Our Flexible Friend - The Dipole Antenna
Build The PW Easy 144MHz Amplifier
Triangles, Trapezoids & Squares - Locators Explained
QRP Contest Rules

REVIEWS

 YAESU FT-3000M
GOSKR Tries The FT-3000M 144MHz Mobile

WIN
An IC-706
DONATED BY MARTIN LINCOLN

ICOM IC-T7E
Dual-Band Hand-Held
REVIEWED
It’s Awesome!

You know who you are. You drive farther, use your mobile rig longer, and buy the most dependable radio products you can get. The FT-3000M is the only amateur 2-m FM mobile radio with 70 full watts of TX power! Reassuring, when you’re driving a lonely stretch of highway!

Like the 50-Watt FT-2500M, the FT-3000M is rated MIL-STD 810. And, both let you take the back roads with confidence. Built to resist jolts, bumps and the corrosive affects of dust, mist, and rain, the new FT-3000M, and popular FT-2500M take abuse and perform like champs. Plus, the FT-3000M is a great base, too. The new FT-3000M comes equipped with some sensational exclusive features!

• WIDE BAND RECEIVE! From 110-180 MHz, VHF, and 300-520 MHz UHF to 800-999 MHz, AM aircraft receive!
• TWIN COOLING FANS! Unique, twin fans keep the FT-3000M running cool without a problem! So, don’t worry about long transmission keydowns.
• SELECTABLE POWER OUTPUT! An awesome 70 watts, plus 50, 25, and 10 Watts.
• TRUE FM! Voice clarity has never been better.

• INTERACTIVE PROGRAMMING! Continual scrolling menu guides you through 50 settings—and won’t let you forget the next step!
• SIMPLIFIED FRONT PANEL! New Quick-Touch™ dual-concentric knob controls menu programming and adjustments.
• PC PROGRAMMABLE! Optional ADMS-2B Windows™ Programming Software programs your FT-3000M in seconds!

The FT-3000M’s feature-rich just like the FT-2500M 50-Watt mobile, and built to the tough performance standards you’ve come to expect from Yaesu. We think you should have at least one, don’t you?

Features
• Frequency Coverage
  Wide Band Receive
  RX: 110-180 MHz, 300-520 MHz, 800-999 MHz
  TX: 144-146 MHz
• AM Aircraft Receive
• MIL-STD 810 Rating
• Interactive Programming
• High Power Output: 70 Watts, plus 50, 25 and 10 Watts
• Quick-Touch™ Dual Concentric Control Knob
• Twin Cooling Fans
• ADMS-2B Windows™ Programmable
• Digital Coded Squelch (DCS)
• 81 Memory Channels
• Auto Range Transpond System™ (ARTS™)
• 1200/9600 Baud Packet Compatible
• Smart-Search™
• Alphanumeric Display
• Dual Watch
• Full line of accessories

Smart-Search™ scans and stores active channels for quick access.

“Smart-Search™ scans and stores active channels for quick access.”

“Yaesu did it again!”

YAESU
Performance without compromise.

For the latest Yaesu news: hottest products, visit us on the Internet! http://www.yaesu.com
EDITOR'S KEYLINES
Rob Mannion G3XKF shares his viewpoint on the amateur radio world.

THE IC-706 *TOP-TO-TWO - COMPEITION* PART 2
Win an Icom IC-706 transceiver donated by Martin Lynch!

RECEIVING YOU
The Pw postbag.

NOVICE NATTER
Eilene Richards G4UM answers readers' queries as she dips into her postbag.

CLUB SPOTLIGHT
Is your club in the 'spotlight' this month?

PRACTICAL WIRELESS SUBSCRIPTIONS

RADIO DIARY

REVIEW - THE YAESU FT-3000M 144MHz MOBILE TRANSCEIVER
John Goodall G0SRK goes mobile with the latest offering from Yaesu.

THE PRACTICAL WIRELESS 144MHz QRZ CONTEST
Neil Taylor G4LX says it's the time of year to dust off your portable rig, take to the hills and join in the fun of the Pw low power contest.

THE DIPOLE ANTENNA
Matt Probert explains why the basic dipole antenna should be regarded as your 'flexible friend'.

AIR TATTOO - COMPEITION
Spot the difference and you could win tickets to the RAP's Benevolent Fund's Silver Jubilee International Air Tattoo in July.

REVIEW - THE ICOM IC-T7E DUAL-BAND FM TRANSCEIVER
Tex Swann G1TEX puts what he found to be a very capable hand-held through its paces.

THE PW BRASSICA
Maurice Schofield G4WUP shares his design for a vertical f.m. antenna, designed to fit in a "cabbage patch!"

THOSE AMAZING AURORAS
Ian Poole G5YWX says Auroras are not just a wonderful sight, they play a big part in radio propagation too!

TRAPEZOIDS, TRIANGLES & SQUARES
Patrick Alley G5XJKW unravels the mysteries behind the various locator systems.

VALVE & VINTAGE
This month Phil Cadman G6CUP has a valved t.r.f. set on his workshop bench.

ANTENNA WORKSHOP
Gerald Stanney G3MKC looks at planning permission for antennas and the ways to get around it legally!

VHF REPORT
David Butler G5ASR explains how it's possible to make contacts using Sporadic-E propagation.

BITS & BYTES
Mike Richards G4WIC looks at common computing in radio problems.

EQUIPMENT SPECIFICATIONS
Deviation on f.m. is an area that often causes amateurs confusion, here Ian Poole G5YWX dispels the mysteries.

HF FAR & WIDE
Leighton Smart G4OMI guides you to successful DX working.

BROADCAST ROUND-UP
Turn into your favourite radio stations with Pw's broadcast band expert, Peter Shore.

FOCAL POINT
Graham Hankins G5EMX keeps you up-to-date with the Amateur Television Scene.

BARGAIN BASEMENT
Free readers' ads.

BOOK SERVICE
Why not take a browse through our comprehensive list of books?

COMING NEXT MONTH
68 ADVERTISERS' INDEX
**THIS MONTHS SPECIAL OFFER**

**YAESU FT-736R** Multi-mode quad band base station

<table>
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**THE KING FOR THE BIRDS! GET READY FOR PHASE 3D NOW!**

**HF TRANSCEIVERS**

**KENWOOD**

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**ICOM**

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**VHF/UHF HANDI's & PORTABLES**

**YAESU**

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**VHF TRANSCEIVERS**

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**A DATE FOR YOUR DIARY**

**SMC OPEN DAY**

**Practical Wireless, June 1996**
Radio Communication Handbook

6TH EDITION
One of the world's largest and most comprehensive guides to the theory and practice of amateur radio communication. An invaluable reference book for radio amateurs everywhere.

Price: £20.00

Amateur Radio Operating Manual

4TH EDITION
Revised to include digital communications, 2m "fox-hunting", microwaves and moonbounce for the first time. Both newly licensed and experienced operators will find this book invaluable.

