Free
Inside This Issue
32 Page
Greenweld Electronics
Summer Sale Catalogue

Constructional
Build A 1.2GHz Pre-scaler

Go Portable On HF - Build Doug DeMaw W1FB's Helical Antenna

Review
The TE Systems 1410G 144MHz Linear Amplifier

Plus
Getting Started The Practical Way,
Focal Point, CB High & Low,
Prize Competition and Lots More
Yaesu's Pair of Aces

The FT-26/76 hand-helds make your life simple with all the features you will ever need. They're easy to use and designed to fit comfortably in your hand, and weighing in at just one pound each, the FT-26/76 lets you travel light.

For complete details on these handelds call your nearest Yaesu dealer now!

FT-26/FT-76 Hand-helds that make your life simple

- FT-26: 144-146MHz, FT-76: 430-440MHz.
- Supplied as standard with FNB25 and NC28C.
- 53 Memory Channels.
- 5 Watt Output, 12V DC NiCad Batteries Available.
- Four User-Programmable Power Levels (with FNB-27).
- Built-In Vox.
- Built-In DTMF calling For Selective Or Group Calling.
- Backlit Display and Front Buttons.
- Direct 12-Volt Operation With E-DC-5 Adaptor.
- Key, PTT and Dial Locking.
- Automatic Repeater Shift (ARS) Built-In For 2 Meters.
- Automatic Power Off.
- Selectable Channel Steps.
- Automatic Battery Saver.
- User Selectable Channel-Only

Display, Simple Operation For New Hams.

Accessories Options:
A selection of batteries and leather cases. Desktop quick charger (NC-42 1 hour), CTCSS encode/decode unit (FTS-17A), DC adaptor with noise filter (E-DC-5), Mobile mounting bracket (MMB-49).
Secondhand lists sent daily – phone now for yours!

FT990
Simply one of the best HF transceivers ever to storm the market – phone today and we’ll tell you why.

FT890
The smallest HF rig with internal A.T.U. facility – part exchange your FT757, 140 or FT707 now.

TS450/690
Fing out why these two have gone from strength to strength over their predecessors – namely the TS440S and TS690S.

IC728
The newest to the Icom HF range as well as the popular IC725 and ICX735 – phone for your price now.

ICR7100HF
Icom base receiver with continuous coverage 200kHz – 2000MHz. HF kits also available for ICR7100 and ICR7000.

TM741E
Tribander mobile with remote head facility – plus all other dualband models available new or secondhand. New FT5100 coming soon.

2m and 70cms hand-helds from the Kenpro KT22E thumbwheel to the sophisticated Kenwood TH28E.

Worldwide
SSB MODIFICATIONS available for ICOM IC7100 and CRT100 fitted or supplied in kit form for EXPORT

6 Royal Parade, Hanger Lane, Ealing London W5A 1ET
Tel: 081-997 4476
Fax: 081-991 2565
In the fast-moving world of mobile communications, Kenwood's new TM-732E FM dual-band transceiver is a winner. Despite its compact design, the TM-732E packs a host of advanced features such as dual receive (including VHF+VHF and UHF+UHF), built-in DTSS and pager functions. The detachable front panel has a high-visibility LCD display to provide instant intelligence on operational status. And on-the-move operation is facilitated by a multi-function microphone. TM-732E offers true pole-position performance.

Enjoy all advantages of these superior features:
- Detachable front panel for maximum freedom of choice during installation (requires optional PG-4K/PG-4L kit)
- Dual receive on same band (VHF+VHF or UHF+UHF) with one antenna
- Audible frequency identification
- Multi-function microphone
- Built-in DTSS with pager function
- Tone alert system
- Separate speaker terminals for each band (switchable)
- Automatic band change (ABC)
- Multi-scan functions
- 50 split memory channels or 64 simplex memory channels plus 1 call channel (switchable)
This latest Ten Tec Argonaut QRP rig is down in price this month to an amazing £99.5. 5 watts all bands 180-10m SSB/CW variable IF filter down to 500Hz. Full-break-in and vox. Phone for brochure.

**HF Transceiver Discounts**

Phone for Quote

**YAESU – KENWOOD – ICOM**

**GENUINE UK STOCK! 12 MONTHS WARRANTY**

**New – Ramsey USA Amateur Radio Kits – QRP kits etc**

**FASTEST MAIL ORDER IN UK!**

On the left is a picture of our busy mail order department. We have 3 full time packers, handle nearly 20,000 parcels a year and everything is completely computerised for speed. Goods can normally be dispatched same day and delivered within 24 hours upon request. Everything is insured by us against loss or damage and we can supply almost any product you see within the pages of this magazine. Phone or write for our latest mail order price list and take advantage of our superb before and after sales service.

**MFJ Products from stock!**

**300W HF ATU**

The MFJ-948 is a complete 300 Watt serial ATU in a box. It will match coaxial, balanced feeder, and single wire. A dual needle VSWR/Power meter makes adjustment simple and complete 300 Watt aerial. The MFJ-948 is a MFJ Products from stock!

**STOP PRESS: New MFJ 20M QRP rig with 500Hz CW filter £179.95**

**TONNA BEAMS**

**VHF/UHF**

All with “N” connectors

THE BEST

6M

Price

200/5 el. £59.00

2M

208/4 el. £32.00

208/4 £41.00

200/9 el. £39.00

208/9 9 el. £45.00

208/22 11 el. £95.00

208/13 13 el. £105.00

208/17 17 el. £169.00

20cm

200/9 el. £33.00

209/19 19 el. £40.00

205/23 23 el. £39.00

205/25 55 el. £55.00

**OTHER REGIONS and SPECIAL ORDER PRACTICALS**

For further information or prices contact local dealer.

**DIAMOND**

**VSBR/POWER METERS**

6X-100 – 1.6-40 MHz, 30-300W-3kW £99.00

6X-200 – 1.8-200 MHz, 5.20-200 watts £179.00

6X-402 – 1.4-40MHz, 5-20-200 watts £299.00

6X-600 – 1.8-60MHz, 5-20-200 watts £399.00

6X-800 – 1.8-80MHz, 5-20-200 watts £500.00

6X-1000 – 1.8-100MHz, 3-20-200 watts £600.00

**BASE STATION ANTENNAS**

CP-4 – 10-12-20-40 vertical with radials £149.00

CP-5 – 10-12-20-40-80 vertical with radials £199.00

CP-6 – 10-15-20-40-80 vertical £299.00

D-1000 – Discone 25-1300 MHz, 30 FT cable £84.95

D-22E – 2m x 5/8 5.6dBi gain omni directional £49.95

D-707 – Active rx. 1.5-1300 MHz £90.00

**FIBREGLASS VERTICALS**

X-30 – 2m/70cm 4.57-23dB gain 1.7m long £95.99

X-200 – 2m/70cm 4.57-23dB gain 3m long £99.00

X-500 – 2m/70cm 8.31-7dB gain 5.2m long £119.00

X-700 – 2m/70cm 9.31-3dB gain 7.7m long £129.00

V-2000 – 2m/70cm 1.8-525 MHz, 5-20-200 watts £179.00

V-2002 – 2m/70cm/23cm 1.8-1300 MHz, AUTO £219.00

**MOBILE ANTENNAS AND MOUNTS**

NR-2000 – 2m/70cm/2m mobile whip PL259 £49.95

D-505 – Active rx. antenna 1.5-3000 MHz 12v £69.00

NR-710 – 2m/70cm mobile whip PL259 £25.00

NR-790 – 2m/70cm 4.57-2.1dB gain 60 watts £48.00

SG-790 – 2m/70cm whip 5.06-7.5dB spopener £68.00

DP-22E – 2m/70cm whip PL259 £69.00

M-285 – 2m/70cm whip PL259 £79.00

CM-1 – 2m/70cm whip PL259 £89.00

AM-4 – Gutter mount bolt over type £12.95

EC-M – PL259/4029 cable kit for QRP-Q $9.95

SP M – Heavy duty magnetic mount with cable £22.95

**NEW “HARI” HF ANTENNAS**

A great new range of antennas that are pre-tuned, beautifully engineered to professional standards and constructed of heavy duty, multi stranded, clear plastic coated wire. All antennas are boxed fed and fitted with SO239 sockets.

W3DZZ 80/40 dipole 200W 34m £79.00

W3DZZ 80/40 dipole 1kW 34m £99.00

W3DZZ 40/20/15/10 200W £69.00

W3DZZ 40/20/15/10 200W/42m £49.00

W3DZZ 40/20/15/10 1kW £69.00

Dipoles 20/15/10m 200W £79.00

Dipoles 30/17/12m 200W £79.00

**ARGONAUT QRP!**

**SAVE £300! £995**

This latest Ten Tec Argonaut QRP rig is down in price this month to an amazing £99.5. 5 watts all bands 180-10m SSB/CW variable IF filter down to 500Hz. Full break-in and vox. Phone for brochure.

**MICROPOWER SUPPLIES AND LINEARS**

Send SAE for full colour Microsoft catalogue

**MAST HEAD PRE-AMPLIFIERS**

PR-145 – 2M 100 Watt 16dB gain – 0.6dB NF £75.00

PR-145-2M 500 Watt 18dB gain – 0.6dB NF £109.00

PR-430 – 70cm 100 Watt 15dB gain – 1.2dB NF £85.00

**MICROPOWER SUPPLIES**

PT-107/… – 100 Watt fully protected (non meter) £49.00

PT-110/… – 100 Watt fully protected (non meter) £69.00

PC-110 – 100 Watt fully protected non meter £55.00

PT-120/… – 100 Watt fully protected (non meter) £119.00

PT-120/… – 100 Watt fully protected (non meter) £169.00

**AMPLIFIERS (with GaAsFET Pre-amps)**

R-23 – 2M-1.4W in 30W max out SSB/FM £79.00

R-45 – 2M-3.15W in 43W max out SSB/FM £99.00

R-500 – 2M-1.7W in 50W max out SSB/FM £199.00

SR-100 – 2M-4.25W in 100W max out SSB/FM £159.00

SR-200 – 2M-10-50W in 200W max out SSB/FM £299.00

VR-30 – 2M/70cm 1.4-6W in 30W max out SSB/FM £229.00

RU-200 – 70cm 0.8-1.5W in 20W max out SSB/FM £119.00

R-432-70cm 6-12W in 80W max out SSB/FM £339.00

**New MFJ-1278 Data Controller**

£279

This superb data controller gives you 9 modes of operation; Packet, Amtor, RTTY, ASCII, CW, FAX, SSTV, Navtex and contest keying. The best selling data controller in USA is now available here!

**AMERITRON HF LINEARs**

NEW 600 Watts £699. AL-811

This linear is incredible value. We have put it through its paces and it really stands abuse. 3 rugged 811A tubes provide up to 600 Watts output from 160-10m. A hunky mains transformer and full metering is included. Used by DX-peditions it has to be amazing value at £699 inc VAT.

AL-406X 1kW from 160-10m 3-500Hz tube £1099.00

**Other Ameritron linears are available. Send SAE today.**

**ON-DECK**

Self powered – it can sniff frequencies from over 100kHz! 1MHz – 2.4GHz £149.95 inc. nl-cad & charger

**NEW “HARI” HF ANTENNAS**

A great new range of antennas that are pre-tuned, beautifully engineered to professional standards and constructed of heavy duty, multi stranded, clear plastic coated wire. All antennas are boxed fed and fitted with SO239 sockets.
2m & 70cms Dual Bander DJ-580E

£369 inc VAT

The DJ-580E hand-held is the most advanced design ever offered to the radio amateur. Building on the winning formula of the DJ-560E, ALINCO have now reduced the size dramatically and introduced a combination of innovative features that will make your operating even more fun and certainly more versatile.

It goes without saying that ALINCO offer you all the standard features you expect from a hand-held including dual watch, dual controls, scanning, searching, priority, etc. Of course ALINCO's standard of engineering and reliability is now becoming the envy of its competitors. (They're also pretty envious of ALINCO's prices!) Naturally you get a full 12 month warranty including parts and labour. It's the extra features that really make this a winner.

For example you now have ALINCO's patented circuit that retains full operation with dry cells even when battery voltage falls by 50%. Great for emergency applications. You get a programmable auto power off feature, battery saver, digital telephone dialler and three output power levels. And we've only just started! Key in a special code on the keypad and your rig will turn into a fully operational automatic crossband repeater. Key in another code and you will open up the receiver for a.m. airband reception and frequency segments up to 995MHz! You can even use the DTMF feature to send and receive two digit code messages.

To learn more about the transceiver that has already taken the Japanese and American markets by storm, phone or write for a full colour brochure.

“The Most Comprehensive Specification Ever Offered!”

Available direct or from your local dealer

Auto repeater mode
AM Airband Reception
Expanded Receive to 995MHz

UK “Gold Seal” Warranty
Now with every unit!
Look for the sign on the box!

Specification

<table>
<thead>
<tr>
<th>Tx</th>
<th>144-146MHz</th>
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<tbody>
<tr>
<td></td>
<td>430-440MHz</td>
</tr>
<tr>
<td>Rx</td>
<td>AM 108-143MHz</td>
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<tr>
<td></td>
<td>FM 130-174MHz</td>
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<td></td>
<td>FM 400-470MHz</td>
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<td></td>
<td>FM 810-995MHz</td>
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Steps
5, 10, 12.5, 20, 25kHz

Memories 42

Power Output
2.5/1.0/0.3 Watts
5 Watts with 12V DC

Scan 8 Modes

Tones 1750Hz plus DTMF
Optional CTSS

Sensitivity 12dB SINAD -15dBu

Size 140x58x33mm

Weight 410g

Accessories Supplied
Ni-Cad pack, AC charger, belt clip, carry strap, dual band antenna.

WATERS & STANTON ELECTRONICS

22 Main Road, Hockley, Essex. Tel: (0702) 206835
Retail and Mail Order: 22 Main Road, HOCKLEY, Essex SS5 4QS. Tel. (0702) 206835 / 204965
Retail Only: 12 North Street, HORNCOURCH, Essex. Tel. (04024) 44765
VISA & ACCESS MAIL ORDER: 24 Hour Answerphone. Open 6 days a week 9 am - 5.30 pm
Rail: Liverpool Street/Hockley or District Line/Hornchurch
Number Crunchers

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RSC Power Systems is the original "System Tailor" with over 10 years of IT and electronics experience. Our massive purchasing power allows us to offer leading edge technology at highly competitive prices. Each system is designed with to be versatile with expansion in mind. Options include CD ROM, WORM, Re-writable (optical) and Hard drives up to 1.2Gb, as well as Tape Streamers, LAN cards and almost any peripheral you could ever want. Call the sales team to discuss your individual requirements.

Our showrooms are open from 9am-5pm Monday to Friday and Saturday by appointment.

286 16MHz
£429.00

386 40MHz 128K Cache
£529.00

486 33MHz 128K Cache
£849.00

386sx 25MHz
£489.00

486sx 20MHz 128K Cache
£599.00

486 50MHz 256K Cache
£1069.00

A REAL GEM IF YOU RUN 6 MTRS! (G41AZ)

All Systems include:
- 3.5" 1.44Mb/720K FDD
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- 12 Months warranty
- Optional on-site maintenance

OPTIONS

ADDITIONAL MEMORY (RAM)
Per Mb
£25.00

MATH COPROCESSORS
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5X Co-pro
£95.00
387-33 Co-pro
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89Mb 16ms
add £99.00
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add £199.00
213Mb 16ms
add £369.00
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IDE Controller
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MONITORS & GRAPHICS ADAPTORs
14" VGA Mono Paper White
£79.00
14" SVGA MultiSync Colour .28 pitch
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Windows Accelerator Card S3
£159.00

CASE OPTIONS
For a Full Height Tower Case add
£49.00
5.25" 1.2Mb Floppy
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3.5" 2.88Mb Floppy
£99.00

Power Systems 0923 241921 or 211087

77 Queens Road, Watford, Herts, England WD1 2QN  Fax: (0923) 211102
WHAT WOULD YOU EXPECT AFTER THE ICOM IC-728? ..THE IC-729 OF COURSE!

- 100W on all HF Bands
- 10W output on 6m
- Speech Compressor
- Passband Tuning
- Direct Digital Synthesizer
- 26 Memories
- Handmic Supplied

The IC-729 gives you complete HF coverage plus the increasingly popular 6m Band. Come and try ICOM's newest transceiver today.

Top value at only £1085 inc. VAT.

HAMSTORES stock a wide range of new Amateur gear plus a large selection of second-hand and ex-demo stock including; BARENCO, DIAMOND, COMET, SONY, AOR, LOWE, DRAE, CUSHCRAFT, KANGA KITS, DEECOMM, ALLGON, TOYO, AEA, CDR, MET, MFJ, AKD, ICOM, YAESU, KENWOOD, ALINCO, JRC ETC.

Watch this space for more news, 73’s, Chris G8GKC, Gordon G3LEQ & John G8VIQ.

BOTH STORES NOW OPEN TUESDAY - SATURDAY. 09:00 - 17:00 WEEKDAYS. 09:00 - 16:00 SATURDAYS.

Payment by Access, Visa and Switch. Part-exchanges welcome, finance can easily be arranged (subject to status). Interest free credit is available on selected new ICOM products.

If you cannot visit an ICOM HAMSTORE in person we operate an efficient, computer-based Mail order service. Stock items normally despatched within 24Hrs.

Unit 8, Herne Bay West Industrial Estate, Sea Street, Herne Bay, Kent CT6 8LD Telephone: (0227) 741555, Fax: (0227) 741742

International House, 963 Wolverhampton Rd. Oldbury, West Midlands B69 4RJ Telephone: 021 552 0073, Fax: 021 552 0051
Directly descended from the FT5200, the FT5100 is a compact dual receive crossband full duplex mobile transceiver. Miniaturisation technology allows many features as standard including built in antenna duplexer, dual full frequency LCD display and dual receive capability on two channels in the same band. An efficient cooling fan allows up to 50W VHF and 35W UHF output. All this in a package smaller than a standard car radio.

FT890 MOBILE/BASE HF

The FT890 is already starting to stamp its mark on the mobile HF transceiver market. The FT890TU variant, with built-in ATU, is proving especially popular. A recent review in HRT June 1992 edition by Chris Lorek G4 HCL sums it all up by saying "It has an extremely versatile performance with features to satisfy most people" and "I was most impressed considering the overall size of the set." Why not pop along to your nearest SMC showroom and try one for yourself, you'll be pleasantly surprised!

Optional accessories include:

- FP800 Power supply.
- ATU2 Internal automatic ATU
- FC800 External automatic ATU
- DVS2 Digital voice storage system
- SP6 External speaker (base).
- SP7 External speaker (mobile).
- TCX03 Temperature compensated oscillator unit.
- MMB20 Mobile mounting bracket.
- XF455K 250Hz CW filter.
- YF100 500Hz CW filter.
- YF101 2kHz SSB filter.

SEE REVIEW IN HAM RADIO TODAY JUNE 92 EDITION
### SMC for all your antennas

SMC are proud to be associated with COMET Co LIMITED

**COMET** produce arguably the best quality base and mobile antennas available today on the amateur radio market. Discerning radio amateurs will appreciate the stunning combination of amazing performance and aesthetically pleasing styling of some of the latest range of antennas available from COMET via SMC, the authorised UK distributor.

#### BALUNS
- **CBL-30:** 1:1 1.7-30MHz, 1kW P.E.P.  
  - **Price:** £18.95 A
- **CBL-2000:** 1:1 0.5-50MHz, 2kW P.E.P.  
  - **Price:** £25.50 A

#### HANDHELD ANTENNAS
- **CHF75:** 2m/70cm BNC 0dB/3.2dB  
  - **Price:** £12.25 A
- **CH1200WS:** 23cm BNC 5.6dB 3kW wave  
  - **Price:** £14.50 A
- **CH-400X:** 2m/70cm/23cm BNC tri-band (OK for scans at 130/300/800/900MHz)  
  - **Price:** £23.50 A

#### MOBILE ANTENNAS
- **CA-7HR:** 7½m x wave centre loaded  
  - **Price:** £33.95 B
- **CA-14HR:** 14mhz x wave centre loaded  
  - **Price:** £33.95 B
- **CA-21HR:** 21MHz x wave centre loaded  
  - **Price:** £33.95 B
- **CA-50HR:** 50MHz x wave centre loaded  
  - **Price:** £33.95 B
- **CA-285:** 6m/2m dualbander 0dB/3.5dB  
  - **Price:** £32.75 B
- **B-22:** 2m/70cm/5.6dB Black  
  - **Price:** £36.65 B
- **CA24MB:** 1.9m 5dB 7.6dB  
  - **Price:** £38.50 C
- **CA24KG:** 2m/70cm 6.0dB/4.8dB  
  - **Price:** £40.75 C
- **CX-702:** 2m/70cm 2.1/0.9/0.4dB  
  - **Price:** £46.95 B

#### DUPLEXERS
- **CT-305:** 10m+6m/2m Duplexer  
  - **Price:** £25.00 B
- **CA-522:** 6m/70cm/2m Duplexer  
  - **Price:** £24.95 B
- **CT-551:** 6m/2m/70cm Triplexer  
  - **Price:** £22.00 B
- **CXX-514:** 6m/2m/70cm Triplexer  
  - **Price:** £35.75 B
- **CXX-421:** 6m/2m/70cm Triplexer  
  - **Price:** £39.95 B

#### MOUNTS
- **TIR:** Adjustable trunk mount  
  - **Price:** £11.50 B
- **IS6:** Mini trunk mount (black)  
  - **Price:** £16.25 A
- **IS6:** Mini trunk mount  
  - **Price:** £12.75 B
- **IS7:** Mini trunk mount  
  - **Price:** £12.75 B
- **CXX-428:** Mini cable assembly  
  - **Price:** £16.25 B

### DAIAI POWER SUPPLIES

The Daiai range of power supplies is proving very popular with all types of applications, both for the professional user and the hobbyist alike. From the smallest 9A continuous PS120MkII via the extremely powerful 24A PS304, to the top of the range 32A continuous 95250X.

All the Daiai range of PSU's feature variable voltage from at least 3-15V and switchable voltage/current metering. Both the PS304 and 95250X have a higher lighter socket, convenient for powering your handheld. Also available from Daiai are some good quality SWR/MW meters and coax switches.

#### POWER SUPPLIES
- **PS120MkII** - 3.15V Variable 9A/12A max.  
  - **Price:** £69.95 C
- **PS140MkII** - Fixed 13.8V 12A/14A max.  
  - **Price:** £68.00 C
- **PS141MkI** - 15V Variable 24A max.  
  - **Price:** £125.95 B
- **PS40X** - 1.5V Variable 32A/40A max.  
  - **Price:** £189.00 D

#### COAX SWITCHES
- **CS201:** 2 Way 2539  
  - **Price:** £24.99 B
- **CS20162:** 2 Way N  
  - **Price:** £27.50 A
- **CS401:** 4 Way 2539  
  - **Price:** £38.00 B

#### SWR METERS
- **CN101:** 1-8-150MHz  
  - **Price:** £12.95 A
- **CN10H:** 1600MHz  
  - **Price:** £225.00 B

#### LINEAR AMPLIFIER
- **LA2008:** 2m 1.5-5MHz  
  - **Price:** £19.95 C
- **DLA 80H:** Dual Band Linear SW  
  - **Price:** £25.00 C

### ROTATORS

#### COMMUNICATIONS TERMINALS

- **TELEREADER TNC TERMINALS**
  - **TNC 24 MKII**
    - No more 'add ons' for satellite operation
    - High speed Morse via satellite
    - TTL or RS232 input
    - CW I.D. built-in
    - PC software included
    - **Only £329**

- **TNC MICRO**
  - **Only £209**

- **TNC 24 on Demonstration at SMC HQ**

The UK appointed agents for:

- **Yasu**, Daiai, Comet, Create, Tokyo Hy-Power, Hokushin & Telereader.
- **Also suppliers of:**
  - AOR, Sony, JRC, Jaybeam, Drake Henry Linears, Toyo, Icom & Strumech

#### STRUMECH VERSATOWER

- **MAIN STOCKIST**
- **MOST POPULAR MODELS IN STOCK**

### SMC INFORMATION

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**TEL:** 0703 255111  
**FAX:** 0703 263507

Use up 31/1000 instant credit subject to status written quotation on request.  
Yasu distributor warranty. 12 months parts & labour
It's nice to see all this shiny new equipment in the mags, isn't it? However, we know that the latest gear doesn't always appeal, especially to those with tight budgets. Thus we have a growing selection of pre owned equipment, all fully tested and warranted so you have the opportunity to indulge without incurring the wrath of the bank manager - send a large SAE for the latest up-to-date list.

Don't forget - we stock a wide range of accessories including antennas, mounting hardware, cables, connectors, mobile mounts, SWR meters, PSU's, morse keys, coax switches, rotators, scanners and receivers, microphones, headphones and much much more!

Best part exchange deals in the country KW - your one stop amateur shop.

KW has been serving radio amateurs in Kent for many decades - a tradition the new KW will be continuing! Be you man of Kent or Kentish Man, everything for the amateur is right here in the heart of the country. A quick look at a map will also show how easy we are to get to from other areas. Sussex Man and Surrey Man will find us via the M25/M20 network and convenience for the M2/A2 route makes it ideal for London Man to leave the problems of the City behind. The Queen Elizabeth II bridge at Dartford also means that Essex Man can reach us very quickly.

Our showroom is bright, warm and comfortable, allowing you to relax whilst browsing through our latest books, checking out the latest accessories of trying out a new rig on air before you buy.

