficult to obtain these days. However, I've had good results by using the more common, and cheaper, polystyrene capacitors.

Toko Inductor

Some may question my use of a standard 'off the shelf' Toko inductor for L1. The ideal choice is an inductor wound on a cylindrical former without a core that may introduce thermal instability.

One great advantage in using a core is the ability to preset the frequency of the v.f.o. Experience has taught me that using a v.f.o. with a core usually works well, especially if the tuned circuit is contrived so that the core is almost out of the coil when the oscillator is set at the correct frequency.

A common way to get the v.f.o. on the required frequency range is to adjust the amount of capacitance in the tuned circuit. This often involves adding small values of fixed capacitance in parallel with the variable capacitor, but the addition of extra capacitors can also degrade thermal stability.

Swings & Roundabouts

So, here we find ourselves with a case of "swings and roundabouts"! To get over the problems, my usual solution is to hit the required frequency range as near as possible with the variable capacitor and one fixed capacitor (C2) and to use the core to attain the desired low frequency end of the range.

With my approach, the values for C1 and C2 are such that the core is inserted only a very small part of the length of the coil. At the risk of being thought a Philistine I adjust the range of the variable capacitors by pulling off vanes. This is possible by carefully using a pair of thin nosed pliers but probably dedicates that particular variable capacitor for use in the particularly v.f.o. under construction

To help you use them, Table 1 gives a set of what our American friends would call "ball park values" for using standard Toko Coils for the v.f.o. Values up to 14MHz are given but after 10MHz you're on your own!

The values for C1, C2 and C3 will certainly need adjustment to achieve the desired frequency range. Begin with these values and adjust according to need.

The final adjustment is done by using a proper Practical Wireless, September 1999

Band (MHz)	L1 (Toko No.)	C1 (pF)	C2 (pF)	C3 (pF)	C4 (pF)	C5 (pF)
1.8	KANK3333	75	120	560	1000	1000
3.5	KANK3334	75	100	560	1000	1000
7.0	KXNK4173AO	20	47	270	560	560
10.1	KANK3335	25	68	220	680	680
14.0	KANK3335	25	68	68	220	220

Table 1: 'Ball park' figures for using Toko coils (see text).

Band (MHz)	L1 (μH)	C1 (pF)	C2 (pF)	C3 (pF)	C4 (pF)	C5 (pF)
1.8	11.0	200	200	1000	2200	2200
3.5	5.5	120	120	510	1000	1000
7.0	2.9	50	50	250	510	510
14.0	1.4	30	30	120	250	250

Table 2: Associated component values for the 1.8 to 14MHz bands (see text).

Band (MHz)	L1 (μH)	C1 (pF)	C2 (pF)	C3 (pF)	C4 (pF)	C5 (pF)
5.0	3.9	75	75	410	680	680

Table 3: The value may be scaled for other frequencies. This table shows values for 5MHz, suitable for a 9MHz i.f. (see text).

trimmer tool on the core of L1. **Take care - these cores are brittle and easy to break.**

Fixing the core is simple, I use a blob of bee's wax melted on the tip of the soldering iron and dropped on to the top of the core. However, it's possible to make further slight adjustments after the bee's wax is in place.

To help further, Table 2 contains another set of "ballpark" figures for the v.f.o. In these, the inductance values are included for those who wish to wind their own coils. A combined value for C1/C2 is quoted and this will require individual adjustment as described above.

The smaller table, Table 3, is to help you design a 5 to 5.5MHz v.f.o. circuit. This would, of course, be for use with a 9MHz i.f.

Two Stage Buffer

The rest of the v.f.o. circuit is a two stage buffer amplifier, provided by Tr2 and 3. The r.f. output level of this amplifier can be altered by adjustment of R8.

The output of the v.f.o. is at the emitter of Tr3 and is a pre-set control to allow adjustment of the output. The v.f.o. supply is well decoupled including the use of C11 which is a 1000pF feed-through capacitor set into the box which houses the circuit board.

In practice, the frequency determining capacitor, C1, will probably require a reduction drive. My usual solution is to use the small in-line epicyclic drives.

Whatever method of construction is used, the components **must be rigidly mounted**. But 'Ugly' construction works well if there are no loosely mounted parts.

The photograph shows my prototype 7MHz v.f.o. which is built on perf-board. I find this is a good medium for v.f.o. construction but avoid making the layout too tight and introducing stray capacitance between components.

PW

So, get that soldering iron busy and I hope to work you on the bands!

With the Millennium fast approaching, the Editorial team (last month) began looking at books which covered the development of wireless over the last century - specifically valve regenerative receivers. This month, the 'Book Profiles' will continue along this theme and the Editorial team have picked out some real goodies for you.

The following six titles cover a variety of subjects - from one about the secrets of Tesla's radio to those covering Crystal sets and old radio projects and includes one fascinating book on the early use of Radio Photographs and Radio Photograms.

If you're a Radio Amateur who enjoys learning about early radio projects and other historical aspects of Amateur Radio then one of these books could be for you.

Book PROFILES

Radio Tesla - The secret of Tesla's radio and wireless power. **George Trinkaus**

This book is a short (37 page), soft cover format publication detailing the "peculiar radio technology of Nikola Tesla" - in the words of the author, George Trinkaus, himself.

The author uncovers the secrets behind a topic that, he says, is taboo in official science. All aspects of Tesla's work in the field of radio and wireless power are discussed in this booklet.

Some examples of what you will find beneath the covers of this book are: 'High Voltage, Sudden Pulse'; 'Low Frequency', 'Conduction Through The Ground', 'Resonance' and 'Aerial Capacity'. All chapters are, once again, well illustrated. **Good information source.**

Henley's 222 Radio Circuit Designs **John E. Anderson, Arthur C. C. Mills & Elmer H. Lewis**

Henley's 222 Radio Circuit Designs is a reprint from Lindsays Publications Inc.

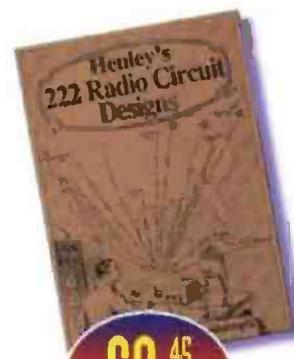
and it contains various circuits with which the radio novice or experimenter can build their own Amateur Radio

equipment. In the Preface to the book, the Editors say that it was their aim to "present the various circuits with their complete electrical design in such a specific manner that the novice can build successfully any of the circuits without any other assistance, and yet in such a manner that the more advanced experimenter can use the book as a reliable reference". This book would, therefore, be useful to both beginners and the experienced alike.

The Editors also go on to say that they have chosen those circuits which are in use daily "with a view of including only typical and practical circuits". Some of the Chapters include: 'Meaning Of Wave Length And



£5.30



£9.45

Frequency'; 'Antennas'; 'Fundamental Coupling Schemes'; 'Coils And Condensers'; 'Simple Crystal Detector Circuits'; 'Simple Detector Circuits Using Vacuum Tubes'; 'Amplifier Circuits' and 'Transmitting Circuits' - to name a few!

The diagrams are fairly clear, if a little small at times, but if you love experimenting with different things then this book could be worth a read. **Recommended.**

Crystal Set Loopers A 3 Tuber & More **Volume 8 Crystal Set Society Newsletter**

Most Radio Amateurs are no stranger to the building and design of crystal sets and because of this, most will have heard of the Crystal Set Society and their newsletters. We featured a lot of them in the Book Profiles in the March edition of *Practical Wireless - Crystal Set Loopers A 3 Tuber & More*, however, wasn't featured in those profiles.

This compilation contains all issues from January 1998 through to November 1998 and is "packed full" of projects and information about Crystal Set radios, mostly dealing with design and electronics issues. In the Preface to this collection the Editor, **Rebecca Hewes**, says that they "focus on simple, old-time, elegant radio circuits that enthusiasts can build from scratch".

Some of the Chapters in



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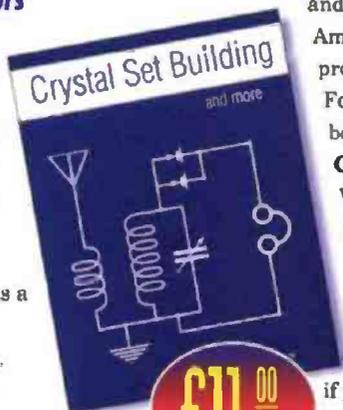
Crystal Set Loopers A 3 Tuber & More include 'An AM/SW Frisbee Crystal Radio', 'Biasing Effects On Diode Performance' (Parts 1 & 2), 'Scott's Bucket 'O Rocks Indoor Antenna', 'Mike's Super-Duper AM/SW 3-Tuber', 'Loop With A New Twist' and much, much more! Intrigued? You should be. This book is definitely worth a read, **Highly recommended.**

Crystal Set Building And More (Volume Six and Seven) Various Authors

With various contributions from different authors, this volume of the *Crystal Set Society Newsletter* has a number of varying topics. Some of them follow the same sort of line as Rob Mannion G3XFD's beginners series 'Radio Basics', for example, 'A Crystal Headphone From A Cat Food Can'.

In this newsletter, **William E. Simes** states: "The instructions that follow are intended to demonstrate just how simple building a functional high-impedance crystal headphone can be ...". He goes on to describe how he uses a cat food can for this project.

Another interesting book from the Crystal Set Society with the emphasis on the building of crystal sets. If you are interested in building a crystal set yourself, this book would be a useful starting point. **Recommended.**

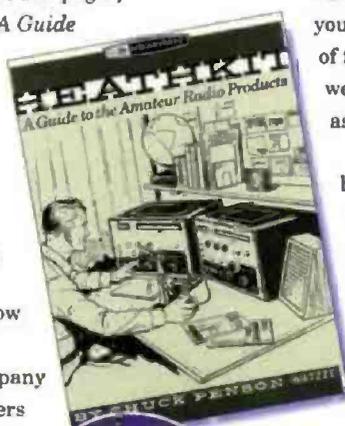


£11.00

Heathkit - A Guide To The Amateur Radio Products Chuck Penson WA7ZZE

This book would be useful to anyone who has an affection for the Heath company and its kits - both its history and their various Amateur Radio products. In the Foreword to his book, the author - **Chick Penson WA7ZZE** - states that "This book is intended to be a kind of field guide, or spotter's guide if you prefer. It is a book to keep in your backpack while roaming flea markets, a book to keep in your shack for handy reference when you work someone running an HW-12A ...".

A fairly hefty book consisting of 248 pages, *Heathkit - A Guide To The Amateur Radio Products* covers nearly everything which you need to know about the Heath company - Its Chapters include: 'A History Of The Heath



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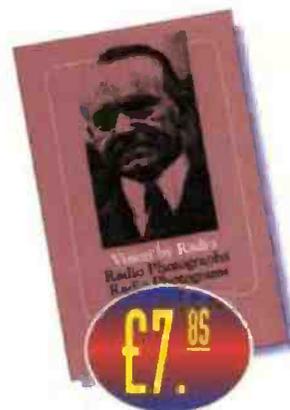
Company'; 'Buying And Collecting Heathkits'; 'A Guide To The Amateur Radio Products'; 'Heath Master Product Index By Model'; 'Heath Master Product Index By Type'; 'Product References' and finally, 'Product Timelines'. *Heathkit - A Guide To The Amateur Radio Products* contains a lot of useful information and is well illustrated with pictures of their products.

Recommended.

Vision By Radio • Radio Photographs, Radio Photographs C. Francis Jenkins

Vision By Radio is a **Lindsay Publications Inc.** reprint of the original which was first published back in 1925 and looks at the first pieces of equipment capable of sending photographs and pictures by wire and radio and is, if you like, the beginnings of facsimile - and what we have come to term as FAX.

This fascinating book covers various elements of the origins of sending photographs via wire and by radio and contains some of the fascinating first experimental pictures and pieces of text which were sent electronically.



£7.85

It contains descriptions of various designs such as: the Amstutz System; the Electrograph; the Baker machine; the Dr. Korn machine; the Rignoux and Fournier Scheme; the Belin machine; the American Telephone & Telegraph Company Machine and many more.

Another aspect that this book focuses on is 'Radio Vision' in which the author describes some of the machines used in the development of Radio Vision and Radio Movies for the reception in the home of broadcast studio performances. The author gives the following examples: "dancing girls; public speakers; pantomime; marionettes; motion pictures and, by remote control, outdoor events, sports, etc.". This book is a fascinating read and contains some very interesting photographs and diagrams. **Highly Recommended.**

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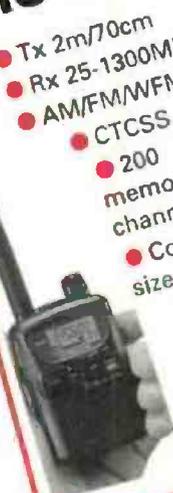
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antennas in action

welcome to AiA!



Hello and welcome to the September 1999 Antennas-in-Action, our bi-monthly column of ideas, designs, news and reviews of antennas, accessories and book covering all these topics.

917EX

News Releases

I've had several news releases in from Procom A/S of Denmark, suppliers of high quality antennas, measuring equipment and accessories. I've had three sheets of antenna details about their CXL range of antennas, for use in the 150, 450, 900, 1800 and 2400MHz bands. Procom can also supply a vast range of connector adapters to match other plugs and sockets to the FME style of connector, there are 21 variations shown on the second leaflet.

Duplexers for use around 150MHz are shown on another leaflet, featuring the DPF2/1,

DPF2/6 and MPX2/6 range of compact units. Various models cover the range of 138 to 175MHz range with a duplex spacing of 4-10MHz (4-15MHz on the MPX2/6) the units have maximum r.f. input of 50W. The various duplexer units also feature a band rejection of 60-90dB (depending on the model) while claiming an insertion loss of less than 1.5dB.