Price: £11.65

Packet Radio Primer

2ND EDITION
For the radio amateur interested in connecting into the packet radio network, then this revised and expanded book covers all the recent developments taking you on from the basics right up to satellite operation.

Price: £8.50

Test Equipment for the Radio Amateur

3RD EDITION
A wide range of test equipment is included, much of which can be made from the construction details provided. The essential reference book for your bookshelf.

Price: £10.45

The Best Amateur Radio Books Available

- All from the RSGB!

(RSGB Member's prices on request)
Open Day
Ham Radio's Biggest
Hockley, 10am Sunday 2nd June

FREE Food & Drink - FREE Entry
FREE Draw for rigs

OPEN DAY 1996 - 2nd June
This is our biggest yet, 3 Marqueses and all the food and drink you need. There will be RSGB and Short Wave Magazine stands, plus manufacturers stands from YAESU, KENWOOD, and ICOM. There will also be a prize draw for several rigs.

PRICES
Examples are shown on the left of this advert. To get the rock bottom prices you will have to visit us on the day. However, for the rest of June we shall be still be offering great deals.

ALINCO DJ-190E

This is the new exciting handheld from ALINCO. For an unbiased opinion, read the PW Review in the May issue. It's the ideal rig to keep in the car, in the brief-case, or to take on holiday. At our price you can afford to!

- 2 metre Handheld
- CTCSS Encode
- 1750Hz tone
- 40 Memories
- Wideband Receive
- Ni-cads
- AC Charger

Our Price

£199

ALINCO AR-146 2m Mobile

This rig is superb. It leaves the competition for dead! At our price you can't afford not to have 50W high power 2m FM in the car.

£269

Power Supplies

Includes a host of exciting features. You get CTCSS, 250 memories as standard and a wideband receiver covering 108/142/440MHz. You'll love its compact size and its electronic vol./squelch controls. Send today for full details of tomorrow's handheld.

£439

JUST ARRIVED

Cushcraft R-7000 VHF vertical plus optional 80cm kit. (Stocked up to 10) £399
New Index Plus QRP rig - £99

FT-736R

£1399

YAESU - June Deals *

Model | RRP | June Price
--- | --- | ---
FT-1000MP-DC | £2599 | £2089
FT-1000MP-AC | £2249 | £1749
FT-990DC | £1999 | £1499
FT-736R | £1999 | £1499
FT-5000 | £329 | £249
FT-840 | £799 | £699
FT-2500 | £399 | £319
FT-51R | £229 | £179
FT-290R | £699 | £599

Kenwood - June Deals *

Model | RRP | June Price
--- | --- | ---
TS-870 | £2399 | £1999
R-5000 | £1299 | £999
TH-79 | £479 | £399
TH-22 | £254 | £214
TS-790 | £1959 | £1599
TM-733E | £729 | £629
TM-251E | £419 | £339

ICOM - June Deals *

Model | RRP | June Price
--- | --- | ---
IC-706 | £1195 | £995
IC-775DSP | £3899 | £3299

ALINCO - DX-70 in Stock

W-30 2m/70cms 3/5dB 1.15m £39.95
W-50 2m/70ocms 4.5/7dB 1.8m £54.95
W-300 2m/70ocms 6.5/9dB 3.1m £69.95

£995

FT-840

£799

IC-706

£1195

ICOM - DX-70 in Stock

ICOM DX-70 in Stock

W-3A 3 Amp 12V current/volt protected £22.95
W-5A 5 Amp 12V current/volt protected £29.95
W-10A 10 Amp 12V current/volt protected £49.95
W-10AM 10 Amp 3.5V variable £59.95
W-25AM 25 Amp 3.5V variable £89.95
W-30AM 30 Amp 3.5V variable £119.95
Summer '96 Cirkit Catalogue now in preparation... On Sale 25th April 1996

The Summer 1996 Catalogue has 280 pages packed with over 4000 products.

- New Multimedia CD ROM Titles
- New Radio Amateur Equipment
- Even Further Additions to our Computer Section
- PIC Microcontroller Projects and Modules
- 280 Pages, 25 Sections and Over 4000 Products from some of the World's Finest Manufacturers

Cirkit
Tel: 01992 448899 Fax: 01992 471314 Cirkit Distribution Ltd Park Lane Broxbourne Herts EN10 7NQ

C.M. HOWES COMMUNICATIONS

Mail Order to: Eydon, Daventry, Northants. NN11 3PT 01327 260178

Top Value Receiving ATU
CTU8
Antenna Tuning Unit
500kHz to 30MHz.
Helps reduce spurious signals and interference in the receiver.
Sockets: 50239
Kit (inc. hardware): £29.90
Factory Built: £49.90

CTU9
All the features of the CTU8, plus a voltage for balanced feeders.
Kit (inc. hardware): £39.90
Factory Built: £69.90

Receiving ATU with balun
ASU8
Selects between 3 antennas. Includes a switched attenuator.
Kit (inc. hardware): £39.90
Factory Built: £69.90

Receiving Antenna Selector
ASU8
Selects between 3 antennas. Includes a switched attenuator.
Kit (inc. hardware): £39.90
Factory Built: £69.90

WIDE-BAND PRE-AMP, 4 - 1300MHz.
Boost those signals with the HOWES SPA4! Low noise IC amp with 10dB switched equalizer. Over 15dB gain. Good dynamic range, IP3 +15dBm. 50 Ohm. Coax powered for shack or masthead use. Just the job for use with discone etc. in weak signal areas!
SPA4 £15.90
Assembled PCBs: £22.90

MULTI-BAND SSB/CW RECEIVER
The DXR20 covers 20, 40 and 80 bands with optional extra band modules for 160M, 10M, 15M or 10M amateurs or 5.45MHz or NEW 11.175MHz HF air. Many high performance features in this excellent direct conversion design!
DXR20 Kit: £39.90, IX52 "S meter" Kit: £10.90, HA2OR hardware pack: £28.90
(Other receiver kits available. DXR20 & DCS2 also available as assembled PCBs)
Please add £4.00 P&P. (UK only)

NEW! - Hardware for SWB30
Build a great looking SWR bridge with the SWB30 kit and the new HA31R hardware pack.
Custom made 14swg aluminium case with printed and punched front panel, 50239 sockets, switch knobs, nuts & bolts etc. HA31R: £18.90
SWB30 (1 - 200MHz, 30W) Kit: £13.90

The famous HOWES ACTIVE ANTENNA KITS
AA2. Covers 150MHz to 30MHz. The neat compact answer for those with limited space.
Kit: £8.90
Assembled PCB module: £14.90

Kit: £19.90
Assembled PCB module: £27.90

AB118. Optimised for long distance reception on 118 to 137MHz air-band.
Kit: £18.80
Assembled PCB modules: £27.90

MB156. 156 to 162MHz marine band active antenna system (the brother of AB118)
Kit: £18.50
Assembled PCB modules: £27.50

73 from Dave G4KQH, Technical Manager.