For those unable to visit we offer a speedy mail order service to get goods to you quickly. Unfortunately you will miss out on the refreshments and the charm, wit and experience of our sales staff! Rest assured we always do our best however you contact us!

We look forward to serving you. 73's Tom G6PZZ
Six Lane Waterway

Even on the way to the NEC on the Friday, the M42 looked like a six-lane version of the Cowes to Torquay power boat race! There was so much water on the roads, that I've no doubt that other motorists like me were wishing that they too had diesel-engined cars rather than petrol!

One look at the exhibition site will make anyone realise that the NEC costs to the visitor, the commercial stand-holder and the RSGB itself will be inevitably high. But what can be done about it? Are we stuck with the NEC? Or can the national society look for an alternative location?

What Are Shows For?

The questions I've raised, brings another question to mind. What are amateur radio shows for nowadays? Are they a 'shop window' on the hobby in general, or just an exercise in selling or promoting ideas and products.

But, even bearing in mind the importance of what I've described, aren't we beginning to forget vital aspects of these events? This includes meeting old friends, learning more about the hobby, seeing what the varied sections of the RSGB have to offer, etc. I'm wondering if the social and educational aspects of events like these is perhaps being pushed into the background, yet that could become one mammoth bargain hunt. And don't forget, I've already said I like bargain hunting too!

National Societies Accused

National amateur radio societies are often accused of being remote, inaccessible and difficult to contact. Despite this, the RSGB can hardly be criticised for their effort at the NEC this year.

The president, Terry Barnes G1OSS, was to be seen everywhere throughout the duration of the show. All departments of the RSGB were represented, and they were easy to find.

I understand, on good authority, that the idea to open out the stands came from the former General Manager Philip Smith. Thanks to his initiative, society members and others could easily locate and talk to everyone from the Education & Training section, waxworks Polish Membership, before moving on to talk to the staff of Radio Communications.

Well done RSGB! Everyone was extremely well! Everyone was accessible, and the society was seen to be doing its best to promote itself and the hobby, to best advantage.

However, and despite my accolade, there's a big problem. And unfortunately it all comes down to that problem we all suffer from... lack of money!

The NEC Problem

The problem about the NEC, as I see it, is not the NEC or their organisation. It's the NEC itself. It's too expensive and too remote. Or in my case, extremely remote, and the RSGB has to pass on the costs to everyone. Although the show is readier to offer publicity by being there, I wonder if our hobby can afford the luxury of such a prestigious site.

But, after all, an enormous number of rallies, conventions and shows take place at less imposing sites... and they're successful. One or two take place at council-owned sports complexes, and schools are very popular.

Wrongly Assumed

I had wrongly assumed that the NEC was a venue operated by central government. Research shows that it's actually run by the City of Birmingham on a full profit-making basis.

I also learned that far from being subsidised, the show organisers have to pay £50 per visitor for car parking, regardless of whether a car is parked or not. This is the only way of avoiding the very high NEC rate and the fee normally applied. I'm glad the RSGB takes advantage of this facility! It's obvious that anyone organising an event at the NEC has a great deal to take into consideration. I don't have to say how, other than that they look around for other sites in the area.

Perhaps other people will think differently. Maybe they think the recession is nearing its end, and this aspect must be having an effect. Having my thoughts, I think that I'm fully aware that some amateur radio traders reported fairly good business.

So, although the results of the NEC are probably interpreted in different ways, I think a national show is needed. But is the present venue the right place? Is it likely to dampen the enthusiasm for what should be a popular event with everyone. Can British amateur radio afford the NEC?

Microwave Project

Like very many other QRP enthusiasts, I built and used the famous Exe microwave project. Even now (if you're lucky) you can still find the occasional pair of Exe dishes at Shows. For a project published so long ago, I'm sure the Exe still arouses interest. Developed by Dick Ganderton G8VFH (now editor of our sister publication Short Wave Magazine) and John Fell GM4CP (now G4PHU), the Exe was published in June 1981 was a bandwidth of 167GHz project. The Exe became extremely popular and led to many amateurs discovering and getting the bug for microwaves.

With this in mind, I'd like to follow up a reader's suggestion and ask how many of PW's home-brew enthusiasts would like to take a closer look at this project. I look forward to hearing your views.

Elisted Image

I managed a very brief conversation with Charles Suckling G3WOD at the NEC, and he's keen to discourage the elitist image cultured by one or two microwave specialists. Indeed, it's Charles and fellow enthusiast Mike Fell GM4EJH who have developed the simple 10GHz transverter system, recently published by David Butler in PWs 'VHF World'.

However, to do our bit to encourage microwave activity, I need your help. What do you think we should do on microwave shows.
Dear Sir

First of all I would like to say excuse me for my bad English. I don't speak and write it very well and I know of your magazine by a friend who is a subscriber.

Every month he lends me PW and I enjoy it. There is a lot of articles and they're all very interesting. We don't have a magazine like PW in France. We have magazine for the radio amateur like REF, Megahertz Magazine and some magazines for CB, but not one like yours.

I'm very surprised by the quality of new rigs and new equipment that you have in the UK. We can see this a few months later in France. Why? I don't know! And your prices are more advantageous, maybe at the end of this year, this will change?

I would like to add that my town, Auxerre which is 160km south of Paris, organises every year at the same time the biggest show for radio amateurs in France. It happens in the second week end of October (10th and 11th of October). Are you intending to visit us? All visitors will be the welcome, and if you need more information don't hesitate to contact me.

Mr Philippe
Auxerre
France

Editor's reply: Thank you for your letter and comments Mr Philippe. I'm sorry to be so formal, but you didn't let us have your first name. You can be assured that nobody in the office can write in French as well as you do in English! The PW team were pleased to read your letter, and delighted to hear that you enjoy the magazine. Our biggest handicap in France is of course the fact that we're an English-language magazine.

Despite that, we're very pleased to hear from our French and other continental readers. We were also surprised to hear your comments on equipment and prices; personally I've always assumed that all the radio gear I fancy is always cheaper abroad! Perhaps, after your show, you would like to send us some photographs and we'd be delighted to share the news with readers.

Dear Sir

In the July, August and September 1990 issues of PW, you carried an article about an s.s.b. transmitter for home construction, called the 'Marland'. I have built this with the intention of adding the companion receiver, which you refer to in reply to a letter from G3WOW in the February 1991 issue.

Can you say when the design for the receiver will appear? I am sure that there are many other Marland users who would like to add the other half to their rig.

Also I would like to thank you for a publication which is a great help to me, as I am a newcomer to the hobby. The descriptions of circuit operation are especially important. I know it's not always possible, but it helps if the circuit diagrams are accompanied by a brief explanation of what happens to the signals at various points in the circuit. This is very important when fault-finding.

Derek Chenery
Dover
Kent

Editor's reply: Thank you for your letter Derek. The PW team are pleased to hear that you've enjoyed using the 'Marland' and are now patiently waiting for the receiver side. I did ask, in my editorial reply to G3WQW, for readers interested in the receiver project to contact me. Apart from your letter, that's the lot! George Dobbs G3RJV decided to leave that project for a while and concentrate on the PW 'Jubilee' 14MHz mobile s.s.b transceiver. This is now almost ready for publication and I hope to have a prototype of my own working soon. However, earlier in the spring, another 'Marland' owner contacted us to say he'd converted his transmitter into a transceiver. This project is now being evaluated and I hope to have some news on that project soon.

In the meantime, I'd still like to hear from 'Marland' owners, whether or not they'd prefer a separate matching receiver.

Dear Sir

I feel I ought to drop you a line after reading your editorial in PW June.

Well done! I do not see why if these 27MHz rigs are available why we could not purchase, modify and use them! They would be ideal for QRP work on 28MHz, Novice use and also transverting for v.h.f/u.h.f. or even h.f.

They would also be useful for /M or /P work in my other hobby as a re-enactor of the English Civil War period. I find that the main h.f. rig is a little too bulky, and power-wise a little too high for caravan work. However, a 28MHz rig would be super, and would enable us to use the band when it's dead for DX.

I hope that you get the backing of the RSGB and RA to allow us to legally buy, modify and use the sets again. If so, I aim to get at least one! Keep up the good work!

C. Barber G4LDS, Burnham-on-Crouch, Essex

Editor's reply: Forsooth, 'twas an illuminating letter Mr Barber. Methinks that your antenna must look most oddley on either your periwig or 'round-head's hat! I really don't know what 'side' (Royalist or Cromwellian) you're on G4LDS, but it's the most unusual use for amateur radio I've heard about! Do you base-load your musket or pikestaff? However, thanks for your support, and I hope eventually to hear from the RSGB and RA on the matter.
Dear Sir

I see from your correspondence that the Class B hunting season is upon us again! I refer to the letter from John Hemming 2E1ANW, on the subject of the novice licence. Now let me say at once, that I am in favour of the new licence, as it fills a much felt need.

I am also used to the Class A lads sniping at the Class B operators and telling us that we are, somehow, an inferior group; something to do with not knowing Morse, I believe! Whilst I am, perhaps, prepared to take snide comments from 'old timers' it seems we now have to battle with a new breed of hunters.

Let me quote from John's letter "might not make some of the operating mistakes that Class Bs do every day". To judge from his callsign John has been licensed several weeks and therefore, being very experienced in these matters, has already discovered the subordinate species in our ranks. He's also aware that Class A people do not make these mistakes, or at least if they do he is prepared to overlook these petty foibles!

The truth is that there are good and bad operators on both sides of the fence. My own achievements in amateur radio include 38 countries on 144, 21 on 432 and eight on 1296MHz. I have worked through the satellites since Oscar 6 and I am active on 10GHz s.s.b. and f.m., and also on 24GHz.

My current tally of certificates is over the 50 mark so I think I must be doing something right! How does this equate on talking to working on 3.5MHz, or at least if they do he is prepared to overlook these petty foibles?

Incidentally, my oldest and most prized certificate is that issued by the Short Wave Listener in September 1948 making me a member of the VHF Listeners' Club. I wonder how many are still out there now?

Glen Ross G8MWR, Coventry

Editor's reply: Thanks for your interesting comments Glen. Perhaps carrots won't grow above 30MHz? My own listening experience on 3.5MHz s.s.b. makes it seem to be like overhearing conversations from a doctor's surgery! But joking apart, it's remarkable how Austin Forsyth G6FO's, Short Wave Listener magazine, during its relatively short life, predicted by its own appearance, the future for Short Wave Magazine, as a dedicated listeners' magazine wasn't it?

Dear Sir

Ref: 'Keylines' April. If you can't afford the Editor's suggestion of a 'Linguaphone' course, try the language tapes such as 'Deutsch Direkt' or 'Get By In..'. Your local library, will also have many books to learn from.

A useful free source are the BBC's 'culture' programmes, which usually include mainly native speakers in various situations and subtitled pronunciation in an Anglicised text. Regarding the "ignored novice". He probably has 3.5MHz coverage like mine - two annular rings radiussed on Portsmouth and Herefordshire. Not only were the stations probably not ignoring him, there's a good chance they didn't even hear him! Check an article on 3.5MHz sky wave cover from a 1960s edition of Short Wave Magazine for details.

Finally, rejected hobby newcomers? Not at my local club. The main reason is probably treatment by magazines. Projects are buildable in a few hours, hence they are simple to the point of unsuitability, use standard parts (Far East plug/socket box in a recent retail magazine) while being an insult to the builder's intelligence and can't be too complex in their text or the poor newcomer won't understand.

Small wonder that we are now suffering a near disastrous shortage of good r.f. engineers, not one superhet receiver has been published for ages! I mean here one which does not use the four i.c.s, a plated-through double-sided board and costs £70 odd and people are asking for valve projects and older equipment details. I hope that PW will occasionally feature the multi-part article offering a well made and useful item of radio equipment.

Peter J. Brent
Crawley

Editor's reply: Thanks for the letter Peter, and the good ideas on language study and other comments. The various BBC programmes are excellent sources for students. Unfortunately, with regards to the "ignored novice" I know that the offending G station DID hear the novice, as he told the next G he worked that he wasn't going to work at 5w.p.m., etc! Finally, the PW 'Churchill' s.s.b. project will be published soon. I feel that this will prove very popular, and it will keep you busy for a while, and you'll end up with a very useful rig that will prove useful on v.h.f. as well as h.f.

What do you want in PW?
What projects do you prefer? Are small projects to your liking? Do you want v.h.f. circuits?
Write in and tell us - we're here to serve you!

COMPETITION CORNER
Spot The Rig

Our art bod Steve Hunt has manipulated another pic of a rather famous piece of amateur radio equipment. Can you work out what model and make it is? Or should you take the hint and mow that lawn?

Name...............................
Address...............................
........................................
........................................
........................................

❑ Subscription ❑ Voucher
Send your entry (photocopies acceptable with coupon) to: May Spot The Rig Competition, PW Publishing Ltd., Eneco House, The Quay, Poole, Dorset BH15 1PP. Editor's decision on the winner is final and no correspondence will be entered into.

Entries to reach us by August 21st.
First Prize: One year subscription or £20 book voucher.
Two runners-up: Six months subscription or £10 book voucher.

I think that this rig is a...

Editor's suggestion of a multi-part article offering a well made and useful item of radio equipment.

May Spot The Rig Competition August '92

Subscription

Voucher
Nevada Nabs NEC Thieves

Thieves had a nasty surprise when they were caught stealing new equipment from the Nevada stand at the RSGB's NEC show on Saturday May 29th. Amateur radio retailers have been hit hard by thefts at shows recently, and a new initiative against crime provided dramatic results within 20 minutes of the show opening its doors to the public on the Saturday.

Prompt action by Nevada staff member Paul Martin G0AFF, enabled Nevada's managing director Mike Devereux G3SED, to challenge the suspect with the assistance of a member of the NEC security staff. The alleged suspect was then arrested and interviewed by police.

In the meantime, the vigilance of the NEC security staff led to the detention of an alleged accomplice. The combined actions led to the recovery of two hand-held transceivers, a Standard C528 and a Kenpro KT220 together worth £600. Two young men, both licensed radio amateurs, from the Chesterfield area of Derbyshire were later charged with theft following the incident. Mike Devereux G3SED was delighted at the results gained by the new security initiative operating between amateur radio dealers and staff: "Paul Martin's action stopped the theft of two valuable hand-holds, and the results show that the new approach to security, accompanied by better communications is working. Dealers are determined to crack down on the increasing number of thefts from stands at shows and rallies, and we are delighted with the success of our new approach. Finally, I must also say how delighted we are with the co-operation and professional approach of the NEC security staff, and how quickly they detained the second suspect".

IRTS Jubilee Year Expedition, Clare Island, Co. Mayo

A major expedition to Clare Island, off the west coast of Ireland, is planned between August 8 and 15th. A major expedition to Clare Island, off the west coast of Ireland, is planned between August 8 and 15th.

Due to demand from owners of the FT757GX Mk1, Yaesu have agreed to extend the production run. Price is expected to be around £20 + VAT.

Radio Amateur Courses

Brighton College of Technology, Pelham Street, Brighton, East Sussex BN1 4FA. Commencing Monday 14 September 1992. Two evening classes are available: Mondays from 6 until 8.30pm covers the theory necessary to pass the City & Guilds RAE and Wednesdays, also from 6 until 8.30pm for Morse and practical project building. Enrolment fees cover the cost of all notes and paperwork. For further details, please contact Tim Snickland G4EOA on (0273) 667788 ext. 605 or 730.

Derby Tertiary College, Prince Charles Avenue, Mackworth, Derby DE3 1LR. To commence in September 1992, C&G 773 NRAE will run on Wednesdays from 6.30 to 8.30pm (Novice) and the C&G 765 RAE will run on Thursdays, again from 6.30 to 8.30pm. For further information, contact Student Services on (0332) 519951 or course tutor F. Whitehead G4MLL on (0332) 512080.

Doncaster Water colour, Waterl. Doncaster DN1 3EX. Commencing September (should there be enough demand), the class will be on a Tuesday evening from 6 until 8pm, and anyone interested should contact Mike Parkin G0GDS on (0322) 321212 ext. 292 or 287.

There will also be a basic practical electronics course on a Wednesday evening, 6 to 9pm, the tutor being Trevor Jones, who can be contacted on the same number.

The City of Westminster College (formerly Paddington College), 25 Paddington Green, London W2 1NB. Commencing early September 1992 (for May 1993 exam). Both class A and class B licences will be catered for (i.e. a Morse course will run concurrently). Additionally, an advanced Morse course is hoped to be conducted, taking candidates up to 22/25 w.p.m., with insight to professional/ marine procedures, etc. Professional college lecturers will conduct the classes. Prospective candidates should contact Ann James, in the Science and Technology Department on 071-723 8826, as soon as possible for enrolment details, etc.

Newport AFS, Brynglas Community Education Centre, Brynglas Road, Newport, Gwent NP1 5SU. Commencing Friday 18 September at 7pm, and each Friday thereafter, (with the exception of public/school holidays). The course is being planned to end at about the date of the May 1993 examination, although anyone wishing to sit the December 1992 exam is welcome to do so. Anyone interested in taking this course, is invited to contact Kevin Smilling GW7BC, at the above address. Brynglas Education Centre is a registered City & Guilds Examination Centre. Alternatively, enrolments for the course can be made during Brynglas Centre's 'Open week', from September 5 to the 10th, or on the first night of the course.

Bradford & Ilkley Community College, Great Horton Road, Bradford, West Yorkshire BD7 1AY. Tel: (0274) 75377/75337. Enrolment times are September 8, 9 and 10th, between 9.30am until 4pm, or 1pm until 9pm. Late enrolments will be accepted. Further details may be obtained by contacting the college at the above address.

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Swansea Foxhunting Group

Swansea Foxhunting Group are organising a 144MHz direction-finding foxhunting event for August 15 and 16th. This will consist of four foxhunters on each day. The foxhunt area will be the forest of Dean, an area central to all the known 144MHz foxhunting groups in the country.

Further details from Philip Smith GW1XBG on (0792) 642001. A detailed information sheet of the weekend activities will be available, so please send a s.a.e. if you would like to receive a copy.

Langford Lodge Wartime Centre

In 1942, the Lockheed Overseas Corporation took over Langford Lodge Estate, near Crumlin, County Antrim, Northern Ireland, and created Station 597, a vitally important repair and research base for the United States 8th Army Air Force European Theatre of Operations.

At the height of the war, over 3000 people were based at Langford Lodge. Large numbers of men, machines, B17 and B24 aircraft passed through the base and on to other stations. Some of America's finest entertainers, including Bob Hope and Glen Miller, played at Langford Lodge.

Although the Mansion House at Langford Lodge no longer exists, accommodation buildings have been converted to house Ireland's finest wartime centre/museum.

The 50th anniversary of the commissioning of Station 597, will be on 15 August 1992, and will be celebrated at Langford Lodge Centre, with a '40s dance, BBQ, fireworks display and most importantly, dozens of returning veterans.

Over the weekend, Lagan Valley ARS will be operating a special event station, callsign GB0AAF (Army Air Force). It is hoped that veterans who are unable to come over from America will be able to make contact via the short wave radio bands.

The station will be operating the following frequencies: 144.260MHz, 28.590MHz, 12.95MHz, 7.070MHz, 3.760MHz and also Packet and AMTOR modes.

An encouraging response has been received from various Royal Air Force radio clubs, other wartime centres and interested parties in Great Britain who have promised to also be active on the radio.

Contact address for special event radio station is: Colin Tait, 33 Riverside Drive, Lisburn, Country Antrim, Northern Ireland BT27 4HE.

Amateur Radio Special Event Station GB17USA

The amateur radio special event station GB17USA is to commemorate 50 years of the USAF B17 Bomber and air/ground crews first arrival in England at Royal Air Force Station Hemingford (now a disused airfield) near Hemel Hempstead, Hertfordshire.

The actual date of arrival was 12 June 1942, but was not made official by the War Office until 12 August 1942.

Primary communications will be as follows:

- 144.305MHz c.w., 144.360MHz s.s.b., 145.055MHz, and 28.550MHz s.s.b. plus/minus 5kHz and 3.515, 7.015, 14.277, 14.450, 21.290, 28.550MHz s.s.b

The licence for GB17USA is from August 9 for 23 days. The station will be on the air depending on operators available, equipment and propagation with special effort on weekends and August 12. A special QSL card to stations worked, also they may have a certificate to some special stations which will be advised over the air.

If more information is required, contact Terry G4PSH QTHR, tel: (0296) 85760. For the States, contact Ernie W1BFA QTH or Steve ARL.

Public Information Manager.

The Tall Ships Special Event Station GB8TS

August 1992 sees the return of the 'Tall Ships' to the River Mersey as part of the Grand Regatta. Columbus 1992, a flotilla of over 70 tall sailing ships celebrating Christopher Columbus' historic voyage of 500 years ago, in which he discovered America. The ships, including 11 of the World's tallest, will sail through the Mersey as part of the Grand Regatta Regatta.

The ships have left the river, celebrations completed, on the afternoon of Sunday 16th. Depending on conditions and time of day, most of the popular short wave bands will be worked, as well as v.h.f. and some u.h.f. operation.

A rather unusual QSL card, depicting the event and location, has been designed to send to those who send in their confirmation of working the station, as well as for short wave listeners. All QSLs will be acknowledged via the Bureau please. All QSLs will be acknowledged.

Although the Lighthouse is only a 10-minute walk from the promenade over sand and rock, access is dependent upon the tides. Wellington boots are essential, as a deep pool of water forms around the base of the lighthouse, and the door is edged.

Inside the lighthouse, the accommodation is good, as it possesses light, heat, a bedroom, kitchen, toilet and a bathroom with a shower, as well as a general area, store and lamp-room. It even has a phone! All of this will be welcomed by the operators who will be staying aloft for up to four nights.

The success of the special event station is looking good, given the unique callsign, location and event. Added to that the amount of interest already generated world-wide and within the hobby, in events connected with the Columbia voyages and Tall Ships in general, and they might have a pile-up. Contacts and schedules from other stations involved with the Regatta will be most welcome.

Gerry Scott is acting as publicity co-ordinator and he can provide additional up-to-date information (s.a.e. please) Gerry Scott GB1TGR, 15 Penkott Road, Wallasey, Merseyside L59 7DF. Tel: 051-630 1393.

BBC Wenvoe ARC

August 15 marks the 40th anniversary of the beginning of the domestic television service in Wales, which started from the BBC Wenvoe transmitter, near Cardiff, on Band I, 405-line. Today, transmissions continue - albeit on v.h.f. 625-line PAL colour!

To mark the anniversary, members of the BBC Wenvoe ARC (GW4WVO) are running special event station GB2WV. They will be active on all f.h. bands, including 3.5MHz, to warn fellow 'Gs'. They will especially welcome QSOs with anybody from the broadcasting profession. All QSOs will be acknowledged with a special QSL card, which incorporates a potted history of the Wenvoe station.

Details from Paddy O'Reilly GW4MAD on (0222) 515213.

1st Annual Scottish Activity Weekend

Due to the fact that two of the regional stations did not appear for the 1st annual Scottish Activity weekend event, on April 18 and 19th earlier in the year, anyone having a contact with GB2STB can now claim 20 points towards the 'Scottish Century Award'. Any comments regarding this event would be appreciated, especially those concerning the points system. All letters will be answered.

Paddy GM3MTH, 9 Ramsey Place, Coatbridge, Lanarkshire, Scotland ML5 5RE.

Newscast95

Practical Wireless, August 1992

15
details from Nail Barlowe G0WXY, The Bungalow, Maina Road, Gretnahoe, Linlithgow, Stirlingshire, on August 6.

Manchester & District ARG meet at the Catholic Club, off Windmill Road, Woodhouse, Manchester, on Mondays at Southgate ARC meet at The Riverside Centre, The Old Fire Station, Southgate, Hertfordshire.

Midland ARG meet at 8pm in First Floor Rooms, Ossett Community Association, Moston Lane, Manchester M10 9BN. Further details from Roger Muggleton G0FHPK, 3 Victoria Buildings, Cairnryan, Wigtownshire.

Wiltshire ARG meet Fridays, 8pm at Thornbury United Reform Church, Chapel Street, Thornbury, 7.30pm. Talks start at 8pm. Morse code classes, etc. For further details, contact Mr W. Lindsay-Smith G3WNI, Way Close, Medford, Hemyock, Cullompton, Devon, EX11 6AL.

Wrexham ARG meet at the Maesgwyn Centre, 214 High Street, Wrexham, 7.30pm. Further details from Ian Carter G0GRI on (01978) 830363.

Vale of Eden RAC. Further details on the club from Alexander on (0362) 410526.

Versham ARG meet 2nd & 4th Tuesdays, 7.30pm at Radio Group (Middlesbrough) Ltd, 65 West Street, Bourne, Lincolnshire PE10 9PA. Tel: (0778) 65387 (6-7pm).

Open Valley ARG meet Thursdays, 8pm in Grange Working Men’s Club, New Kent Road (off Malborough Road), St. Albans, Hertfordshire. 2nd Tuesdays are their main monthly meetings. More details from Walter Craines G3PMF, 5 The Crescent, Abbotsend, Langley, Wodnesfield, WORS 0DS.

Wakefield & District ARG meet Tuesdays, 8pm in 1st Floor Rooms, Community Centre, Prospect Prospect, Ossett. July 14 is on the air night, the 21st is ‘The Simple Spectrum Analyser’ by Gordon Parkin GOISJ, the 28th is ‘Improve Your CW Using A Spectrum Analyser’ by Cyril Davey G7GLO, the 3rd Monday is a talk on hf and August 2nd is Foxhunt, featuring details from Brian G6ZKI1, 21 Elm Bank, Ossett.