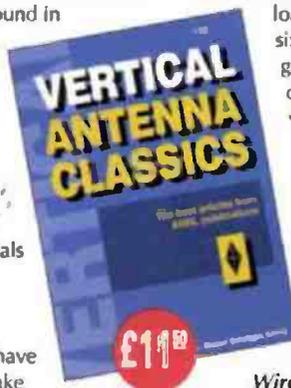
Another leaflet describes the Procom SWR 3000 antenna analyser that covers 30-2700MHz, with a graphical display showing the s.w.r. of the antenna (over a range of frequencies) attached to the N-type test socket. A small keypad controls all functions and ranges. For more information about these or other contact Procom A/S direct at Vinkelænget 21-29, DK-3330, Gørlose, Denmark. Tel: (+45) 48 27 84 84. Or you can contact their UK agent Communication Technical Services Ltd., Unit 15 The Gatwick Metro Centre, Balcombe Road, Horley Surrey RH6 9CA, Tel/FAX: (01293) 822602.

Two Books

Now to have a look at two books for you. The first book is from The ARRL 'stables' in the form of

Vertical Antenna Classics

compiled and edited by Bob Schetgen KU7G. This large-format book contains, within the six chapters, reprints from the best articles to be found in other ARRL publications. The chapter headings are: 'Theory and Modelling', 'VHF and UHF', 'HF', 'Reduced Size' and 'Radials and Ground Systems'.



£11.95

If like me you have struggled to make sense of one of the antenna modelling software packages (like MININEC3, ELNEC and MN), then the first chapter of this book is required reading. In the last five pages of this chapter, there's a good grounding (pardon the pun) on MININEC, its strengths and limitations in use. Then follows three chapters of practical vertical antennas, using a variety of materials including copper water pipe.

In chapter two there are nine subsections giving a variety of antennas for use in the 144 and 430MHz bands, although the antennas and references to the 220MHz band are superfluous to the UK and Europe. One interesting design that I might 'have-a-go' at is a vertical wire Extended Double Zepp (EDZ) for the 50MHz band. (although I'll probably modify it for the 144 or even the 430MHz band). Chapter three does a similar job covering h.f. with eight sections this time.

Chapter four has five subsections on directional arrays including steerable arrays for low band work, phased arrays and using the guy

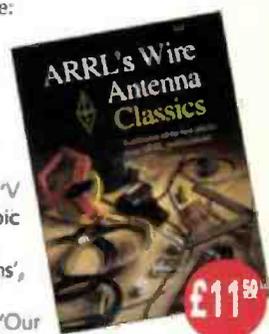
wires on a vertical to give an directional gain ability. Chapter five shows you how to reduce the overall height of an antenna by either 'capacity hat' or loading coils while chapter six deals with radials and ground systems, subjects often 'forgotten' about in vertical antennas. All in all, I think it's an excellent read, packed with details.

Second Book

The second book, also from the ARRL is another compilation offering. The ARRL's

Wire Antenna Classics, compiled by Chuck Hutchinson K8CH, has ten chapters and presents quite a few h.f. antenna designs that are very unusual. The chapters are:

'Dipoles', 'Multiple Dipoles', 'Loop Antennas', 'Collinear Antennas', 'V and Rhombic Antennas', 'Wire Beams', 'Vertically Polarised', 'Our Friend The Tree', 'Receiving Antennas' and finally 'Antenna Ideas From W1JF'.



£11.95

There are over 100 pages of ideas and designs in this new book, including more information on the EDZ described elsewhere on these pages, how to make traps for wire antennas, how to increase the bandwidth of a 'simple' dipole, 'V', inverted 'V's and 'V' beam antennas, 'J' and multiple 'J' poles (?). There are Delta Loops and 'Curtain' antennas, Slopers and quad antennas, Quarter waves and Inverted 'L's and of course ... how

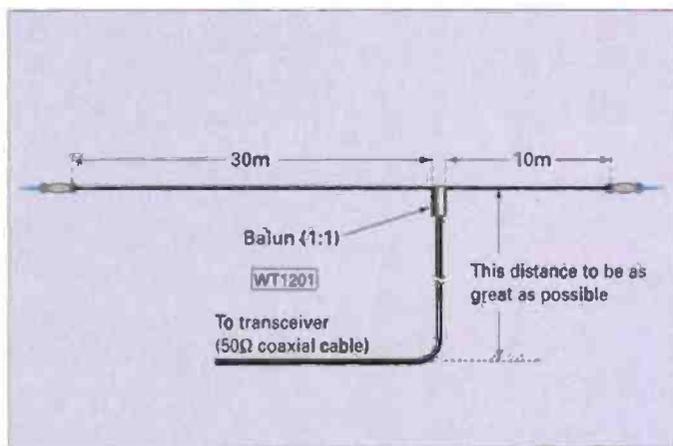


Fig. 1: An asymmetric (or 'crazy') dipole for 7MHz.

to use trees in your antenna system.

Much thought and hard work has gone into compiling ARRL's *Wire Antenna Classics*. For instance in chapter two on Multi-band Antennas there are nine articles dealing with antennas covering more than one band, including a very good description by 'our own' Louis Varney G5RV about the antenna bearing his callsign. There is also a very interesting section on making traps that resonate on two bands at the same time.

In Chapter Nine 'Discussing receiving antennas', there are many antenna ideas worth looking at. Although if you intend putting up a Beverage antenna for 'Top Band', you'd better make sure you have a lot of space. Although more modestly, for listening to the 1.8 and 3.5MHz bands, the 6.5m square K6STI receiving antenna with a 20dB amplifier works well, having a good noise rejection capability. The ARRL's *Wire Antenna Classics* is excellent reading, and very tempting to try new antennas that are both cheap to make and easy to put up.

Crazy Dipole

I've received a letter from Bill G3XZF, who says "Here's an item for your 'Antenna Workshop', the 'Crazy Dipole', or to give it the more correct name, an asymmetric dipole for the 7MHz band. Some years ago I put together the illustrated antenna which works a dream. If you imagine a normal dipole cut, for say 7MHz and that consists of two element, each a little over 10m long" (as shown in Fig. 1).

"To one side of this antenna I

added double the length (20.2m) and I found that the feedpoint impedance had become almost exactly 50Ω, giving a very low s.w.r. Needing only a little adjustment of lengths to get even better. To make use of a coaxial cable feeder, I decided to fit a 1:1 balun (for which there are details enough in the various magazines and books) at the feedpoint. Slight changes of dimensions may be needed to give the lowest s.w.r. at your location".

"So, after putting the antenna up, I set the dawn clock, waking up at 05:58 before it went off. I made a pot of tea and settled down to call 'CQ USA' on the c.w. section of the 7MHz band with about 80W coming out of the set. To my surprise, the first answer was from the California area (although it shouldn't have been a surprise, as it was still evening there after all). So, as you can see the antenna works well. It also works well on



Fig. 3: The EDZ running alongside and to the left of the R5 Vertical antenna.

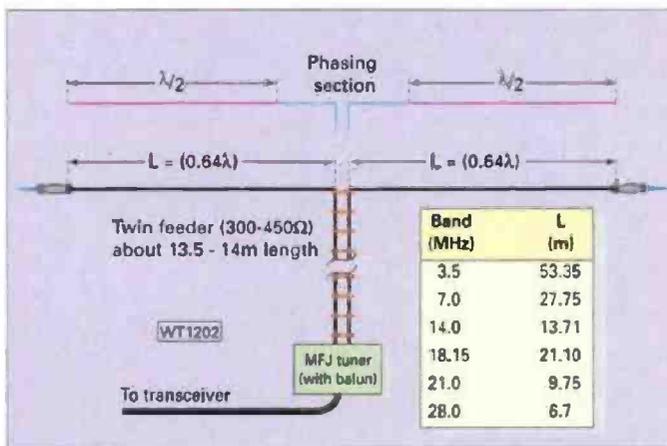


Fig. 2: G3HUT's Extended Double Zepp (EDZ) antenna. See text for details.

21MHz - but that's another story".

Another Wire Antenna

Thanks Bill, and another wire antenna type letter I've had was from Mike Doubleday G3HUT saying that he'd seen an article by G40BE in a recent journal about a variant of the original single radiating element Zeppelin or 'Zepp' antenna. The design had been 'stretched' or extended to become what we now know as an 'Extended Double Zepp' ('EDZ'). Mike says that having operated, with a fair amount of success, on most bands with an h.f. EDZ for many years, readers might like more information about this antenna that may be used to work any or all of the 3.5 - 28MHz bands but may be restricted by the size of the location.

Mike suggests taking the dimension for the EDZ antenna, as given in antenna books, but by concentrating on the higher bands,

you can provide an 'all singing and dancing' antenna that works on most bands, but with a maximum horizontal top of just over 22m. Mike says he started by designing his h.f. EDZ for 18MHz (originally calculating the overall top length in Imperial measurements). For a frequency of 18.15MHz, he says he arrived at a measurement of the top elements of 22.45m. The EDZ, at its design frequency exhibits approximately a 3dBd gain (reference to a halfwave dipole) in a radiation pattern with two major and four minor lobes. But, surprisingly, as Mike says, he's found it will also perform usefully on several bands lower in frequency.

Mike says he makes no claims of originality for this EDZ design (shown in Fig. 2), but says "I have merely collated information over many years and then set about to prove that, in the main, the system works well. My findings have been supported by W7KMZ who, having been given my basic parameters such as real ground conditions with average conductivity, type and gauge of wire used, height, and actual description of the design of the EDZ carried out a computer analysis (using ELNEC version 3.08) of the design.

"From the analysis and with the antenna centre fed with 300 or 450Ω ladder line, W7KMZ has had 'predicted' results (lobe pattern analysis derived from computing gain, take off angle, heights, beamwidth, degrees, slope and angle, etc) that agree quite well with my findings. The 21-page analysis is rather complicated to read and far too lengthy for this article, since the results were not only confined to the 21MHz EDZ but included all other bands 3.5-

antennas in action

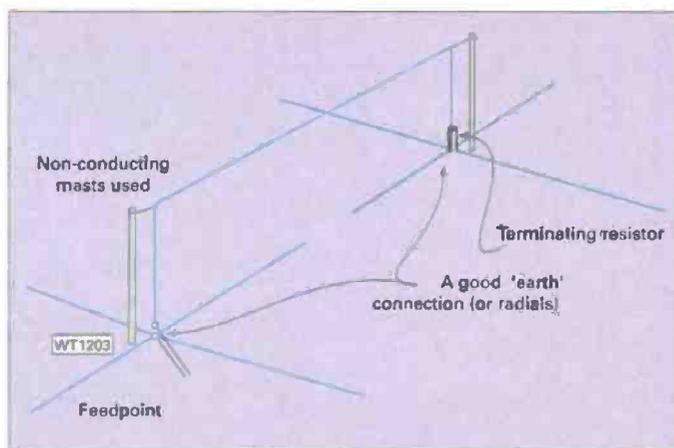


Fig. 4: A representation of an antenna proposed by VK2BUA (see text).

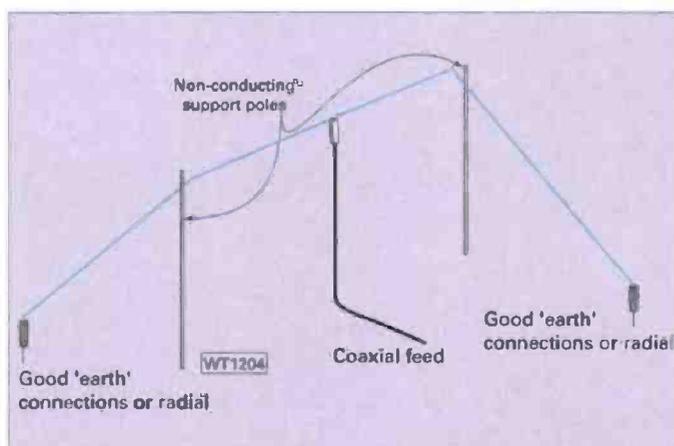


Fig. 5: A representation of centre-fed wide-band antenna, again by VK2BUA (see text).

28MHz at different heights. Mike went on to say "There is nothing magic about the EDZ (Mike's EDZ and R5 are shown in the photo of Fig. 3. Ed.), it is a well tried and true dipole that offers useful gain at its design frequency and good multiband performance. My experience has shown that depending upon the power being used, either 300 or 450Ω twin feeder may be used utilising a suitable balun if necessary. Of course, depending on the space available, the lengths shown in the table will give some idea of the design length for the centre of different bands. A feeder length of 14.5m a good compromise to start with and the best form of coupling (series/parallel) can be found by reference charts or by experimentation".

Magical Mirth

A letter from Colin Topping GM6HCW, 'Master of Magical Mirth' is how Colin signs himself (he's an amateur magician), but there's nothing funny about his

idea for his earthing system that he describes in his letter. Colin says "The best way I have found of 'grounding' my h.f. receiver is to use a length of 22mm diameter copper waste pipe with several holes of around 5mm diameter drilled into it.

"Once the pipe has been knocked into the ground and connected to the radio via a suitable wire, pour water down through the pipe. The holes in the pipe allow the water to seep out and so improve the overall earthing effect. The pipe requires to be 'watered' every now and then, more so in dry weather. Ordinary table salt could be added to the water, but not if it's situated in the middle of the prize flower bed".

A good idea Colin and a method that has been used in many situations before. However, the effect of the 'earth' does depend heavily on the actual soil in the garden itself I've found. My own property is on a very dry sandy soil with an almost infinite earth

resistance reading (or so it seems) but the method described by Colin does work for a receiver. I'm less sure about its effectiveness for a full legal amount of r.f. though.

I would imagine that a combination of the 'earth rod' that Colin uses and several counterpoise elements attached to the ground rod itself and taken around the garden just under the surface of the soil (flower bed or lawn) should prove rather better for a transmitter. But as I've said before, unless you on a VK2BUA Web site page (see text). try it in your location you cannot say if it's really going to work or not!

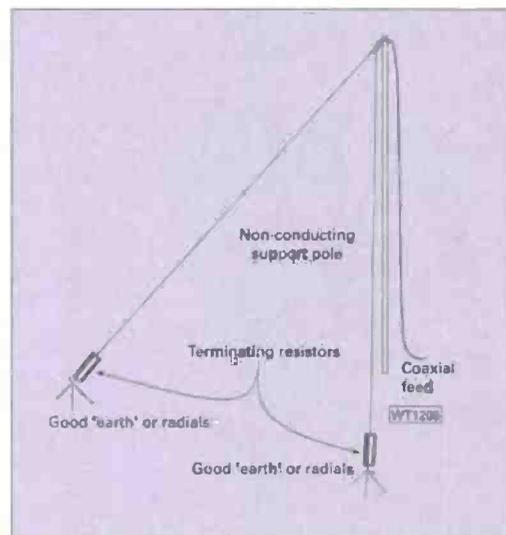


Fig. 6: A terminated 'V' sloper similar to one found before, unless you on a VK2BUA Web site page (see text).