Cirkit Catalogue now in preparation.
If it's on the radio, it's in Monitoring Times!

Satellite Times is the world's first and only full-spectrum satellite monitoring magazine, exploring all aspects of satellite communications, including commercial, military, broadcasting, scientific, governmental and personal communications as well as private satellite systems. The satellite industry's most respected experts contribute to every bi-monthly issue of Satellite Times, addressing both amateurs and experts alike.

If it's in orbit, Satellite Times covers it!
There's no doubt about it, PW readers are a helpful bunch! I'm able to say this because I've even more first hand experience following the publishing of Mr J. Joyner's letter in 'Receiving You' in the April issue.

Following the letter's publication we had some interesting response to Mr Joyner's letter asking for help to enable someone who is deaf to be able to use a form of hearing aid with a TV set. One response came from Derrick Cornelius GODLD who just happens to work for Dorset Social Services!

The photograph shows Derrick, who works as a Care Manager for Social Services, demonstrating a special unit enabling people with hearing loss to listen to television sound. The unit he's showing me is the Sarahec Crescendo 10, made by Sarahec Ltd., Middlesborough TS2 1RH. Tel: (01642) 247789.

The Crescendo 10 is very simple, compact and safe in use. Importantly, it doesn't require any electrical connection to the TV set. It is only about the size of a pack of cigarettes and incorporates a volume control and on/off switch.

In use, the unit's microphone (on a very long lead) is attached to the TV's loudspeaker using Velcro. It can also be used by someone talking to the user, in the same fashion that Derrick and I are demonstrating in my office!

Derrick tells me that (in Dorset) the Crescendo units are available from the Social Services Sensory Loss team. He suggests that anyone who requires help or knows someone else who requires assistance in hearing, that they contact their local Social Services.

It may also interest readers that I've recently started using an infra-red set of "cordless" headphones in my office/cum shack at home. Although the set in use at the moment are mine, it means I've got one less set of leads to worry about on my desk. The next project I'm aiming to set up, is to get myself a pair of infra-red linked stereo headphones, which can be switched to any of my receiving equipment.

Finally, I've no doubt that some readers will find GODLD's information helpful, and I also think that the 'cordless' approach will prove helpful, as it's done in my case. Thank you readers for your response to the original letter in April PW. It just shows how helpful you are!

Bangor Club

As I write this edition of "Keylines", I have just returned from providing a PW talk to the Bangor and District Amateur Radio Society in Northern Ireland. And what a trip it turned out to be!

The Manx Airlines (very noisy) BAC ATP turboprop aircraft took just over an hour to fly me from Luton to Belfast City Airport on Friday 12th April. I was met there by my good friend Terry Barnes GI3USS. I'll be using the 144MHz transceiver myself and to loan out to newly-licensed friends who don't have a rig for themselves.

Final Treat

My final 'treat' during the weekend was a guided tour of the Ulster Folk Museum between Bangor and Belfast to see the Irish Railway and Transport Museum. And to be honest, I was staggered at this 'hidden jewel' of a collection.

The railway and road transport collection reflected the whole of Ireland and included some magnificent Irish "broad" and 'narrow" gauge (my particular favourites) locomotives and rolling stock. Terry Barnes son Michael acted as our (very!) knowledgeable guide and I spent an enjoyable Saturday afternoon seeing the trains and the newly-opened road transport section.

In the new road transport section I saw a magnificently (newly restored) Belfast trolleybus and Dublin tram and realised I was not only seeing a wonderful collection of vehicles, but was witnessing unity in what has been a troubled area of the British Isles. Thanks to the Bangor & District ARS I came away happy and full of hope for the future of my Irish friends, North and South.

Derrick Cornelius GODLD demonstrating how the 'Crescendo' hearing aid unit is used, with G3XFD acting the part of a TV 'loudspeaker'!
In the February 1996 issue of *PW* Richard Newton GORSN reviewed the latest 'all in one package' mobile from Icom. He stated that as a keen mobile operator he'd be more than happy to own one - well now all *PW* readers have the opportunity to own an IC-706 by entering this easy-to-enter 3-part competition.

Martin Lynch has very generously donated an IC-706 together with 10 of his T-Shirts printed with his logo as prizes for this very special competition.

**FIRST PRIZE:** IC-706, a Martin Lynch T-shirt & a three year subscription to *Practical Wireless.*

**SECOND, THIRD & FOURTH PRIZES:** A Martin Lynch T-shirt & one year subscription to *Practical Wireless.*

**SIX RUNNERS-UP PRIZES:** A Martin Lynch T-shirt

All you have to do is answer the three multiple choice questions below, all the answers can be found in this issue. Make a note of your answers and keep them in a safe place until next month (July) when we'll be asking the three final questions and printing the entry form.

**Questions**

Q1: Martin Lynch is well known as an Icom dealer, which Icom rig is reviewed by G1TEX in this issue?

A. IC-775  
B. IC-77E  
C. IC-Z1E  

Q2: What is the date of the 14th Practical Wireless QRP Contest?

A. June 9  
B. May 19  
C. June 16

Q3: If you take out a subscription this month what will you receive for FREE?

A. A *PW* Binder  
B. Two Free Issues  
C. A Book
RECEIVING

You

PW's Postbag. If your letter is published you'll win a prize.

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

Protest Walk

Dear Sir
I refer to 'Keylines', *PW* April 1996 and the proposed 'Protest Walk' for Amateur Radio'. I'm sorry that your rally and march couldn't take place. It's about time someone made public the amateur radio point of view. Being vociferous, to my mind, is a compliment! What a shame that the RSGB let you down. You'd offered to organise an effective event that they couldn't be bothered with.

You are most philosophical to agree to continue to support them. However, the RSGB should start to learn that they cannot take that support for granted. It doesn't matter how many special offers they run - the RSGB will only attract a greater proportion of amateurs to its membership if it provides the services and functions that those amateurs require. But how can clubs attract younger members? I feel that an honorary 'ice breaker' is helpful (a person, not a ship!). This person would be tasked with ensuring that newcomers feel welcome, are introduced to established members and would have baffling new technicalities explained at their own level. Entering a roomful of strangers - even friendly ones - can be daunting for many new club members. A friendly, empathic person, assigned to help, makes the experience more welcoming.

Dr. Godfrey Manning
G4GLM
Middlesex

Dear Sir
After reading your editorial in the April issue of *PW* I found myself in agreement, for the first time ever, with the management of the RSGB. Their response to your proposal to hold a protest march was totally in accordance with my own. I am sure that when you have attended a rally in your capacity as magazine Editor, you must have paused in your work sometimes to survey the passing scene. Not a picture of sartorial elegance is it? Un-clean jeans and trainers, scruffy anoraks, unshaven faces, all topped off with the inevitable baseball cap, often emblazoned with the owners callsign in letters 3in high!