White Rose ARG meet Wednesdays, 8pm at Hope All Saints Church, Wellington Lane, New Street. July 9 is ‘Aerial Radiation Patterns’ by G3GC, 3rd Wednesday is their Foxhunt night, the 17th is Construction contest. Further details from Neil Bartholomew GOJXY, The Norfolk Dumpling, The Livestock Exchange, Northallerton, North Yorkshire, 6.36197.

Wigston -Warwickshire ARG have meetings & events. Further details from Mrs Cassie Pegg, 13 Victoria Buildings, Cairnryan, Wigtownshire.

Winchcombe ARS meet at Winchcombe ARS meet at The Old Fire Station, Southgate, Hertfordshire, 7.30pm. More details from Malcolm Butler G6WVR, The Oakleigh, Myton Road, Kidderminster, Worcestershire.

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White Rose ARG meet Wednesdays, 8pm at Hope All Saints Church, Wellington Lane, New Street. July 9 is ‘Aerial Radiation Patterns’ by G3GC, 3rd Wednesday is their Foxhunt night, the 17th is Construction contest. Further details from Neil Bartholomew GOJXY, The Norfolk Dumpling, The Livestock Exchange, Northallerton, North Yorkshire, 6.36197.

Wigston -Warwickshire ARG have meetings & events. Further details from Mrs Cassie Pegg, 13 Victoria Buildings, Cairnryan, Wigtownshire.

Winchcombe ARS meet at Winchcombe ARS meet at The Old Fire Station, Southgate, Hertfordshire, 7.30pm. More details from Malcolm Butler G6WVR, The Oakleigh, Myton Road, Kidderminster, Worcestershire.

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Woolwich ARG meet at The Good Old Days, 65 West Street, Bourne, Lincolnshire PE10 9PA, (0778) 65387 (6-7pm).

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Ian Hickman describes a simple and inexpensive pre-scaler that can add a great deal of versatility to your bench frequency counter. Any PW ‘Robin’ frequency meter owners will find it particularly useful.

The project I’m going to describe, produces an economical, simple to construct pre-scaler. It can operate with input frequencies up to 1.2GHz.

The sensitivity of the pre-scaler, even at this frequency, is excellent, permitting fairly loose coupling to the source. The loose-coupling avoids excessive loading, which could otherwise affect the frequency of an oscillator or even stop it running altogether.

The key to the unit’s low cost, is the use of a pre-scaler designed for use in the phase-lock loop forming part of the synthesiser in a Band IV/V TV receiver. These i.c.s are designed for consumer applications and are very modestly priced. They can often be pressed into service in applications such as this, for which they were never designed.

How It Works

Let’s take a look at the process, and see how it works. The device we’re going to use is the Siemens SDA4212. It’s a dual-modulus pre-scaler which divides either by 64 or by 65, depending upon the state of a logic control line.

The dual-modulus facility is not required in this application, so the line is strapped permanently ‘high’ (connected to the chip’s positive supply rail). This selects the divide by 64 mode.

A useful feature of this i.c. is the built-in input pre-amplifier, which provides high sensitivity. Fortunately it’s equally happy with a large input signal, unlike some pre-scaler chips which only operate reliably over a fairly restricted range of input amplitude.

Division Ratio

To be useful as a pre-scaler to extend the range of a counter or frequency meter, a decimal division ratio such as 10:1 or 100:1 is needed. So, some lateral thinking is necessary in order to take advantage of the low cost and high sensitivity of the SDA4212 i.c.

In this case, we need to turn a division ratio of 64:1 into 100:1. This is achieved by using a divide-by-five stage to gate out every fifth pulse from the SDA4212’s output.

Doing this twice over produces the desired result, as indicated in the output pulse chart I’ve provided in Fig. 1. Let’s suppose, for the sake of example, that the waveform in Fig. 1(a), is the output from the SDA4212 when fed with a 1GHz input.

With this example, the waveform (a) is at 1GHz x 1/64 or 15.625MHz. After the knock-out-one-pulse-in-five circuit, the frequency is 1GHz x 1/64 x 4/5 = 1GHz x 1/80 or 12.5MHz, as in Fig. 1(b).

Repeating the process gives 1GHz x 1/80 x 4/5 = 1GHz x 1/100 or just 10MHz, as in Fig. 1(c). Notice that in (b), the pulses are not all equally spaced, whilst in (c) the pattern is even more odd. However, this is of no consequence in the present application. Finally, further divide-by-ten stages are incorporated. These give a choice of divide-by-100, divide-by-1000 or divide-by-10 000.

Magazine Circuit

The diagram, Fig. 2, shows the circuit of the pre-scaler. It’s based on an application circuit, published in the Siemens company’s house magazine, (ref. 1).

The unit is powered from a PP9 battery, and in view of the current drain, around 50mA, a rechargeable NiCad battery is recommended. When fully charged, a battery of this type will run the unit continuously for over an hour.

A 2.1mm power socket is incorporated in the design to enable the battery to be recharged without removing it from the unit. A d.c. source of about 18V is suitable for the purpose.

A suitable power source can be conveniently obtained from a 12V 300mA unregulated plug-top power supply. These power units will provide the best part of 18V when the load current drawn is only 10mA.

The charging input by-passes the switch, which will normally be in the off position during charging. The charger can be connected to the unit while it’s in use. However, as the maximum recommended charging current for a NiCad PP3 style battery is only 10 or 12mA, the unit will not operate correctly with a flat battery. You must give it time to charge up first!

Three Legged Regulator

The d.c. supply from the battery is applied to a standard three-legged 7805 regulator. The earthy leg is ‘propped’ up on diode D5, to provide a stabilised output of about 5.5V. This extends the operating frequency range of the divide by 64 pre-scaler, IC1.
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7. ALINCO DR-599E - Dual watch, remote head hi power mobile 2/70. Special attention to U.K. operation - one of the few to offer tone burst inside the rig, not built into the mic like most. New bright lit display and a host of features. £599.00

8. ICOM IC725H/475H - The best in high power base station multimodes. These two supremos from ICOM have killed the competition dead - there isn’t any! 100W on either 2 or 70, together with dual RX on one band (i.e. two frequencies in band simultaneously received), plus RX on the opposite band i.e. for the TH-77E transceiver on 2 and RX on 70CM, or visa-versa for the TH-48E. £395.00

9. ICOM IC275H/475H – The best in high power base station multimodes. These two supremos from ICOM have killed the competition dead - there isn’t any! 100W on either 2 or 70, together with dual RX on one band (i.e. two frequencies in band simultaneously received), plus RX on the opposite band i.e. for the TH-77E transceiver on 2 and RX on 70CM, or visa-versa for the TH-48E. £395.00

10. ALINCO DJF1E/51E - Small, neat, tough, versatile, 2M handles with AM air band. £239/£179

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The diode, D3, protects the regulator in the event of accidental reversed battery polarity connection. The stabilised output powers the e.c.l. (emitter coupled logic) pre-scaler IC1. It also supplies the four other i.c.s, which in the interests of battery economy are mostly c.m.o.s. (complimentary metal/oxide silicon) types.

The input signal at the input BNC socket, SK1, is applied via two 10nF capacitors in series to the pre-amplifier input of the pre-scaler chip. The pre-amplifier output is internally connected to the divider stages.

The two Schottky diodes, D1 and D2, protect IC1's input in the event of an excessive input voltage being applied. The output of IC1 is a.c. coupled via R1 and C6, to two stages of the quad two-input AND gate IC2, used with self bias as linear amplifiers.

**Simple Inverter**

The action just described, converts the e.c.l. output to a solid t.t.l. logic swing, while the 'pull-up' resistor, R4, at the output of the third AND gate, also used as a simple inverter, converts it to a full swing suitable for h.c.m.o.s. devices.

The output of the third AND gate is applied to the B input of a dual decade divider IC3, and also to a two-input OR gate, part of IC3. The output at Q (D) (pin 9) of IC3, is at one fifth of the frequency of the B input (the divide by 2 section with its A input at pin 15 is not used) and goes high during every fifth input pulse. This maintains the output at pin 1 of IC4 low for that pulse, so gating out one pulse in five.

The delay through the divide-by-five section of IC3, is compensated for by the delay through the OR gate in the clock frequency path (output at pin 4 of IC4). This process is repeated again using the second divide-by-5 section of IC3 together with the other two OR gates, giving an output of (F in) x 1/100 at pin 13 of IC4.

The output is applied to two cascaded divide-by-10 stages, comprising of IC6. With the links P1-P5 and P3-P6 as shown in Fig. 2, the three-position switch, S1, gives a choice of divide-by-100, divide-by-1000 and off.

**Without Overflowing**

The divide-by-1000 range enables frequencies above 1GHz to be displayed on a 10MHz counter without overflowing. For use with a counter with a 1MHz top frequency, you should cut the two links, and rewire them to the lower positions. This will provide a choice of divide-by-1000 and divide-by-10000.

The selected output is routed through S1b, to the remaining section of IC2. This section is strapped as an inverter and used as an output buffer.

**Careful Construction**

I built my version using single-sided copper-clad fibre glass p.c.b. material for cheapness. This needs careful layout and construction, because it's working with signals up to 1.2GHz. Fortunately, only the short track from the input socket to IC1, via C1 and C2, has to work at up to 1.2GHz.

The p.c.b. layout, with track diagram and component overlay, are shown in Fig. 3 and 4. The input track is soldered directly to the cut down centre conductor of the input connector. The connector is a BNC socket of the sort with a square mounting flange.

Two of the mounting screws carry solder tags. The ends of which are bent over at right-angles and soldered to the ground plane of the p.c.b., on either side of the input track.

Note that the link over the input track, is used to connect together the ground planes on either side of the input track. Support for the p.c.b. is provided by three bolts. In view of the small board area, these simple mounting arrangements are all that is necessary.
Aluminium Box

The case is a two-part aluminium box measuring 38 x 70 x 102mm, from Maplin Electronics (their ref: AB9). This provides adequate space to accommodate a NiCad type PP3 in addition to the p.c.b.

The output from the pre-scaler can either be by a flying coaxial lead or via another BNC socket. In the former case, it is best to limit the length of the lead to about 500mm, preferably using 75Ω coaxial cable. This is because the 75Ω type has less capacitance per millimetre than 50Ω coaxial cable.

In the latter case, a short BNC to BNC lead is the best option. Again, the lead should be preferably of 75Ω coaxial cable, used to connect the pre-scaler to the counter or frequency meter with which it is to be used.

Construction Stages

Construction is best carried out in stages, testing as you go along. The diagram, Fig. 4, shows the component locations. To start, I suggest you first mount the components associated with the 7805 i.c. regulator.

Next, you should then check that 5.5V is available to power the other ICs. Now mount these, and check that the current drawn is about the expected amount.

You should note that along with many other pre-scalers, the SDA4212 i.c. will free run at a few hundred MHz, in the absence of an input. So you can expect to see a frequency of a few MHz at the output, on the divide-by-100 range.

The exact frequency will depend on the particular layout, the chip itself, and on whether the input is open-circuit or short-circuited. This effect is useful, as it provides a quick and simple check on whether the unit is basically functioning or not.

Prototype Performance

The prototype performance was verified by driving a Racal-Dana Universal Counter/Timer type 9500 via the pre-scaler, from a Racal-Dana Signal Generator type 9087.

The process was carried out at each of a number of frequencies from 1MHz to 1.2GHz. Starting with a largish output from the signal generator, the correct division ratio was verified by comparing the output frequency with a reference frequency.
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generator and counter digital read-outs.

During the evaluation, I steadily reduced the output until any further reduction resulted in mismatching. This level was taken as the sensitivity at that frequency.

My results showed that maximum sensitivity occurs at around 600MHz and that the sensitivity is considerably better than 10mV even at 1.2GHz. The unit is usable right down to 10MHz, though at this frequency the required input has risen to 14dBm or about 45mV.

The pre-scaler will even operate down to 1MHz, if it's pushed very hard. But in reality, the useful range can be taken as 10 to 1200MHz.


Miscellaneous

Suitable case (see text), p.c.b. (PCB Service), BNC input socket, coaxial cable, BNC plug, NiCad battery (see text), four-pole three-way switch. Power socket with switch over-changing to (suit), battery connector, hardware. Connecting wire, wire for p.c.b. links.

Radio Diary

July 11: The Cornish Rally will be held at Penair School, St. Clement Hill, Truro. Usual amateur radio/electronic/computer traders, Bring & Buy, ample free parking, refreshments, vintage wireless display, RINAS, RAFARS, repeater groups, etc. Doors open 10.30am, disabled visitors 10am. Admission is £1, accompanied children under 16 free, otherwise 50p. Talk-in on S22, 0243100. Further details from Mr. Barrie Thomas G8ONR, 'Crekside', Greenbank Road, Deworan, Nr. Truro, Cornwall. Tel: (0827) 567296.

July 12: The Horncastle Amateur Radio, Electronics & Computer Fair will be held in the Sports Hall of Queen Elizabeth's Grammar School, as last year. There will be facilities for a flea market outside, a talk-in station on 144MHz & there is lots of free parking. If anyone would like to bring things to sell from the boot of your car (electronics/radio only please), you will be able to, for a small fee. Any information can be obtained from Tony Nightingale on (0592) 522482, or send an s.a.e. to: The Area Youth Office, Horncastle Youth Centre, Capesthorne House, Horncastle, Lincs LN9 6HW.

July 12: The Sussex Amateur Radio & Computer Fair will be held at Brighton Race-course. Trade stands, Bring & Buy, picnic area, refreshments, car park, free shuttle to Brighton sea front. For more details, phone Robert Gornall (0424) 444466.

July 12: The 9th McMichael Rally will be held at the Haymiff Youth & Community Centre, Burnham Lane, Stourp (near Burnham Railway Station). The event starts at 10.30am & admission is £1.50. The car boot sale (no advance bookings) is 10p per pitch on the day. There is free parking on site & talk-in is on S22 (145.500MHz). For more details, contact Neil G8XYN on Maidenshead (0628) 229627.

July 12: The 2nd Wirral Rally will be held in the Masonic Hall, Manor Road, Liscard, Wallasey, Merseyside. Doors open 11am (10.30am for disabled). Details from Dave Clifford GM5NP on 051-639 5922 & Darren Roberts on 061-476 3076.

July 25/26: Norfolk ARS are planning a 2-day event. Details from Sheila GOKWP. Tel: (0603) 618110.

July 26: The Rugby ATS 4th Annual Amateur Radio Car Boot Sale will be held at the BP Truckstop on the A5, just south of the M1 motorway. Open from 10am, admission is £1 per car & facilities include a good cafeteria & toilets. Talk-in on S22 by G8BCS. Seats are £1 pre-booked or £1 on the day. Further details from Peter on (0465) 32105 or for bookings ring Kevin on (0203) 441150.


August 16: The Southend Rally will be held at The Rocheway Centre, Rochford, nr. Southend-on-Sea, Essex. Bring & Buy sale, bar & refreshments, ample parking. Talks & in & out on S22 vhf for booking & other details, contact John Stone GODFE on (0727) 232216.

August 23: The West Manchester Radio Club's 'Red Rose Rally' will be held at the Bolton Sports & Exhibition Centre, Silverwell Street, Bolton (town centre). All the usual trade stands, societies, Bring & Buy, etc. All at pavement level. Refreshments available all day & bar. Doors open at 10.30am for disabled & 11am for general public. Admission £1, children free. Further details from Dave G010 on (0204) 241056 evenings only.

August 31: Huntingdon ARS will be holding their Annual Rally & Junk Sale on the usual venue, the Medway Centre, Coneygeare Road, Huntingdon, Cambridgeshire. Doors open 10am until 4pm. Featuring trade stands, Bring & Buy, components, junk & their usual excellent refreshment bar. Car boot pitches available. Talk-in on S22 & G8BOV (431.125MHz). Details from David Leech G1100 on (0204) 441156.

September 6: Vane Amateur Radio Society will be holding their Annual Rally at The Laindon Community Centre, Laindon High Road, Aton Road, Laindon, Basildon, Essex. The centre is only a short walk from Laindon Railway Station on the Fenchurch Street to Shoeburyness Line. Doors open from 10.30am to 4.30pm. Admission £1.50. Featuring many traders, Bring & Buy, refreshments & a free raffle. Talk-in on S22. Approach roads will be signposted. For further details contact Mike Musgrave G4NVT on (0286) 543025 or Doris Thompson on (0286) 552686.

September 6: Milton Keynes & DARS will be holding their 8th Car Boot Rally at Cranfield (south side), Cranfield, Bedfordshire XMK4 3AL (off J13 or J14 of the M1). Doors open 9.30am until 4pm. Hot & cold snacks & drinks, admission is 50p. Talk-in on S22, G8MXC. For further details, contact either Ray G1LRU on (0908) 660796, Tony G6WXM on (0908) 316435 or Dave G5ZPA on (0908) 505110.

September 12: The Scottish National AR Convention will be held at the Fife Institute of Physical & Recreational Education, Viewfield Industrial Estate, Gleneothes, Fife. Doors open 10.30am until 5pm. For further details, contact John Hardwick GM4AAL on (0908) 416071 during office hours or otherwise on (0908) 762705.

Attention rally organisers. We like to give your events all the publicity possible, but you can help us to help you by making the details as short as possible. Thank you!
As he's a keen v.h.f. man, we asked Richard Ayley G6AKG to try the beefy 1410G 144MHz linear amplifier out on the air.

With today's densely populated housing, radio amateurs running QRO equipment are not the most popular people on planet earth! So, when I was asked to review an amplifier capable of delivering no less than 160W on 144MHz, I cringed at the spectacle of all the possible domestic strife I might be the centre of.

However, 12V linear amplifiers like the one I'm reviewing are not just meant for base-station use. They can of course be used for mobile hill-topping, using a lightweight beam and small mast. The mobile aspect would be the personal attraction for me owning one of these amplifiers. It's the only circumstances under which I could use such a high-powered beast!

**Compact Power**

There's no doubt in my mind that the TE 1410G amplifier is certainly one of the most compact ways of obtaining high power, 160W at 144MHz. It's ideally suited to the mobile environment.

The amplifier is not much larger than a two pound box of chocolates, measuring 70 x 150 x 270mm and weighs approximately 2kg. The exterior appearance of the amplifier is very solid, but at the same time stylish. It gave me the feeling that it was built to last.

Like most semiconductor linear amplifiers, a large black heat-sink forms the chassis of the design. Two gold-coloured anodised plates are fixed on to the heat-sink using small hexagonal machine screws. These form the front and back panels of the unit.

An interesting point to note, is that only those fixings that need to be used by the operator employ the more standard type of fastener. A wrap-round type cover, also in black heat-sink forms the chassis of the design. Two gold-coloured anodising, forms the base/cover of the amplifier.

**Fully Populated**

Both the rear and front panels of the amplifier have a busy look about them. They are almost fully populated with controls and sockets.

Looking from left to right at the back panel, there is a 25mm fuse holder, and a four-pin Jones plug for the 12V d.c. supply. There's also a B7G type valve socket wired for external monitoring and control, and two SO239 sockets. Finally, there's a small rotary control for setting the transmit/receive (TR) hang-time when the amplifier is being used on s.s.b.

Personally, if I purchased this particular model of amplifier I would change the two SO239 sockets for N-types. I was disappointed to find this type of socket on such a high quality item of equipment. Having said that, I shouldn't be altogether surprised as the TE 1410G is manufactured in the USA, which is also the home of the PL259 connector system!

I would also change the accessory socket for something a little more robust and practical. Maybe a 7-pin DIN type would do the job, as the B7G is outdated and very fragile. No doubt our US cousins over-looked the DIN system plugs and sockets as being a little too European!

**Jones Plug**

It was nice to see however, the Jones plug and socket being used for the high current 12V d.c. connection. Like the SO239/PL259, the Jones plug is also a hang over from the American contribution to the Second World War (yes they are that old!).

I don't think a more suitable power connector has ever been devised. That's probably why Japanese manufacturers are still using a variant of them on their mobile h.f. transceivers.

It's fair to say I'm a little biased towards electronic produce from the USA. In the past I've had the good fortune to work with their commercial communications equipment, and generally it's built to very solid standards, as well as being easy to service. The TE Systems' range of linear amplifiers follow in this fine tradition and long may they reign.

**Paddle Switches**

Three paddle-type toggle switches dominate the front panel of the amplifier. Two of these are illuminated with green l.e.d.s.

On the right of these switches is a vertical array of red l.e.d.s. These indicate whether the amplifier is on or off-line and providing output, or if the amplifier has reached its maximum rated operating temperature. The third l.e.d. is to show the status of a hard-wired p.t.t. facility, if it's used.

**Amplifier Rating**

The amplifier rating is for a 50% duty-cycle to the Industrial, Commercial and Amateur Service (ICAS) specification. When the heat-sink temperature reaches 65°C the amplifier is automatically taken off-line, and the temperature warning l.e.d. is triggered.

The circuit used to operate the warning l.e.d. can also be configured for switching on an external cooling fan. This can be done via the accessory socket, rather than taking the amplifier off-line. If this facility is to be used, TE Systems suggest this is best done in liaison with their appointed distribution and service agent.

**Antenna Pathway**

In operation, the power amplifier is switched in and out of the antenna pathway with the first of the two front panel switches. The second switch controls the line status of the on-board GaAs-f.e.t. receive pre-amplifier. The GaAs-f.e.t. pre-amplifier has 15dB gain (minimum) with a nominal noise figure of 0.6dB.

In my opinion, this extra receiving gain, matches in well with the philosophy of increasing receiver performance to match transmitting capability. Despite this, my personal feeling is that most modern v.h.f. transceivers far outstrip their transmitting capability by already using low-noise, high-gain front ends.

Anyway, most serious DXers look to put this extra gain at the mast-head were it belongs! Although I must admit it's a nice touch and can easily be switched-out of circuit.

The third switch on the front panel gives you the option of switching out the transmit-receive delay circuit, for either f.m. or hard-wired p.t.t.
Good Practice

With high power low voltage equipment it’s always good practice, if possible, to locate the equipment near the power source. This is in order to avoid losses in long cable runs.

No doubt the designers at TE Systems bore this in mind with the 1410G amplifier, because they have enabled each of the front panel facilities to be wired via the back-panel accessory socket. This facility is enabled by cutting a few internal links, and it’s a procedure which is well documented in the user’s manual.

Good Manual

The good, easy-to-use manual provided with the amplifier is worthy of any prime mover, let-alone an accessory. There are five chapters including: general information, installation, operating instructions, theory of operation and maintenance.

In fact, everything you’ll ever need to know about the amplifier is shown in an easy-to-follow block diagram format, backed up with a full circuit ‘schematic’ and parts list. As I’m an ex-service engineer, the manual made me feel very at home with the amplifier. I’d be totally at ease with carrying out any modifications or service on the unit.

The internal construction of the amplifier is very smart and well arranged, showing a high standard of workmanship. The p.c.b. is made from double-sided glass fibre laminate.

Very nearly all of the tuned inductors are etched onto the board in linear strip-line fashion. This gives the design a clean and un-cluttered look.

Good Quality

The components used in the amplifier are of good quality, with high stability micro postage stamp type trimmers used throughout the design. The amplifier is based around three bipolar devices run in class A-B which combines efficiency with linearity.

The first of the devices is used as a pre-driver, its output being divided equally to each output stage, these are run in parallel with their outputs combined before being fed through a low-pass filter. The bias networks are very uncomplicated using silicon diodes which provide good thermal tracking.

Additionally, all the tuned circuits used are low Q. This technique provides a flattened performance curve right across the band. It’s a factor that’s very important in the USA, where 144 to 148MHz is available for amateur use.

Unconditionally Stable

It’s plain to see that the TE Systems’ designer went to a great deal of trouble to make this amplifier unconditionally stable, both thermally and electrically, as a large amount of the hardware is devoted to r.f. decoupling.

In use, the amplifier can withstand poor v.s.w.r. conditions of up to 3:1, although the manufacturers point out this value may, in time, cause transistor failure. Large devices such as the type used in this amplifier are prohibitively expensive. In fact, they’re far more expensive than an average v.s.w.r. meter, a point worth bearing in mind!

Removable Module

The GaAs-f.e.t. receive pre-amplifier stage is built on a small removable module, which is ‘piggy-back’ connected to the motherboard. This I feel is an inspirational design feature, making it a five minute job to replace the f.e.t. Unfortunately, GaAs-f.e.t.s are are a little touchy and do not suffer ill treatment more than once. The control p.c.b. is also attached to the motherboard in the same way, making it easy to service.

My last comment about the interior of the amplifier, is that the output relay is of a fairly nondescript type. It wouldn’t look out of place under the bonnet of any automobile!

It just goes to prove that almost any high current relay can be made to work with high levels of r.f. at least up to v.h.f. That’s producing their inadequacies are tuned-out!

Richard Chickened Out

Bearing in mind my earlier comment about using an amplifier of this type on my home installation, Richard (needless to say) chickened-out!

I took the amplifier and myself to my club, the Flight Refuelling Club near Wimborne. Here they have a modest 144MHz installation for everyday use, which I felt was fairly typical of most amateur station facilities today.

Trying to find a prime mover multi-mode rig with just 10W r.f. output proved to be a problem. Once, all 144MHz s.s.b. equipment on the market had 10W maximum output combined generally with a carrier level control.

However, a quick survey of most of the club members’ 144MHz gear proved that this was no longer the trend. It seems that nowadays, 25W maximum was the normal output level to be encountered.