Antipodean Wires

The Internet is a wonderful place for finding things, and I found some 'Antipodean' wire antenna ideas on a website for the Australian company Philip Collins & Associates Pty Ltd of Sidney Australia. On one of their pages called 'HF Broadband Wire Antennas' by Marc Robinson VK2BUA makes a few ideas available for you to try out 'at home'.

Marc starts the pages "Early in my training I was taught that an antenna must be cut or tuned to a quarter wave resonate length, or a

multiple thereof, if it is to radiate efficiently. That statement still holds true, but we can bend the rules and trade a bit of the efficiency for bandwidth when we need it. Such is the case with the lengths of wire described here. All are proven in commercial installations I have engineered 'here and there' on my travels".

The actual graphics within the Web page would not reproduce too well, so I've drawn a representation of them in Figs 4, 5 and 6. The designs are mainly terminated wire antennas, a system that improves the bandwidth, somewhat at the expense of efficiency. But go and have a look for yourself at their website <http://www.pca.cc>

Webwatch

Philip Collins & Associates Pty Ltd. (Australia)

www.pca.cc/ANTENNAS/BROADBAND/broadband.html

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Well that's all I have room for this issue, I'll see you in the November issue again.

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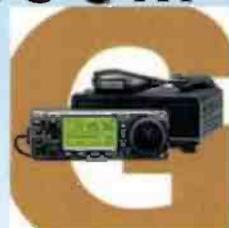
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The selection of PWs from 1950s and 1960s on the 'shop' counter tells us that it's Phil Cadman G4JCP in charge this month. And, resplendent in the shopkeeper's traditional sandy brown dustcoat, is that a B9A based valve he's holding in his hand?

Warm greetings from an even warmer G4JCP (The Midlands are experiencing one of those rare hot spells as I write). However, before moving on to my main topic, I'd like to mention some readers' letters on a subject I covered last time - low voltage valves. The first letter came from **John Hodgkins G3EJF** and concerns the ECH83, a low-voltage mixer/oscillator. John tells me he has distinct recollections of replacing ECH83s with ECH81s, the mains-voltage equivalent.

Not every ECH81 worked, John says, but that didn't matter - he had a plentiful supply of ECH81s and no ECH83s! Apparently, this unofficial substitution may have given rise to the story that ECH83s were simply specially selected ECH81s.

The EBF83 - a low-voltage i.f. amplifier - also has a 'mains' equivalent in the EBF89. John cannot remember whether he ever made this substitution, but considers it to be worth trying.

A Sceptical G4JCP

At first I was rather sceptical about John's claim about the ECH81. However, consulting my battered old *Mullard Maintenance Manual* I was surprised to find that the inter-electrode capacitance of both the ECH81 and the ECH83 are the same but for one small discrepancy.

A strange finding! If the valves are physically different - a reasonable assumption considering the operating voltages are so dissimilar - I would have thought the capacitance in either valve would be different too.

Even more surprising was the comparison between the EBF83 and the EBF89; they have identical inter-electrode capacitance so it seems! Well, now I have suspicions too.

If anyone else has heard about the substitutions, or knows anything about the manufacture of low voltage valves, can they please write and tell me. Meantime, I shall soon (with luck) be in possession of a genuine valve tester. Then I can check the story out for myself.

Hybrid Design

A letter sent to **Jack Spratt G3KWG**, who had a rather nice hybrid communications receiver design published in the September 1962 issue of *Short Wave Magazine*, elicited a most interesting response. His rather professional looking design used ECH83s for all functions except for the audio driver and output stages.

My feeling that the receiver was not simply a one-off amateur project was confirmed when Jack told me that it was based on a commercial design he did back in 1960. The set was part of a type-approved marine radiotelephone for fitting to merchant ships and small craft under 1600 tons. Marketed as the A20 by Ajax Electronics Limited, some 200 of the design were sold. Unfortunately, Jack doesn't have one.

The performance of the receiver was 5µV for 20dB signal to noise ratio at 30% modulation. (The receiver was designed for a.m.). Intermodulation and cross modulation, etc., performance was never measured, but the receiver was good enough to coexist with the 10-20kW pirate radio stations that were then operating in the Thames Estuary!

Before reading Jack's letter I'd not thought of a maritime use for low voltage valves, yet operating from small craft clearly has parallels with operating from a vehicle. Although the A20 was made obsolete by the eventual change to s.s.b., Jack has heard that some are still in use. I wonder, has anyone got one for sale?

On a related point, **Dr. Godfrey Manning G4GLM** (of SWM 'Airband' fame), sent me a note about making a list of commercial hybrid radios. So, silly me agreed to do one; just those listed in the *Radio and Television Servicing* series for now.

Actually, I was surprised to find so few, a little over 20 basic designs and that includes both car radios and battery portables. If you want a copy of the list just send an s.a.e. direct to me.

By the time you read this it should be on my Web page at www.oldpark.demon.co.uk and then follow the 'Valve and Vintage' link. Any hybrid set that you know of that isn't there, please send me the details and I'll add it to the list.



Fig. 1: One of G4JCP's new acquisitions is a Ferguson 3202. There were several variants of this model in both two-track and four-track forms (see text).

Godfrey also commented on the OC82/OC82D transistors found in one hybrid car radio I mentioned. This little-known combination was popular for a short time but was quickly superseded by the better specified (and ultimately very popular) OC81 and OC81D.

Tape Recorders

A chance encounter at the Three Counties Radio and Computer Rally, held in Worcester a few weeks back, put me in touch with an old friend and his wife, both now retired. Long time readers of *PW* who live, or once lived, around Dudley will remember **J. Arthur Parkes** and his wife **Freda** who used to run a small but popular radio and TV shop in the town.

A frequent source of components and advice when I was in my late teens. (Arthur and Freda were also well known for having two gorgeous daughters).

Editorial comment: Here it should be noted readers that G4JCP is a very eligible Bachelor - and not so bad looking himself!).

Arthur just happened to be selling some of his old equipment which included several valved tape recorders. At last I was able to obtain a tape recorder (two, actually) on which to play back my old reel-to-reel tapes.

My original - and very much worn-out - tape recorder was disassembled long ago and the components used to make a valved audio amplifier. Which still works, by the way!



Fig. 2: The other tape recorder recently acquired by G4JCP is an Elizabethan LZ29/L. Incidentally, Elizabethan was the brand name of a well-respected independent tape recorder manufacturer who was proud enough to tell purchasers where the tape recorders were made - via the inset badge. (See text).



Incidentally, Arthur was also quite familiar with the ECH83/ECH81 story too.

One of my new acquisitions is a **Ferguson 3202**, see Fig. 1. There were several variants of this model in both two-track and four-track forms. The basic design was also marketed under the **HMV** and **Ultra** brand names.

The other model is an **Elizabethan LZ29/L**, see Fig. 2. Incidentally, Elizabethan was the brand name of well-respected independent tape recorder manufacturer who was proud enough to tell purchasers where the tape recorders were made - see the badge in the inset of Fig. 2.

Recorders Neglected

Valved tape recorders seem to be rare and sadly neglected these days and yet they were very popular from the early 1960s and on into the 1970s. After that, transistors and the compact cassette took over.

Sadly, unlike most valved equipment, tape recorders are very much mechanical items and time does not treat bearings, belts, pulleys and idler wheels at all kindly. These recorders were very much the cam-corders and video recorders of their day, particularly amongst teenagers.

I was not alone in recording unsuspecting aunts who flatly refused to believe that it was their own voice they were hearing! For many people listening to these recorders this was the very first time they'd heard their own voice being played back. Unlike our visual appearance - we all know what we look like - our recorded voices differ greatly from the sound we hear as we speak.

Restoration Difficult

Restoring old tape recorders can sometimes be difficult. The electronics are usually easy to fix but the mechanics can be quite a problem. Rubber and other similar compounds can deteriorate to the point where a recorder is rendered useless for want of a new belt or idler wheel.

Any recorder - particularly if substantially free of any mechanical defects - should be stored in a cool dry place, and treated with more than a little respect.

If you want to get involved with valve tape recorder restoration and repair, the book which is a 'must-have' is the **Tape Recorder Servicing Manual** by **H. W. Hellyer**, see Fig. 3. First published in 1965 by George Newnes Limited, it's a collection of circuit diagrams and servicing notes on just about every domestic tape recorder marketed up to the mid-1960s.

The book also has a general introduction to tape recorders, tape recording and microphones. Long out of print, a copy occasionally turns up at book sales. And your local library might just still have one - so it's worthwhile asking.

When Cleaning

When cleaning tape heads and guides, use solvents specifically intended for the purpose. The stuff for cassette decks is fine. Use either a purposely designed applicator (which are, unfortunately, not commonly available) or cotton wool buds.

If at all possible, deflux (de-magnetise) the tape heads and guides **before** playing back (or recording) any tape. Magnetised heads can cause loss of high frequencies and even partial erasure of your irreplaceable recordings if severe. Having said that, I don't know of any suitable head defluxer that's readily available*.

Editor's offer of help: As a keen tape-recording enthusiast with a large collection of reel-to-reel machines I have a 'head de-magnetiser' myself. Any reader wishing to borrow it can do so by contacting me at the office. **G3XFD**.

Any lubricant should be used very sparingly. Take great care to keep oil well clear of **all driving surfaces**.

Initially check play, fast wind and rewind functions with an old tape. Brakes can snatch (or not work) and even modest strain can easily snap the old acetate recording tape. If that happens you'll need a splicing kit - if you can find one.

De-magnetised scissors and **Scotch Magic Tape** might provide an acceptable short-term substitute to a proper splicing kit. But don't be tempted to use ordinary adhesive tape.

Recording Tape

Now we come to the recording tape itself. Old acetate tape becomes brittle with age so care is needed at all times. Modern tapes with later types of backing - polyester and pvc - should still be in good condition and remain quite strong.

However, there is one problem that affects even modern tapes. It's to do with the binder, the 'glue' that sticks the tiny particles of iron oxide to the plastic backing.

To be fair, the binder problem mainly affects professional and semi-professional tapes which have a matt-black back, rather than the domestic varieties that have a traditional 'shiny' back. But it can occur with any tape that hasn't been stored correctly. It's called **sticky shed syndrome** and tape manufactured from the middle of the 1970s through the early 1990s is most at risk.

Unfortunately, under anything but controlled low humidity storage, the polyurethane used in the binder has a tendency to absorb water. The water reacts with the urethane molecules causing them to migrate to the surface of the tape. As the tape passes the heads and guides the molecules rub off and 'gum up the works'. You'll know you have a problem when the tape starts to squeal and slow down!

Fortunately, sticky shed syndrome due to water absorption is almost always fixable, although the fix only lasts about a month under normal storage conditions. This miraculous fix is commonly known as 'baking a tape'.

The idea is to expose the affected tape to even heat - around 54°C - for about four hours and then let it slowly cool back down to room temperature. Baking a tape can be done several times but really you should copy the tape soon after treatment and then store the original tape in an airtight container with some desiccant. **PW**

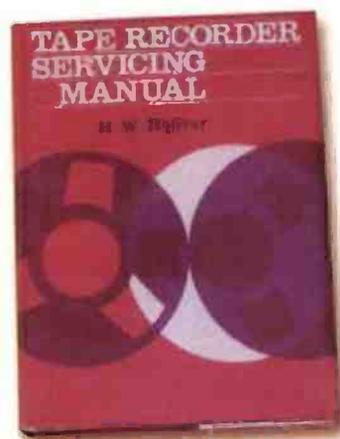


Fig. 3: This book - practically a 'classic' on the subject is now out of print although some libraries may still stock them (see text).

Sounds Ridiculous?

If all the tape problems sounds rather ridiculous, I assure you it's not. I've long had a big problem with some of my half-track stereo tapes!

Last year I 'borrowed' our domestic electric oven (WARNING: don't try this with a gas cooker) for a few hours to bake my tapes. The process worked and so I hastily copied their contents onto compact disc. Now everything is fine. That is, until someone finds a problem with CD longevity...!

Oops, I see my own tape's run out. 'Better say cheerio until it's my turn 'in the shop' again. Please send your comments and letters to me either via the **PW** offices, via E-mail to phil@oldpark.demon.co.uk (no, I've not changed my ISP - yet) or direct to: **21 Scotts Green Close, Scotts Green, Dudley, West Midlands DY1 2DX.**

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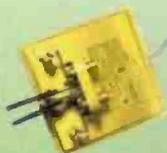
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Red Sprites & Blue Jets

Patrick Allely GW3KJW investigates the theory of Sporadic-E, the 'E'-layer and the part played by 'Red Sprites' and 'Blue Jets'. Haven't got a clue what he's talking about? Read on and discover some possible reasons as to why v.h.f. signals can all of a sudden appear at "enormous strengths from exotic lands at seemingly impossible distances".

No, this article is not just another title for a musical version of *Romeo and Juliet*, nor *A Midsummer Night's Dream*, but a genuine source of investigation for v.h.f. enthusiasts - a chance to finally solve one of the greatest propagation mysteries of all time. I refer to the enigma of Sporadic-E (Sp-E) propagation, that wonderful engine which causes v.h.f. signals to appear at enormous strengths from exotic lands at seemingly impossible distances.

Many of us will have sat and wondered as 144MHz, for no apparent reason, has changed from a dead band which was occupied by only a few faint beacons and an awful lot of local Packet radio, to a band which has suddenly burst into life, with strong signals coming in from Greece or Hungary, Malta or Romania. Signals that have lifted out of the noise threshold to S9 plus and remained so, sometimes for hours on end, at other times merely for a few minutes.

Most of us will know what's happening - "it's Sporadic-E propagation" - we tell ourselves, we know that at about 90km above the earth the 'E' layer is reflecting v.h.f. signals without causing much attenuation to them and that these signals are quite choosy where they land. You might hear and work someone in Slovakia, whilst 20km down the road, your friend is hearing nothing from Slovakia and thinks that his antenna must have become faulty.