Imagine the image of amateur radio which would be created in the mind of 'Mr Average Citizen' on seeing 500 such individuals in one place for the first time. He would not know that most are pleasant, interesting friendly people to talk with and some are downright clever. No, the image created would be exactly that which you are trying to dispel. Why also, for heaven's sake, waste a petition on 10 Downing Street? They do not control the press, they can't even regulate their own behaviour! By all means organise a petition on the grounds of misrepresentation of the image of amateur radio, but then get several copies printed and deliver them simultaneously to the Editors of the tabloids and broadsheets. If after a couple of days there was no reaction, follow them up with a letter asking why?

Most licence holders would, I am sure, support you in this endeavour.

Arthur Sharp GOWNZ
Hampshire

Editor's comment: Excellent idea! Arthur! So, let's all try Arthur's idea. After all, it's got to be far better than reading old satirical magazines and Golf catalogues!

Doctors & Dentists

Dear Sir
I've thought of an idea to promote amateur radio. We all pay a visit to our dentist and GP or attend the out-patients hospital at some time or another. How often do you see a radio magazine in the waiting rooms? So, the next time you visit one of these places, why not take your surplus magazines along, someone might just pick one up and read it and say yes, that is a hobby I would like to follow? Arthur Sharp GOWNZ

The 1930s

Dear Sir
I was very interested to see in your March issue the letter headed 'The 1930s' from F. J. Walker as my own history was rather similar. I bought the March issue just casually and it took me back to pre-1939 when I made a one valve short wave set on which it was a thrill to receive Schenectady.

I new a little about radio and I joined the RAfVR as a wireless operator as a way of getting radio knowledge free of charge! There were not so many facilities then for study as there are now at evening classes, etc.

I took *Popular Wireless* then and I never did know whether it was taken over or not, I well remember that there was a 30 -line scanning disk type of TV receiver for home construction in it once, but as an apprentice at that time, it's cost was probably beyond me.

I am not very active at present, but found your current number very stimulating and well presented.

Peter Readings G4FML
Surrey

Editor's reply: Reader's memories from the 1930s are very welcome. Did you build the 30-line scanning disk TV receiver Peter mentioned? Write and share YOUR memories and record them for posterity at the same time!
Dear Sir

Much as I enjoy PW every month I have one request to make. As a five year-old, my father bought me a Ladybird book called Making a Transistor Radio which started with a basic crystal set, and developed into a highly sophisticated (for a five year-old) transistорised, amplified radio. Needless to say, I had a great deal of help with the project, but the main thing that kept my interest was that at every stage, you had a working radio. Perhaps PW could consider such a project, spread over several months, which starts out as a simple, single band receiver, and develops through time into a multi-band, multi-mode receiver? I think this would interest both beginners (like me) and old hands alike and at the end of the day, provide a set which could be a source of much pride, as well as not costing the earth all in one go.

I would be interested to hear if such a project has already been covered at some time in PW, or if it’s possible to do it the future.

Gary Cavie G7JSF
Essex

Editor’s reply: The PW ‘Clubman’ project was run many years ago on the same lines as Gary’s suggestion. And comments from readers on his idea are welcomed. The author of the Ladybird book in question was none other than Rev. George Dobbs G3RJV. Making A Transistor Radio was a 50-page hard-back book, in full colour, and was published by Wills & Hepworth Ltd. in 1972 at the grand price of 15p! (Archive copy in PW office). If you see one at a ‘Jumble Sale’ (as I did) it would still provide a very helpful introduction for a beginner... at a bargain price.

---

Dear Sir

So Morse is yesterday’s mode? Well, see the attached!

R. G. Taylor G3AVQ
Oxfordshire

Enclosed with Mr Taylor’s letter was an advertisement taken from The Daily Mail, March 14th 1996. It was for the post of ‘Instructional Officer 1 - Telecommunications’ and stated ‘You will be required to instruct students in telecommunications procedures and transmitting and receiving Morse Code at

18 words per minute. The advert then goes on to state the necessary qualifications (ONC, C&G, etc.). Oh well! perhaps there’s (official) life in the ‘Old Mode’ yet eh?

Editor’s comment: The team wish you success with the photocopies we sent you Gregory. Incidentally, the team hope readers enjoyed the free Antenna Data Chart issued with the May PW.

Dear Sir

In the PW Changer feature (PW March issue) it is stated that the coil manufacturer Denco no longer exists. Not true! Denco is alive and kicking and has recently recommenced the manufacture of the MAXI-Q range of miniature coils for valve and transistor applications. Their address is: Denco (Clacton) Ltd., 259 Old Road, Clacton on Sea, Essex CO15 3LU.

K. S. Seddon
Cheshire

Editor’s comment: Thank you for the information. Please see the news report in this issue.

---

Dear Sir

The advert for the PW offices, marking it clearly for ‘Receiving You’
BBC 'DAB' Hands At Broadcasting

The BBC sees the future of broadcasting to be Digital Audio Broadcasting (DAB) and the Corporation started the initial DAB services in the autumn of 1995. And to help its listeners, the BBC Engineering Information Department have published a helpful booklet The Future Of Radio - BBC Digital Audio Broadcasting.

Present DAB coverage is limited to the London area and parts of south-east at the moment. But the BBC consider that the facilities offered by DAB (including interference free reception, high quality sound, easy-to-use radios, automatic tuning, wider choice of programmes, text and data, will revolutionise the future of radio.

Listeners will need new receiving equipment, in the same way that new equipment is needed to listen to CD equipment. in the same way that new equipment is needed to listen to CD equipment.

Further information is available from: BBC DAB, Room 509 Henry Wood House, Broadcasting House, London W1A 1AA. Tel: 0171-580 4468 or FAX: 0171-765 4427. E-mail: bbc dab@bbc.co.uk

Kites On The 'Net

After we published the article "Five And Nine By Force Four" by Ron Wilson G3MJSV about combining radio, fresh air and kites in PW April we received a letter from an antenna group who are on the Internet.

The Kite Antenna User Group was formed by A. G. Hanna G1OSMU with the intent to exchange information and ideas in an effort to re-discover and develop the art of antenna kite flying. Anyone with access to the Internet is welcome to "surf in" and have a look.

If you're interested in kites for lifting antennas G1OSMU also runs Sky High Kites at 39 Dalton Crescent, Comber, N. Ireland BT23 6HE. Tel/FAX: (01247) 874224. Internet: http://www.kitesantenna.com

Denco Back In Business

Denco (Clacton) Ltd., a name associated with 'home-brew' radio construction for many years is back in business! This news came to light following a mention of the company in a Practical Wireless article.