Almost all of the modern multi-mode rigs need to be tweaked internally to give the required drive level. Alternatively, they must be run with a relay-controlled power attenuator, which in the end made me settle for using the club’s standby rig, an old Yaesu FT221R.

Respectable Report

Despite the problems encountered with input levels*, (See note below regarding input levels), when the amplifier was eventually used with the FT221R, it brought forth a respectable 57 report from a chap in South Humsberide, on the first call. The antenna installation at my disposal during the course of my tests was a 10-element Jaybeam Yagi antenna at approximately 15m a.g.l.

The band conditions were not good, and without the GaAs-f.e.t. pre-amplifier it was hard going due to the deep QSB. No adverse comments were passed about transmit audio quality or the bandwidth of the signal.

Summing Up

In summing up, I’ve got to say that speaking overall, the TE Systems’ 1410G amplifier is a well-built, well thought-out and very substantially documented amplifier.

Any adverse comments I’ve made about the amplifier are relatively minor in nature. I’m very grateful to the Flight Refuelling Amateur Radio Club, for the chance to test the amplifier on their antennas, although I would still love to own one if the wife and neighbours would let me!

My thanks to Bredhurst Electronics Ltd of High Street, Handcross, West Sussex RH17 6BW, Tel: (0444) 400786, for loaning me the review model, which is available from them at £339 plus £5 p&p. Bredhurst can also supply the 1412G 30W input drive model at £299 plus £5 p&p.

Manufacturer’s Specifications

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>144-148MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input power</td>
<td>10W Nominal (see note ref. input levels)</td>
</tr>
<tr>
<td>Output power</td>
<td>160W Minimum</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Class of Operation</th>
<th>Power amplifier</th>
<th>Pre-amplifier</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A - B</td>
<td>A</td>
</tr>
</tbody>
</table>

| Transmit-receiving sens. | 0.5W Minimum |
| Antenna v.s.w.r. | 3:1 Maximum |
| Receive pre-amplifier gain | 15dB Nominal Minimum |
| Receive pre-amplifier noise | 0.6dB Nominal |

| Supply current @ 13.6V | 20A |
| Peak | 26A |
| Dimensions | 70 x 150 x 270mm |
| Weight | 2kg Approx. |

Editorial note regarding G6AKD’s comments on the input level for the TE 1410G:

Unfortunately, when the original review model was collected from Bredhurst Electronics, we were unaware that TE Systems produce the linear amplifiers with a wide range of input levels. For example they have 149QG with 2W input and a 160W output. This series of amplifiers is also available for the 50 and 430MHz bands.

(Full information available direct from Bredhurst Electronics).
Test Equipment

The PW workshop and test facilities are jointly known as the ‘Tardis’ by everyone in the office. The name was adopted because of the similarity of the screened r.f. room to Dr. Who’s preferred transport! Our technical sub-editor Tex Swann G1TEX uses the workshop a lot and although he’s surrounded by very sophisticated gear, he doesn’t dismiss the basic ‘tools’ found in nearly everyone’s shack.

My job as technical sub-editor of PW gives me access to many pieces of test equipment, all doing splendid jobs. The total cost of this sort of gear is way beyond the pocket of the average radio amateur. I can say this, because I can’t afford it at home myself!

So, if we can’t afford much test equipment, what can we, as enthusiastic amateurs achieve with simple (cheaper) test facilities? The answer in my opinion is a great deal! I feel, that with three main pieces of test equipment, we could do most of the testing needed in our hobby.

Humble But Useful

I’m going to start with the humble, but extremely useful, multimeter. You can use it for measuring millivolts to megavolts, microamps to hundreds of amperes.

In fact we can use the meter in any job where we need to know the voltages, currents or resistance. In fact, I’ll take this opportunity to mention a very useful booklet designed to help you get the most out of your meter.

The booklet *Are The Voltages Correct?* is a PW reprint and is very good value for money. It’s available from the Book Service and the author guides you through the techniques needed in fault-finding with a meter. I can guarantee that you’ll not underestimate the versatility of your meter after you’ve read the booklet!

Two Main Forms

Now it’s time to look at the various types of multimeters. This unsung hero appears in two main forms, digital and analogue, and each has its strengths and weaknesses.

As digital meters seem to be very popular, I’ll start off with a look at these very neat instruments. Even the cheaper digital multimeters (d.m.m.) will measure d.c. and a.c. voltages, over an extremely wide range, with a good degree of accuracy.

Many d.m.m.s even display their readings to three, or more, decimal places. Some even have ‘auto-ranging’ to use the most effective voltage range for the test. In auto-ranging, the instrument automatically selects the appropriate voltage or current range.

A diode and transistor testing facility may also be fitted on the more expensive meters. This most useful feature can be used to great advantage to check out those surplus transistors you bought at the last rally.

Major Disadvantage

The major disadvantage of digital meters, shows up in the slow reaction to fluctuating readings. The last numbers may be rapidly changing, making them difficult to read and you might end up with an ambiguous result.

So, against the list of features I’ve listed for the d.m.m., how does the trusty old analogue multimeter fare? In truth, I have to admit that it fares very well for certain tests.

For example, on analogue meters, a fluctuating measurement is not a real problem. Because of the meter movement’s action, both the mean and variation readings can be read.

The final accuracy is very dependent on your ability to read the meter scale. To help in this, the more expensive meters have an anti-parallax mirror fitted on the instrument’s calibrated scale.

The anti-parallax mirror ensures that when the reflection in the mirror is directly underneath the meter’s needle, the reading should be correct. All you have to do is position yourself so that the mirror can do its job!

Another advantage is that when measuring a.c. voltages, the moving coil analogue meter’s bandwidth is in many cases, higher than an equivalent d.m.m. This added benefit allows comparative tests to be carried out into the higher audio frequencies.

Analogue Meter Disadvantage

Unfortunately, the moving coil analogue meter also has a major disadvantage. The main problem isn’t because of the movement, but due to its mechanical switching arrangements.

The problem with this form of meter occurs when they’re accidentally used as ‘smoke signal’ generators! It’s something that can happen to any amateur or professional technician for that matter!

This unhappy state of affairs, usually happens when you’re in a rush and trying to measure mains voltage or other high current supply. It’s bound to happen when the last time you used the meter, you were using the resistance (or ohm’s range).

The result is almost invariably, a spectacular (and expensive) expanding cloud of acrid smoke. If you’re lucky the fuse will blow before this happens, but don’t count on it!

Expensive Mistake

When it comes to being careful about overloading meters, I have it on good authority, that the editor Rob Mannion G3XFD, managed to make an expensive mistake. It happened when he was working on the 750V d.c. electrified Southern Region of British Rail in the early 1960s.

Apparently, Rob was demonstrating the sensitivity of a very expensive multimeter to a track lineman, whose job it was to maintain conductor rails and cables. This attentive man was interested to see how superior Rob’s neat little meter was, when compared to his bank of test lamps. He was sure that the traditional lamps, arranged in series to illuminate fully when applied to 750V, were adequate.

Rob duly demonstrated the meter, quite forgetting the fact that he’d been measuring the loop resistance of a length of conductor rail just before. The next few moments of the demonstration transfixed the linesman in his place, as Rob promptly disappeared in a cloud of thick black smoke!

After the smoke cleared, Rob was left holding a strap with a charred, hollow Bakelite box on the end. In this instance, the meter movement had not only burnt out, but the 750V d.c. on the conductor rail had arced inside and completely destroyed the meter. End of demonstration!

(Incidentally, despite the demonstration, we understand that BR still prefer the test lamp method!)

So, take care when you’re using a test meter. Try to...
make it a strict rule that you switch to the highest range first. If you do this, you can work down. You can't work up after the meter's burnt out!

If you are offered one of these meters second-hand, then a good sniff at the edge will usually let you know if it has had the burn-out treatment. They're easy to spot, and Rob tells me that the smell lingers for some time!

Radio Frequency Measurements

Having discussed the basic meter that everyone needs in the workshop, I realise of course most of us in our hobby, need to take measurements at radio frequencies. To this end, there's a whole range of instruments to help and, as in measuring d.c. or low frequencies, there are digital and analogue methods of displaying the results.

There are two 'ends' to measure in most electronic circuits. They are of course the input and the output. For the input at r.f. there are basic signal generators providing levels from 1µV to around 1V. This signal may have a frequency or amplitude modulation facility.

Frequency accuracy and stability are the most important aspects to bear in mind when choosing a signal generator. And don't forget, it should of course cover the frequency band you need.

The output level from a signal should also be checked before you buy. If the output is too small for the job, then I'm afraid little can be done to help. However, should the output be too large a stepped attenuator can reduce the signal to a more useful level. It may even reduce out-of-band signals.

A good signal generator can cost several hundred £s, and an excellent one will set you back several thousand. Do we have to spend that much? How can we achieve good results at a cost to suit our pockets?

Signal Generator Alternative

Fortunately, when it comes to buying a signal generator, there's an alternative. If you can't afford a signal generator, why not use my second recommended piece of test equipment - the familiar dip-meter.

When valves ruled supreme, the dip-meter was known as a grid-dip oscillator (g.d.o.). Tradition dies slowly, and the letters have remained with us, but nowadays have become gate-dip oscillator. Fortunately, there's still a connection with the old days, as the grid was the control electrode in a valve, and the gate in a field effect transistor (f.e.t.) does basically the same job.

The dip-meter is a versatile instrument. When it's oscillating, the 'dipper' will provide a rather rough-and-ready signal source on most bands from 1-250MHz. It will also probably produce useful harmonics up into the u.h.f. bands.

The same g.d.o. can then be used to check both the wanted frequency and harmonic output of a transmitter. By adding a small antenna to one side of the coil, it can also be used as a simple field-strength meter for optimising an antenna.

The dip-meter can prove to be very useful in the signal-strength meter role. Despite only providing a relative indication, it can help you set up cubical-quad and other antennas to best advantage.

You can resonate the antenna using the dip-meter in its basic role (as a dipper) and then go on to use it as a field-strength meter. As I've said, they are a most useful instrument to have around.

Resonated Antenna

While on the subject of resonating antennas, you can use it to identify your 'long wire's' natural frequency. This must be useful, especially as so many amateurs rely on the long wire as their only antenna.

The measurement can be done by using a single or double turn coupling loop. Using this method and a dip-meter, the resonance of a random length of wire may be found.

The Rev. George Dobbs G3RJV outlined this technique in Fig. 1 of 'Getting Started -The Practical Way' (page 29) in the May 1992 issue of Practical Wireless. Using a similar method the natural resonance of an antenna array may also be found.

Note: Don't forget that when you couple the dip-meter to the antenna under test using this method, that you'll be radiating a signal! So, when you do use this method, try to ensure you're not going to cause any interference and make sure you stay within your licence conditions. In other words, don't radiate a signal on the medium waveband!

Digital Robin

My third and final recommendation for basic test equipment has to be a digital frequency counter. As it happens, I think that the PW 'Robin' frequency counter is a superb unit. This instrument is capable of counting well into the 430MHz band.

The 'Robin' is sensitive enough to check the output of almost any g.d.o. Using the frequency meter in this way, adds accuracy to the often crudely calibrated tuning scales often found on commercially-made dip-meters.

Fortunately, the PW 'Robin' is quite cheap to build and provides very good results. Anyone on a fairly tight budget should consider building one. If you aren't quite sure about tackling the job, you can always call me in the office (between 12 and 1pm please) to discuss the project.

Tex's Round Up

So, to round up this time, I'll leave you with a final piece of advice. With the basic items of test equipment I've suggested, almost all the tests an amateur needs to do can be carried out. Nowadays, only the multimeter needs to be bought, as honestly speaking, it's not really worthwhile making your own test meter. All the other suggested items have appeared as projects in PW within the last few years.

Who said test equipment has to be expensive? It certainly wasn't me!
Firstly this month, I've got an observation that's been made by a number of readers in letters to 'CB High & Low'. A lot of the letters include sentiments such as "the 27MHz band is now pretty well useless because 'skip distance' during the day allows very distant (foreign) 27MHz stations to override otherwise receivable local signals", or words to that effect! I'll deal with this later.

One reader is also convinced that the only answer to the first problem is to make available another v.h.f or u.h.f band allocation. Ah! That brings back memories, that's one of the main reasons why we abandoned Band I v.h.f. TV in the UK!

If you want another u.h.f. (or v.h.f.) band, you will have to convince the DTT it's needed. A strong National CB Radio Society to back the request would be helpful (hint!) Now let's get to the problem of 'skip distance'.

**Skip Distance**

The term 'skip distance', sometimes called the 'hop distance', has been in common use since the ionosphere was discovered. This is the name given to the medium by which h.f. radio waves can be transmitted around the world.

The word 'skip' is used to indicate a distance along a great circle ground path, over which h.f. radio signals, otherwise propagated via an ionospheric region (normally the F region), are transmitted from one place on earth we can call (A in the diagram) to another, at a great distance (B in the diagram).

Most textbook illustrations of 'skip distance' give the impression that 'ionospherically propagated' h.f. radio waves, travel from earth, up to the ionosphere and back to earth again in straight lines. They also give the impression that no signals will be heard anywhere between the two places. This is not so!

**Radiation From Antennas**

Radiation from directional (beam) antennas, commonly used by the amateur radio fraternity, travels toward the ionosphere. The radiation is usually at a fairly low angle with respect to earth. However, it spreads out over a wide arc before reaching an ionospheric region as illustrated in Fig. 1. In this case there will be a 'hop distance' (hd) (call it 'skip' if you wish!) along the ground over which no signals are receivable except for those due to 'ground-wave' propagation.

After the first reflection from ground, the propagated wave spreads more and more. This has the result that signals may be returned to earth almost anywhere along a ground path, beyond the initial 'hops' or 'skips' over any ground distance at all.

**Single Element Verticals**

Propagation using single element vertical antennas, as used for 27MHz CB could, under certain conditions, follow a similar trend. This would occur if radiation from the antenna is at low vertical angles, let's say 20 to 30°, but this is unlikely if they are very near to the ground, or operated in conjunction with a ground-plane.

**Ionospheric Propagation**

When, and only when, the right 'ionospheric conditions' prevail, transmission and reception of signals between stations on 27MHz separated by ground distances of thousands of kilometres, or more, becomes possible. Under these conditions, signals from distant stations can arrive with sufficient strength to override transmissions from a 'local' station.

The ionospheric phenomenon does not occur all day or every day, as some 27MHz operators seem to think! This is because of variations in the degree to which the ionospheric regions become ionised.

The 'right conditions' are not all that frequent anyway. Ask any 28MHz band amateur radio operator and see what they say!
Radiation From The Sun

The intensity of ionisation of the ionospheric regions, is due to the emission of various forms of radiation from the sun. These emissions are mostly ultra-violet, and they normally increase with the occurrence of ‘sunspots’.

The degree of ionisation, in turn, determines what is known as the ‘critical frequency’. Transmissions above this frequency and reaching the ionosphere at a low angle of incidence, are refracted and returned to earth. They are then reflected back to the ionosphere and so on. This is how h.f. transmissions are propagated over long distances around the earth.

Solar Cycles

You’ve probably already heard solar cycles being discussed on the air. The solar cycle number 21, shown in Fig. 2, reached its minimum more or less at the end of 1987. The diagram shows the progressively increasing ‘sunspot counts’ for the whole cycle. The conditions for h.f. band DX would have been quite frequent from 1978, when the ‘sunspot counts’ were over the 100 mark, and reached peak at just over 160 during 1980. At present, we are only about halfway through the current solar cycle, number 22, and the sunspot counts are still fairly high. They’re still in the region of 150, with two peaks reaching over 190, as shown in Fig. 3.

This record for solar cycle number 22 is from its beginning (end of 1987) to February 1992. Remember that a solar cycle lasts about 11 years, although records show that some have been shorter and some have been longer.

Less Frequent

The chances of two-way long-distance (DX) contacts on the higher h.f. bands, including 27MHz (or interference from other very distant stations), will become less frequent as we get near to the minimum of cycle number 22. These conditions will prevail for some while after the start of the following solar cycle, number 23. However, DX conditions may prevail for short periods during that time, due to short spells of sunspot activity.

Final Observation

As a final observation, CB radio transceivers designed for f.m. only, will of course receive s.s.b. transmissions which will sound like garbled speech. These transmissions could be mistaken for a foreign language from some distant station.

In reality, the transmission may well be coming from a local CB operator illegally using a s.s.b. (single side band) transceiver. There’s a lot of them about you know!

Extended Holiday

That’s the lot from me this time, and for a little while as I’m taking the chance of an extended holiday, I hope you enjoy ‘CB High & Low’ as much as I enjoy preparing it.

All the best to you all, and don’t forget: CB radio is fun whether you’re on high or low. Cheerio for now!

Further Information and Reading

Our contributor Ron Ham (‘Reflections’) deals with the mysteries of sunspots, solar activity and ionospheric, etc., every month. Also, the book Radio Wave Propagation (h.f. bands), which deals with the subject in considerable depth, is obtainable from PW Publishing.

Editor’s suggestion: Waves And Wires And the excellent ARRL Antenna Manual are two more books that are worth reading (see Book Service).

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If you have a subscription then you will know all about the Practical Wireless Subscribers’ Club. If you don’t then read on. Membership is free and automatic for all subscribers to this magazine and is our way of saying thank you to all those who have had faith to pay for it ‘up front’. Each month there are Special Offers and occasional competitions with some really useful prizes to be won.

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**Special Offers and discounts normally available to all members.**

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If you do not want to deface your PW a photocopy of this coupon will be accepted.

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Practical Wireless, August 1992
The AR1500 is the World's first true compact hand-held wide range receiver offering SSB as standard and has remained easy to operate. Many facilities have been carried across for the NiCad pack, spare dry batteries may be carried for extended operation and the receiver is supplied with a comprehensive selection of accessories:

- 4 x AAA alkaline cells
- Charger, DC lead fitted with cigar lighter plug
- Telephone, Soft case, Belt Webb, 5 meters (approx) of serial were terminated in a BNC connector for shortwave reception and Operating manual.

Versatility is excellent. The AR1500 may be powered from it's internal NiCad pack, quarter dry batteries may be carried for extended operation and used with the dry battery case, the set may also be plugged directly into the cigar lighter socket of a motor vehicle (external input range 11 - 18V DC).

Although offering a long list of facilities and operating modes, the receiver performance of this compact hand-held receiver can not be directly compared to that of the AR3000A or even the longer range Oceanic Airband and ship to shore. Of course the listening too. The World's shortwave and Amateur bands can be monitored, reception of AM, NFM & WFM.

The AR1500 can meet a number of requirements to satisfy Airband or Marine enthusiasts, Professional off air monitoring and of course casual listening too. The World's shortwave and Amateur bands can be monitored, even the longer range Oceanic Airband and ship to shore. Of course the listening too. The World's shortwave and Amateur bands can be monitored, reception of AM, NFM & WFM.

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The AR1500 has a new 'automatic memory' feature which automatically stores busy channels from search bank 9 into the 100 memory channels of scan bank 9. There are 1000 memories in total arranged in 100 memories x 10 banks, there are also 10 additional programmable search banks. Each memory will store frequency and mode (NFM, WFM, AM and SSB) the search banks will also store the step increment. There is a massive EEPROM memory store for all memories and search banks so that no backup battery is required. The memories may be over-written time and time again. The memories may be over-written time and time again. The memories may be over-written time and time again. The memories may be over-written time and time again. There are 1000 memories in total arranged in 100 memories x 10 banks, there are also 10 additional programmable search banks. Each memory will store frequency and mode (NFM, WFM, AM and SSB) the search banks will also store the step increment. There is a massive EEPROM memory store for all memories and search banks so that no backup battery is required. The memories may be over-written time and time again. The memories may be over-written time and time again. The memories may be over-written time and time again. The memories may be over-written time and time again.

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Another, perhaps more common, use of logic circuits is counting pulses. So, the next step is to take a closer look at counting pulses and how to do it.

**Counting Job**

There's a whole range of digital i.c.s whose job is counting pulses. For example, the 7490 t.t.l. decade counter is an inexpensive and common counter i.c.

This chip contains the logic circuitry enabling it to divide by counting. This means that for a certain number of pulses put into it, the 7490 will give one pulse on the output.

However, by using various connections to the i.c., pins it can divide by 5, 6, 7, 8, 9 or 10. We are to use it to divide by 10.

In this case for every 10 pulses fed in to the input, the i.c. will produce one pulse on the output. So, the device 'counts' every 10 pulses for one pulse out, or, in other words, it divides by 10.

**Digital Divider**

The digital divider is a very useful device. The circuit, Fig. 1, shows two 7490 i.c.s connected to divide by 10. Both 7490 circuits are identical.

A simple way to think of their operation in this application is to imagine them as 'counter blocks'. They work like this: when pulses are fed into pin 1, after every 10th pulse entering pin 1, one pulse comes out of pin 12. The diagram, Fig. 6, provides a simple illustration of the technique involved.

The supply line, which is the usual 5V t.t.l. supply voltage, and I suggested several approaches in the July PW for simple power supply ideas. However, for the complete project, the regulator has been incorporated on the main p.c.b.

On the main circuit diagram, Fig. 1, you can see that the supply goes to pin 5 of each 7490 i.c. Two capacitors C3 and C4, are added on the supply line near each counter chip.

The capacitors serve to decouple the supply. In other words, they help prevent any of the signal appearing on the supply. The capacitors are important, and should be placed as close as possible to pin 5 on each i.c.

The pulses produced by the circuit are very rich in harmonics. These harmonic signals go well into the v.h.f. radio spectrum, and they are best retained within the required signal paths of the circuit.

**Looking At The Process**

Perhaps it's best that we start with a look at the full process. If a signal with a frequency of 1MHz (pulsed at the rate of 1MHz) is fed into IC1, the signal will be divided by 10, producing a signal at 100kHz.

This month, the Rev. George Dobbs G3RJV shows us how to divide, regulate and calibrate. In this case, George can really claim that we need to divide to work, even though it's digits he's dealing with!

The heading photograph shows George Dobbs G3RJV's prototype t.t.l. crystal oscillator and divider board. The '1M' '100K' and '10K' legends refer to the frequency outputs of 1MHz, 100 and 10kHz.

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**Construction**

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100kHz.
If this signal is then fed into IC2, as shown in
Fig. 1, a signal of 10kHz will be produced on the
output. Of course, 100kHz is a tenth of 1MHz, and
10kHz is a tenth of 100kHz. The circuit, when fed
with a 1MHz signal, allows outputs at 1MHz,
100kHz and 10kHz.

What Use Is It?
I've no doubt you're wondering 'what use is this
circuit?' Well to answer your question, it can be
added at the output of the 1MHz t.t.l. oscillator you
built last time, (July PW) to produce a crystal
calibrator.
In case you're not quite sure what a crystal
calibrator is, it's a piece of test equipment which
produces accurate signals for checking the
calibration of a receiver. Used alone, the 1MHz
oscillator would produce a signal which can be
heard at every 1MHz point (1MHz, 2MHz, 3MHz,
4MHz, etc.) on a receiver, well into the v.h.f. range.
The two dividers I've described help to fill in the
gaps. The first stage produces a signal which can be
heard at 100kHz points, and the second a signal
which can be heard at 10kHz points.
The extra frequency-marked points are useful to
check the frequency of a receiver, especially one
with an analogue scale, or to calibrate a home-
brewed radio. The amateur radio licence requires the
licensee to have an accurate method of checking the
frequency of transmissions, and this circuit can do
that job.

Circuit Laid Out
The diagram, Fig. 2, shows how the circuit can
be laid out as a printed circuit board design, and the
diagram shows the copper track side. One of the
advantages of digital logic i.c. circuits is that they
often produce "pretty" p.c.b. layouts. This board
only contains three i.c.s and four capacitors.

In addition to the supply line, there's also an
input and two outputs. The diagram, Fig. 3, shows
the component side of the p.c.b.

Boards Combined
The t.t.l. divide board and the t.t.l. oscillator
board can be combined to produce a switched
crystal calibrator. The method of switching the
boards is shown in Fig. 1.
All the switching functions are done by a single
switch, which is a two-pole, four-way rotary wafer
switch. This is a switch that's based on a control
shaft with a single knob. It can switch an input to
any one of four output contacts.
The four-way wafer switches are usually made
with three poles. In other words they have three sets
of four-way switching actions controlled by the
same shaft. This is a common arrangement because
it's easy to get 12 switching contacts around the
wafer of the switch.
As you might expect, four-pole three-way, two-
pole six-way, and one-pole 12-way are also common
combinations of the wafer switch. You can often
pick up some useful, and very cheap, switches of
this type at rallies.

Power Switch
The section of the switch, S1a, is the pole which
acts as a power switch for the calibrator. In position
1 (below the 1MHz position in Fig. 1), the 5V
supply goes nowhere! In the other three positions it
provides the supply for the oscillator and the
dividers.
The section S1b selects the required output.
Position 1 also goes nowhere, it's the 'off' position.
Position 2 picks up the 1MHz signal from the
oscillator. The position 3 on S1b picks up the
100kHz signal, and position 4 the 10kHz signal
from the divider board.
Neat Idea

You’re probably wondering ‘what about the third pole?’ Well, it has no use in this circuit and can remain unused. However, I’ve got a neat idea for the more sophisticated constructor!

Why not use the third pole as an indicator switch? You could use the spare contacts on S1c (the unused pole) to switch three light emitting diodes.