But do we really know what is happening? As far back as 1932, Professor F. E. Terman, Dean of the School of Engineering at Stanford University and assisted by three fellow professors, wrote his famous book *Electronic & Radio Engineering*. In it there's a short

Fig. 1: A map showing three contacts being made at the same time between Wales and Spain, The Netherlands and Portugal and Ireland and Italy. The paths of the individual contacts cross the same point where Patrick GW3KJW suggests that there are a series of thunderstorms taking place.

description of Sporadic-E (just one paragraph in fact) where he states: "The occurrence of Sporadic-E is quite unpredictable; it may be observed both day and night, The cause of Sporadic-E ionisation is still uncertain".

We've not made great progress into understanding this mode of propagation in the intervening years, but I believe that we are now much closer to understanding and, perhaps, predicting more accurately how and when Sporadic-E propagation will appear.

What Do We Know?

Now what do we know about the E-layer? Well, we know that between 90 and 130km above the earth, there's a layer of gas molecules (nitrogen and oxygen mainly) which will ionise under certain conditions, giving off light and capable of reflecting electro-magnetic energy. We also know that this layer is constant in height, is not greatly affected by the sun and is present both day and night. (Terman was right on this point).

How do we know? The quick answer is that we can see it, or at least we can see its effects. I refer to the *Aurora Borealis* (and *Aurora Australis*), the *Northern Lights*, the effect of the solar wind passing through the earth's magnetic field and ionising the gases, roughly above the Arctic and Antarctic circles.

There, at roughly 90km above the earth, exists ionisation and v.h.f. signals will reflect off this ionisation. We can see it, we can hear it on our radios and it happens both day and night.

We also know that, following certain predicted meteor showers, we can work long distances on v.h.f. via the E-layer. This is because the individual (minute) meteors, which vary in size from a grain of sand to the size of a pea, strike the gas molecules at speed, thereby causing these molecules to ionise and reflect radio signals. (This happens at any time of the day or night, totally independently of the position of the sun and there again we can, during the hours of darkness, see the effects of these collisions as well as hear them on v.h.f.).

Just think, the next time you see a shooting star, a local amateur may be making a 2000km QSO on 144MHz via that same meteor trail! Incidentally, the average size of a meteor trail is 1.6km (1 mile) wide and 32km (20 miles) long and that's from a piece of material smaller than a peal

What About Sporadic-E?

However, you may ask "But what about Sporadic-E (Sp-E)?" Well, let's consider the 144MHz band. From records kept over the years, we know that contacts via Sp-E start roughly in May and end usually in August, with a peak during the month of June. There are exceptions, though, openings have occurred both earlier and later, but generally speaking May to August is the period.

An interesting phenomena is that the openings rarely happen during the hours of



“Could it be that these Blue Jets and Red Sprites, with their enormous charges of energy, have the power to affect the gas molecules in the E-layer? The energy is such that almost continuous ionisation could take place as long as the thunderstorm was in being. This could account for the Sp-E openings that last for some hours whilst others just last a few

darkness and seem to peak around the late afternoon period. For those of us living on the fringes of Western Europe, these openings enable us to make contacts with stations more than 800km and sometimes up to 2000km away in all directions except to the West. There's a 'skip' distance of about 800km, which precludes us working these shorter distances via Sp-E.

We can now deduce that because we have a skip distance, we must have an angled reflective signal with a chordal hop of about 2000km average. This places the reflecting layer at about 90km or so - our mysterious E-layer - but what's now exciting it and then exciting us?

One way of attempting to unravel the enigma is to study the paths and directions of known contacts, who was working who and when. To help, I offer a number of contacts based on some of my own QSOs.

One afternoon in June, I was working Italy and Yugoslavia on 144MHz via Sporadic-E propagation. This had been going on for about one hour when suddenly the propagation stopped, as if a switch had been turned off. Then, a few minutes later, the band opened up again, but this time the signals were coming from Southern Spain only. What had turned the switch on and off and also altered the direction of propagation?

Another time, again in the afternoon on a fine June day, there seemed to be a great deal of Sp-E propagation. I was working stations in the Barcelona area of Southern Spain and not hearing signals via E-layer from any other direction. A near neighbour in Ireland (I live on the West coast of Wales), was working northern Italian stations, I could hear him but not them and I later found out that at exactly the same time, a friend in the Netherlands was working stations in Portugal!

The lines drawn between these points of contacts would converge roughly in the same area over northern France and, believe it or not, a thunderstorm was taking place there at that time. Similarly, with other Sp-E contacts I've had, there has always been a thunderstorm roughly halfway along the path. It's more than coincidental that the greatest number of thunderstorms occur in Europe during the month of June - the time of the greatest number of Sp-E openings. (See Fig. 1).

Why Thunderstorms?

But why should thunderstorms affect the E-layer which, you must remember, is about 90km high and thunderstorms, big as they are, top off at roughly 15 000m, some 75km short of the layer?

Is there something in the electrical discharges affecting the E-layer? Well, I believe that there is. Some time ago, a BBC 'Horizon' TV programme on the power of lightning showed film footage taken of the tops of thunderstorms from a high flying military aircraft. Large plumes of blue light were clearly shown moving upwards from the clouds up to a height estimated to be 100km. Further pictures in this programme showed numerous thunderstorms with bright upward discharges, these latter pictures were taken from a space shuttle.

Blue Jets & Red Sprites

Scientists are now taking an active interest in newly discovered phenomena and have already found that, what are now termed **Blue Jets** are optical ejections from the top of electrically active core regions of thunderstorms. They propagate upwards in narrow cones with vertical speeds of roughly 100km/s, disappearing optically at roughly 40-50km. Their optical energy has been estimated as about 4kJ - with a total energy of about 30MJ.

Red Sprites are massive, but weak, luminous flashes that appear directly above an active thunderstorm and occur at the time of lightning strikes, either cloud to cloud or cloud to earth. They are predominantly red (hence their name) and they range from single spots to

groups and extend above the cloud tops up to 90km and extend across horizontal distances of up to 50km or more. Their optical energy is roughly 10-50kJ giving a total energy estimated to be of the order of 10-100MJ within the total of 5-50GW (Giga Watt) of power!

A cursory study of the daily weather forecast shown on the TV reveals the presence of thunderstorms likely to occur on the continent. For the purpose of possible Sporadic-E openings, thunderstorms close to home will not be of interest in this context, but a line of storms situated over the Alps could, and does, occasionally bring Romanian contacts.

Similarly, a storm region over Andorra brings contacts with Gibraltar or Tunisia. The hot, humid days of mid-summer make for spectacular storms, especially over the higher regions and, unfortunately, over most test match pitches.

Could it be that these Blue Jets and Red Sprites, with their enormous charges of energy, have the power to effect the gas molecules in the E-layer? The energy is such that almost continuous ionisation could take place as long as the thunderstorm was in being. This could account for the Sp-E openings that last for some hours whilst others just last a few minutes.

Again, the fact that thunderstorms become electrically active, then die away only for another one to appear perhaps many hundreds of km away, could be the cause of the openings to various countries being so separated. As I've previously stated, I was working into Italy for a while, then suddenly I was working southern Spain. There's no doubt that the reflecting area had changed.

The belief that Red Sprites may extend horizontally over 50km suggested other ideas. In fact, it gives rise to my belief that there's room for stations many hundreds of kilometres apart to deflect signals off this ionised patch to specific points without the signals scattering and, from the strength of the incoming signals, without much attenuation.

Although a 50km diameter patch seems large, it appears that there's a definite cut-off point at its edge where, from full deflection, there's nothing and the v.h.f. signals simply pass away into outer space. This, I believe, is borne out by the fact that you may hear a near amateur exchanging 5 and 9 reports with someone, say, in Austria, whilst you are hearing nothing of the DX. Then, miraculously, it's your turn and your neighbour is left out in the cold and the patch has shifted in your favour.

Many Proposed Theories

I have seen many proposed theories on how Sporadic-E (Sp-E) propagation is switched on at v.h.f., none of which are entirely convincing and some of which are so complicated that I cannot totally understand them. Perhaps there are many reasons why this wonderful v.h.f. mode of propagation occurs, perhaps a combination of various natural weather and sun activity.

I've been lucky, being able to spend a lot of time on v.h.f., I've been about in numerous Sp-E openings, one which happened as late as 2100UTC and this immediately followed a good aurora. That was an evening to remember! I've also worked Sp-E at 0700UTC, but most openings have taken place during later afternoons, the peak time for thunderstorms.

As Terman said so many years ago, the cause of Sp-E is not known, I do not know the answer, but I believe that in a few years time, someone will be able to prove the reason and I would suggest that Red Sprites and Blue Jets will somehow be involved in the theory.

Serious investigation is already being undertaken, especially in the USA, to attempt to prove a relationship between thunderstorms and Sp-E. I would like to think that all of us interested in v.h.f. working will make a note of our Sp-E openings, the places we contacted and, if possible, find out where the thunderstorms, if any, were at the time. *PW*

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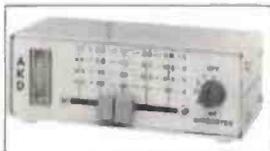
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Global AT-2000 receiver a.t.u. with 'D' control, matches long wires and coaxial systems, £40. SEM 144MHz receive converter 28MHz £1, £5. Both excellent condition. Tel: David G8PPR on Bradford (01274) 651488, anytime.

Grundig Satellit 600 professional radio in mint condition, £190. Tel: (01704) 538529.

Heath DX-60 transceiver with v.f.o., £65. FT-101 h.f. transceiver, £140. Russian H4 h.f. receiver with p.s.u., £80. ET-4336 v.f.o. unit, £55. 15 inch RGB monitor, £20. Wanted: military sets, receiver/transceiver, etc. Tel: Ben (01562) 743253 or 106312.10359@compuserve.com

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official receipt, mint condition, £36. Tel: 0191-526 7902.

Icom IC-207 h.f./v.h.f./u.h.f. 50/35W remote head dual microphone, controls, boxed with manual, v.g.c., £220. Tel: (01487) 823879.

Icom IC-215 f.m. portable transceiver 2W (144MHz), 15 channels, 30 crystals, 3W output, 13.8V input, nine NiCads, manual, circuit, working, or meter, suit HRO SNR, etc.. £5. Tel: Alan G3MBL, near Bury St Edmunds (01284) 827379.

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Icom IC-740, hasn't been used much, good condition, £350. Tel: Dave on Herts (01582) 765410.

Icom IC-751A 100W h.f. transceiver, WARC bands, built-in p.s.u. back-up battery recently replaced v.g.c., £550 o.n.o. Yaesu FT-221R 2m (144MHz) multi-mode transceiver, g.w.o., £250 o.n.o. Tel: G00Z0 (0121) 706 9752.

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JRC-545 DSP receiver with NVA 31B speaker. Low supplied, hardly used. Callbook, WATH and PTWB radio books purchased late November, £1200, no offers. purchaser must collect to ensure complete satisfaction. Tel: Boumemouth area (01202) 892986.

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Kenwood TS-850S a.s.b. and e.w. filters, microphone, manual, matching PS31 p.s.u., all v.g.c., £675. Tel: Derek G3NKS on Chatterham (01242) 241099, before 9pm.

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Kenwood TS-850SAT, mint, manual, boxed, £700. Kenwood MC-85 microphone, excellent condition, with instructions, boxed, £50. Share 444 microphone, £40. Yaesu YS80 g.w.r./p.w.r. meter, 1.6-60MHz, 3W-2kW, £50. TA33 JNR, dismantled, £100. Tel: Bill GW3RKO on Newquay (01545) 560410.

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plus Eddyfone 840C receiver, R300 and scanner seem OK, offers for lot, collect only. Tel: GALLJ on Leeds 0113-286 8707.

Palstar KH6 6m (50MHz) hand-held, as new, boxed, £70 plus carriage. Tel: (01745) 570538.

Panasonic DR49, excellent, £130. Century 210, excellent, £130. Grundig SAT650, excellent, offers. Grundig SAT2000, good, £75. Sony any antenna, as new, £35. Next day delivery arranged. Tel: Cardigan (01239) 682623.

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PWMay 1966-Dec 1995 HRT Jan 1985-Dec 1988, no gaps. Itec Electronics Computer Self Training Course, five volumes, collect near Rugby. Offers. Tel: G3WAL on Boumemouth (01202) 434068.

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August 1999
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Was It All Done By Pigeons? Eric Westman gives us his fascinating account of America's first commercial wireless telegraph service.



Joe Carr K4IPV looks at the all important issue of matching your home built Yagi to the feeder in Part 2 of 'Building VHF/UHF Yagi Antennas'.

John Wilson G3PCY continues his popular look at second-hand bargain receivers - this month its the turn of the Trio R-600.



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◆ Bandscan America
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Kevin Nice G7T2C spends some time with the Grundig YB400 PE portable and sees how it compares to his shack in storage.

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Layout of 2 trap sloper Coax Feed

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THIS MONTH DAVID BUTLER
G4ASR HAS REPORTS OF
CONTACTS INTO RUSSIA ON
THE 144MHz BAND AND THE
START OF WORLD-WIDE DX
ON THE 50MHz BAND.

Propagation on the 50MHz band during June was reasonably good with Sporadic-E (Sp-E) openings occurring on many days during the month. On a few occasions multi-hop Sp-E paths formed enabling contacts to be made into Asia and North America.

Trans-equatorial propagation (t.e.p.) was also noted with a number of UK stations making contacts into Africa and South America. Contacts via Sp-E were also made on the 144MHz band with stations up to 2000km away. During one of these events an opening occurred to Russian stations located near Moscow some 2600km from the UK.

THE 50MHz BAND

First of all I will be taking a look at recent DX contacts made on

the 50MHz band. On June 7 between 1740-1815UTC, the station of A61AH (LL75) in Dubai (United Arab Emirates) was heard on 50.120MHz by a number of stations in the UK. He was strongest in northern England and is known to have contacted G0JHC (IO83) for his first G contact followed by G4FVP (IO94) and G3WOS (IO91).

The station of A61AH runs 100W from an Icom IC-706 transceiver into a 5-element Yagi. Neil Carr G0JHC reports working 6W4RK in Senegal on June 8 at 1328UTC. Most G-stations worked him on c.w., with signals peaking around 529. In Cornwall, however, the station of G8BCG/P (IO70) made a contact on s.s.b. with 59 signals being exchanged.