Readers who had heard that Denco was in operation again, contacted the PW office. And following enquiries, Denco's Managing Director Mr Ron Allwright, whose father founded the company, confirmed that the company is again manufacturing the Maxi-Q range of coils for valve and transistor use, together with the 1.6MHz and 45kHz L.T. transformers.

Further details on Denco (Clacton) Ltd.'s products are available directly from Denco (Clacton) Ltd., 259/265 Old Road, Clacton-on-Sea, Essex CO15 3LU. Tel: (01255) 422213, FAX: (01255) 476751. (Practical Wireless will be featuring Denco and its famous products in a future issue. Editor).

Low Down On AKD Receiver

Here's the latest 'low down' on the AKD communications receiver due to be launched in September - It tunes from 30kHz (yes 30kHz!) to 30MHz and not as published in Rob Mannion G3XFD's 'London Show Report' (page 40 May PW).

AKD has pointed out that the receiver, which they're aiming to be available for around £160, will cover from 30kHz to 30MHz. Rob apologises for his mistake and realises that this extra coverage is of great significance. "I'm waiting to get hold of one of these receivers, they'll certainly be of great interest" he told PW's 'Newsdesk'. "And when they've got the receiver on the market...I'll chase them to produce the companion transmitter" joked Rob!

For further information on the new AKD receiver and their other products contact Val Wagstaffe at: Unit 5, Parsons Green Estate, Boulton Road, Stevenage, Hertfordshire. Tel: (0438) 351710.

Open Again!

Waters & Stanton Electronics are once again throwing open their doors for what has become an annual, well supported event. The sixth W & S Open Day will take place on Sunday 2 June at 22 Main Road, Hockley, Essex and will feature many second-hand and end-of-line bargains together with plenty of free refreshments!

Peter Waters & Jeff Stanton are looking forward to welcoming you when, at 10am they open the doors to their showroom. Why not pop along, meet the faces behind the names and who knows, you may even find that bargain you've been looking for!
The End Of An Era

The first 'G' series Amateur radio call signs were issued in the 1920s but on 1 April 1996 history changed when they gave way to a new 'M' call. A special award ceremony was held on 30 March at Subscription Services Ltd. in Bristol to mark the award of the first M series call sign.

John Keeling of the Radiocommunications Agency awarded M0AAA to Reading & District Amateur Radio Club and M1AAA to Ian Oliver who applied for the new series last October. Mr Keeling congratulated the recipients and stated that it was an historic moment in the world of amateur radio.

Both M0AAA and M1AAA were presented with specially designed framed certificates together with manually completed versions of the new licences. All those who attended the award ceremony also had the opportunity to look behind the scenes of the radio licensing operation.

New Products

Antenna Tuning Unit

In response to many medium and long wave DXers' enquiries Lake Electronics have produced the TU3-LF antenna tuning unit which is designed to handle frequencies below 500kHz.

Features of the TU3-LF include:
- All aluminium case finished in matt black with brushed aluminium front and rear facias.
- The cabability when coupled to a end-fed wire of tuning down to 20kHz.
- SO239 connectors and standard 4mm terminal sockets.
- Supplied in kit form or ready-built.
- A maximum useable frequency of around 30MHz.
- If used with a QRP transmitter it will handle up to 20W.

Alan Lake tells us that the Sun Spot cycle is now at its lowest ebb which means that although the higher frequency bands are not so good, DX can be heard easily on the medium and long wave bands. This means that by using the TU3-LF you could discover a whole new interest!

Low Power Transceiver

Seattle based Index Laboratories have recently announced a replacement for their QRP Plus low power transceiver (reviewed in PW February 1995). The new model called the QRP Plus-1 has been re-engineered with many improvements being made, such as the inclusion of RF speech processing and an all new receiver design.

The receiver side of the QRP Plus-1 is a single conversion design with a 30kHz i.f. and incorporates SCAFl variable bandwidth digital filters. The frequency coverage is from 1.8 to 30MHz and is optimised for s.s.b. and c.w.

The transmitter operates on all bands from 1.8 through to 28MHz including the WARC bands with adjustment of s.s.b. and c.w. power from 5W down to milliWatt level.

The UK distributors Waters & Stanton Electronics have the first shipments available for £849 and would welcome your enquiries for more information on (01762) 206335.

Dual-Band Hand-Held Weather Facsimile Decoder

The latest product to come from the Yaesu stables this month takes the shape of the FT-50R dual-band handheld offering a full 5W of power output as well as wide-band receive from 76 - 999MHz. The transmitting frequency range of the FT-50R is 144-146 and 430-440MHz in 5-50KHz channel steps.

The recommended retail price of the FT-50R is £339 and for that you get three selectable receive modes, 12 memory channels, digital coded squelch, high audio output, alphanumeric display, direct f.m. to name just a few of the features. There are a range of accessories available for the FT-50R all of which are common to the FT-10R/40R range.

Further information can be obtained from Yaesu UK Ltd., Unit 2, Maple Grove Business Centre, Hounslow, Middlesex TW4 6DR. Tel: 0181-814 2601 or from any Yaesu approved dealer.
**NEW YAESU FT-50R**
Yaesu's answer to the Icom T-7E new ultra compact dual band transceiver with wideband Rx: 76-999MHz (AM, FM, FM-N). Our Price £289.95

**ICOM IC-T7E**
Rx available 108-180/400-500/850-950MHz Compact dual band h/held. Icom stole the HF market with their introduction of the T-7E and are set to repeat history again with their latest marvel of technology, the T-7E. Incredible, everything you would possibly want incl CTSS listed as standard along with high power nicad + charger. RRP £249.95

**ICOM IC-706**
HF transceiver with 6+2m. RRP £193.95

**MFJ-259**
HF digital SWR analyzer + 1.8-170MHz counter/resistance meter. RRP £249.95 P&P £5

**RL-9**
30 dual band verion of the above. RRP £69.95 P & P £4

**MFJ-748B**
1.8-150MHz counter/resistance meter. RRP £59.95 P&P £3

**DSP-9 PLUS**
1.8-150MHz SWR meter. RRP £239.95 Our Price £179.95

**MFJ-748**
1.8-150MHz Automatic SWR meter. RRP £249.95 Our Price £229.95

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1.8-150MHz SWR meter. RRP £249.95 Our Price £229.95

**MA-339**
Mobile Holder. Fits all h/held radios. Sticks onto dashboard of car. RRP £9.95

**MSS**
132 High Street, Edgware, Middlesex HA8 7EL
Close to Edgware underground station (Northern Line). Close to M1, M25, A406.