Each I.E.D. can be switched on by the 5V supply, and they could be mounted in line on the calibrator case. Mark the case to show ‘1MHz’, ‘100kHz’ and ‘10kHz’ by the appropriate I.E.D.

Although they’re not really needed, the I.E.D.s will add that little extra touch to the project. But don’t forget that the I.E.D.s will need a series resistor in line with the supply to protect the I.E.D. from the 5V supply. Thankfully that’s neither difficult nor expensive and it’s been incorporated on the p.c.b. design.

Three Terminal Regulators

To help us with power supplies, there’s a very useful range of I.C.s often called ‘three terminal regulators’. They look like transistors, but are actually useful integrated circuit devices for providing a regulated voltage from a higher voltage.

The regulators are manufactured for a specific output voltage, one of which is 5V. A suitable regulator I.C. for our T.T.L. project is the 7805. This device, and its connection details, is shown in Fig. 4.

Regulator I.C.s usually require a minimum input voltage some 2V above the regulation voltage. In the case of the 7805, it will work over an input range of 7 to 25V and produces a 5V output while providing a current of up to 1A.

Regulator Circuit

The regulator circuit is shown in the lower part of the main circuit diagram in Fig. 1. The 7805 has an input and output pin and a common pin, which is connected to ground, and these are shown in Fig. 4.

On top of the I.C. is a metal tab, to which a heat-sink may be connected. For use in our calibrator project this is connected to the small heat-sink as shown in the component overlay diagram, Fig. 3.

The circuit also shows two capacitors, and these are included to decouple any noise due to the action of the regulator’s internal circuitry. The input is shown for a 12V d.c. input, as this is a common supply voltage, but despite this the circuit will work over the whole 7 to 25V range.

Shopping List

Two 7490 I.C.s, Maplin OX66W are suitable (there are many other suppliers). See July PW for explanation of chip identification. 100nF disc ceramic capacitors. Three-pole four-way wafer switch (Maplin FF75S or similar). Receiver, 7805 type. Maplin QL311 (similar) suitable.

The Prototype

In the finished prototype calibrator, I connected the two capacitors directly between pins 1 and 2 and 3 and 2. In my version, the I.C. was bolted to the side of the case using the mounting hole in the metal tab.

The circuit can be used directly with a 12V d.c. supply. The power switch in Fig. 1, (S1a) is best connected in the power input line to the regulator, as this will switch the d.c. supply on and off.

To help you get a good idea of what to do, the construction of the calibrator can be seen from the prototype’s photograph, Fig. 5. Any suitable case which can contain the boards may be used. The output socket in my prototype is a phono socket, but any other type of connector can be used.

Easy To Use

The calibrator is easy to use. You shouldn’t have to connect it directly to the receiver. Usually, a wire about a metre or so long, coming from the output and laid near to the input of the receiver will do.

However, if the receiver is well screened by a metal case and the antenna input lead is also via a screened input, the end of the wire may have to be placed inside the case to enable the receiver to detect the signals.

As I mentioned in the previous article, the oscillator should be switched with the trimmer capacitor to be at 1MHz. Also, don’t forget that the receiver must be used with a beat frequency oscillator (b.f.o.) or in the c.w. or s.s.b. mode. When you’re using the calibrator, begin by finding the 1MHz points, before going down to the 100kHz and 10kHz points.

That’s your lot for this month. Keep building, and having fun and I’ll see you next time.
For a summer project, the well-known amateur radio designer and writer Doug DeMaw W1FB, has come up with a portable h.f. antenna design. Armed with the transmitter from last month's PW, surely you must be tempted to try portable working now!

Figs. 1, 2, 3 and 4: Mechanical details of the W1FB 3.9MHz (suitable for 3.5MHz also) helically-wound vertical antenna. The antenna is arranged for normal mode radiation, which is vertically polarised and omni-directional. Suitably treated wooden joiners (see Fig. 5) are used to combine the three antenna sections. The shorting strap D provides an electrical connection between the antenna sections, and stabilises the joints. The 'top hat' E is a 250mm diameter aluminium disc, attached to a 10mm bush (F). The bush is drilled at the centre for attachment to the 8mm diameter brass rod (G). The 6-32 screw at the top of the section A winding passes through a threaded hole in rod G to connect the winding to the top hat.

As I'm a camper and a QRPer, it goes without saying that a transceiver is an essential part of my field pack.

Unfortunately, not all camping areas have trees of the correct height, or somewhere to accommodate a dipole or end-fed wire. To get over this problem, I've adopted the rule that "if you can't go out, go up". In other words...vertical antennas provide a solution to this problem!

This article describes a helically wound h.f. band vertical that breaks down into a conveniently-sized bundle for transporting it to the camp site. It's got the advantage that it may be tailored to the amateur band of your choice.

Short Vertical Antennas

Let's take a look at short vertical antennas in general. The debate over whether a top-loaded, centre-loaded or base-loaded short vertical is best will no doubt continue until Doomsday!

Over the years, I have used each type and have had good results with all of them. However, this was provided the loading coil had high Q and the feed-line was matched to the antenna.

The quality of the ground system does, of course, play an important part if good performance is to be achieved. The more effective the ground screen or radial system, the greater the overall efficiency.

I have found that helically wound vertical antennas perform better for me, than verticals of the same length, using lumped inductance for loading coils do. The voltage and current distribution is more uniform with a 'helical' than for short verticals with loading coils.

Although this may not be important with regard to general performance, I find it appealing from an academic point of view. So, I've said my piece, and it's time to look at the idea!

Essence Of A Helical

Let's take a look at the essence of a helical vertical antenna. Firstly, owing to a small outer diameter of the antenna coil, respective to a wavelength, axial mode radiation doesn't occur.

Therefore, the long slender coil (normal mode) performs in the same fashion as a short vertical that contains a loading coil. Resonance is 1/4λ and this requires approximately 0.5 wavelength of wire to construct a 0.25λ radiator.

The greater the diameter and length of the helically wound coil, the less wire required to establish 0.25λ resonance. Experimentation with resonance will be required with various form factors.

Experimentation may be done by erecting the antenna at ground level, and operating it in conjunction with four 0.25, radials. These are laid upon the ground, and a small four turn sampling coil is inserted between the feed-point of the vertical and the ground screen.

Dip Meter Check

When the sampling coil has been inserted, a dip meter can then be used to check resonance, by inserting its coil in the small link at the antenna feed-point. Add or remove helix turns until the antenna is resonant in the chosen part.
of the band. The capacitance hat must be in place at the top of the antenna when this test is performed.

I like to make my antenna resonant at the upper frequency of the range of interest. This enables me to add a small adjustable loading coil at the feed-point, for establishing resonance at frequencies that are lower in the band.

The 2:1 s.w.r. bandwidth for a properly matched helical vertical is quite narrow, in the order of 8kHz at 3.8MHz. The feed impedance is between 8 and 150Ω, typically. This calls for a matching network or tapped resonating coil at the feed-point to ensure a match to 50Ω coax cable. More on this later.

**Capacitance Hat**

A capacitance hat or metal rod is necessary at the top end of the helix. This prevents the Tesla-coil effect at high power levels. A diameter of between 200 and 250mm is satisfactory. If a metal rod is used instead of the hat, make it approximately 440 to 560mm long.

A helical vertical may be space wound or close wound. The pitch of the winding is dependent upon the coil form diameter and the wire gauge used. The heavier the wire the higher the antenna Q because of a reduction in a.c. resistance.

**Practical Helical Antenna**

I needed a 3.5MHz vertical for use with my Kenwood TS-140 when camping. I installed a mounting bracket near the roof of my aluminium-sided camping trailer to accommodate the vertical.

The location I chose, places the antenna in the clear above the roof of the camper. The antenna is worked against the metal side and frame of the trailer. When it’s in use, a ground rod is driven into the soil below the camper. A ground strap is then attached to the frame of the unit.

To accommodate the transmitted power. For operating convenience, L3 in Fig. 6, can be a roller-coaster coil or a tapped coil (tapped every three turns). The foundation for my antenna is a fibre glass cubical quad spreader. In my case, the spreader is made up from three telescoping sections. You could use a hollow fibre glass fishing rod, as an alternative to the quad spreader.

The telescoping feature is impractical for the antenna in Fig. 1, however, owing to the coil wire being added to the fibre glass form. Each section can be slipped into the mating section if you cut 50mm or so of stock off the upper end of each section.

Wooden joiners are used to combine the antenna sections, as shown in the diagram. I turned these joiners on my lathe to have the upper end of each slightly smaller in diameter than the bottom end.

Turning them in this way ensures a snug fit inside the fibre glass tubing. The joiners are fixed to the tubing at the lower end of each wooden insert.

The mating upper section of the vertical, simply sits on the top of the joiner. The shorting straps prevent the 'loose' antenna section from turning or slipping out of the lower section. Each upper antenna section slips into its lower mating section (there's a recess of approximately 20mm).

There's no reason why 25mm o.d. plastics plumbing pipe can't be used for the coil former on the helix. The wooden joiners would be the same diameter from one end to the other at each junction.

**Higher Bands**

Helically wound verticals for the higher bands can be wound on wooden dowelling rod. This is quite practical if the wood is treated with an exterior grade of polyurethane varnish. The type of varnish used on boats, also works well as an effective moisture-prevention treatment.

I once used a 4.9m long wooden hand rail as the form for a 1.8MHz helix. I coated the wood with three layers of spar varnish, wound the helix and added two more coatings of spar varnish.

A 250mm diameter aluminium pie tin served as the capacitance hat! This antenna performed very well, and I worked a fair amount of DX with it.

Continued over...
Speaker Wire

The windings for sections B and C in Fig. 1, were made from the commonly available translucent plastics covered speaker wire (this is often sold as light-duty mains cable in the UK and is of figure '8' section, Editor). The suggested wire pulls apart easily to form two single conductor wires of equal length. Details of the windings are shown in Figs. 3, 4 and 5.

The translucent plastic insulation on the wire withstands ultra-violet radiation, heat and cold quite well. It's also cheap! Antenna section A is wound with No. 16 magnet wire (1.5mm diameter enamelled wire is suitable).

Each section contains 13.5m of wire for 3.9MHz *(Readers in the UK, see note at end of text). Ideally, each section would be wound with equal spacing between the turns.

Owing to the taper of the sections, I was not able to judge the proper spacing between turns. Because of this, the upper ends of the three sections have turns that are spaced farther apart than the bottom halves of the sections. This has little effect on the overall antenna performance.

I would have preferred to use shrink tubing over each antenna section after completing the windings. I didn't have shrink tubing of great enough diameter, so I simply ran a strip of clear RTV (or Silastic) compound down two sides of each antenna section. The compound keeps the turns firmly in place. Low-loss electrical tape may be used in place of shrink tubing or sealant, and you can also use bath-tub caulking material to fix the windings in place.

Antenna Matching

The diagrams, Figs. 6 and 7, show two methods for matching a 50Ω feeder to the vertical antenna. The tapped coil method is simple and easy to use.

The coaxial cable feed is tapped on the coil near the grounded end to provide a s.w.r. of 1:1. The overall coil is adjusted to provide resonance at the operating frequency.

Since there is some interaction between the tap points, it's necessary to readjust the taps two or three times to obtain a 1:1 s.w.r. This technique requires the helix to be resonant slightly above the chosen operating frequency.

A simple T network is shown in B, in Fig. 6. I use the T network when camping. This permits me to use the antenna on frequencies other than the 3.9MHz (75 metre) band. However, the tapped coil method shown in Fig. 7, is only suitable for single-band operation.

If your transmitter is able to withstand moderately poor s.w.r. conditions, you may wish to eliminate the matching networks and install a 365pF variable capacitor between the antenna feed-point and the coaxial line.

If this is done, the helical antenna must be lower in frequency than the proposed operating frequency. Valved rigs work nicely with this tuning arrangement. But be warned, s.w.r. protected solid state equipment will gasp in horror if you try this method!

Multi-band Operation

In the USA, we have a larger frequency allocation between 3.5 and 4MHz than in Europe. However, Practical Wireless readers in the UK will be interested to know that I've used my 75 metre band (3.9MHz) portable helical vertical antenna on 7, 10 and 14MHz without changing the antenna windings. The T-network a.t.u. in Fig. 6, makes this possible.

Remember that as the operating frequency is increased, so is the radiation angle. This is okay for 'cloud warming' contacts, but don't expect great results when chasing DX!

A better technique is to retain section C of Fig. 1 and construct a new section B for 7MHz use. If there is around 13.5m of wire on section C, you will need approximately 8.5m of wire on section B for 7.2MHz. Readers in the UK and Europe will have to adjust these lengths for their 7 to 7.1MHz allocations.

Alternatively, you could build sections C for 14MHz and tailor sections A and B for 14, 7, 3.5 or 1.8MHz. A set of sections would permit operation on many bands.

Remarkable Results

The longer the antenna the better the performance. However, I've had remarkable results with very short helically-wound antennas.

For example, I constructed one that was just under 1m long and 10mm in diameter for use on 1.9MHz. I had to use 24s.w.g. enamelled wire and a small loading coil to obtain resonance.

This was in 1954 when a.m. was king on 'top band'. Owing to the light gauge wire, I restricted my transmitter power to 10W.

I made several contracts out to 160km and was elated to receive signal reports of Q5 and S6 to S9 with the midget antenna. Later on, W8UUN and I constructed an experimental helically wound dipole for 1.8MHz.

The antenna was 5m long and had a bandwidth of 3kHz! Matching was accomplished by means of a link at the centre of the dipole's continuous winding. A small capacitance hat was used at each end of the dipole. Results were good, and we had solid QSOs of up to 800km during night-time operations.

If there is a bottom line to this story, it's that no shortened antenna compares in efficiency to a full size antenna of the same type. However, on the advantage side, short antennas are a practical means to an end when there's not enough room available for a large antenna.

*Note: Although the antenna dimensions are based for the 3.9MHz (75 metre) band, there is no necessity to alter the dimensions of the antenna if an a.t.u. is used.

I've included the formula below, so that you may use it to design a helical for the band of your choice.

\[
L(\text{antenna}) = \frac{516}{f(\text{MHz})} \quad \text{(in feet)}
\]

Shopping List

Wire (see text) aluminium disc, glass fibre tubing for pole, tape, sealing compound, coaxial cable, plugs and sockets, brass rod, plastics tubing for base-loading coil (see text), variable capacitors (see text), solder tags, polyurethane varnish (yacht varnish is ideal). Note: The reference numbers for the nuts, bolts, screws and threads used in this project are American standards. Readers having to purchase screws, rather than modifying the design themselves, will find that ironmongers and specialist tool shops will have equivalents and information.
SMC are pleased to announce that we are now approved dealers for both KENWOOD and ICOM products as well as being the sole UK distributor for YAESU equipment.

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Kenwood products available at most branches
Sound mechanical construction is an important factor with all radio gear, especially when it is required for military use. This was frequently proved during WWII when static and mobile sets had to be robust and able to perform under really hazardous conditions.

Do keep in mind that this war was fought 50 years ago when the current hungry thermionic valve, with its fragile glass envelope, was the latest technology. Before the advent of the printed circuit board, some 10 years later, radio components were generally either bolted to the chassis or 'strung' between tag boards prior to their connections being soldered.

**Solid Construction**

Many of us young engineers learnt a lot about 'solid' construction through modifying, repairing and using the variety of purpose-built sets that appeared on the surplus market after the war. It was like your favourite dealer today selling off all his beautiful stock, new and boxed, at scrap prices, hi!

Almost all military sets were assembled and wired by hand, individually aligned and tested. In addition to performance and electrical reliability, the designers had to think about mechanical construction, stability and weight. The latter was really important, especially if the equipment was being carried by a soldier on foot or used in aircraft where every ounce had to be considered. To this end various alloys were used, and all nuts and bolts were fitted with spring washers and then 'painted' to prevent them coming loose.

Don't forget that a slack fixing could mean a poor earth connection causing crackles or intermittent operation of the set. Worse still, a stray nut, bolt or washer could lodge itself between components, create a short circuit and cause damage to the valves or the power unit. Every effort was made to prevent 'silly' faults like this from occurring.

**Beautifully Engineered**

Throughout WWII, military wireless equipment, on both sides, was well-designed and beautifully engineered as shown by the German low frequency communications receiver Torn. E.B. The set itself, Fig. 1, made by Telefunken, weighs (bathroom scales) about 22lb (10kg) and measures approximately 330x210x230mm.

The sturdy metal casing, finished in German field grey, has a hefty carrying handle at the top and a number of webbing attachment points on the top and threaded rod opposite this panel is one of the three long bolts that secures the chassis to the cabinet, and its slotted head is visible just left of top centre in Fig. 6. The turret in Fig. 5 is disengaged to illustrate the direction of movement of the contacts, and to show the relative size of each 'biscuit' assembly.

Obviously the large terminals marked 'A' and 'G' (right of Figs. 1 and 6) are provided to accept a long-wire antenna and an 'outside' earth. Any of the following frequency ranges, 1, 96.6-177.2kHz, 2, 171-313.7kHz, 3, 304.5-558.5kHz, 4, 540-990kHz, 5, 955kHz-1740MHz, 6, 1.674-3.075MHz, 7, 2.920-4.820MHz and 8, 4.360-7.095MHz can be selected by rotating the central knob (Figs. 1 and 6).

The range number appears in the small square above the knob and tuning instructions, for the vernier dial, are shown in the upper and left and right oblong panels. The left (darker) and right sides of each panel are labelled 'Grad' & 'kHz' respectively.

Tuning to a precise frequency is carried out with the knob below the vernier dial, and it's indicated on the crescent shaped vernier dial below the 'A' terminal. This has a reasonably slow-motion drive and is scribed 0 to 100 which corresponds to the 'Grad/kHz' relationship given in the two oblong panels. For example, range 4, 0, = 540kHz, 25, = 624kHz, 50, = 749kHz, 75, = 881kHz and 100 = 990kHz. At this point the upper rectangle is showing "1 Grad = 4.5kHz", a
I often suggest specific books in this column, firstly, because I believe it helps many of our readers. Secondly, it shows the respective authors and publishers that their efforts are appreciated.

Two more books that link WWII research to our present day observations are Radio Astronomy by Roger Jenkinson, published in 1966 by Newnes and The Radio Universe, by J. S. Hey, published in 1971 by Pergamon Press. Briefly, in addition to some good reading on the title-subjects, both authors refer to the investigation, by Dr. Hey, into enemy attempts at jamming British radar stations operating at “wavelengths of a few metres.”

However, it appears that in February 1942 a period of high noise level, seen on the screens, was due to sunspot activity and not the work of German engineers. These findings were kept under wraps until the war ended. Since then, enthusiasts in the fields of radio and astronomy have kept a regular watch on sunspots and their effect on the propagation of terrestrial radio waves.

Reports And Observations

As usual I end up with your reports and observations. From his home in Edinburgh, Ron Livesey, using a 2.5m telescope and a 4.0in projection screen, identified four active areas on the sun’s disc on April 3, 4, 15, 16 and 24; five on days 18 and 19; six on the 21st, 24th and 26th and seven on the 2nd and 25th. At the other end of the UK, Patrick Moore (Selsey) watched the progress of a number of groups and spots as they appeared with the 27 day rotation of the sun. He kindly sent a drawing, Fig. 7, of the solar disc as he saw it on his projection screen at 0655 on the 19th.

Aurora Reports

The auroral co-ordinator for the British Astronomical Association, Ron Livesey, received reports of ‘active aurora’ up to 90 for the overnight period on April 19, and ‘glows’ on the 24th from the Kirkwall Met Office. ‘Active aurora’ on the 2nd and 3rd, and ‘corona 2/3 sky’ on the 5th from Jay Brausch in North Dakota.

Acoustic reflected radio signals from the Lerwick beacon, GB3LER, on 144MHz, were received by Doug Smillie at 1720 on the 3rd and 1414 on the 18th.

Magnetic Observations

Although there were no magnetic storms recorded during April, the magnetometers used by Tony Hopwood (Upton-On-Severn), Karl Lewis (Salshash), Ron Livesey and Doug Smillie, for observations, were unsettled on days 3, 5, 6, 8, 9, 10, 17th to 23rd inclusive and 26, 27 and 29th.

Sporadic-E Season

The 1992 Sporadic-E season began for John Woodcock (Basingstoke) on May 5 when he received strong pictures from Italy, in Band I, at midday. Since then he logged Estonia on the 7th, Estonia and Sweden on the 9th, Spain on the 12th, Italy again on the 15th and Estonia and Portugal on the 18th. Programmes from Italy and Spain at the bottom end of Band II, on the 5th, reports Michael Larsson (Cheadle Hulme) that an event was in progress. And, to add a bit more weight, Russ Burke (Northampton) tells me he received television pictures from these two countries on the 2nd, 3rd, 4th and 11th.

Earthquake

Finally, I don’t think we can blame the sun for this! Around 0222 on April 13, Peter de Jong was at home and awake when Holland experienced its strongest earthquake since 1692! Its strength was 5.5 on the Richter open scale near Roemund, some 160km from where he lives in Leiden. “It was indeed a weird and frightful experience. It is like being weightless, with waves moving back and forth (instead of up and down) under you. The whole house shook, despite the distance from the epicentre,” wrote Peter.

He added, “Ultimately it is related with the same fault as the now active Etna volcano!” Local damage in Peter’s area has been estimated at £30m. We are glad that you are safe Peter and thank you for this first-hand account, it is much appreciated by us all. Apart from her horror of the situation, Joan’s reaction to your letter was, “it must feel like standing on a jelly.”
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**Mathematics For The RAE**

To start off this month, we'll begin with the easiest bit! Let's suppose that we have three capacitors connected in parallel, as in Fig. 1. For this problem, the effective capacitance across the terminals a and b is given by:

\[ \frac{1}{C_{a-b}} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} \]

To help, I'll put some figures in to illustrate the principle. In this example I'll say that \( C_1 = 470\text{pF} \), \( C_2 = 560\text{pF} \) and \( C_3 = 2.2\text{nF} \), what's the effective capacitance between the terminals a and b?

\[ \frac{1}{C_{a-b}} = \frac{1}{470} + \frac{1}{560} + \frac{1}{220} \]

\[ C_{a-b} = \frac{1}{0.000924} = 1082.33\text{pF} \]

**Capacitors In Series**

What about capacitors connected in series? Well, it's a little more difficult, just like inductors in parallel but don't worry about it, as I'll explain it carefully.

Mathematically speaking, calculation of the effective value of series connected capacitors is the same as that for the parallel connection of inductors. If it's still a bit puzzling, don't fret, as it will become clearer a bit later on when we look at inductive and capacitive reactance.

The effective value of three capacitors connected in series (Fig. 2) is:

\[ \frac{1}{C_{a-b}} = \frac{1}{C_1} \cdot \frac{1}{C_2} \cdot \frac{1}{C_3} \]

Let's make it a little more complex, but just as easy!

Now we'll put a few figures into the problem. Let's assume \( C_1 = 470\text{pF} \), \( C_2 = 22\mu\text{F} \) and \( C_3 = 4.7\mu\text{F} \), what's the effective capacitance between the terminals a and b?

\[ \frac{1}{C_{a-b}} = \frac{1}{470} \cdot \frac{1}{22000} + \frac{1}{4.7} \]

After calculation, \( C_{a-b} = 0.0003 + 0.00027 = 370.4\text{pF} \)

**Series Parallel Combination**

Let's make it a little more complex, but just as easy! Look at the drawing of Fig. 3, and you will see three capacitors in a series-parallel combination.

To work this one out, we attack it in two stages. First we work out the \( C_2/C_3 \) combination, and then calculate this new value with the value of \( C_1 \). It couldn't be easier, could it?

Now we'll put a few figures into the problem. Let's assume \( C_1 = 470\text{pF} \), \( C_2 = 100\text{pF} \) and \( C_3 = 330\text{pF} \). Don't forget that when capacitors are in parallel we add their values. So, the combination of \( C_2 \) and \( C_3 \) (let's call it \( C_x \)) is:

\[ C_x = 100\text{pF} + 330\text{pF} = 430\text{pF} \]

The combination of \( C_x \) and \( C_1 \) in series (this is \( C_{a-b} \)) is:

\[ C_{a-b} = \frac{470 \times 430}{470 + 430} = \frac{202100}{900} = 224.6\text{pF} \]

This gives us an answer of 224.6pF when it's rounded up.

Well that wasn't so bad was it? I'll leave you with your homework for this month, with just a few easy questions to set this session in your mind:

Using the arrangement of Fig. 1, find \( C_{a-b} \) when:

i) \( C_1=10\mu\text{F} \), \( C_2=22\mu\text{F} \) and \( C_3 = 47\mu\text{F} \)

ii) \( C_1=470\text{pF} \), \( C_2=560\text{pF} \) and \( C_3 = 2.2\mu\text{F} \)

iii) \( C_1=10\mu\text{F} \), \( C_2=1\mu\text{F} \) and \( C_3 = 2200\mu\text{F} \)

Use the arrangement of Fig. 2, to work out \( C_{a-b} \) for the following values:

i) \( C_1=10\mu\text{F} \), \( C_2=22\mu\text{F} \) and \( C_3 = 47\mu\text{F} \)

ii) \( C_1=470\text{pF} \), \( C_2=560\text{pF} \) and \( C_3 = 2.2\mu\text{F} \)

iii) \( C_1=10\mu\text{F} \), \( C_2=1\mu\text{F} \) and \( C_3 = 2200\mu\text{F} \)

**Two In Series**

For just two capacitors in series, having values given in the same type of units:

\[ C_{a-b} = \frac{C_1 \times C_2}{C_1 + C_2} \]

What is the effective capacitance of 330µF and 680µF connected in series? As both values are given in µF?