There was a brief opening to South America on June 10 around 1815UTC. Andy Kissack GD0TEP (IO74), located on the Isle of Man, worked PP5BC in Brazil and heard the PY3ARL beacon. Across the water in Blackpool, the station of G0JHC heard the LU (Argentina) and PY beacons for an hour but no other activity during this time. Neil did find some activity on June 13 when he worked 9J2BO in Zambia during an early evening opening.

Propagation between the UK, North America and the Caribbean area were noted on June 15 and June 16. The Newfoundland beacon VO1ZA (50.039MHz) was heard by G3ZYY (IO70) at 1635UTC on June 15 peaking to 539 at times. Later in the evening at 2140UTC it

reappeared again with a much stronger signal and the c.w. station of VO1JN was heard.

Roger Horne G4HBA (IO80) reports working VO1JN at 2146UTC and hearing the FP5XAB beacon (St. Pierre and Miquelon) for 20 minutes. On the following evening, June 16, the station of WP4O reported working a number of European stations including EI5FK, G0JHC, G3CEG, G3NVO, G4HBA, G4IGO and GW4VEQ. The Puerto Rican station runs 150W into a 4-element Quad antenna. Neil G0JHC also made a contact with KP4EIT (FK68) during the same opening.

Ivan Palmer G7SNC (JO02) mentions that he made an s.s.b. contact with OD5SX (KM74) on June 20. Ivan uses an Yaesu FT-690 transceiver, a 10W amplifier and 5-element Yagi and was very pleased to receive a 55 report from the Lebanese station.

A few days later on June 22 there was an opening into Africa. Between 1530-

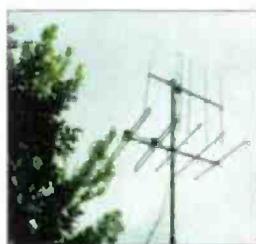


Fig. 1: The 144MHz antennas at the QTH of Nigel Booth M1DKN.

1615UTC the station of TZ6VV in Mali was heard contacting many UK operators. The opening was quite widespread with stations located from the south coast (IO90) to the north Midlands (IO93) getting in on the action.

Events on June 23 were quite extraordinary. It started early in the morning with the first sighting of DX from the Far East. At 0850UTC Hans Wilke DK2PH reported hearing JE1BMJ (Japan) on 50.111MHz

calling CQ and then going on to work OH7IY. Andy GD0TEP copied the Japanese station briefly before signals disappeared into the noise.

The Japanese station was also heard at the QTH of G0JHC peaking 419 but European QSOs on 50.110MHz completely wiped out the signal. Neil recommends that DX stations call CQ below 50.100MHz to clear the European QRM that exists on the International calling frequency.

The station of JE1BMJ runs 1kW output into a pair of 8-element Yagis at 30m above ground level (a.g.l.). Bear in mind that if you are running the full UK power limit of 400W and hear JE1BMJ peaking S1 then it's very unlikely that he would copy you.

Later in the day Peter G3ZSS (IO91) heard JY4NE (Jordan) for 15 minutes around 1700UTC on 50.095MHz. His c.w. signal was in and out of the noise. To round off the day, David MM0AMW (IO75) reports that he caught his first transatlantic opening of the season. Between 2020-2115UTC he worked 30 stations in Canada and the USA via multi-hop Sp-E propagation. His contacts included the stations of KU4IU (EM54), K6EID (EM73) and VO1JN (GN37).

Mike VE9AA reports that MM0AMW was a very consistent signal during the opening and that GD0TEP was also heard with a genuine 599 signal. By the way, the station of GD0TEP runs 100W into a 7-element Yagi. Mike mentions that all his contacts were on c.w. as most signals were generally weak with the exception of stations in GD and GM. Also participating in the opening was the station of WB8XX (EM79) located in Ohio. He reports working 12 stations located in CT, EA, EH8, EI, I, GM and OK. He also heard stations in DL, SP, S5 and YO.

Propagation on the 50MHz band was particularly good during this period. On June 24, Jim Smith G0OFE (IO90)

reported hearing the PY3ARL beacon at 1900UTC and Chris Gare G3WOS (IO91) heard the Brazilian station PY5CC. The PY beacon runs SW into a simple vertical antenna so the propagation must have been quite good.

On the following evening there was an excellent opening to North America. Stations in the UK were working into the W1, W2, W3, W4, VE3 and VO call areas for six hours or so. Catch of the evening for some was C6AGN (FL16) in the Bahamas. If you didn't hear him or much of the other DX then you really must brush up on your Morse code!

The band was open at the QTH of Bob Mobile WA10UB (FN43) to somewhere in Europe for nearly 12 hours. Between 1253-2400UTC he contacted 27 English stations, seven Scottish, three Welsh and one operator in Northern Ireland. Bob also worked stations in DL, EA, EA8, EA9, F, HB9, LZ, OE, OK, OM, ON, PA, S5, SP, YO, YU, 9A and 9H. We really are going to have a competition when the 50MHz band opens up for world-wide DX later in the year.

To round off the month, GD0TEP reports hearing 9J2BO for 30 minutes on June 29 with s.s.b. signals peaking to 59 for much of the time. So, not a bad month at all for DX openings on the 50MHz band. At G0JHC a total of 72 DXCC countries were heard in a six week period with 22 of them being outside of Europe.

Chris Tran GM3WOJ (IO77) reports that in a similar period he worked 4L50 (Georgia) and 5H3US (Tanzania) for two new countries and made contacts with stations in South Africa (ZS6), Zimbabwe (Z23), Zambia (9J) and Malawi (7Q).

Having recently improved his antenna system **John Hilton GM1ZVJ** (IO86) has now decided to concentrate solely on the 50MHz band. He's now using a 5-element F9FT Yagi and looks forward to working stations outside of Europe very soon. This will increase his country score which currently

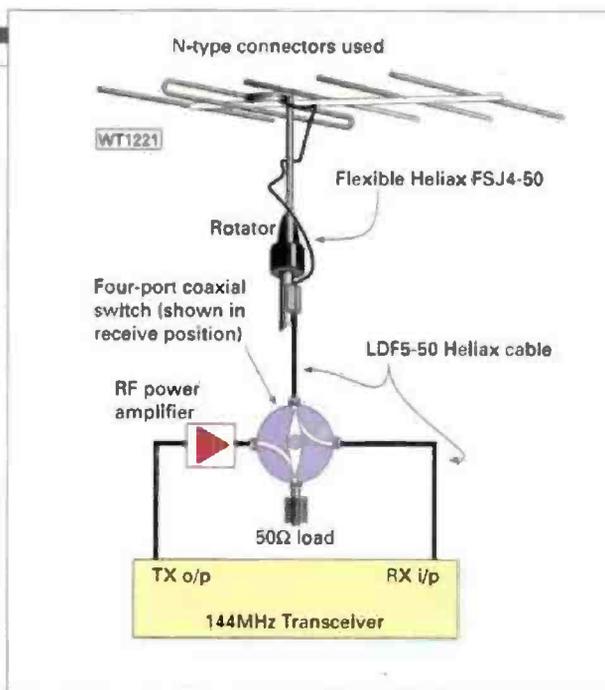


Fig. 2: David's single-yagi system which he uses for meteor scatter communications.

stands at 38 since March 1998.

John, using an Alinco DX-70TH transceiver running 100W, recently made s.s.b. contacts with stations located in Portugal (CT), Spain (EH), Canary Islands (EH8), France (F), Sardinia (IS0), Lithuania (LY), Austria (OE), Finland (OH), Czech Republic (OK), Slovenia (S5) and Croatia (9A).

THE 144MHz BAND

Two Sp-E openings on the 144MHz band occurred on May 24. Around midday there was a very brief event, but most operators appeared to have missed this. Later in the afternoon, between 1430-1435UTC, **Doug Hurr G6MFH** (IO92) worked F1EYB and F5LKW both located in JN23 on the Mediterranean coast. Doug runs 25W from an Icom IC-271E into an HB9CV antenna at 5m above a.g.l.

The opening also spread into south Wales (IO81) with the station of **Bill McDowell GW6ZMN** (IO81) contacting TK/F1PNR (Corsica) at 1435UTC. Other stations known to be making s.s.b. contacts via Sp-E propagation at this time included GW8ASA and GW8CMU.

Julie Yates G0NNF (ex-G8MKD) has obviously been in the right place at the right time!

On May 24 at 1149UTC she contacted the station of IZ5EME (JN52) and then later in the afternoon between 1413-1429UTC she made eight s.s.b. contacts with stations in southern France. The Sp-E opening was very geographically selective as all stations were in the same locator square, JN23.

A few minutes later the ionised 'cloud' had moved and Julie then made contact with two stations on the island of Sardinia, IS0DKU and IW0UQU, both in locator JM49. On June 19 at 1709UTC there was an excellent opening into the Moscow area of Russia.

Julie contacted RX3PX (KO84) and mentions that she was very pleased as the contact over a path of 2600km bettered her previous best by some 300km. Also heard around the same time was the station of RA3LBK (KO65). Both Russian stations are well known v.h.f. DXers being active on both earth-moon-earth (e.m.e.) and meteor scatter modes.

On June 20 and June 22 she heard Belgian stations working more DX via Sp-E but nothing could be heard at her QTH (IO92) in the West Midlands. Her last Sp-E contact of the month occurred on June 23. An s.s.b. contact was made

with SP7JSG (KO01) at 1045UTC and the stations of SP3MIC and SP7CNL heard briefly. Julie runs a Kenwood TS-700S transceiver, a 90W amplifier and a pair of 9-element Yagis. The set-up is obviously working!

Another station to work into Russia during the Sp-E opening on June 19 was **David Edwards G7RAU** (IO90). He managed to work RK3AF but it took five minutes to crack the pile up. **Dave Dibley G4RGK** (IO91) reports that he caught a Sp-E opening on June 20 between 1130-1230UTC. He contacted YO4FYQ (KN44), YO4NF (KN44), YO5QAQ (KN16) and YO9AZD (KN35) and heard ten other Romanian stations. Later in the evening between 1620-1700UTC stations in East Anglia (JO01/JO02) were heard working U55WU (KN20), UT5ER (KN78) and UROEY (KN88) but nothing was heard at his QTH.

Nigel Booth M1DKN (JO02) wrote to me before the start of the Sp-E season mentioning that, in his opinion, the 144MHz band has been rather 'flat'. He hasn't been hearing anything on s.s.b. despite occasionally copying the GB3VHF beacon 140km away and the PI7CIS beacon at 225km with good signals. He mentions that next time you notice a lift in conditions you might care to beam towards his QTH in north Norfolk as he is always looking out for f.m. and s.s.b. contacts.

The photograph in Fig. 1 shows the 144MHz antennas used at the QTH of M1DKN. I'm not certain from the photograph whether the beams can be rotated, if not, then that could be the reason why Nigel is not hearing much on the band - with any type of directional antenna you need some form of azimuth rotation.

Assuming Nigel has a rotator, the next area that needs attention is the coaxial feeder. The cable looks very thin, the consequence of this being that it will attenuate signals to some extent. For example, URM43 cable (5mm diameter) has a

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loss at 144MHz of around 1.5dB for every ten metres.

If the antenna is 20m away from the rig (not untypical) then 3dB, i.e. half the received signal power, will be lost. Throw in at least five plugs/sockets to get around the 'linear' (not in most cases!), the v.s.w.r. bridge and the transceiver plus a few dodgy joints and water in the coaxial and it's a wonder anyone can hear anything!

RECEIVE LOSSES

One method I use to keep receive and transmit losses to a minimum is shown in the diagram, Fig. 2. It applies to a single-Yagi system which I use primarily for meteor scatter (m.s.) communications.

Starting with the 144MHz Yagi antenna, this is supplied with a moulded N-socket which eliminates water ingress. These sockets are designed to work up to 18GHz and, if the matching N-plug is terminated correctly, the combination will provide a very low loss connection capable of withstanding high power.

An important point to note is that the cable you use must match the impedance of the driven element of the antenna. Don't use a 75Ω feeder with a 50Ω antenna. I use 1 inch diameter Andrews LDF5-50 Hellax as the main feeder to keep the losses to a really low level - a few tenths of a decibel.

However, it's not flexible having a solid copper outer sheath and cannot be used to go around the rotator. It might work once or twice and then the feeder will literally break in half! This is also a problem with other cables that have a thin copper outer coating. Although this type of cable is quite flexible it really does not stand up to continual flexing and

eventually (within a year or so) the screening cracks into small sections and you'll wonder why your v.s.w.r. has suddenly got worse.

To go around the rotator I introduced a short length of flexible FSJ4-50 Heliacx cable. This is a low loss cable especially designed to be twisted around a small radius. All interconnecting joints are made using n-plugs/sockets and covered with self-amalgamating tape to keep the water out.

The lower end of the main feeder comes directly through the cottage wall. I first removed some stonework and cemented a drainpipe in place as a cable duct. The end of the cable is arranged to be about 1m away from the transceiver. The LDF5-50 feeder is terminated in an n-socket and connected directly to a 4-port coaxial switch.

You may not be familiar with this type of switch but they are very useful indeed. Unlike a conventional changeover relay this switch has four ports (or connections). If you look at the diagram you'll see I've shown the switch in the receive position. When I put the transceiver into the transmit position, the switch flips over, one half connecting the amplifier to the main feeder and the other half terminating the receiver in a low power 50Ω load. I use LDF4-50 (0.5 inch Heliacx cable) as patch leads from the switch to the transceiver.

To further reduce losses, I completely removed the output switching circuitry from my Yaesu FT-221RD transceiver and provided separate sockets for the transmit and receive ports. With an optimised Mutek replacement front-end this ancient transceiver really does have better sensitivity than many, if not all, v.h.f. multi-

mode radios available today.

Indeed, in terms of noise figure and sensitivity the rig performs much better than a £2000 transceiver which I've recently bought. The FT-221RD doesn't send the operating mode in Morse code when you switch the mode button and it doesn't say "Hello" on the l.c.d. display when you turn it on. But then again.....!

DEADLINES

That's it again for another month. I hope you've been working some good DX on the v.h.f. and u.h.f. bands. Please forward any news, views, 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 DX. SEE YOU AGAIN NEXT MONTH.