**P & P**
UK mainland: £10.00. Overseas: Please enquire.

**FURTHER OFFERS**
1.8-150MHz SWR meter (no display). RRP £99.95 Our Price £69.95

**DSP-599**
1.8-150MHz SWR meter. RRP £149.95 Our Price £129.95

**DSP-599**
1.8-150MHz SWR meter. RRP £149.95 Our Price £129.95

**MFJ-748**
1.8-150MHz SWR meter. RRP £249.95 Our Price £229.95

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**Antennas**

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**Scanners**

- **AR-8000** The ultimate handheld receiver covers everything from 50kHz-1900MHz all mode (AM, NFM, WFM, USB, LSB, CW) **Special Offer £369.95**
- **NETSET PRO-44** Listen to aircraft, ham, marine and much more with this superb scanner. Covers 66-88/108-174/300-512MHz. **RRP £299.95. OUR PRICE £199.95**
- **REALISTIC PRO-25** Want to get into scanning? Then this is for you. Listen to aircraft, ham, marine and much more with this great scanner. **OUR PRICE £179.95**

**Handheld Antennas**

- **T-2602** 2m/70cm/23cm (2/3/5.5dB) flexible antenna with wideband receiver (14" long BNC). **OUR PRICE £229.95 P&P £1**

**Accessories**

- **TS-4000** Duplexer (Coax) 2m/70cm **£24.95**
- **TS-6000** Duplexer (Coax) 2m/70cm **£19.95**

**HF Antennas**

- **R5** 10/12/15/17/20 MHz vertical **£295.00**
- **R7** 10 thru to 40 MHz vertical **£389.00**
- **AV-3** 14-21MHz vertical 4.3m long **£89.95**
- **AV-5** 3.5-7 MHz vertical 3.4m long **£159.00**
- **APA** 8 Band Vertical **£189.00**
- **A35** 14-21MHz Yagi **£240.00**

**Scanners**

- **IC-W21** 15W FM mobile **£699.95**
- **IC-W2** 25W FM mobile **£269.95**
- **IC-2** 25W all mode **£269.95**
- **FT-230R** 25W FM mobile **£189.95**

**Sony SW-100E** Award winning miniature SW receiver with SSB. **RRP £249.95. OUR PRICE £199.95**

**Sony SW-77** This is the best portable SW receiver on the market. **OUR PRICE £359.95**

**S.W. Portables**

- **Sony SW 7600G** RRP £199.95 **OUR PRICE £179.95**
- **Sony SW-55** RRP £299.95 **OUR PRICE £259.95**

**Handheld Antennas**

- **T-2602** 2m/70cm/23cm (2/3/5.5dB) flexible antenna with wideband receiver (14" long BNC). **OUR PRICE £229.95 P&P £1**

**Accessories**

- **D7** Four band HF 10, 15, 20, 40 1.5kW **£159.95**
- **SM7** BNC antenna from your scanner to your transceiver. **£24.95**

**Sony SW 7600G** RRP £199.95 **OUR PRICE £179.95**

**Sony SW-55** RRP £299.95 **OUR PRICE £259.95**

- **TS-6671** New ultra small BNC mount. Allows you to use any existing BNC antenna from your scanner to transceive on your car without having to purchase a car antenna. **OUR PRICE £229.95 P&P £1**

**Thirdhand & Ex Demo Board**

- **IC-736 HF + 6m...** **£1349.95**
- **TS-950S Deluxe HF** **£1899.95**
- **FT-736R 2m/70cms base £1299.95**
- **D-580** 2m/70cms P&P £339.95
- **IC-2E** 2m complete **£339.95**
- **D-65** 2m/70cms **£339.95**
- **FT-280R** 2m all mode **£299.95**
- **FT-230R** 25W FM mobile **£189.95**
- **DR-MD6** 6m mobile (ex demo) **£279.95**
- **FT-280R** 2m/70 cms **£299.95**
- **IC-W2E** 2m/70 cms P&P £249.95
- **IC-W2E** 2m/70 cms P&P £299.95

**West Midlands Branch Now Open**

**Unit 1, Canal View Industrial Estate, Brettell Lane, Brierley Hill, W Mids DY5 3L0**

**Tel:** 01384 481681

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**Practical Wireless, June 1996**
I've recently had a letter from Bill Abrahams in Belgium, who kindly pointed out that in the April edition of 'Novice Natter' the photograph showing the barometer was not showing the atmospheric pressure and the world clock was not showing the time! Sorry about that, but the photos and captions are added by others and I don't see them until I get a copy of the magazine. (Apologies for any confusion caused by this. Ed.)

The barometer shows you whether the trend is falling, rising or steady, it doesn't show the actual pressure as a figure, sorry if the caption was misleading. However, I found that just knowing the trend was enough to plan some DXing.

And rest assured, the world clock does tell the time. very accurately too! Thanks Bill for gently pointing this out!

Lancashire Youngster

Shaun Davies from Lancashire wrote to me back in February, hunting for a dynamic car phone that's been sorted out thanks to the Editor (well done Rob, you've no doubt got a good junk box). Shaun is 12 years old and is interested in radio, his grandad has got a short wave receiver and is going to help Shaun build the ZN414 receiver from the March PW.

I do hope that Shaun and his Grandad will let me know how they get on building this project and what kind of results they get. Keep up the good work both of you.

Pen Friends Sought

Dinesh Kumar is a 22 year old student in the southern corner of India, studying for his Masters Degree in Electronics. He's passed the Amateur Station Operator's Certificate exam at Grade I (similar to our RAE) and is awaiting his call sign from the authorities. Apparently, he'll probably have to wait another three or four months yet!

Dinesh is looking for a pen friend in the UK who is about the same age and interested in amateur radio. If you think that writing to another amateur would interest you, then his address is: K.N. Dinesh Kumar, IV SEM, MSc Electronics, Dept of Electronics, Cusat, Kochi-22, Kerala, South India, DIN - 682 022. I'm sure he'd welcome your letter.

On Air Manners

The other day I received a letter from a fellow amateur, (requiring value of stamps). Sometimes, IRCs are used as a form of international currency. And as an example the British DX Club will usually accept IRCs as payment for their publications. For example, their latest booklet called Radio Stations in the United Kingdom costs £2.50 post paid, but you can send six International Reply Coupons instead. I'm sure other groups do the same, they'll always tell you in any adverts or publicity they send out. I've shown an IRC that I received recently from a reader here so you can see what they look like (note the information given in the left-hand and centre boxes is applicable to each individual country). When I take it to my local Post Office to exchange it, they will stamp the right-hand box with their stamp to validate it. I hope this helps you out.

International Reply Coupons

Mr Hibbard recently wrote to the PW Editorial office with a query about International Reply Coupons (IRCs). The PW 'team' thought that perhaps I ought to mention here for any newcomer's benefit, that an International Reply Coupon is really just like an international postage stamp.

For example if I wanted to get a reply from an amateur in New Zealand, either to a letter or perhaps if I wanted his QSL card sent directly to me, it's not fair to expect that station to pay for the postage back to me. So, either I send him local currency to pay for the stamps (this is expensive for me to do, as are international money orders and the like), or I could send him some mint New Zealand stamps bought from a stamp dealer.