Putting the figures in the above formula gives us:

\[ C_{a-b} = \frac{330 \times 680}{330 + 680} = 224400 \]

These figures give an effective value of 222.2µF when two capacitors of 330µF and 680µF are in series.

Here's a final example of capacitors in series:

In this example we have three capacitors having of 3.3nF, 910pF and 750pF connected in series. Now we have to determine their effective capacitance.

To start the process, you should state all three values in a common sub-multiple, or the easiest choice is to use picoFarads (pF). As 3.3nF is the same as 3300pF, the values can be stated as 3300pF, 910pF and 750pF:

\[ \frac{1}{C_{a-b}} = \frac{1}{3300} + \frac{1}{910} + \frac{1}{750} \]

After calculation, \( C_{a-b} = 0.000732 + 0.001111 + 0.001333 = 0.002176 \). Inverting this figure gives us the answer of:

\[ C_{a-b} = \frac{1}{0.002176} = 370.4\text{pF} \]

Finally, I'll leave you with a combination using the circuit of Fig. 3.

Find \( C_{a-b} \) when:

vi) \( C_1=2.2\text{µF} \), \( C_2=1.1\text{µF} \) and \( C = 2200\mu\text{F} \)

**Cheerio for now, and don't forget that maths isn't difficult really. It's just another tool in your workshop, to help you get the most out of radio!**

---

**Theory**

If you're following Ray Faulkley G3AGS's series, the last lesson dealt with inductors in series and parallel. This month will be just as easy, as Ray deals with capacitors in the various circuit combinations found in radio.

---

**Fig. 1: Capacitors in parallel (see text).**

**Fig. 2: Capacitors in series (see text).**

**Fig. 3: A circuit made up from capacitors in a series-parallel combination.**
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For his bi-monthly look at the world of ATV, Andy Emerson G8PTH looks back at the Dayton Hamvention in April.

The World of ATV

They sell operates only in class AB and probably restores the shaved-off sideband. The performance figures they publish are pretty meaningless in this respect, and everyone is awaiting a proper review of this product before endorsing it.

Nicest ATV product (for me) was a text superimposition module for putting slants, calligns or numerical information onto a video signal. This tiny board could be adjusted for our 625 line video and costs £175. Because the text is a graphic image you can have your own artwork scanned into its memory.

Slow-scan is another world as far as I am concerned, but I must say the SSTV fraternity made an excellent job of publicising their chosen mode. The SSTV hospitality evening was well attended and they put out a lot of informative literature on slow-scan.

Near Broadcast Standard

Remember that old TV Times comment form - I never knew there was so much in it? Well, the same applies to Avid, The Amiga-Video Journal. I picked up a copy in Tower Records, Chicago and was stunned to find near-broadcast standard accessories available for this computer.

Having read in this column about a 19" rackmount Professional Video Chassis, the products range from an internal timebase corrector to a complete video and audio routing system operating under the Amiga's control. Broadcast-quality maps, titling fonts and pictorial backgrounds are offered in profession, together with dozens of add-ons for the Video Toaster all with desperately catchy names!

Now these products don't exactly have pocket-money prices, but they do mean that a self-employed professional has a chance to build a studio and make a living, producing the same kind of results that hitherto only big outfits could muster. Of course you also need the creative flair and artistic ability, but this is understood.

Up to now, the Amiga has made all the running, but over in the States at least the IBM PC is fighting back. You can of course now get output converters which will turn VGA graphics into NTSC (or PAL) video, and genlocks are also available. Some very tasty software has been released lately, and I have ordered some demo disks.

Restored Vehicles

At the Vintage Sound and Vision Collectors' Fair at Birmingham in May, there were two nicely restored old GPO vehicles, a linemen's van and more interestingly, a Radio Interference van of circa 1950. The shade of green was a bit pale and the signwriting looked far too modern, but otherwise it was spot-on.

The owner would be very pleased to know what sort of apparatus his van would have carried in its day. If you can help, please write to Mr E. Irish, 56 Shobnall Street, Burton-on-Trent, Staffs. DE14 2IH.

By the way, if the idea of a collector's fair specialising in old TV, wirelesses, juke boxes, gramophones and records appeals to you, make a note in your next year's diary for May 16th. It will be held again at the National Exhibition Centre.

ATV Interference

Having read in this column about unwanted sideband transmission in the 23cm band, a reader contacted me about a similar (accidental) case where a TV signal was apparently wiping out the beacon segment of the 23cm band. This time it was a real amateur station, not a pirate, but the matter has now been dealt with. The reason is that the whole affair was sorted out amicably within the amateur community, which is how these things are best handled!

And that's it once more. Please keep your reports coming in so that we can all keep up with what's going on in amateur radio's most highly developed mode!
For All Amateurs

The BARTG rally is of general interest for all amateurs, with most aspects catered for, but with an emphasis on data communications. A new feature this year, owing to popular demand, will be a bring and buy stand.

Parking is available for 5000 cars, and talk-in will be on S22 and SU22 and there’s on-site catering.

Peter has organised other successful rallies and he tries to cater for a wide range of data interests, not just machinery, which had a charisma that doesn’t seem to be shared by its Teletype in the early days. This was a fully compressed and cached hard drive. The BBS software is BPQ v4.05 and NNA v1.12.

Also active on the h.f. bands, Robert has now worked 120 countries. He can often be found competing in ARRL and CQ RTTY contests.

Best of luck in the future Robert, and if YOU would like to join Robert and be featured as ‘Sysop Of the Month’, please send me a photograph together with your particular interests, etc.

Activity In Korea

I’m pleased to say I’ve got news of activity in Korea, sent to me by Ahn HL2INO. Ahn’s home BBS is HL0EMC.KOR.AS.

I have purposely left the text exactly as it was sent to me, to show the tenacity of people like Ahn. Not only does he have to contend with the complexity of the mode itself, some time out, and send Ahn some information. I’m sure he would be MORE than grateful for anything you might send.

Ahn’s Message

Here’s what I received from Ahn. Operational BBS:

HL9DA: 21.111, 144.700. KAM. IBM AT CLONE. SYSOP: HL9EKL. HL3ADI: 14.111, 144.700. KAM. IBM AT CLONE. **: HL3ADI.

HL3JEAL: 7.040. 144.700. KAM. 386 MACHINE. **: HL3JEAL. HL0BTW: 7.040. 144.700. KAM. IBM AT CLONE. SYSOP: HL5LH.

NETROM: THENET VERSION 1.0. HL1ABL-5: MOO. 1200 METER MT TOP. HL3ADI-5: BAE. 600 METER MT TOP. HL2DI-7: TOP. 1700 METER MT TOP. HL3EHV-5: EMS. 700 METER

MT TOP.

HL9DA-1: MAD. 600 METER

MT TOP. SYSOP: U.S.A. RADIO CLUB IN KOREA.

THE NETROM FREQ IS 144.700 MHZ. 1200 BPS WITH TINY-2 AND 27C256. IT WILL CHANGE TO MORE NEWEST ONE IN PRETTY SOON.

PACKET USERS ARE APPROXIMATELY 100 STATIONS IN ALL OF KOREA. KOREA BEGAN PACKET OPERATION ON 1986 WITH GLB PK1L. HL9IO MR.OHY CROSS (USA PEOPLE BUT HAVE GONE TO USA) MADE ABT 10 PK1L OLD MODEL TNC AND DISTRIBUTED THEM TO HIS LOCAL HAM FRIEND. MAY BE THAT WAS THE FIRST OPERATION IN KOREA. WHEN HL FRIEND GOT MORE PACKET KNOWLEDGE, THEY COULD GET MANY KIND OF TNC2 LIKE KAM, PK232, TINY-2, MFI1274.. BUT TNC PRICES ARE MUCH EXPENSIVE AND MUCH HARD TO GET IN KOREA. THESE DAYS MANY HAM ARE INTERESTED IN PACKET AND NOW CAN FIND MANY NEW PACKETERS ON MONITOR BUT THEY SAID ME TNC MANUAL AND NETROM AND BBS ARE SO MUCH DIFFICULT FOR THEM BECAUSE ALL INFORMATION TEXT ARE WRITTEN IN ENGLISH OR JAPANESE. THIS FORGER LANGUAGE IS THE ONE OF THE REASON WHY SLOWLY INCREASE PACKET GROW. HL3EKL.HL2INO. HL1ABL.HL3ADI.HL3EHV.HL3EAL.HL3EIR.HL2DIW. THESE 9 PEOPLE ARE MOST ACTIVE ON PACKET AND GAVE MUCH COOPERATION AND DONATION FOR DEVELOPMENT OF KOREA PACKET. FOR EXAMPLE: BUILD MANY NETROM ON HIGH A TOP AND LET OTHER BBS SYSOP TO INSTALL BBS AND EDUCATE MANY PACKETEERS THROUGH VHF QSO...

Fig. 1: Robert G4XDD, SYSOP of GB7XDD.

For this month’s sysop, I’m featuring Robert G4XDD, Sysop of the central London CITY BBS, GB7XDD. This BBS is located in Kensington, and it’s shown in Fig 1. As one of the new breed of packet BBSs which appeared two to three years ago, GB7XDD is only intended to serve the local user, feeding the network with personal mail through larger, regional nodes.

In the case of GB7XDD, the link is primarily with the large 7-port GB7HSN BBS in Mottingham, Greater London, although links exist with other feeder nodes. Robert is also an extra class US amateur, and licenced as NV3Y. As you would expect, he forwards to and from New York via the LONNY wormhole. This facility is also increasingly used as a multiple link to chat nodes on Long Island for conferencing.

As a matter of interest, FCC testing sessions are administered by Robert four times a year for anyone wishing to obtain a full US licence.

Returning to packet, the equipment at GB7XDD is small scale but powerful, in keeping with where many people give up, but he also has to translate every manual, doc-file, instruction and bulletin into his own language.

With a developing network like they have in Korea, it’s also particularly commendable that they do it all themselves. There’s not many ‘Elmers’ in Korea!...

Perhaps we could learn a salutary lesson here! Why not take
Regional Sysop Meetings

Unfortunately, regional sysop meetings are difficult to organise. This is due to the high and sometimes prohibitive cost, both in terms of money and time, of attending national sysop meetings. Despite the problems, regional meetings seem to be gaining in popularity. Recently, I received copy from Brian GB8ASO, with the details of the West Midlands Sysop meeting in February. Indeed, by the time you read this, I expect to have held a meeting of the East Anglia Sysop meeting.

In East Anglia, we've found that local meetings can be much more helpful to the local network. We have also found that much more can be achieved, plus of course, that the travelling time is much less! Perhaps you could let me have your views on this. Drop me a line, together with any reports of your local meetings?

More Pactor

Phil Bridges from Siskin Electronics, has sent me a huge pile of information about the various products that he handles. One in particular, is the new Pactor controller from PacComm. Designed by a German team of amateurs, it was described in last month's 'Packet Panorama'. It's now being produced by PacComm under licence.

In order to stimulate interest, Phil will be selling the first batch at cost. So, if you are interested, get your name on his list! PacComm's Pactor features are given in Fig. 2. Phil tells me that he is holding back on the DSP modem from AEA at present, owing to the incompletion of the unit and the unfair rate of exchange. It certainly does carry a very large price tag, so I think it will be relegated to a privileged few!

Looks Interesting

One product that looks interesting, is the 4-port USCC slot card. This offers the sort of thing I really wanted myself, instead of the two DR51 cards that I bought at the show! These are the features:

- Port 1 300/1200 baud (f.k.a.h.f.) packet using an AM 7911 chip.
- Port 2 1200 baud v.h.f. using a TCM 3105 as used with the Tiny 2, KAM and KPC4.
- Port 3 9600 baud G3RUH compatible using the DF9IC design.
- Port 4 High speed disconnect header - can be used to add PSK or additional RUH modem.

Supplied with G8BPQ networking software and the very popular BayCom PC software for conventional terminal operation.

By simply altering a few capacitors and resistors port 4 can be altered to 2400, 4800, 19200 or even 38400 baud.

As an introduction, Phil is offering this at special prices for Node/BBS sysops.

PacComm's Pactor

* PACTOR, AMTOR and RTTY modes
* Error-free data transmission
* Four times faster than AMTOR
* Complete ASCII character set
* Memory-ARQ restores bad data packets
* On-line data compression
* Automatic speed adaption
* UNPROTO mode (FSC)
* Listen mode to monitor PACTOR QSOs
* ID capability (c.w.)
* Built-in message system
* Automatic log-book function accessible over the air
* Digital tuning display (i.e.d.s)
* 15 status i.e.d.s

Software Problem

I'm hoping to complete my gateway shortly, using GB7LDI's AMTOR software with the PC and shall then be operational.

However, with the increase in traffic comes the increase in problems. Quite a considerable amount of money is donated by the AMSAT organisations, to say nothing of time, in order to put a satellite into orbit.

If you are considering passing mail to/from places using SatGats, then please also consider making a donation to or even join AMSAT UK. This way, it will be possible to organise future satellites and hopefully, one day even have a geostationary orbit! My BBS will certainly carry a 'prompt' beacon.

That's it for another month. Photo's, news and comments please to G3LDI @ GB7LDI or (0508) 702278 or QTHR.

73 and Happy Packeting

Practical Wireless, August 1992
New OSCAR
On July 23, the Ariane V-52 launch will carry aloft the oceanographic TOPEX/POSEIDON primary satellite payload plus two microsatellites, S.80-T and KITSAT-A. The term KITSAT is an acronym for the 'Korean (Advanced) Institute of Technology Satellite' which will become OSCAR-24.

The satellite has been made under the export guidance of the University of Surrey engineers by three Korean students, and is a near clone of its forerunners UoSAT-Oscar-14 and UoSAT-Oscar-22.

New Orbit
Jeff Ward G0/RRLA of the UoSAT team explains that KITSAT will be placed into a nearly circular orbit with a semi-major axis 7700km and an inclination 66°, a totally new orbit for any OSCAR. The frequencies currently planned for use will be 145.900 and 145.850MHz (f.s.k.) uplinks with a single 435.175MHz downlink.

Using The Satellite
How do you start using the satellite? Like its predecessors, the KITSAT-A PCs will provide open access store-and-forward digital communications for stations in the Amateur Satellite service. This system will use the standard protocols of the PACSAT Suite for message forwarding.

The PCs will have 13 Megabytes of CMOS RAM available for message storage, and will use data links of 9.6kbps (9600 bauds) or higher. The KITSAT will become the second 9.6kbps PACSAT available in the Amateur Satellite Service.

The satellite will help take the ever growing load from U-022, and 200 users and mail forwarding gateways stations will be immediately able to access the KITSAT system using identical equipment and software programs.

French Satellite
Although there’s been no recent confirmation, some three months ago RACE president Jean Gruau FB2S, told us that the French ‘ARSENE’ OSCAR (an acronym for ‘Ariane Radio Amateur Satellite pour l’Enseignement de l’Espace’) was to be launched by the ESA Ariane V-53 flight, together with the main HISPASAT satellite in July 1992.

The ARSENE satellite is designed by student engineers and has its electronic modules built by radio amateurs from ‘ATEPRA’ (‘Association Technique pour l’Experimentation du Packet Radio Amateur’). It will carry three packet transponders, using standard AX25 f.s.k. at 1200 bauds.

The three uplink frequencies will be in the 435MHz band and the single downlink frequency in the 145MHz satellite band. The exact planned frequencies have yet to be released. A Mode S linear transponder will also be available.

The 18W of transmitter output power from the satellite will provide a comfortable link budget allowing connections through the packet transponder of ARSENE between stations without special equipment.

High Orbit
The high orbit of the ARSENE satellite is also a new one for any OSCAR, and it will provide a mean access time of nearly 12 hours per day for stations up to 40° latitude. Its orbit will be equatorial at an inclination of 0°. The perigee will be around 20000km and the apogee around 36000km, so giving an earth orbital period of 17 hours and 30 minutes.

Satellite Scene
by Pat Gowen G3IOR
This month Pat Gowen G3IOR looks at the coming OSCAR satellites, the latest Shuttle ‘SAREX’ mission, discusses the OSCAR-13 operations and the exciting DX activities on this satellite.

Shuttle Amateur Radio Experiment
The Shuttle Amateur Radio Experiment (SAREX) which flew on STS-45 was a huge success. It was long awaited by many European amateurs who wanted a high inclination Shuttle mission in range over their horizons.

The onboard amateur radio operators Dave Leetsma N5WQC and Dirk Frimout ON1AFD, who are shown in Fig. 1, Brian Duffy N5WQW; Kathy Sullivan N5YYV shown in Fig. 2, were all using the callsign N5WQC.

The whole crew can be seen in Fig. 3. During the mission they made numerous general QSOs, and those they worked included Stu K0UL, Ted G6HMS, Stan G3RL, Ted G3TMD, Roger G3LDI and myself G3IOR.

School Contacts
Among the 17 scheduled school contacts for the SAREX mission in England, Wales, Norway, Canada, Brazil, Spain, Belgium, Saipan and five US States was GB2HC, the club station of Harrogate Young Ladies College, who were so successful with the GB1MIR mission. They’re pictured in Fig. 4.

Most Impressed
Richard Horton GB3XWH, head of GB2HC, was most impressed with NASA’s efficiency and enthusiasm in the planned contact. During the mission, NASA were on both telephone and FAX from an hour prior to the schedule, until half an hour after, to assure full co-operation.

The spacecraft, which had been flying with the payload bay pointing towards the earth, with the nose in the direction of travel, meant screening of the antenna to earth, hence the sometimes very foible paths.

For the special contact Atlantis flew in nose-to-earth attitude with the wings parallel to the direction of motion. This provided an unrestricted view of the antenna, and a full 10 minute session of uninterrupted questions and answers.

Interactive Space Experiment
As well as the planned educational QSO, GB2HC also took part in earth observation of the ‘INSPIRE’ (Interactive Space Physics Experiment) which had the crew firing an 8kW electron beam modulated with audio tones from 50Hz to 7kHz. radio amateurs were asked to listen for the produced signals at v.l.f. noting time, frequency, type of signal, duration of signal, and to record where possible.

John Brangan GM4HRJ, says “Previous space v.l.f. experiments have re-transmitted their signals down through the ionosphere on 430MHz f.m. This time only the v.l.f. signal was propagated, if propagation is similar to that of the v.l.f. ‘whistlers’ and ‘sliders’ that travel from pole-to-pole, the main quarry is ‘how will they get down to earth’? This mostly depends on levels of D and E-layer absorption which can be massive in daytime in this very active solar period.

At night, D and E-layer absorption may be minimal, and signals may propagate from the Antarctic to the Arctic, hence possibly audible in the UK. By tuning a v.l.f. receiver to an otherwise quiet frequency below the Omega signals (i.e. below 7kHz), and using a wire antenna (as long as you can get) in a north south direction, you listen for obvious audio-keyed tones”.

The RSGB’s Space Radio Handbook, page 154, reports the previous Challenger v.l.f. experiment.
A Special Card

A special QSL card is planned for the STS-45 mission. If you made a two-way contact, or even heard the SAREX-downlink, you qualify for a QSL card. Please send your QSLs to: Sterling Park ARC, PO BOX 599, Sterling, VA 22170, USA. Enclose a large s.a.e. plus one US Dollar to cover postage, marking the outside of the envelope 'STS-45 SWL' or 'STS-45 QSL-2 way'.

Coming Shuttle Missions

Future SAREX missions look assured. This is because in addition to the crew of STS-45 who I've already mentioned, we now have eight other NASA Astronauts who are licensed amateur radio operators. The operators include: Steve Nagle NSRAW, Linda Godwin NSRAZ, Ron Parise WA5ISR, Jerry Ross NSSJC, Jay Apt W5QWL, Richard Richards KB5SIS, Ellen Baker KB9SIX and Ken Cameron KB5AWP.

Increasing Ellipticity

The OSCAR-13 satellite still appears to be increasing its ellipticity, with little sign of arrest. In late May, the apogee was still rising, and the perigee had come down to 576km. In late May, the apogee was still rising, and the perigee had come down to 576km. It's hoped that the complex calculations that have been made, predicting a reversal soon, will come about. If they are correct, then OSCAR-13 will not re-enter atmosphere until the time that Phase B is placed into orbit. All users report that OSCAR-13 is working well and is increasing its activity. The new schedule appears to be working well and is meeting with the approval of old and new users alike.

Reliable Predictions

James Miller G3RUH, always has reliable predictions of the future planned operating schedule for OSCAR-13, well ahead of the events. He says "I like to keep my flock well informed".

Like me, James gets very annoyed about planned AMSAT and OSCAR events that are either not planned, or if they are publicised, are far too late to get into print before the event happens. You would be surprised at what we miss because no-one thought or planned ahead in time!

OSCAR-13 Information

Up-to-date information about AO-13 (OSCAR 13) operations is always available on the beacons, 145.812MHz or 435.658MHz in c.w., RTTY and 400bps p.s.k. The active command stations listed below with their packet radio addresses welcome constructive feed-back about operations. They are Peter DB2OS @ DKUMVA, James G3RUH @ GB7DXX and Graham VK5AQR @ VK5SI. All of them are on Usat-22.

DX On OSCAR-13

When I first came on the v.h.f. bands forty years ago, it was rare to work outside your own country. It was rarer still to work beyond your own continent. But if you ever did you make QSOs outside the continent. When the first 'B' licences were issued, I confess I was fooled into thinking that due to the restrictions mentioned, many operators would make rapid transitions from the 'B' to the 'A' licence. When, on the contrary, I found that far from making transitions, many operators were quite satisfied with the 'B' licence.

Uplinking From Europe

Busy on the satellites, and heard uplinking from Europe were: CT1AVR, BBS, WW and XC. CUCXE, YU3DXU, E9GO (on both 'J' and 'B' modes), LZ2DP, HJ and MH, EBS1ZD, OK1UPR, YO3AC; HAZR, HB0FL, 15000, 1WBS BNB, ARY and BU all ATY; LA1K, LA1BR, OK3A, 1UFC and ZAQQ, OZ1KM, OZ4IP, OZ2LA, OZ4RD, 1XLA, LA6V, SP4MPM, SP5MN, SPF5K, SP7UTB, VB1, SVINR, OK3AU, RC2CWH, EWOUL50, UZ2APWA, YZ3TT, 9H1SW ('J' mode), VSQ5R, SVBAY, GM3NUF, LAG6H, HB0UTF, Y2TOK, Y5TOK, EA6IE, EH1DRK, EA4CMY (B+J), EA5ZM, EA2A, EA2CLS, EEA4E, EBS1Q, EHAEB, E9GO, G0O6A, GO5QO, GJY3L1 and GJ7DNJ, UB8EIE, UZ4PAW, YO12LGY, YO3AC, YPOA, YTV2D, TAI1D, TA1ZD, 3A0NIAG/P, 4U1HTU, TFRK/4HPB.

Other Reports

Harty DCTKS, worked Bruce TA1ZA in Istanbul, whose OSL manager is WA61CD. John G6ZQE worked J59GM on Grenada, both VK9CK and VK9KL on Cocos Keeling Island, but was sad to miss out on FO0CI from Clipperton Island.

From the African continent, activity was heard from A22WB, CS3G, EA2LS, FR3KJ, FR5DL, TRCA, TLFC10MON2P, VQ9GR, ZW6AR, ZR6C00L, CNO1G (Ahmed, also going to TL8 soon), V51DM, Z21H, ZS4PV and 5V1G.

African Continent Activity

From the African continent, activity was heard from 4X1MK, 4X1LB, HS0LSQ, HZ1HZ (on c.w.), YI1BGD, U0L/UM8MM, RL7GQ, VU2MBG, VU2NBT, Y4BV4, 457AVR, UAO60, UAO0AL, UAO0SNY, UL7T/UM8MM, 9M2CR and YB1CS, and many JA stations.

The Americas

The Americas provided contact activity from the north with CS5ANY (Modes A and F) and FMSAB, FO0CI (Clipperton Island), J39JM, VP25E/W6BYL, K4MEG, ZP1RC, XE1HO, WP4KJ, PJ2C, PJ2ME, XE1ZOG, XE1OE, PJ2Y, PJ2KKR, OX3DB, XE1PM, XE1HOS, VO1TX, WB4BS/K7L, XJ9GM, XE1OE and FM5AB, with many of VE's and WS in all call areas and states. South America provided PJ2C, PJ2MK, P5PMK, P7PSH, P8ZACM, PY6AXS, PZ5OC, and KP4s EK6 and EY7.

Oceania

From Oceania the activity came from FK1BK, H44KA, VK2PK and VK2DRJ, VK4s LE, ZQ and TQ, VK8s KTC and SQ, VK7D1, VK9CK, VK9CL, 3DR/R, V73BOQ, HK6JI, KH6BA and YB1CS and YC1TL.

Asian Sources

Asia sources of activity provided 4X1MK, HZ1HZ (on c.w.), YI1BGD, U0L/UM8MM, RL7GQ, VU2MBG, VU2NBT, Y4BV4, 457AVR, UAO60, UAO0AL, UAO0SNY, UL7T/UM8MM, 9M2CR and YB1CS and YC1TL.
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"A GENUINE PRICE FROM A GENUINE DEALER"
don't get a lot of time in the workshop nowadays, and it's a pity because I love building my own radio gear. Recently however, several fascinating projects for PW have passed through my hands and this has meant more time building prototypes in the shack.

At the same time as I got busy with building, I got the chance to borrow a very useful hand-held frequency counter from Waters & Stanton. I'd never had the chance of using one in my own workshop when building a project, so this was an ideal opportunity.