73 David GAASR.

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EXPLOITS FROM THE SHACK
OF M0BCL!**

Reports of propagation conditions in June have varied between 'pretty good' to 'pretty bad', according to our reporters this month. All told though, I have had some reports come in of some nice DX being worked from all parts of the world on all, if not most, of the bands, which tends to speak for itself.

The **WPX contest** helped a few of our reporters snag a few rare countries which are only activated during such events, so I guess that's one good reason for having h.f. contests!

Whilst I'm on the subject of contests, it never ceases to amaze me how 'keen' the ears of contest operators are. Isn't it strange that during 'normal' operating sessions, one just can't seem to get that new country you've been chasing for months, but as soon as a contest comes along, you suddenly work it with 3mW and a dummy load for an antenna, getting a 5 and 9 report as well! Ever noticed this phenomenon, anybody, or is it just me I wonder?

OLD ACQUAINTANCES

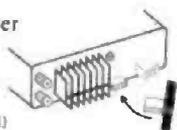
A letter came in this month from **Tom Hutton GW0HUT** of Osbaston near Monmouth which shows just how this



Fig. 1: Tom Hutton GW0HUT of Osbaston sent in this photograph of (left to right): himself (Tom GW0HUT); Bob TZ6DX and Arthur GW4JCO.

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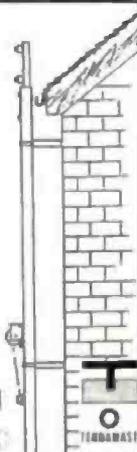
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hobby of ours brings people together from all over the globe. Tom received a surprise visit from **Bob TZ6DX** recently, who he last saw in India in 1991.

Tom explains that Bob is a Diplomat 'by trade' and has more call signs than anyone he knows! As a result of the visit, a "great radio evening" was had by them both and they were joined by a couple of local amateurs as well. See Fig. 1.

FURTHER EXPLOITS!

Further to his exploits published in the June 'HF Far and Wide' regarding his underground antenna system, it seems that **Paul Williams M0BCL** of Wellington in Somerset is at it again!

This time though, his antenna is above the ground, but not by much! He's been using a 1.5m vertical telescopic whip antenna (of the type found on transistor radios) on the 21MHz band, which is mounted directly from his tuner using a right angled PL259 plug.

Using this most basic of set ups and just a couple of watts of c.w., he's managed to hook up with 4K6GF in Azerbaijan at around 5777km with 4.5W, as well as UA3WFS in Russia with 3W at 3967km and RN3DM in Moscow with 2W at 4425km distant, plus a string of other similar contacts.

It looks like Paul certainly seems to enjoy the "challenge of QRP" but makes things even harder for himself by using proverbial 'bits of string' with which to radiate his low power! In fact, he tells me that he has omitted to send reports of his contacts with 6W, as that is excessive power he reckons!

TRISTAN DA CUNHA

Colin Topping GM6HGW and his wife **Gail GM7GKE** are visiting Tristan Da Cunha with a dental team and would like readers to know that they will have a rig with them and will be operating on the 14MHz band whilst on the island. They have sent us their "provisional" itinerary and would welcome any contacts from PW readers.

They will be travelling to Cape Town by aircraft on August 30 where they will sail (on the South African research vessel *S A Agulhas*) to Tristan on September 2 and will arrive in Tristan on September 8/9. They will be leaving Tristan and sailing to Cape Town on October 1, arriving in Cape Town on October 7. They will be leaving Cape Town and flying back to the UK on

October 10. There will be an Amateur Radio station on the ship and there may be an opportunity for them to use the equipment whilst they are on the boat as well.

PROPAGATION REPORT

Now over to **Don McLean G3NOF** of Yeovil for his regular h.f. 'Propagation Report'. Don says: "Generally, the h.f. bands, with the exception of 14MHz have not been too good during the daytime, with the best conditions appearing from 1600UTC onwards. 14MHz was the most reliable, being open day and night for the most part.

"On the 18MHz band Japanese and other Asian stations came in on the short path between 1100 and 1600UTC, with north America being heard at various times between 1100 and 2300UTC. Africa was more elusive, with just a few being reported in the mornings and afternoons.

"The short path to Asia on 21MHz was good between 1500 and 2000UTC, with a few openings up to as late as 2300UTC. For a few days the long path to Australia was open

at around 2300UTC, while Africa came in during morning and afternoon. North America was best between 1400 and 2300UTC, while south America came in from 2100UTC onwards.

"The 24MHz band was patchy. Only a few Asian signals were heard between 1500 to 1600UTC and a few east coast US stations at around 2100UTC. The long path to Australia opened just a few times at 2200UTC and only a few African stations were heard during the afternoons.

"Finally, the 28MHz band was very patchy, with just a few north Americans being heard around 2100UTC, most signals being from south America during the evenings, although there were some Africa stations heard around 1600UTC".

By the way, **Don G3NOF** mentions a visit made recently to his club, **Yeovil ARC**, by our very own **Rob G3XFD** and says how interesting it was!

YOUR REPORTS

Starting with the 1.8 and 3.5MHz band (this month comes **Eric Masters G0KRT** of

PW Listening & Operating Watch List

(All times in UTC):

Charlie Blake M0AIJ listens and operates: 0500-0700 on 7.061MHz s.s.b. with an NRD-525 receiver & Sloping Wire antenna and is also busy with his mobile rig;

John Heys G3BDQ operates: mainly weekends, during daylight hours on the 136kHz band using 100W and an end-fed wire;

George Woods G3LPT (Suffolk) operates: an open net on 29.630 f.m. every weekday morning, except Monday, at 0930 local time;

Don McLean G3NOF operates: 1030 Saturdays on 3.685MHz on the ISWL Net or 1030 Sundays on the Yeovil ARC Net on 3.665MHz s.s.b. using a Kenwood TS-950 & trapped dipole antenna;

John Wheeler G0IUE monitors: 28.600 n.b.f.m. every evening between 1730 and 2230 regardless of conditions using a Yaesu FT-920

running 100W and a 2-element TET triband beam antenna/half-wave vertical antenna;

Leighton Smart GW0LBI operates: on 1.949MHz s.s.b. and around 1.820-1.836MHz c.w. on weekday evenings between 1900 and 2230 using a Yaesu FT-747G QRP transceiver at 5W maximum and a 60m long wire Marconi antenna;

Rob Mannion G3XFD listens and operates: (weekdays & weekends) 1800-1830 on 3.7MHz 100W s.s.b. & 3.530 or 3.560MHz and 18.105MHz QRP c.w. using an Alinco DX-70 transceiver and a long wire antenna. Also at 2300 on either 3.560, 7.025MHz (c.w.) or 3.7MHz s.s.b. (All operation dependent on PW workload!);

Sean Gilbert G4UCJ operates: around 0700 to 1100 and 2100 to 0000 seven days a week on 14MHz and 7MHz using an FT-307 and Alinco DX-70 transceivers at 3/30W output and a Q5RV dipole antenna in the loft space.

Milton Keynes, who used QRP s.s.b. for a change to hook up with G0CIS, while using a.m. brought in G4FKK both on 1.8MHz during the evening.

It was back to 2W QRP c.w. for him on the 3.5MHz band, however, which gave Eric contacts with G5VQ and HA0HH (Hungary) both at around 0800UTC, his antenna being a 30m end-fed W3EDP up at around 5m.

Yours truly, GW0LBI, also had a bash at early-morning 3.5MHz, working EA3FCD (Spain), RA1CCA (Russia) and OH6TER (Finland) all at around 0600 using 1W c.w. and a 50m long wire antenna.

THE 7 & 10MHz BANDS

On now to the 7 and 10MHz bands where we have a report from **Sean Gilbert G4UCJ** in Milton Keynes who, using 30W of c.w. and a G5RV in the loft, hooked up with 5N0MSV (Nigeria) at 0200UTC, OJ0/K7BV (Market Reef) at 2311UTC and CY9RF (St. Paul Island) at 0147UTC on the 7MHz band, while 10MHz operation brought him contacts with PY1KS (Brazil) at 0009UTC, TI2PZ (Costa Rica) at 2331UTC, CN8WW (Morocco) at 2306UTC and CY9SS (St. Paul Island) at 2321UTC.

Next comes **Carl Mason GW0VSW** of Skewen in West Glamorgan, who operated as SV8/GW0VSW from Zakynthos Island during June. His 10MHz contacts using 5W of c.w. included DL7AVE (Germany), F5EAZ (France) and YO2BP (Romania), all at around 0400UTC, while **Ted Trowell G2HKU** on the Isle of Sheppey in Kent, offers a single 7MHz contact in the shape of CO2MA (Cuba) at 0400UTC, an unearthly hour for Ted!

THE 14 & 18MHz BANDS

Despite the fact that conditions on the higher bands weren't as good as expected, our reporters have been out there in the thick of it, so to speak and their logs show what can be done. There was just a single 14MHz s.s.b.

contact this month from **Don McLean G3NOF** in Yeovil in the form of CY9SS (St. Paul Island).

He was much more active on 18MHz, however, contacting BV5BG (Taiwan), CP6XE (Bolivia), QSL via IK6SNR, J41RKE (Greece), a string of Japanese stations, YB0CEF (Indonesia), 5Z4GS (Cyprus) QSL via WB2YQH, as well as 7K2PMJ, (Japan), 9V1JA (Singapore) and 4S7DA (Sri Lanka) QSL via W3HNC, all contacts worked using 100W and a Yagi beam antenna.

Eric G0KRT has been using high power this month too, listing s.s.b. contacts on 18MHz with 4Z5JE (Israel) at 2055UTC and RN1A/3 "the only Englishman with a Russian callsign" he reckoned!

Meanwhile, over in Bishopston near Swansea, **Robin Trebilcock GW3ZCF** lists impressive 14MHz s.s.b. contacts with HR1/K3VN (Honduras) at 0731UTC, EK6TA (Armenia) at 1949UTC, A45AR (Oman) at 1938UTC and VK6MV (Australia) at 0821UTC.

Robin's 18MHz contacts included VU2VX (India) at 1455UTC, DS5RNM (Korea) at 1404UTC, SU1SK (Egypt) at 1930UTC, 9K2HN (Kuwait) at 1630UTC and while out portable in Pembrokeshire he also racked up JA8JGW (Japan) at 2011UTC and VU3MVCV (India) at 1624UTC.

THE 21MHz BAND

It looks like the 21MHz band was the centre of activity for most of our reporters this month which their logs show. Despite conditions being somewhat 'up and down' they certainly managed to dig out that exciting stuff, no doubt all down to their patience, expertise and skill.

First of all though, a warm 'HF Far & Wide' welcome to **Declan EI9HQ** this month who sends a single band 21MHz report from the Emerald Isle. Using 400W into a 3-element Yagi beam he lists his contacts with BV4QI (Taiwan) at

1600UTC, HL0UPK (South Korea) at 1822UTC, EX9MZ (Khirghizia) at 1840UTC, 9Y4ZA (Trinidad & Tobago Islands) at 2240UTC, CE1UW (Chile) at 2327UTC, AL7J (Alaska) at 2356UTC, CO7DS (Cuba) at 0008UTC, V31DPC (Bellze) at 0126UTC, ZL3JT (New Zealand) at 0235UTC and HH2LE (Haiti) at 0230UTC.

Using 3 and 30W of c.w., on 21MHz, **Sean G4UCJ** lists his contacts as HC8N (Galapagos Islands) at 2247UTC, TI1C (Costa Rica) at 0048UTC, BD4DW (China) at 1850UTC, WH2/N2NL (Guam) at 1927UTC, as well as VR2BG (Hong Kong) at 2236UTC, HK0ER (San Andreas Island) at 2340UTC and KH6ND (Hawaii) at 1702UTC.

Between sessions in the garden, **Ted G2HKU** had a bash at the 21MHz band using 70W of c.w. and a mixture of G5RV and vertical antennas. With this set-up, he hooked up with 5N3CPR (Nigeria), JA2ZJW (Japan), VQ9VK (Chagos Islands) and PT7SY (Brazil) at around 1500UTC.

While operating at 1800UTC he brought in CO8LY (Cuba), JY8YB (Jordan) and FY5YE (French Guyana) and at 2000UTC he lists LU9AY (Argentina). He also adds a 5W QRP contact with UR3IDD/MM in the Mediterranean Sea at 1500UTC.

The 21MHz band was the main attraction this month for **Don G3NOF** too. His huge log for this band, includes s.s.b. contacts with BA7JG (China) (QSL via **PO Box 1711 Guangzhou, Peoples Republic of China**), BV4KA (Taiwan), JT1CO (Mongolia) (QSL via **Box 905, Ulan Bator 23, Mongolia**), FG5FY (Guadeloupe), VK3MAA (Australia), YB0ECT (Indonesia), 4S7DA (Sri Lanka), 9M2/GM4YXI (Malaysia), VU2SWS (India), ET3AA (Ethiopia) and 5X1T (Uganda).

Eric G0KRT, using high power on 21MHz this month, lists V2BE (Antigua and Barbuda Islands) for a new country, as well as K2UOP (USA) and 5C8N (Morocco), all at around 2200UTC.

THE 24MHz BAND

The 24MHz band is one place to keep half an eye on as it very often throws up quite a gem or two in terms of DX. Funnily enough, I talk to many amateurs who have yet to even try out 24MHz, yet it can be a very productive band.

Robin GW3ZCF hooked up with 5X1T (Uganda) at 0929UTC, as well as S79ZG (Republic of Seychelles) at 1900UTC, while **Sean** offers c.w. contacts with ZS6AVP (South Africa) at 2100UTC, 5Z4FM (Kenya) at 0940UTC, R1AND (Antarctica) at 1423UTC and a QRP contact with 5N0MSV (Nigeria) using just 3W output.

Ted G2HKU had a crack at 24MHz too, digging up AD6C (USA), ZSSRON (South Africa) who is ex-G0IEZ and SV9/GM3YOR (Crete) with 70W of c.w., while a switch to 5W brought a nice two-way QRP contact with ZS6AVP (South Africa), all at around 1500UTC.