The latter option isn't very easy either as I don't know the postage rates in New Zealand. Fortunately there is a third, and much easier option, if I buy an International Reply Coupon from my local Post Office and enclose it with my letter or QSL, the amateur in New Zealand can use it to buy 'one or more postage stamps representing the minimum postage for a priority item or an unregistered letter sent by air to a foreign country'.

If I was expecting a reply from New Zealand, I would make sure that I enclosed two or three IRCs just to make sure I had sent enough postage. The IRCs will cost you approximately 77p each to buy over the counter at all Main Post Offices.

If you live in a very small village or only have a small Sub Post Office locally I'm not sure whether they would carry IRCs all the time, but all main offices do. They won't add much weight to you correspondence as they weigh about half a gram each.

If you ever receive IRCs and aren't sure what to do with them, just take them to your local Post Office with a letter that you want to send and they will exchange them for the required value of stamps. Sometimes, IRCs are used as a form of international currency. And as an example the British DX Club will usually accept IRCs as payment for their publications. For example, their latest booklet called...
Start Young In Malta

Anthony Buttigieg 9HTB wrote me a lovely letter telling me about his young son Daniel. Anthony is rather proud, and rightly so, as Daniel is the youngest fully licensed amateur on the island of Malta GC. (Incidentally the GC stands for 'George Cross', awarded to the Maltese people for their bravery in the Second World War).

Daniel started studying for the RAE when he was just 10 years old! Last year he sat the Morse test and then in December he sat the RAE and now, at 14, is a fully licensed amateur. He belongs to the Malta Amateur radio League in Attard and now gives Morse lessons at the club.

Well done Daniel! It just goes to show what you can do if you really try. Thanks to Dad, Anthony for passing on the information, keep me posted as to what you are all up to.

Special Event QSL cards

If you collect QSL cards then you should keep your ears open for some of the Special Event Stations that John Densem G4KJV operates. During May, John will be using GB3HMP from a coal mine museum in Aberavon.

In June it will be GB2BHH from the Malmesbury school for handicapped children. July will mean assisting G2BRR with his GB2ARC station for the Arthritis & Rheumatism Council for Research.

The other special John’s hoping to run is GB75RBL in July for the 75th Anniversary of the Royal British Legion (Malmesbury Branch). John makes his own QSL cards, using some kind of computer package and a colour printer - his cards have certainly given me something to experiment with! (see ‘Bits and Bytes’ this issue).

Quite where John finds the time for all this I’m not sure. He’s the QSL Sub-manager for the G4Z series, he’s on packet, belongs to the ISWL, the RAF Amateur Radio Society and the Aircrew Association!

That’s as well as the special event stations and QSL making!

Pressing the push to talk (p.t.t.) switch or the Morse key. Many of you do this. But do you listen for very long, or is it just a very few seconds and then off you go?

On the frequency you have chosen to use, there may already be a conversation (whether speech or Morse) taking place. However, that doesn’t mean to say that you will be able to hear both sides of it. Perhaps you should listen for a short while, and perhaps put out a very quick enquiry to see if the channel or frequency is occupied? That way you have taken every possible step to avoid clashing with others already enjoying a contact.

Something else that bothers me when I listen around on the air are the operators who join an already running discussion - uninvited. If you have something to add or would like to join in, isn’t it much nicer to quietly announce you are listening when one station hands over to the next and then wait to be asked to join in?

Amateurs are, by and large, a very friendly banch, but many of the older operators do appreciate politeness. It’s unusual to ignore someone who has asked to join in. I don’t think I can ever remember a situation when that has happened - certainly not whilst I was on the air.

I’ll get off my ‘soap box’ in a minute, but please if you hear a station ‘testing’ or asking for a report on the state of their signal - don’t ignore them. I have heard a station asking for a report because they were testing a different antenna, no-one answered (I couldn’t as I was just using a receiver at the time, it’s so frustrating!).

Anyway, within a few seconds of the transmission finishing, another station appeared calling for a friend, who immediately answered. I’m sure they’d been listening all along, it would have been nice if one of them had helped out the first station.

When you are new on the air, a little politeness goes a long way, it also helps to get over those first nerves. It’s very difficult when you start trying to talk to other people over the air, especially if you have never tried things like CB or operating special event stations when you were a Scout/Brownie or Guide, etc.

Finally, a plea to those whose Morse code is well above the testing speed and skill. Spare a thought for those who try and join a Net if they aren’t as good as you. With a bit of practice and careful nurturing, they will get better and will be able to make a good contribution to the Morse conversations that go out over the air.

That’s it, I’ll climb down now. Let me know if you hear any real good stations on the air or have had someone be particularly helpful when you were a little ‘green’.

Elaine G4LFM

That’s all for this month, I hope I’ve included something of interest for everyone and helped to answer more of your questions. Don’t forget I’m always pleased to receive your letters so keep them coming to PO Box 183, Ringwood, Hants BH24 3XD.
The GPT Amateur Radio Club

Located at Beecroft, Nottinghamshire, is the GPT Amateur Radio Club, site of GPT Ltd., the UK's largest designer and manufacturer of Telecommunications equipment. Although the club was set up some 20 years ago by company employees, non-employees are always welcome to join the club.

Meetings are held every Thursday evening and most Sunday mornings in the radio shack on the GPT sportsground. Thursday evenings are usually devoted to operating and general chatter about amateur radio, whilst Sundays are geared around Morse code operation and constructional projects.

About once a month there is a special event evening, where a guest speaker is invited to the club. Sometimes a junk sale is held or a visit to a place of interest to radio amateurs. Additional social events are also held during the year in the company's social club.

Hospice Appeal

‘Club Spotlight’ has recently received a press release from Dennis Spratt G7AGZ, giving details of a forthcoming event. This event is in aid of the ‘Mount Edgcumbe Hospice’ in St. Austell, Cornwall.

The event starts on the 2nd June 1996 leaving Lands End at 7am BST, hoping to reach John O'Groats in two and a half days to complete the first leg of the journey.

Dennis says that he does all the setting-up of the project, including fundraising, doing the event and handing over the cheque.

Dennis will be issuing a certificate to each station that confirms their contact. During each QSO a contact number will be issued and RST report. Due to the fact that this is a charity event, Dennis hopes that each station that wishes to confirm their contact will enclose an s.a.e. to help with the return of mail, as the event being paid for by Dennis and his brother.

The cost is expected to be around £300, which includes the van hire, fuel and living costs. Dennis is hoping to raise the £2000 target that he has set himself. Since 1991 Dennis has completed three tours of Cornwall and one operation in 1994 in the Pendennis Castle in Falmouth, for which he used GBSM7EH on 144 and 29MHz f.m. bands.

If you would like to know more about this event, please contact Mr. Dennis Spratt, 66 Glenthorne Road, Threemilestone, Nr. Truro, Cornwall TR3 6UA.