We get many chances to review equipment in PW. But this time, rather than treat it in the usual fashion, I thought it better to share the experience of using a hand-held frequency counter in the workshop, after all, this is Practical Wireless.

**Not A Review**

So, bearing in mind what I've said, this is not a review. Instead, it's me sharing the experience as if you've joined me in the shack!

My workshop at home is basic. I have one end of our garage, with my radio gear packed into one end. Apart from good lighting, and a very good stock of components, it's no different from many other workshops. Good ventilation is very important, and I found the Optoelectronics 2300 frequency counter to be very sensitive. I quickly compared and contrasted it with our other frequency meter.

I'm of the opinion that one of the most useful (perhaps the most versatile) instruments available to the amateur is the dip-meter. Like Tex Swann G1TEX, I tend to use the g.d.o. a great deal, and I found the Optoelectronics 2300 frequency meter to be a very useful aid in conjunction with the dip-meter.

**Dipper Calibration Doubtful**

My faithful dip-meter is old, and frequency calibration is only approximate and rather doubtful. It was useful to have the 2300 around, because all I had to do was let the hand-held instrument 'sniff' the signal from the dip-meter.

The frequency counter has its own antenna, and the instrument proved very sensitive. I quickly compared and contrasted it with our other frequency meter.

I was very pleased to see the final 70.260MHz being displayed on the frequency meter's l.e.d.s, and it had been so easy to use! What had been such a tedious job before, has now become much easier.

**Suffering From Interference**

Like many other radio enthusiasts, I'm always suffering from interference on the h.f. bands. And in common with many amateurs, in the past I've had to grin and bear the interference.

However, I was determined to track down one particular annoying signal affecting 14MHz. It had been a nuisance for a long time, but only appeared when my daughters were home from school.

Using the 2300, I was able to locate the source of the signal in my eldest daughter's bedroom. The frequency meter proved very sensitive. I had the chance to borrow a very useful hand-held frequency meter in and out of the workshop. Some are obvious, and they'll save you much time. Others will no doubt occur as you work.

**Radiating Signals**

I soon found another l.n.b. radiating signals on h.f. strong enough to be locked onto by the Optoelectronics 2300. After some research, I've discovered that the problems are probably caused by the high level of local oscillator injection on the satellite equipment.

I'd come across the problem before, as our Hotel in Dayton, during the Hamvention, had 'piped' satellite TV. The main dish was just below my bedroom window, and the spurious signals coming from that source made all the h.f. bands virtually useless.

I was very pleased to see the final 70.260MHz being displayed on the frequency meter's l.e.d.s, and it had been so easy to use! What had been such a tedious job before, has now become much easier.

**Quick Cured**

The computer modulator problem was soon cured, by the purchase (at a rally of course) of another modulator for just £1. Not a bad price for a cure! I then remembered a problem I had helped solve for another radio amateur during 1991. This, to cut a long and sad story short, involved a satellite TV low noise block (l.n.b.).

The radio amateur concerned could not operate on the higher h.f. bands at all because of very bad interference. They'd tried everything except changing the l.n.b., which fortunately (or unfortunately!) was installed for the benefit of the amateur's disabled and housebound wife.

The problem was found to be on the l.n.b. The culprit had been found and changed, after I'd suggested that someone with a portable spectrum analyser should be called in. So, remembering that, I walked along the road where I live, taking the frequency meter with me.

**In The Workshop With The Optoelectronics Handi-Counter 2300**

Rob Mannion G3XFD, is trying to find time to build more home-brew projects for later publication in PW. Recently, he's had the chance to use the Model 2300 frequency counter from Optoelectronics while he's been busy building.
Between April-end and now - late May - we have seen a very large change in the Sun's condition, as those who listen to the RSGB news each week will have noticed. Seemingly we have dropped off the plateau and are plunging into the depths of a sunspot minimum.

Of course, with all this, the weather has hardly been of the variety that keeps any of us indoors. But at least lack of rain is keeping the garden weeds down!

Here's the quote of the month! Standing on bridge as steam train passes, working hard; whiff of exhaust steam/smoke/oil. Plaintive 'old timer', taking photographs of event. 'Why can't my FT101 smell like that?'

The 1.8MHz Band

This, alas, is the static season, when only the diehards try 1.8 MHz. Ted G2HKU used sideband from Sheppey for his regular ON7BW contacts, while the key was used upon LY2BVJ and HB0/DL6SDWP.

John G3BDQ in his hideaway in Hastings is suffering a lack of enthusiasm, excess of gardening, days out and the rest of it. Perhaps if John shut out more light with wire, the gardening would reduce? Anyway, LY2BVJ, LY2BVZ and 15GCT were hooked on s.s.b., while c.w. accounted for OK2PMT, OK3TKG, DK36ED, LA0CJ and UA1WDQ.

Incidentally, the area 1.850-2.000MHz is the part set aside for novices a contact, as they have to come on in that area and give the gardening would reduce? Perhaps if John shut out more light with wire, the gardening would reduce? Anyway, LY2BVJ, LY2BVZ and 15GCT were hooked on s.s.b., while c.w. accounted for OK2PMT, OK3TKG, DK36ED, LA0CJ and UA1WDQ.

Contests

Contests are always a useful source of new countries. July 11/12 is for the IARU HF World Championship. July 19/19 shows both the Barcelona Olympics HF and the SEANET c.w. Over the August 1-2 period the YO DX Contest will be well audible here, but as indeed will the WAE contest over August 8 and 9th.

The 7MHz Band

The band you love - to hate - 7MHz! The better the antenna system, the more you need an attenuator in the receive side. Those who have caught on to this, are the ones who love the band.

Eric Masters G6KRT reports from Surrey's Worcester Park, where he runs a Lake DTR-7 transceiver on the key with about 1W out. This goes into the antenna comprising the 26m top of the W3EDP antenna, but fed against a quarter-wave counterpoise.

There were seven two-way QRP contacts with 6 stations, plus six again on 5, 80, 160, DK7OB, DL1UZ, DL4KG, DL5MGK, DL8BWM, F2WW, FBTM, FD10000P, H5AQO, H8BLCF, IK2SVG, LAT2K, OH6IYV for a new one, ON4GU, ON4TA, PAF3FSC, P3A0Y, SMCCOX, SM6UGI, UC2WSL and YL2BI.

Pat ON7PQ reports that he keyed with 8D7CV, ZK3CL, HJ20V, EP2EU, PY0FZ, VP6SS, VK9NS, VP5/WB5HRQ, HK7DSZ, KX2SA, JW6E, DX3GL, VK6HD, FSEW, CN8ST, NJ0ZJ, JW6LX, FM5SH, G4SMCIR1, NY3MDGM and K4PD.

The one-and-only from Ted G2HKU on this band was UA0DFC, raised on c.w.

The WARC Bands

Over now to Don G3NDF in Yeovil to start off on the WARC bands, where on 18MHz he made s.s.b. contact with FO9XX and GM4JDS, while on 24MHz he found A71BS, CM6LE, DQ0RF, PZ1EL, U18ZAC, 9K2JR, 9M2CW and 9M8BL.

The WARC bands seem to have the best for the money of the whole group. Thus the G3NDF sideband signals were able to use this band to raise A71BK, AHOM/W7 (Romeo of X00BE, fame, in Reno, Nevada).

4L3D, G4SMC/8R1, GW3CCY/5N0, HCIEEV, HHZ2, HIHUB, HPVOP (S. Shetlands), ZL2KAT, HJLRS, HJ20F, HJ30JY, HZ2AB, OA0FF, OA0JCC, UA0KBY, U8LW, U6KKA, V59CC, V0BNW and V80J4O.

Contests are always a useful source of new countries. July 11/12 is for the IARU HF World Championship. July 19/19 shows both the Barcelona Olympics HF and the SEANET c.w. Over the August 1-2 period the YO DX Contest will be well audible here, but as indeed will the WAE contest over August 8 and 9th.

The 14MHz Band

With the summer static level, the noise on the 14MHz band has been quite fierce whenever I have looked. Don G3NDF notes that his s.s.b. raised EP2AG, IU1OTW, IU3VRF/LI3, SZ2HASBUS, VP6CGK on S. Georgia, 2A1BM, 9SHD, 9K2DT and 9M2SH.

But by contrast the ON7P0 listing includes c.w. only to 7Z7/HU5, AP6AJ, 7Q1XX, 6A16C, BV4CT, HS1C0D, VP8BZL, YA5MM, 1A0KM, BY8AC, VP8SS, XH4/NTN7L, XU0RA, 9SA9G, S2/HASBUS, FM5SH, H21AB and F0DSF.

Now to Ted G2HKU, who only mentions one c.w. contact, with QV7F/EJ.

The 21MHz Band

The 21MHz band seems to have been the best for the money of the whole group. Thus the G3NDF sideband signals were able to use this band to raise A71BK, AHOM/W7 (Romeo of X00BE, fame, in Reno, Nevada).

4L3D, G4SMC/8R1, GW3CCY/5N0, HCIEEV, HHZ2, HIHUB, HPVOP (S. Shetlands), ZL2KAT, HJLRS, HJ20F, HJ30JY, HZ2AB, OA0FF, OA0JCC, U8LW, U6KKA, V59CC, V0BNW and V80J4O.

Contests are always a useful source of new countries. July 11/12 is for the IARU HF World Championship. July 19/19 shows both the Barcelona Olympics HF and the SEANET c.w. Over the August 1-2 period the YO DX Contest will be well audible here, but as indeed will the WAE contest over August 8 and 9th.

The 14MHz Band

With the summer static level, the noise on the 14MHz band has been quite fierce whenever I have looked. Don G3NDF notes that his s.s.b. raised EP2AG, IU1OTW, IU3VRF/LI3, SZ2HASBUS, VP6CGK on S. Georgia, 2A1BM, 9SHD, 9K2DT and 9M2SH.

But by contrast the ON7P0 listing includes c.w. only to 7Z7/HU5, AP6AJ, 7Q1XX, 6A16C, BV4CT, HS1C0D, VP8BZL, YA5MM, 1A0KM, BY8AC, VP8SS, XH4/NTN7L, XU0RA, 9SA9G, S2/HASBUS, FM5SH, H21AB and F0DSF.

Now to Ted G2HKU, who only mentions one c.w. contact, with QV7F/EJ.
Solar Data for May 1992

We are now in month 70 of solar cycle 22, and solar flux levels are continuing to plunge from the high levels sustained over the last two years. Solar cycle 22 which officially began in September 1986, had a very steep rise and then reached a plateau of generally high values. The downside of the cycle is now starting to show itself and the forecasters are turning their attention to just when solar minimum will be, with the latest predictions ranging from early 1995 to well into 1996.

There were only two small disturbances during the first week of May, on the 3rd and 4th, caused by small M type flares, but little came of them. However, on May 8 a major M7.4/4B flare took place, starting a series of activity. The solar aurora on the 22nd nothing was caused by the passage of a comet, but by the 12th the flux levels have also dropped significantly. They were measured 111 units, this being the peak level on May 2 1988, it recorded 113 units, and was still high on May 11 with the geomagnetic A index peaked at 99, JNO9, 19, J011, 21, 31, 22, 33, 34, 99.

The flux level continued on its slippery down-hill slope and on May 31 it only measured 99 units. This may be depressing to the so-called experts who worry about the 'numbers', but to the real v.h.f. DXer it isn't anything to be concerned about, as there will always be DX kicking around via some propagation mode or other, as the following reports show!

The 28MHz Band

On the 28MHz band, Ted GH2HU notes that he keyed with PY3CJ, TA1L, 2P6CW, TA2EC, PY2SHS, 7PSR, PUFOF, N9ND, plus a 4W effort with N9ND. Picking the microphone up, Don G3NDi was able to work BZ7HB, CTJFT, HC15K, LL53CUP, JA43K, JA5DMQ, ON4AVD/5N0, V2UKC, VZ2VMI, XX5AW, ZD7SM, ZF2SD, ZP4AA, 5H3GM, 6T2YD/5A, 7Z1AB, 7P8DX, 7P8E8 and 81MR.

At ON7PG, the keyer was the means of entering VK3CL, VPSS1, VP3CA, SO9AA, VP8BL, HFO/40L, XD0X, OOSLAGASH, JH6E, PJ2AM, SZ5HASBUS, HS1CDO, BY4STV, N8AVNPS, WL7F, 7PSR, SN0KZJ and YJ2FR into the log.

Finally, John G3BDO who looked in the s.s.b. segment of the band, and snapped up VP6BL, VP2EDH, G4MCC/6R1 and FH8CB.

Slower Contact Rate

Over the past few months there have been many comments in the letters about the practice of using 'last two' when calling into a pile-up. All of them note how much slower the contact rate becomes with operators who accept partial calls; and all of them report cases where both stations in the pile-up have the same last two letters in their calls, and wonder which of them got the QSO?

Liddery, and comic with it, for sure. However, if the operator at the sharpen of the pile-up insisted on

VHF Up

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

The beacon CX1CCC (1073), FC1BHB (JNO9) and F6HRP (1065), GM3WIL (1075), GWOGEI (1073), F1BH8 (JN09) and F6HRP (IN88). Terry Chapman G1UGH (J002) first heard the opening at 1235UTC and was keen to make contact with operators in northern Europe to work many VE operators including VE1RG and VE1YX.

Auralor Openings

There were a few auroral openings and events during May, but most of them were very weak and hardly worth reporting. However, an opening on May 10 was tremendous and contacts could be made on all bands from 50MHz-430MHz with stations situated throughout Europe. It commenced quite early, around 1030UTC in central England (up in Scotland it was detected on 50MHz at 0900UTC), continuing through to about 1800UTC, and then started up again later in the evening from 2100UTC to a few more hours.

I'll now deal with the 50MHz reports, and the first one out of the bag comes from Philip Lancaster G0SW (IO684) who worked a number of stations in the aurora on s.s.b. including G07JQI (1074), G10UTC (IO65), GM3WIL (1075), GWOGEI (1073), F1BH8 (JN09) and F6HRP (IN88).

Ela Marty G6HKM (J051) also caught the aurora in the afternoon, and had an excellent time on the 50MHz band by working 15 countries, including H8S, I, LA, OK, OZ and SM.

Many Stations Active

The DX Cluster reported many stations active on the 50MHz band during the aurora and among the operators noted were LA3EAD (JP50), DK1BL (JO60), DZ1LD (JO55) and SM6CMU (JO65). However, these were just locals compared to the real DX worked by Chris Tran GM3WOJ. Having spent a number of hours working stations all over Europe, Chris decided to do a spot of listening, and whilst idly tuning around at 1322UTC he was amazed to hear ZS6RAD calling CQ on 50.058MHz c.w. peaking 55A.

The South African station was then worked before GM3WJD G3Yed to 28.865MHz to arrange c.w. tests with ZS6AXT and ZS8PT on 50.058MHz. Both of these stations
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INSIDE STORY FROM OUR UNDERCOVER REPORTERS

RADIO SHOPPER have placed several investigators at strategic locations throughout the country. Their job is to report any peculiar activities from INSIDE the industry. This month's report comes from Mr Wood operating somewhere near Nottingham. Apparently, RADIO SHOPPER are being constantly bad mouthed by a number of unhappy dealers & distributors. During operation "MONOPOLY" Ken managed to overhear the following: "Hey, don't buy from Radio Shopper - we've repaired 6 or 7 of the rigs they've sold already". We can now exclusively reveal that this is not completely true! In fact, we can GUARANTEE that we have not had ONE SINGLE fault with any of the rigs which we have sold. Any repairs which we may carry out will all be done in the UK. Finally, have you noticed how we have had to change our logo's for Kenwood, Icom and Yaesu? Draw your own conclusions.

By Mr Ken Wood & Ms I Comm

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were also worked, ZS6AXT at 1330UTC peaking 59A, and ZS8PT directly afterwards at 55A. A little later, at 1336UTC, ZS4S was heard at strength 55A calling CQ on 50.107MHz c.w. and within seconds another DX contact was in the log.

The mechanism for these contacts would appear to be a link-up from the aurora into a trans-equatorial propagation (t.e.p.) path, or possibly aurora linking into Sp-E linking into t.e.p. I'll have to leave it up to the "experts" to work that one out but one thing is certain. If GM3WGW hadn't been the opportunist that he is, then none of this would have been noticed and recorded. Well done Chris!

**Intense Opening**

The auroral opening on May 10 wasn't just restricted to the 50MHz band, but was of such an intensity that many contacts were made over considerable distances on the 144MHz band, and although I haven't received any reports directly I did hear that G3LQR (J002) managed to work a YO, possibly YO21S on the 50MHz band.

For those operators located in central England, the event on the 144MHz band was characterised by an opening initially into Scandinavia, with contacts being made with SM and OH from 1030UTC. By 1200UTC, contacts into this area disappeared and OH from 103OUTC. By 123OUTC, an opening initially into Scandinavia, 430MHz band. A number of stations situated near the eastern side of England, such as G4PIQ (J002) and G8ESB (J094), reported contacts with others such as OH1CF (KPOO), HG5ABC/8 (KNO6), 4N2CCY (JN85) and Y73NO (JN76). At my QTH (I081) I run a much modified FTZ21RD into a pair of 88T triodes giving 400W into an 18-element Yagi. The activity periods were from 1108-1118UTC, 1150-1800UTC and 2135-2200UTC, with the gap between 1118-1150UTC being used to make the sandwiches, fill up the "Thermos" and explain to Marion, my wife, why I wasn't going to cut the grass that day! In total I made 146 c.w. contacts in 68 locations and 18 countries, including 25* DX, 13* HG, 8* YU, 8* I, 6* H8B and much DX such as YU1EV (KNO4) at 1907km, HG6CE (KNO6), HG9RC (KNO8), YU7BV (JN95), HG6ZB (JN96), HG7PL (JN97), OK3CPY (JN98) and OK2SUP (JN99). I've shown all the locator squares worked by myself (shaded) and G4WKN (crossed) in the diagram Fig. 1, and you can easily see that we both worked very similar geographical areas.

**Sporadic-E**

Conditions on the lower frequency bands, especially 50MHz, have been tremendous via this mode, with openings occurring virtually every day during May. Of course, many of you were waiting for conditions to break on the 144MHz band and it came very close to it on a number of occasions. What may have been a Sp-E contact (or it might have been via meteor scatter) occurred during the 144MHz contest on May 17, when G4WKN and GOORC were operating G42AP/P from Flamborough Head. At 1206UTC they were called by YU1FPX (KN04PP) and he was worked at 52 and with sufficient duration to exchange callsigns, reports, serial numbers and locators for two full overs plus 73s.

A little while later, at 1229UTC, IW6BLH was heard whistling up his amplifier for about five seconds before calling them. The contest exchange was quickly given, but the Italian station came back with "negative, negative, please all again", by which time of course the signals had faded out. It is difficult to determine exactly what propagation mode this was, but as G4WKN points out, it was strange that during the whole weekend only two "bursts" were heard and these were both around midday on the Sunday. At the end of the month, on May 30 at 1830UTC, I heard an 17 calling CQ on 144.300MHz, but he disappeared before I could put out a call. A few minutes later, at 1837UTC, I did manage to work IK7HIN (JN81KC) at 59A both ways and he remained audible with me for nearly 10 minutes, so it was definitely Sp-E. By way of confirmation, PE1NMC heard 19TVF at 1841UTC and G8ESB worked 18KPV at 1843UTC. By the time you read this there should have been some very good 144MHz openings with contacts numbering in the hundreds. I'll report about them next month!

**Tropospheric Openings**

Conditions for the tropospheric openings during May generally, and between May 13-19 in particular, were very good and allowed many long distance contacts to be made on the v.h.f. and u.h.f. bands. A major IARU contest on May 16-17, and a French contest on May 30-31, kept activity at a high level. From May 13, stations in central England were working into northern Germany on the 144MHz, 430MHz and 1296MHz bands. During the next few days the opening spread into northern England and Scotland, allowing many contacts to be made into continental Europe. Stations located on the North Sea coast fared particularly well and G4FX (I094), using a 50MHz antenna, reported LA1ZE peaking 59+ on the 144MHz band. A number of stations situated near the eastern side of England, such as G4PIQ (J002) and G8ESB (I094), reported contacts with GM1YOA/P (I067) Benbecula, GM4CAQ (IP90) Shetland and G4MPX (I089) Orkney.

Kevin Griffiths G1VDF, a member of the Hereford Amateur Radio Society, reports that their v.h.f. contest group had an excellent outing during the 144MHz contest on May 16. Operating as GW1VDF/P from the Black Mountains, Powys, the group worked 1027 stations in 73 locator squares and 17 countries including HB9, LA, OE, OK, OZ and SP, with the best DX being O2K2FM (J099FN) at 1534km. The final claimed score for the contest was 1 608 993 points, and although not a winning score, they were very happy with it.

**Meteor Showers**

The months of July and August provide not only an increase in the daily sporadic meteor count, but also include periods of some of the better meteor showers. The Delta Aquarids occur between July 12 to August 18, with...
I'll also send you details of the Bavarian Contest Club meteor scatter contest, being held between August 8-14.

Meeting In Vienna

In March of this year I attended the International Amateur Radio Union Region 1 v.h.f./u.h.f./microwave meeting in Vienna, on behalf of the RSGB and in the capacity as the society's v.h.f. manager. At this meeting many items were discussed in preparation for the IARU Region 1 Conference to be held in Antwerp, September 1993, and a small number of recommendations were made which could be implemented immediately. The first concerns the 50MHz band, and it was agreed that the recommended frequency for a.f.s.k. SSTV working should be 50.10MHz.

A problem becoming more prevalent, is one of computers using clock frequencies at 8MHz or 16MHz. Harmonics of these are producing interference to the weak signal e.m.e. sub-band, 144.000-144.025MHz, and therefore it was suggested that publicity should be given to the use of 144.160-144.160MHz as an alternative for e.m.e. operation. The results of the recommendation will be monitored with the aim of incorporation into the usage part of the band plan if successful. (However in hindsight I don't think this move will meet with much favour and it may be necessary to move the h.f. end of the e.m.e. sub-band allocation by an extra 5 or 10kHz.)

The last recommendation concerns the 3.4GHz band, and it was agreed that from the end of 1993 the narrow band segment of the 3.4GHz band should be from 3400-3420MHz, and the centre of activity should be at 3400.100MHz. This recommendation was made to support the harmonisation of allocations in the UK, Germany and Holland, the only European countries with access to this band.

Full Scale Conference

As I have already mentioned, there will be a full scale conference of the Region 1 International Amateur Radio Union (IARU) in September 1993. Incidentally, the IARU is split into three world-wide regions exactly matching the three International Telecommunication Union (ITU) regions, with Region 1 encompassing all of Europe, Africa, the Middle East and Asiatic Russia.

The conference, held every three years, is the only opportunity for national societies to voice how they want the amateur bands structured, and proposals from many countries are put forward. Perhaps you might care to add something to the way our v.h.f. bands are run? Do the meteor scatter procedures need changing? Should e.m.e. timing periods be brought into line with m.s. periods? Should the beacon sub-band on 144MHz be reduced in bandwidth? What usage would you put to the space created? Should there be repeaters on the 50MHz band?

If you have any ideas or proposals please send them to me immediately, as the time scales involved in getting papers ready for the conference are incredibly short.

Beacon News

The microwave beacon GB3MXX, located at the BT laboratories on Martlesham Heath, Suffolk, went off the air during a thunder-storm on May 23. Following repairs and upgrade it has now returned to service on 10368.830MHz running 200mW output.

Frank Evans GW8AWM is proposing to operate a new beacon GB83SSL on 432.344MHz from a site 8km south-west of Bristol (O81QJ). The unit is expected to run 100W e.r.p. from four stacked 3-element Yagis beaming east, and as the site has an excellent take-off it should provide coverage through southern England into Belgium, Holland and Germany.

 Expedition Update

I first saw an update on the South Sandwich Island expedition VP8SS, which took place earlier this year. The group had originally planned to operate on the 50MHz band, but because of the bad weather and the need to give priority to the i.f. bands, no operation was possible. They also tried to erect a large antenna system for e.m.e. operation on the 144MHz band but were defeated by 10km per hour freezing winds. The 50MHz equipment, presumably the 100W transmitter and 5-element Yagi, were left with VP8WA in the Falkland Islands.

News has also reached me that two expeditions, to Mahi Vysottskij Island 4J1FS and Kaliningrad 4L2FM, have both failed in their attempts to obtain a permit allowing operation on the 50MHz band. However, the expedition to Glorioso Island (LH38) by FR/DJ30S/G did manage to get a permit and many contacts were made into the UK on May 14, 15 and 16. Following the activity from Glorioso a stop was made on Comoros Island (LH18) operating as D6BRB and further UK contacts were made on May 23. All QSL cards for these operations should be sent to Herr. Bernd Ritter DJ3OS, Schuesslerstrasse 16, D-6145 Lindenfels, Germany.

Now that summer is upon us, many operators are planning to activate rare locator squares and countries. The first of these is to get a mention is the expedition to Turkey, between July 14-29, by Ulf Lindhardt OZ1DOQ and Soeren Pedersen OZ1HTU, which I mentioned in last month's column. In addition to the operation on the 144MHz and 430MHz bands, permission has now been obtained to operate on the 50MHz band, but only in an area 200km east of Istanbul and eastward. Activity will therefore be concentrated in locator areas K1, K2, K71, K72 on the Black Sea coast and OZ1DOQ and OZ1FTU will use their callsign prefixes with either TA2 or TA6, depending in which area they are located. Operation on the 50MHz band will be mainly via Sp-E, using 80W into a 5-element Yagi, but they will be QRV on 14.345MHz and 28.858MHz for talkback and to arrange schedules.