THE 28MHz BAND

Finally we come to the 28MHz band where, despite it being 'extremely patchy', some nice stuff was worked this month. **Eric G0KRT** for instance, mentions working P3A (Cyprus) at 2000UTC, plus NY4A (USA) and L5OUG (Argentina) at around 2130UTC, while **Don G3NOF** offers s.s.b. contacts with ZWSMEL (Brazil), 5Z4IC (Kenya) QSL via MW0AIE, 9J2AM (Zambia) and L22ATR (Argentina).

Using a HF6 vertical antenna and 30W of power on this band, **Sean G4UCJ** spent quite a bit of time here and logged c.w. contacts with 3B8CF (Mauritius) at 1421UTC, 3C2JJ (Equatorial Guinea), at 0906UTC, 5X1T (Uganda) at 1657UTC, YV4A (Venezuela) at 2011UTC, V26E (Antigua) at 2015UTC, plus 3W QRP contacts with L29GBR (Argentina) at 1600UTC, VP5GA (Turks & Caicos Islands) at 1325UTC and P49V (Aruba Island) at 1644UTC.

ROGER COOKE G3LDI TAKES A LOOK AT HIGH SPEED MODEMS, SOME VIRUSES & FREE 'PHONE CALLS!

RadioScene

To tie up the ribbons for this month, we have Ted G2HKU who offers two contacts on 28MHz in the form of PY2OW (Brazil) and KP4TF (Puerto Rico) both at around 1500. This just goes to show that even when a band appears 'dead', as 28MHz often does, it's well worth putting out a call. After all, if we all listen, no-one will work anybody!

SIGNING OFF

Well it appears that our intrepid reporters know no bounds when it comes to chasing DX on the h.f. bands and long may it continue. Most importantly of course, we hope it gives you the readers an interesting feature, as well as helping newcomers to h.f. to see what can be done with all types of antennas and stations, from the most basic to the most advanced.

Thanks again to all correspondents for their reports, information and input to the column. As usual, reports and information (and photos as I'm still looking for photographs of our reporters!) by the 15th of each month. Details at the top of the column.

Leighton G4WLB1

DATA SCAPE

ROGER COOKE G3LDI

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THIS MONTH ROGER COOKE G3LDI LOOKS AT THE VFAST28.8 HIGH SPEED MODEM FROM GMSK DATA

PRODUCTS, EXAMINES THE HEALTH OF OUR COMPUTERS DUE TO THE THREAT OF SO MANY VIRUSES AND FINALLY HE LOOKS AT THE POSSIBILITY OF FREE TELEPHONE CALLS AND MUCH MORE.

I've written about the GMSK Modem before, but it was a while ago and I think it should be given some more publicity, to encourage the use of higher speeds on our Packet network.

The VFast28.8 is a high speed, radio modem adapter for AX25 Packet radio users. The modem has been developed by GMSK Data Products specifically for Radio Amateur use. It uses the latest in VLSI component technology but has no relationship with the V.fast Class modems used on telephone lines.

The design of this modem provides a neat solution to converting a 1200 baud 'TNC 2' or similar TNC to high speed with the minimum of effort. The completed p.c.b. fits onto the modem disconnect header of either a TAPR TNC2 or clones such as the G0BSX, GBSTW 'TNC 2' PLUS, Paccomm Tiny 2, or many other TNC designs.

The modem is also suitable for use with PC based SCC expansion cards such as the Thor RLC100 4 port card,

Baycom USCC and others. Additionally, it requires only seven external wires to complete the installation. (With some TNCs it may be possible to fit the board inside the case, with others a separate case may be required).

As a direct f.m. type of modulation method and data scrambler is used, designs based on the G3RUH modem will inter-work with the VFast28.8 modem successfully. The board is simple to construct and measures only 140mm x 60mm and uses simple-to-buy components with 4 i.c.s required.

The VFast28.8 modem kit comprises a high quality p.c.b. with full ground plane and careful analogue/digital separation, a pre-programmed "mController" and a Technical Manual.

The FX589 modem i.c. used can be obtained direct from the manufacturer and full contact information is given in the VFast28.8 manual. The Web site has further details and the front page is shown in Fig. 1. The URL is www.gmskdata.co.uk Several of these are already in use in the UK at various node-sites and, indeed, we have one here in Norfolk at GB7NP.

NEW DATA TRANSCEIVER

From GB7DIP comes the news about a new 1296MHz Data Transceiver which is a new modified version which uses only easy to get parts. As I

prepare this column (in June) a kit will be available starting on the launch day at Elvaston Castle Rally in Derby on the 13 June 1999. However, the p.c.b.s and a Programmed Pic Chip are now available although the price has yet to be finalised.

This transceiver is designed for high speed Packet and can transfer data at a lightning rate of 115kb and in full duplex mode (cheap modem required but details will be given). This could provide an excellent improvement to the Packet network, but can also be used for Voice communications, as it has full 1296MHz band tuning range, plus an i.c.d. frequency readout for TX and RX.

For more information on this new 1296MHz transceiver, you can try the GB7DIP Web site at:

<http://www.gb7dip.freemove.co.uk/dipg/index.htm> Once

again, you can see the introductory page in Fig. 2. OR show your interest by sending for a zip file containing the full description and set-up details.



Fig. 1: The first page of the GMSK Data Products Web site can be seen at: www.gmskdata.co.uk



Fig. 3: Visit the F18IU Web pages for more information on the high speed tests at:

<http://www.ccr.jussieu.fr/physio/f6bvp/thd2.html>

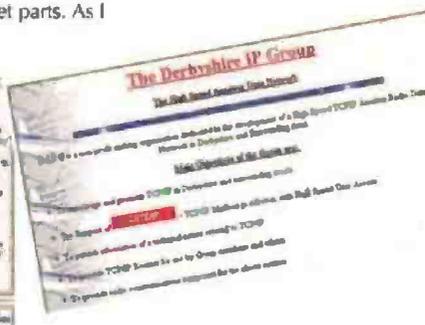


Fig. 2: For more information on the new 1296MHz transceiver visit this Web site: <http://www.gb7dip.freemove.co.uk/dipg/index.htm>

E-mail:
sales@gb7dip.freemove.co.uk

HIGH SPEED TEST

Tests of high speed transmission via Packet radio took place on Saturday 27 March 1999 at Muret (Sub-Prefecture of Haute Garonne Department), near Toulouse, in France. It took place at SARATECH, the show for Radio Amateurs.

For the first time in France, F1BIU and F6FBB succeeded in transmitting digital information between two stations via Packet radio using 76800 bauds on 1.2GHz. Success was not guaranteed insofar as the development of the radio equipment and the software data-processing was done separately. Those involved were Victor F1BIU and Jean-Paul F6FBB. Briefly, the configuration was as follows:

Jean-Paul F6FBB had prepared two computers, a Pentium 100MHz with 16Mb of memory RAM, 200Mb hard drive, equipped with HDLC SCC4 ATEPRA cards and G3RUH f.s.k. modem with the addition of an adapter card by F1TE. Jean-Paul has the



Fig. 4: Freecall's Web site can be found at: <http://www.freecall-uk.com>

modifications necessary for the SCC4 card (for the use of modems providing RX and TX clocks).

The operating system was Linux 2.0.36 (SuSE 6.0) on each PC (memory 16Mb) with modules AX25, ROSE and FPAC. Parameters EAX25 were: MAXFRAME 63 and pacLen 256. The Packets were 16128 bytes.

Although the stations were only a few metres apart, the connection was via radio with TX/RX antennas to complete a radio link. First tests were at half-duplex and finally full-duplex was achieved.

Further details of these tests can be found on the F1BIU Web pages for high-speed Packet at:

<http://www.ccr.jussieu.fr/physio/f6bvp/thd2.html> (See Fig. 3).

FREE 'PHONE CALLS'

A few months ago, I mentioned that the only thing left in the UK now was the free telephone calls! With the amount of free ISPs about now, competition is fierce and it does seem that every day a new 'freebie' comes along. Even AOL now offer TWO months free trial before extracting £14 per month! I can't see this lasting too much longer.

Anyway, back to the free phone calls! I recently received a Packet message from Peter GOGSZ asking if I had seen the information from Freecall.

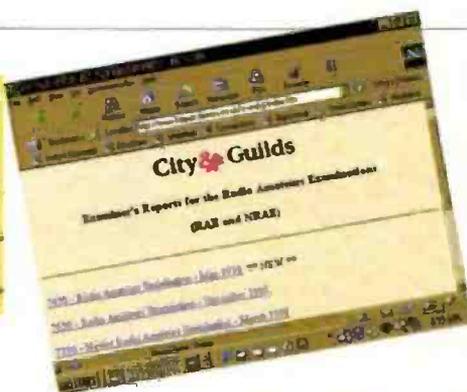


Fig. 5: The results of the May 1999 RAE examination are on the Web site now at: <http://www.kippax.demon.co.uk/c-and-g/index.htm>

Apparently they are offering a free 0800 number to the first 20 000 people to sign up four others.

The offer sounded like a 'scam' to me, but as there was nothing to lose, I followed their instructions. I'm still waiting to hear from them, but if it does come off, then it might be a forerunner of more still. So, hang in there and keep an eye out for the information.

Here's the message I received from them after supplying my four contact names: "Thank you for taking the time to complete our form. As you are probably already aware this is a new and unique service being offered to a select few. We intend initially to issue around 25 000 connections and this will be done on a first come, first served basis.

"As stated on our information pages this is a totally FREE service, all we ask, to complete your registration, is for you to offer this same service to four friends or colleagues from your address book, this is to enable us to keep advertising costs to a minimum. On receipt of their registrations your application will be complete. Please ensure that they enter your name in the referrer section on the form. We will contact you over the next few weeks with your password and access details. SHARE THE BENEFITS OF FREE GLOBAL COMMUNICATION".

Freecall have a Web site

VIRUS TOP TEN INFO	Total	%	% change	Name
	102	32	+4	WM97/Ethan
	73	23	-2	HAPPY99
	45	14	-	CLASS
	27	9	+3	MARKER
	20	6	+3	XMLAROUX
	11	4	-5	WM97/Melissa
	6	2	Re-entry	COLD APE
	6	2	-	CONCEPT
	5	2	Re-entry	WM97/FOOTER
4	1	-	CROWN	
15	5	-3	Others	

Total mail items sent: 42 0782.
Total mail attachments: 36 7386.

URL Watch

GMSK Data Products	www.gmskdata.co.uk
GB7DIP Web site	http://www.gb7dip.freemove.co.uk/dipg/index.htm
F1BIU Web site	http://www.ccr.jussieu.fr/physio/f6bvp/thd2.html
Freecall	http://www.freecall-uk.com
City & Guilds	http://www.kippax.demon.co.uk/c-and-g/index.htm

RadioScene

and if you want to take a look here's the URL:

<http://www.freecall-uk.com> (Fig. 4 shows their first page). Peter tells me he is also still waiting and apparently over 120 000 applied so they are trying to sort all the applications.

VIRUS ALERTS

Recently, a couple of nasty Viruses (or should that be Virii?) were caught, including the **Melissa virus**. Since then there have been E-mails asking you to send a copy of a warning to ALL your friends in your address-book. I was caught with one of these messages, sent to me by a good friend. It was sent in good faith and he obviously also received a copy, before sending it on to me. However, these type of messages in themselves are started by somebody with nothing better to do than to try and clog up the network, whether it be on the Internet or on the Packet network, as I've also seen them there.

The most recent Virus reports were the AIDS Virus and another similar one. If we acted on the advice and produced numerous E-mails from our address-books, this then becomes a chain letter which in itself contributes to the E-mail/Packet pollution!

A survey, carried out recently by a Networking Paper found that 74% of the respondents thought that the threat from Viruses was real but over-hyped. Most were aware of the danger of the real virus, 57% admitted to having had experience of a virus attack. Only 2% had no virus protection in place and 48% thought they were "pretty secure". The Ethan virus remains the pest that is most likely to bother people and held

the top place in a table of statistics.

The following table was relevant during the week of April 26 1999 and shows the top ten viruses caught (see table on previous page).

Obviously the best advice is to keep your Virus protection as current as possible and don't get too complacent about not getting caught. It CAN happen to YOU!

RAE REPORT

Input from **David Pratt G4DMP**, Chief Examiner at City & Guilds, tells me that the Examiners' Report for the May 1999 City and Guilds Radio Amateurs Examination (RAE) is now available for candidates, tutors and any other interested party. Check out the Web site at: <http://www.kippax.demon.co.uk/c-and-g/index.htm> (See Fig. 5).

The report contains the overall performance of candidates in each section of the examination syllabus and details of the number of candidates who entered and were successful.

EINSTEIN USERS?

I'm not sure just what an Einstein computer is myself, I've never seen one nor do I know anybody who has one. However, there's an active users group and, recently, I had the *Einstein Magazine* sent to me.

The *Einstein Magazine* is published for the users of Einstein and other computers, the **Secretary and Publisher** is: **A.E. Adams, Ivy Cottage, Church Road, New Romney, Kent, TN28 8TY**. The **Editor** is **Ted Cawkwell, 9 King St., Winterton, N. Lincs DN15 9RN**.

The material in the magazine looks to be aimed at the programmer, those interested in machine code, DOS, utilities, etc. The spread of material is obviously dependent upon Input (sounds familiar!) but the editor does try to cater for all range of abilities.

The Einstein seems to be a machine of about the Spectrum or BBC B vintage, so they're obviously getting quite ancient - almost stone age where computer technology is concerned! However, there must be some users still out there, so it's good to see these machines still being used.

I overheard a station on 144MHz the other day (who works as a computer engineer) He said that he was on the way to the skip with a boot full of BBC B machines, printers and so on. Nobody was interested in having them - even free - so they were going to the 'bit bucket' in the sky.

What a waste! What's wrong with the youngsters of today? Are they unable to hook up these old machines, learn how to use them or are they just too well heeled that it's easier to buy a Pentium? It's not the impression I get when listening, but they certainly seem to avoid effort these days!

THAT'S ALL I HAVE TIME FOR THIS MONTH. LET ME KNOW OF ANY NEWS OR VIEWS THAT YOU HAVE ON ANYTHING TO DO WITH THE COLUMN. UNTIL NEXT MONTH ...

73 Roger

BROADCAST

REPORTS AND INFORMATION TO ME PLEASE:

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C/O PW EDITORIAL OFFICES
ARROWSMITH COURT
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In April last year, a new 24 hour-a-day international short wave radio station started. In May this year, it went silent - apart from a single hour's service on the 49m band.