The 50MHz band is very popular for expeditions during the Sp-E season because low power and small antennas can provide excellent results. Keep an ear out for Angelo Anna I2ADN as he operates from a number of Italian islands in the Mediterranean this summer.

Angelo has already QRV from Lampedusa Island (JM65HL) as I2ADN/G3 and Pantelleria Island (JM66AT) as I2ADN/HT, and by the time you read this he should be operating with the latter callsign from Panarella Island (JM60XT) between July 11-31. Angelo then plans to operate as I2ADN/IA5 from Capria Island (JM34WB), between August 1-18. All of these only count as Italy of course (but are useful as rare locators), but if you want a new DXCC country try listening for C31/ON4ANT operating from Andorra between July 19-31. I don't know if he has a permit thought.

Apart from sunbathing on some Greek Island, DC3QB will also find time to operate on the 144MHz band. He will be active between July 26 and August 19 from locator KM0TP with an FT225RD, 75W and a pair of 9-element Yagis. I know what I'd rather be doing!

The rare Czechoslovakian locator square KN09 is going to be
activated on the 144MHz and 430MHz bands, between August 8-14, by DJ2OV and DL5YET, primarily for meteor scatter contacts, but also for tropo contacts (if conditions allow). On the 144MHz band they will use 300W and a 9-element D2HF Yagi, whilst on the 430MHz band they plan to use 150W and a 21-element Yagi.

Operation via c.w. meteor scatter will take place with two callsigns, OKDL5YET (no dashes and no (P) for scheduled contacts on 144.141MHz, and OKDJ2OV for random contacts on 144.105MHz. Either callsign will transmit during the first two and a half minute period at a maximum speed of 1200 w.p.m., and will follow IARU recommendations. The frequency for s.s.b. schedules will be arranged via the v.h.f. net on 14.345MHz, but they will also be active on random operation, around the peak of the Perseids meteor shower on 144.200MHz and 144.400MHz.

**Contest Details**

I have received details of two low power contests organised by the RSGB Contest Committee. The first, a 144MHz event limited to 25W p.e.p. output, will take place on Saturday 25 July between 1800-2200UTC. The contest exchange consists of callsigns, report, serial number, locator and county. The other event is very similar, with the exception that it is for the 430MHz band and is very similar, with the exception that it is for the 430MHz band and is being held on Sunday 26 July, between 0800-1400UTC. In both contests there are sections for the single operator fixed station, single operator portable station, all others and listeners. However, you do have to be a member of the RSGB to enter.

Summer microwave contests have been scheduled by the RSGB Microwave Committee to take place between 0900-2100UTC on the following Sundays: July 18, August 16, September 13 and October 4, the latter to coincide with the IARU contest arranged for the same weekend. Scandinavian activity contests will be held between 1800-2200UTC on the following dates: 50MHz on July 28 and August 25, 144MHz on August 4 and September 1, 430MHz on July 14 and August 11, Microwaves on July 21 and August 18. A full set of rules can be obtained from myself on receipt of an s.a.e. and I can also be contacted at my packet radio at my mailbox GB7TCM.

**Deadlines**

Please send your letters to reach me by the end of the month. I always write up the column in the first week of the following month. Don’t forget that I can also receive messages via packet radio at my mailbox GB7TCM and I can also be contacted at my DX cluster GB7DXC.

Photographs of your shack, antennas or any v.h.f. activity are especially welcome. Other pictorial items such as QSL cards, awards, certificates, etc., are also required. They will all be returned to you.

**Annual v.h.f./u.h.f. table**

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</table>

**Annual c.w. ladder**

<table>
<thead>
<tr>
<th>Band (MHz)</th>
<th>Station</th>
<th>Countries</th>
<th>Counties</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>50MHz</td>
<td>G4CFC</td>
<td>16</td>
<td>12</td>
<td>311</td>
</tr>
<tr>
<td></td>
<td>G6HKM</td>
<td>38</td>
<td>26</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>G4ASR</td>
<td>8</td>
<td>34</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>G4OUT</td>
<td>—</td>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>G60JA</td>
<td>—</td>
<td>—</td>
<td>27</td>
</tr>
</tbody>
</table>

*Number of different c.w. stations worked since January 1 1992*

**Back-Scatter**

**Broadcast Round-up**

Reports to Peter Shore via the PW Editorial Office

States and allows users of suitable receivers to scan for stations by format - perhaps a news station, or country music - or by name wherever they are in the continent.

The ID LOGIC works by sending a data stream which contains details once a day of stations and frequencies. In a short wave version, a data stream lasting about one minute would be sent during the station's interval signal.

The data would carry a station's entire frequency schedule for each language. This would be stored by the set and the user would be able to call up a station by simply entering a geographical location and selecting the desired station and language. The set would do the rest.

It will be at least two years before ID LOGIC for short wave gets off the ground. But implementation of the system might give a welcome boost to short wave listening worldwide.

If you are planning a last minute holiday, why not combine it with some DXing? This year's European DX Council Conference will take place in Finland's second city, Tampere, between the August 21st and 24th. Places are still available and you can be sure of a worthwhile weekend if you travel to the land of the all-night day.

Keen DXers from all over the world will be making use of the

---

Practical Wireless, August 1992 55
splendid facilities which the local organisers are laying on. There will be a listening shack filled with a large variety of receivers connected to a huge outdoor antenna farm. There will be workshops on every aspect of the hobby, and lectures given by well known characters from the DX world. Further details are available from EDXC Conference 92, PO Box 212, SF-33101 Tampere, Finland. Telephone +358 0 191 3133 or FAX +358 31 161 857.

In its 50th year of international broadcasting, BBC World Service has launched a new language service, Ukrainian, and published two books about the station's history and role in the world of cross-frontier radio. Journalist Andrew Walker has written *A Skyful of Freedom* recalling the first 60 years of broadcasts around the world from Britain. A colourful and entertaining work, it explains about the evolution of World Service from the Empire Service inaugurated in 1932.

The Managing Director of World Service, John Tusa, has collected together a series of essays written during his six year tenure at Bush House. Called *A World in Your Ear*, it catalogues the role of World Service in helping to bring the end of communism in the eastern part of Europe. It makes for fascinating reading. Both books are available from the BBC World Service mail order department on 071-257 2575.

Radio Vlinius in Lithuania appealed for help at the end of April. The station reported that it is having trouble paying for the cost of landlines and short wave transmission facilities in Moldova. As a result, the station had to restrict its operations to transmitters in Lithuania and the Russian Federation. "If anyone can offer practical proposals", said a FAX reiterating what had been broadcast on the air, "please let us know. FAX us on Vlinius 660926". Can any of PW's readers help?

**European Stations**

**All times UTC+2(GMT)**

The French international service of Belgium, RTBF, stopped all short wave transmissions in early May. A subsequent report in Radio Nederland's *Media Network* suggested that the final transmissions were heard on May 11. Funding for the station had been in doubt for some months, and it now seems that time has simply run out. English and other languages continue to be broadcast by the Flemish BRTN from Brussels. Radio Sofia in Bulgaria transmits English broadcasts:

- 1100-1230 on 11.63MHz
- 1730-1900 on 17.825, 17.78, 15.33, 11.72, 11.765 and 9.70MHz
- 1945-2030 on 17.825, 17.78 and 11.765MHz
- 2145-2315 on 15.33, 11.72 and 11.66MHz
- 0000-0045 on 15.33, 11.72 and 11.66MHz
- 0300-0400 on 15.16, 11.72 and 9.85MHz

Radio Moscow's World Service is no more. Programmes are now transmitted on Radio Moscow International.

A round-up of stations in the Russian Federation from Roy Merrall:

- Radio Ala in Russia has expanded its coverage and can now be heard on a fairly flexible schedule using the following frequencies in combination at different times:
  - 0000-1400 on 15.255, 12.03, 11.965, 11.925, 11.865, 7.40, 7.36, 7.37, 7.315, 6.015, 5.04, 3.995 plus medium wave channels of 1.38MHz, 684 and 579kHz
  - 1400-0000 on 7.40, 7.36, 7.37, 6.025, 6.015, 5.04, 3.995 plus medium wave 684kHz and long wave 279kHz
  - Radio Aief, a Jewish produced programme aired at 1600-1830 on Sunday, Tuesday and Thursday is aimed at Russian Jews at home and in Israel. Frequencies are 12.075, 7.13, 1.467 and 1.17MHz. Announces in Russian as Radiostansiya Aief and rates up to SIG343 on their 25m band.
  - Radio Rezonans also has Russian programmes on 12.075MHz at 0300-0500, 1100-1200 and 1800-2000, although Roy reports generally poor reception. Radio Galaxy had returned to 9.98MHz in early April but subsequently moved to 11.88 between 1900 and 2200 with pop music and commercials with SIG 543 or better. Some identifications and commercials are in English.

The latest edition of Adventist World Radio's *Current* programme guide gives details of the station's operations from three sites in Russia, Using 200kW transmitters in Ekaterinoburg, Samara and Moscow, coverage of Europe has been greatly enhanced. The complete schedule (with transmitter shown by the suffix after the frequency) is:

- 0230-0300 in Arabic on 11.785MHz
- 0300-0330 in Russian on 11.796MHz
- 0330-0400 in Yugoslavian languages on 11.905MHz
- 0400-1430 in Romanian on 11.90E
- 0430-0500 in English on 15.125S
- 0500-0530 in German on 15.125S
- 0530-0600 in Polish on 12.01S
- 0600-0630 in Arabic on 11.775MHz
- 1400-1500 in Italian on 9.775MHz
- 1500-1530 in Yugoslavian languages on 9.775MHz
- 1530-1600 in Romanian on 9.775MHz
- 1600-1630 in English on 15.125S
- 1630-1700 in Swedish on 15.125S
- 1700-1800 in Russian on 15.125S
- 1800-1900 in Russian on 7.31E
- 1900-1930 on German on 7.31E
- 1930-2000 on 7.31E

The BBC World Service Ukrainian Service started on June 1 with a special hour-long transmission at 1900, although normal programmes will be 30 minutes duration at 1930. Two frequencies are used: 9.585 and 6.06MHz.

Radio Yugoslavia's present schedule from its studios in Belgrade:

- 0030-0100 and 0130-0200 on 11.87MHz
- 1130-1200 on 21.605, 17.74 and 17.71MHz
- 2100-2130 on 11.735 and 6.10MHz

11.87MHz, also at 1100-1130 on 21.605 and 1900-1930 on 6.10MHz. All of these are relays of Macedonian Radio in Skopje. An Arabic service can be heard on 15.14MHz at 1715-1800 with quite strong signals, says Roy Merrall. He noted this service in early April, co-channel with AIR in Russian signing off as Belgrade signs on.

**African And Middle Eastern Stations**

The RDT Centrafricaine service signs on at 0427 on 5.03MHz with a repeated four note piano sequence to 0429. The national anthem follows with rapid identification and frequency schedule. There's usually very heavy QRN.

Radio Djibouti has been observed at 0259 on 4.78MHz with very poor signal. The national anthem followed by rapid announcements and identifications possibly in Somali, then an apparent call to prayer. The Voice of Eritrea has improved steadily through April and May, and it is heard as early as 1615 on 9.56MHz in Somali and Amharic, despite co-channel interference from Amman. At 1700 the distinctive electronic organ interval signal precedes the French identification "La Voix de l'Ethiopie". A new schedule from Teheran's Voice of the Islamic Republic of Iran shows some changes to English language output. Programmes in English are now:

- 1030 on 11.83, 11.91, 11.790, 11.715 and 9.525MHz
- 1830 on 15.26, 9.022MHz
- 2330 on 15.315, 15.26 and 9.022MHz

Radio Iraq International has expanded some of its operations. English transmissions are noted at 1300-1500 on 15.40 and 11.25MHz at 1900-2000 on 15.21MHz.

Radio Jordan often predominates with English from around 1500 until abrupt sign-off at variable 1630 on 9.56MHz. Radio Ukraine is often heard in the background.

ORT du Niger can be heard signing on at 0454 on 5.0201MHz. A standard tuning tone is followed by a choral ensemble and a short solo on a horn or local woodwind. A rapid and rather distinct identification follows in French, with a frequency schedule and programme preview. Suffers from heavy commercial QRN.

Qatar Broadcasting Service can frequently be heard, albeit with some difficulty, on 17.825MHz with quite strong signals at 1600 and later. At around 1700 to 1710 the frequency changes to 17.863MHz, but in both cases there are strong co-channel Europeans. Identifies strongly as "I'dhat Qatar mini al Doha".
Roy Merrall has been trying out the new Radio RSA frequencies listed in last month's column. To date, he reports that on the 0400-0600 transmission on 6.955MHz is audible. The station has dropped its long running French service frequency on 15.364 at 1800, in favour of 15.44MHz which has a very strong YLE at the same time.

Radio Tanzania signs-on with quite strong signals at 0156 on 9.71, although only 9.71 has been heard fairly strong signals at 0156 on 5.0501MHz. A repeated celeste chord sequence is followed by 15.44MHz which has a very strong YLE at the same time. The station has dropped its 0600 transmission on 9.695MHz is audible. The station has dropped its announcements and identification announcements and identification and these are followed by what appears to be a repeated celeste chord sequence is followed by 0156 on 5.0501MHz. A repeated celeste chord sequence is followed by 15.44MHz which has a very strong YLE at the same time.

**Asian And Pacific Stations**

Roy Merrall reports a much expanded French service from Radio Australia at 0000-0030 on 21.74, 17.715, 17.115, 15.365, 15.24, 11.88 and 11.22MHz. Some of these are clearly audible in the UK. There is also a special English service to the south west Pacific at 0800-0900 on 11.72, 5.71, 7.24, 6.08 and 6.02, although only 9.71 has been heard and identified to date with fairly weak but clear signals at 0850.

As this edition of Practical Wireless went to press, Radio Japan was starting test transmissions from the BBC's Skelton transmitting station in Shwahli. A choir with orchestral accompaniment follows until 0200, followed by what appears to be a call to prayer.

**The Americas**

A letter has reached me from Chris Gare G3WOS. Chris is secretary of the UK Six Metre Group, and says that he was interested to read in 'Broadcast Round-up' a piece about Havana Radio. On Tuesday and Saturdays at around 2035, Arnie Coro CO2KK hosts a programme DXers Unlimited. This is aimed at both short wave and amateur radio enthusiasts, with material of interest to beginners and old hands alike. Arnie is a very keen 50MHz operator and can often be found on 28.885MHz, the international 50MHz liaison frequency.

Chris goes on to say that Arnie made his first European contact on 50MHz in January this year, working G3WOS and Nick G3KKX. Nick was Arnie's first European contact on 50MHz and went on holiday to Cuba in January. There he was able to collect QSL cards for G3KKX and G4AHN! Chris reports Radio Havana on the air 2000-2100 on 17.705 and 9.67 and recommends the DXers Unlimited programme, saying "there aren't many like it!" Details of the UK GMG Group from Old White Lodge, 183 Sycamore Road, Farnborough, Hampshire GU14 6RF. Do please enclose a stamped addressed envelope.

---

**Advertisers Index**

- AAA ........................................... 62
- AH Supplies .................................. 42
- AOK ............................................ 40
- ADR (UK) Limited ............................ 30
- ARE Communications ........................ 2
- Alan Hooker Communications ............. 62
- Atron Communications ..................... 58
- Amateur Radio Communications .......... 60
- Birckett ...................................... 42
- Castle Electronics ........................... 40
- Cirkit Distribution ........................... 30
- Colourform (Electronics) ................. 42
- Dewbury Electronics ....................... 22
- Dressler ...................................... 48
- Howes, C M .................................. 81
- IC.COM ........................................ 37
- ICS Import .................................... 58
- KW Communications ....................... 10
- Lake Electronics ............................ 42
- Lowe Electronics ............................ 3
- Maplin ........................................ 45
- Marine Engineering ........................ 58
- Marin-Lynch ................................ 19
- Network Systems ............................ 52
- Nevada Communications ................... 22
- Number One Systems ...................... 58
- Power Systems ................................ 6
- President Electronics ...................... 63
- RAS (Nottingham) ........................... 58
- RG5 ............................................ 60
- RST Valve ..................................... 62
- Radio Shack .................................. 68
- Reg Ward ...................................... 59
- SMC ............................................ 22
- SRP Trading .................................. 57
- Short Wave Centre, The ................... 62
- Short Wave Magazine ...................... 59
- Specialist Antenna Systems .............. 61
- Spectrum Communications ............... 40
- Suredata ...................................... 58
- Technical Software ........................ 62
- Waters & Stanton ............................ 4, 5

---

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The HOWES DFD4 is an add-on Digital Readout for analogue receivers and transceivers. If you have a FRG7, an analogue FT101 or a similar type of rig, then the DFD4 has been designed with you in mind. The DFD4 is a frequency counter that can be programmed for any IF offset so it can be used with almost any radio, including the old Government surplus sets. It can also count down as well as up, so it is suitable for "reverse tuning" rigs too.

To make the DFD4 even more versatile, we now offer the PMB4 Programmable Matrix as an optional kit. This enables you to switch between six different programmed offsets, so the DFD4 can be used with more than one radio, and to compensate for IF frequency differences when switching modes. Also new is the CA4M "hardware package". This contains a custom made case with pre-punched anodised aluminium front panel (see drawing above), plus switch, knob, BNC socket, nuts and bolts etc. to enable you to achieve a high standard of finish for your project.

DFD4 Kit: £39-90
Assembled PCBs: £59-90
CA4M Hardware: £19-90

HOWES QRP CW Transceiver

BUILD A QRP TRANSCIEVER!

To build a transceiver with our kits is a simple modular, step by step approach. You can start with the receiver, and then add on the transmitter at a later date if you wish. Various accessory kits are available to increase the facilities, these range from a simple signal meter for the receiver to extra filtering and of course, digital readout. We offer a matching range of "hardware packs" (case, knobs etc.) to enable your station to look as good as factory equipment! Whether you fancy a single band CW transceiver, or more complex dual band SSB/ CW rig, all these kits are designed to be within the scope of the ordinary home constructor. The well thought out designs and the backing of professional RF test facilities mean you can build with confidence!

Single band 40 or 80M CW transceiver:

Kit
Assembled

DF4/40 or 80 SSB/CW receiver
£15-90
£22-70

CTX40 or 80 QRP CW transmitter
£14-80
£21-80

CVF40 or 80 VFO for TX or RX
£10-90
£18-40

CSL4 300Hz CW and narrow SSB Filter
£10-50
£17-40

DCS2 "S Meter" for receiver
£9-20
£13-80

CA8OM Hardware pack (suits 40 or 80M): £29-90

You will also need two 50pF tuning caps (£1-60 each) plus a slow motion dial (£6-90). Total price of transceiver in kit form (including caps and dial): £101-30.

PLEASE ADD £1-20 P&P for kits or £3-00 if ordering hardware.

HOWES KITS are produced by a professional RF design and manufacturing company. They contain good quality printed circuit boards with screen printed parts locations, full clear instructions and all board mounted components. Sales and technical advice are available by phone during office hours. Please send an SAE for our free catalogue or specific product data sheets. Normally all items are in stock and delivery is within seven days.

72 & 73 from Dave G4KQH, Technical Manager.
**TX-3 RTTY CW ASCII TRANSCEIVE**
High performance, low cost. Unbeatable features. BBC, CBM64 tape £25, disc £27. SPECTRUM tape £40. +3 disc £42 inc adaptor board. VIC20 RTTY CW program tape £20. All need our TIF1 interface or a terminal unit.

**GX-2 FAX SSTV TRANSCEIVE**
All modes of FAX and colour/mono SSTV. Review in July 91 Rad Com. BBC only. Complete system only £99 or £119 with FAX direct printing option.

**RX-8 MULTIMODE RECEIVE SYSTEM**
Fax to screen and printer, colour SSTV, HF and VHF PACKET, RTTY, AMTOR, CW, ASCII, UoSAT. Every feature. Full disc printer support. Review in July 91 Rad Com. BBC only. Complete system only £259. DISCOUNT for RX-4 users.

**RX-4 RTTY CW SSTV AMTOR RECEIVE**
Still a best-seller. BBC, CBM64 tape £25, disc £27. VIC20 tape £25, SPECTRUM tape £40, +3 disc £42 inc adaptor board. All need our TIF1 interface. SPECTRUM software-only version £25. TIF1 INTERFACE for best HF & VHF performance with our software. Kit £30, ready-made and boxed £40. Only with TX-3 or RX-4 software.

**APT-1 WEATHER SATELLITE MODULE**
Converts satellite signal for display on any FAX system. £59. For use with RX-8, all connections included and price only £39 if ordered at same time as RX-8.

**FAX AND WEATHER SATELLITES**
Full resolution charts and greyscale pictures for any SPECTRUM computer to a dot matrix printer. FAX £80 or WX SATS £95, both £135.

**ADAPTABLE TO ANY MOUNT YOUR HAND-HELD OR STATION USE.**

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<tr>
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<td>APT-1</td>
<td>£39</td>
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<tr>
<td>LOGBOOK</td>
<td>£8</td>
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<td>RAE MATHS</td>
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<td>TX-3 RTTY CW ASCII TRANSCEIVE</td>
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<td>SPECTRUM tape</td>
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<td>Disc £2</td>
<td>£27</td>
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<td>Disc £3</td>
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**Technical Software (P/W.)**
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Do you need amateur radio equipment?

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But most of all do you need equipment serviced?
We have up to date test equipment, fully equipped workshop for all types of radio equipment.

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<td>1Kw TX, 160-10 or SWL, why pay more than £40 to achieve brilliant results?</td>
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<td>See DEECOMM, they are now our main distributors for these items.</td>
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For more information and prices send SAE to:

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Tel 0948 741717 Fax 0948 741728

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**Alan Hooker**

**SLIMLINE**
Allows you to safely mount your hand-held
£24.95 + £2.95p per mobile radio

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Mounts any single flat surface.
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Made of high quality aluminium.

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A complete range of Citizen Band transceivers submitted for type approval.
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The prepaid rate for classified advertisements is 42 pence per word (minimum 12 words), box number 70p extra. Semi-display setting attracts £13.90 per single column centimetre (minimum 2.5cm). Please add 17.5% VAT to the total. All cheques, postal orders, etc., to be made payable to Practical Wireless. Treasury notes should always be sent by registered post. Advertisements, together with remittance shall be sent to the Classified Advertisement Dept., Practical Wireless, Enfield House, The Quay, Poole, Dorset BH15 1PP. Telephone (0202) 676033.

Please insert this advertisement in the .................issue of Practical Wireless (if you do not specify an issue we will insert it in the next available issue of PW). For insertion(s), I enclose Cheque/P.O. for £..................(42 pence per word, 12 minimum, please add 17.5% VAT to total).

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Telephone (0202) 676033 to find out the special advertising rates available for Radio Clubs.

Recruitment

VOYAFONE

Survey Technician

Vodafone’s involvement in the mobile telecommunications market has proved to be one of enormous achievement. In just seven years the Company has built the world’s largest mobile telecommunications network.

As a result of our ongoing commitment to providing a high quality of service we are now seeking to appoint a Survey Technician, aged 20-28, to join our Radio Engineering Department. The ideal applicant will live within a commutable distance of Newbury, Berkshire, where the position is based. You will be required to carry out systems trials on the Vodafone network, radio survey work using mobile field strength measuring systems and deal with the processing and analysis of survey results.

You should possess an OND/ONC or City & Guilds qualification in an electronics discipline and preferably have experience of radio communication systems and radio propagation techniques. Alternatively, a general electronics background may be acceptable.

A current, full driving licence is essential as you will be required to travel extensively within the UK.

We offer an attractive salary package including over five weeks’ annual leave and a pension scheme with free life assurance.

If you feel you can contribute to Vodafone’s continuing success, please write quoting Ref: VFRD003 or telephone for an application form to:
Jonathan Cottrill, Personnel Department, Vodafone Limited, The Courtyard, 2-4 London Road, Newbury, Berkshire RG13 1JL. Telephone (0635) 503001.
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**Contact Marcia on the Advertising Hotline (0202) 676033**

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**KENWOOD ICOM YAESU**

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73 A Terry Edwards G3 Boost
IC-575H
28/50MHz all mode transceiver
- 100W output power.
- Wide receive coverage 26-56 MHz.
- Built in preamp.
- 99 memory channels.
- Compact size for convenient portable operations.
- 241(w)x95(H)x239(D) mm.

Photograph shows U.S.A. version.

IC-275E/H
144MHz all mode transceiver
IC-475E/H
430MHz all mode transceiver
- Sophisticated DDS system.
- Versatile scan functions.
- Data switch for packet radio operation.
- CI-V system for computer control.
- 241(w)x95(H)x239(D) mm.

IC-1275E
1200MHz all mode transceiver
- Superior sensitivity and stable 10W output power.
- Suitable for satellite communications, EME, packet radio, ATV and propagation tests.
- 99 memory channels.
- Optional weatherproof preamp.
- 241(w)x95(H)x239(D) mm.

IC-970E/H
Multi band all mode transceiver
- All mode operation on 144, 430, 1200 and 2400MHz bands.
- Optional 50-905MHz receiver unit.
- Satellite operation mode.
- Sophisticated DDS system.
- Dual band watch.
- 425(w)x149(H)x406(D) mm.

For further information about ICOM products and your nearest authorised dealer please contact:
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