Merlin Network One, operated by Merlin Communications, the company formed from the management buy-out of BBC World Service Transmission, carried a range of specialist music programmes. The line-up included Radio Caroline and *Media Zoo*, a weekly programme about broadcasting produced by Eric Wilshire.

The station had listeners world-wide, many of whom wrote in to Merlin congratulating them on the initiative. But now only a 60 minute programme is carried each day - a religious programme at 1600UTC on 6.175MHz. The rest of Merlin's output remains on Astra transponder 58 at 10.847GHz in stereo using the 7.38 and 7.56MHz sub carriers.

The reason for the dropping of short wave has not been confirmed but it acts as a blow to the fans of Radio Caroline world-wide. As this edition of *PW* goes to press, the Merlin Web site (www.mno.net) says simply "Watch this space". I'll keep you posted on developments.

TAMIL COMMUNITIES

Britain is host to two international radio stations that target the Tamil communities across Europe and that send programmes back to Sri Lanka. It's more than two years since **IBC Tamil** launched, with an Astra sub carrier plus a couple of hours a day of short wave.

Now the station has been joined by the remarkably similarly named **TBC**, or **Tamil Broadcasting Corporation**. It launched on June 16 and has an hour a day of short wave at 1230UTC on 15.635MHz. The service is beamed from a transmitting station in the former Soviet Union.

In response to an influx of Albanian refugees from Kosovo, RTE, Ireland's national broadcaster, has started a daily service in Albanian. This goes on the air at 1800UTC on 612 and 1278kHz medium wave



Fig. 2: Sticker from Deutsche Welle.

and comprises relays of programmes in Albanian from the BBC, Deutsche Welle, Radio Tirana and Swiss Radio International.

The RTE service reaches overseas with daily English-language short wave transmissions, targeting Asia and the Pacific at 1000UTC on 11.74MHz via the BBC/Merlin site in Singapore and at 1830UTC on 17.885MHz for Africa out of Ascension. On weekdays there's a transmission at 1830UTC for Europe, Africa and America on 12.16MHz relayed from WWCR in the USA. This broadcast starts at 1900UTC on Saturday and Sunday.

Radio Yugoslavia is still on the air to Europe via short wave transmitters in Bosnia. The service opens at 1830UTC on 7.23MHz with Serbian, followed at 1900UTC on 7.22MHz with Spanish. At 1930 there is Serbian on 6.10MHz followed by German. From 2030UTC there's a sequence of 30-minute programmes in French, English and Serbian, all on 6.185MHz.

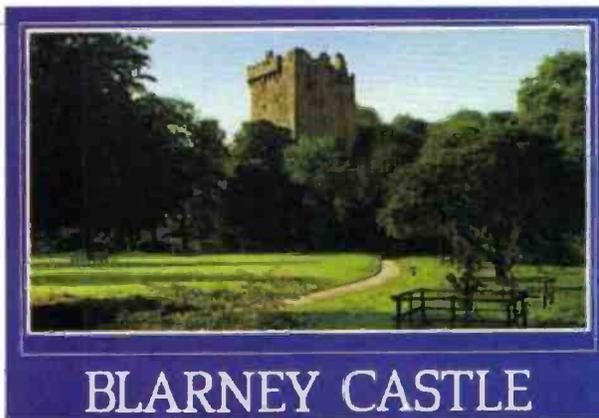
In the refugee camps in Albania and Macedonia, there's a need for information and it's radio that can deliver this. Britain's Department for International Development is responding to the need through the supply of 10 000 BayGen wind-up radio sets.

The International

Committee of the Red Cross is handling the distribution of the sets that will be used by refugees to listen to the plethora of 'missing persons' programmes on the air.

Many major western international radio stations are broadcasting 'missing persons' announcements, including Deutsche Welle which says that it has broadcast the names of more than 30 000 people since the refugee crisis began.

There's a huge need for people who have lost touch with relatives and friends to try and discover their whereabouts so that the process of rebuilding lives can begin. When Briton, Trevor Baylis, invented his clockwork radio, he envisaged it working in Africa to bring information to check the spread of Aids. Today, his sets are



BLARNEY CASTLE

Fig. 1: QSL card from RTE.

being used much closer to home.

THAT'S ALL ...

That's all for this month. Remember that the nights are starting to get longer and so that means more time for trawling across the broadcast bands in

search of interesting catches. Please write to me with details of any discoveries you make and I'll pass the tips on to other readers - and you'll see your name in print!

UNTIL THE NEXT EDITION, 73 & GOOD LISTENING,

Peter

FREQUENCY NEWS

Now let's take a quick canter around some international frequency news. Adventist World Radio has leased time on the Radio Monte Carlo medium wave transmitter in Monaco. It's on the air at 2100UTC in Arabic and French on 702kHz, broadcasting to North Africa and the Middle East.

NHK Radio Japan has English broadcasts - some beamed from the UK to Europe (shown here in bold) - as follows (all times are in UTC):

0000-0015 on 13.65, 11.815MHz;
 0000-0100 on 11.705, 9.665, **6.18MHz**;
 0100-0200 on 21.67, 17.835, 17.685, 15.59, 15.57, 15.325, 11.87, 11.86MHz;
 0300-0400 on 21.61, 17.825MHz;
 0500-0600 on 17.825, 15.59, 15.23, 11.85, 11.84, 11.715, 7.23, 6.11MHz;
 0600-0700 on 17.825, 11.85, 11.84, **11.74, 7.23**, 5.975MHz;
 1000-1100 on 15.59, 11.85, 9.695MHz;
 1100-1200 on 15.59, 9.695, 6.12MHz;
 1400-1500 on 11.88, 11.73, 9.505MHz;
 1500-1600 on 11.73, 9.75, 9.505, 7.20MHz;
 1700-1800 on 15.355, 9.825, 7.11MHz;
 2100-2200 on 21.61, 17.825, 9.725MHz.

Nearby, South Korea has English from Radio Korea International on the air (all times are in UTC):

0200-0300 on 15.575, 11.81, 11.725, 7.275MHz;
 0800-0900 on 13.67, 9.57MHz;
 1030-1100 on 11.715MHz;
 1230-1330 on 13.67, 9.64, 9.57MHz;
 1600-1700 on 9.87, 9.515, 5.975MHz;
 1900-2000 on 7.275, 5.975MHz;
 2100-2200 on 15.575, 6.48 and (via the UK) 3.97MHz.

Although it beams to the continent bearing its name, Radio Free Asia, the newest US-government international station, can be heard in Europe thanks to an extensive network of relays in the USA, Germany and parts of the former Soviet Union. The following is a selection of transmissions which you can have a go at receiving - let me know how you get on! 0000-0030UTC in Vietnamese on 15.56, 13.72, 11.58, 11.56 and 11.54MHz, 1600-1800UTC in Mandarin on 15.68, 15.51, 13.69, 11.945, 11.795, 11.75 and 9.905MHz, 2230-2330UTC in Cambodian on 17.51, 15.705, 11.57, 11.52 and 9.93MHz and, finally, 2300-0000UTC in Tibetan on 15.695, 9.875, 9.365 and 7.47MHz.

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Modes include USB/LSB, AM, sync AM, stereo CW, NBFM/WBFM and stereo FM, with TV sound and video output as standard.

We include Windows software to make it easy to gather information from document scanners, the Internet and other sources. The RD500VX can be linked to your PC to backup or download information, and a database is loaded into the receiver before shipping.

It also has a built in digital sound recorder and editor so a news flash or rare DX can be recorded. Up to 4 minutes of sound can be permanently stored!

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E-mail m.hately@talk21.com **GM3HAT**

CFA OPERATING COMPARISONS

Crossed Field Antennas of the several forms we produce are continuing to amaze people who have tried them. One American amateur-constructor reader of the Internet antenna experimenters' magazine who made a small copy of our published GP CFA and obtained results from indoors which were all within 1 S point of an outdoor inverted V on 40 metres. The E-plate cylinder was 5" dia. & 7" tall. The D-plate disc was 9" in dia. (Ref. K5CNF on CFA forum on www.antennex.com May 8th, 1999).

For technical details and prices write, fax, phone or E-mail stating whether you want:-

- 1) Monoband Crossed Field Loop for any band pole mounting or mobile, or
- 2) Multiband CFL for a balcony or vehicle, or
- 3) EM Delay-line Radiator for laying-on, or around, the house.

Proprietor: Maurice C Hately, M Sc FIEE - Chartered Electrical Engineer

J. BIRKETT

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SMALL WIRE ENDED ELECTROLYTIC CAPACITORS 33µF 450v.w. @ £1.15, 5 for £3, miniature PC type 0.01µF 400v.w. @ 10 for £1

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Trader's Table

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Icom IC-735 Base Transceiver with Gen.Cov. 12V.....£525
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MFJ MFJ-9020 x2 20m CW QRP Transceiver.....£125
Mirzabo MX-145 20m SSB, CW Handy with PL-1000 3.5-50MHz Amp.....£250
Ten-Tec Scout 555 Mobile CW,SSB 50W with 10, 20, 30, 40, 80m.....£399
Trio TS-930S Base Transceiver Mains.....£825
Yaesu FT-757GX HF,Gen.Cov. with PC-757AT and FT-757GX PSU.....£549

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Kenwood TM-251E 2m FM Mobile 50W.....£269
Kenwood TM-441E 70cm FM Mobile 35W.....£235
Kenwood TM-451E 70cm FM Mobile 35W 2m RX, Full Duplex.....£299
Kenwood TM-732E 2m,70cm FM Mobile 50W,35W.....£479
Kenwood TS-711E 2m All Mode Base Transceiver 25W Mains/12V.....£549
Yaesu FT-225RD x2 2m All Mode Base 25W with Mutek Mains/12V.....£540
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Alinco DJ-65 2m/70cm FM with wide RX.....£169
Icom IC-02E 2m FM H/Hand with sp. mic.....£125
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Icom IC-W2E 2m/70cm FM H/Hand (with sp. mic).....£179
Icom IC-W21E x2 2m/70cm FM H/Hand.....£199
Icom IC-W21ET 2m/70cm FM H/Hand.....£199
Kenwood TH-28E 2m FM H/Hand.....£199
Kenwood TH-42E x2 70cm FM H/Hand.....£189
Kenwood TH-77E 2m/70cm FM H/Hand with Sp. mic Full Duplex.....£225
Kenwood TH-78E x2 2m/70cm FM H/Hand with Full Duplex.....£249
Kenwood TH-79E 2m/70cm FM H/Hand.....£245
Standard C-55E 2m/70cm FM Handheld.....£299
Yaesu FT-10R 2m FM H/Hand.....£125
Yaesu FT-530 2m,70cm FM Handy with Full Duplex.....£295
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Yaesu VX-1R 2m/70cm FM micro Wide RX, Software,Sp. mic,DC.....£249

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Drake SW-8 50kHz-30.87-106.1JH-137MHz AM, SSB, WFM.....£399
Grundig YB-500 x2 Portable Receiver with SSB.....£130
Icom IC-R72 Base Station Receiver.....£449
Icom IC-R72 DC 100kHz-30MHz AM,CW,SSB 12V with PSU.....£449
Kenwood R-5000 100kHz-30MHz All Mode Receiver Mains.....£549
Lowe HF-150 30kHz-30MHz All Mode with IF-150, PSU, Keypad.....£299
Lowe HF-250 x2 30kHz-30MHz Receiver 12V PC Compatible.....£399
Sony ICF-SW355 x2 Portable Receiver with FM stereo and SSB.....£189
Sony ICF-SW100E x2 Pocket Receiver with FM stereo and SSB.....£149
Sony ICF-SW7600 Portable Receiver with FM stereo and SSB.....£119
Sony ICF-SW7600G Portable Receiver with FM stereo and SSB.....£135
Stereophone MBR-7 MW,LW,SW with 107-176MHz Portable/Mains.....£45

SCANNERS MOBILE/BASE

AOR AR-2800 0.5-600,800-1300MHz AM,FM,WFM 1000Ch, BFO.....£149
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Yaesu FRG-9600 60-905MHz All Mode Receiver 12V.....£225

SCANNERS HAND HELD

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AOR AR-8000 500kHz-1300MHz All Mode 1000Ch with PC mit.....£279
Icom IC-R11 x3 0.1-1300MHz AM,FM,WFM.....£199
Neter Pro-46 66-950MHz (with gaps) AM,FM 100Ch.....£99
Optio R-10 x2 30MHz-2GHz FM Interceptor.....£179
Realistic Pro-26 25-1300MHz AM,FM,WFM 200Ch.....£149

NEVADA 01705 662145

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KENWOOD TS-440SAT HF 100W TRANSCEIVER £499
KENWOOD TS-680S 100W HF + 10W 6M + CTCSS £499
KENWOOD TS-850SAT HF 100W TRANSCEIVER £899
TOKYO HT-120 20 METRE 10W MOBILE.....£125
TOKYO HX-240 2M HF TRANSVERTER.....£145
TRIO TS-940S 100W HF TRANSCEIVER.....£750
YAESU FT-747GX HF 100W.....£350
YAESU FT-757GX HF 10W TRANSCEIVER.....£395
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ALINCO DR-605E 2M/70CM FM MOBILE.....£235
ICOM IC-307H 2M FM MOBILE TRANSCEIVER.....£225
ICOM IC-228H 2M 45W MOBILE.....£185
KENWOOD TM-201A 2M FM MOBILE.....£159
KENWOOD TM-255E 2M MULTIMODE.....£499
KENWOOD TM-732E DUAL BAND MOBILE TRANSCEIVER.....£329
KENWOOD TM-751E 2M MULTIMODE TRANSCEIVER.....£325
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TRIO TR-2200 GX 2MTR PORTABLE.....£99
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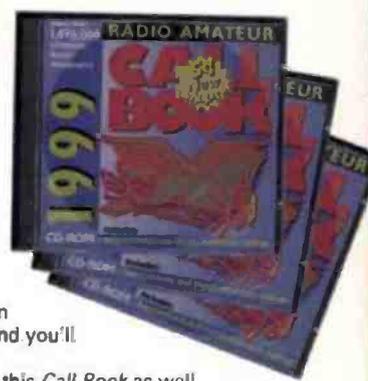
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