Salop Amateur Radio Society

The Salop Amateur Radio Society was established in 1963, by G3RRN ‘Doc’ and G3OMX ‘Old Man Christmas’. The society held its first meetings at the home of Bill Davies (BRS21607) until the membership outgrew this gentleman’s home and hence meetings moved to a local tennis club, though the only Nets they were interested in were on ‘Top Band’.

The club membership was 23 strong by October 1963. Some of those members are still with us to this day.

The society club call sign G3SRT was obtained by G3RRN and used by the same gentleman in August 1964 for a Traction Engine Rally, using the 3.5MHz band and home-brew equipment.

At a local school in January 1966, the society began RAE classes. These RAE classes are still running, with the help of members. But now on a less formal workshop system.

The society hope to start a formal course in the near future, either NRAE or RAE, when a suitable venue and a willing set of volunteer instructors can be obtained. Presently, Salop ARS support three repeaters, GB3LH (RB15), GB3PW (RB6) and GB3PW (RB7). These repeaters are kept in good order by the Repeater management group.

A fairly full program of talks are held on alternate Thursdays, the other meetings being informal RAE tuition and general chat or exchange of ideas. Membership totals around 60 members, both licensed and s.w.l.s. from Shrewsbury and the surrounding areas.

Meetings start at 8pm every Thursday at the Oak Hotel, The Mount, Shrewsbury. Further details from Ian Davies G7SBD, QTHR on (01743) 463711.
Hambleton Amateur Radio Society

At a recent meeting of the above society in Northallerton, John G0VXH was appointed secretary. The club holds a series of Thursday evening sessions and offers a good mixture of informal chat, operating experience, Morse practice and, if enough candidates present themselves, RAE classes.

There are also talks by experts and recent topics have covered test equipment, domestic television, RAYNET and operating abroad. A 144MHz club Net operates every Tuesday evening at 1930 on S18.

Members have also been actively involved in competitions as well as in an interesting young people in radio through a ‘Technology Weekend’ and a ‘Thinking Day on the Air’ station. New members and visitors are welcome and more details can be obtained from John G0VXH on (01845) 537547.

Special Event Station

The year 1996 sees the Irish Naval service celebrating its Golden Anniversary, 50 years of service. To highlight this special event, members of the Irish Naval Service, with help from EI7M, will operate a special event station EI5SN6 for the month of July 1996. The event will operate from the Irish Naval Base, which is located on the islands of Haulbowline in Cork Harbour and from EI7M Club Station at Paur Head. To mark this memorable event, a total of seven unique QSL cards will be available.

The cards will give a history of the Irish Naval Service with a different card available for each band worked. The bands are: 1.8, 3.5, 7, 14, 21 and 28MHz. Modes will be both c.w/s.s.b. with local operation on 144MHz.

More information about this special event can be obtained from Stephen Nolan EI9HIC, Mannix McAllister EI8HIB, QTHR, or Communications Division, Naval Base, Haulbowline, Co. Cork, Rep. of Ireland.

Logo For Canadian Amateurs

‘Club Spotlight’ has heard from Jim Hatch G3OOL regarding a new logo. The 11-pointed Maple leaf plus the eleven smaller maple leaves depict the ten Canadian provinces together with the Yukon and North-west Territories. The light-tinged flashes are there to remind the world that Canada has made good use of radio for over three quarters of a century to enable those who live in its remotest parts to have contact with the outside world.

Canadian Amateurs have played a great part in AMSAT right from its conception and now lead the world in another first with IPARN, an amateur satellite system to allow communications anywhere in Canada using 144MHz equipment. Basically, it has been set up to co-ordinate Search & Rescue and the Emergency Measures Organisation in dense and sparsely populated areas of the country. Why you may ask, has an organisation like this been set up in the UK and Europe? The answer is because at the end of the Second World War over 9000 Canadian servicemen decided for one reason or another to live here in Great Britain. Some of those had radio operating experience, plus the fact that even today Canadians are coming to Europe on business or for pleasure, with the reciprocal licensing arrangement that are in place is it always nice to meet and catch up on the news from the grass roots so to speak. Canadians above all love to chat!

New Repeater Equipment

The Fenland Repeater Group have now installed new equipment in the GB3FR v.h.f. repeater, located on the Lincolnshire Wolds. It consists of a Tait 800 base, kindly donated by Tait Mobile Radio of Huntingdon, Cambs. This presently utilises Mk4 Sheffield University Logic, which permits sub-audio or 1750kHz tone access.

The transmitter uses a stacked pair of folded dipole and the receiver uses a 3dB gain collinear. The site has full battery back up with a reduced TX output to allow uninterrupted operation in case of an emergency. The coverage conforms well to the designed coverage maps and good reports have been received over the period the new system has been in use. The Fenland Repeater Group also manages the 28MHz repeater GB3SO located in Boston.

Vince Edwards G8NGZ holding the new repeater equipment accompanied by Len Badderley G8LXI, the repeater keeper. Provided through the Canadian Broadcasting Corporation and the Canadian Army Signals' whose network throughout the world is available from Stephen Nolan EI9HIC, Mannix McAllister EI8HIB, QTHR, or Communications Division, Naval Base, Haulbowline, Co. Cork, Rep. of Ireland.

Society Of Stroud

The Stroud Radio Society meet on alternate Wednesday nights at the Minchinhampton Youth Centre near Stroud. It is very much an active society who are regularly heard in the contests and are also known for activating Steep Holm Island in the Bristol channel every three or four years.

The society have their own shack and although the antenna system leaves much to be desired, they can be heard calling CQ on club nights. Members would be particularly interested to hear from anyone in arranging a schedule.

The society actively encourages the up and coming amateurs with practical help and advise. They also collect all sorts of unwanted electronic junk to help raise the necessary funds to keep the society going.

On August 25th a radio rally car boot sale will be held, near Stroud, a large venue within easy reach of the motorway. This promises to be a big event with amateurs from all over the country buying and selling.

Several traders have already booked sites and anyone requiring further information can contact the secretary on (01453) 8362006 or FAX on (01453) 836245 during office hours or 886964 evenings.

Send your club information to Zoe Shortland at the PW Offices.
May 12: The Drayton Manor Radio & Computer Rally will be held at Drayton Manor Park, near Tamworth. Trade stands, Bring & Buy, flea market, local clubs and special interest exhibitors, licensed bar and a fun day for all the family. Peter Baylor G6DRN on 0121-443 1189.

Trade stands, May 12: The Drayton Manor on 0161-748 9804.

floor location, refreshments, catering and licensed bar. G3CQR, QTHR or telephone on (01935) 813054.

traders, food, etc. Open 9am to 5pm. Admission/prize

Sunday 19th is the 12th QRP Convention at the Digby

Promotions, Upland Centre, 2

Ipswich. May 18: Ipswich Computer Show, Willow Carrom Sports & Social Club, The Street, Rushmere St Andrew. Doors open 10am to 4pm. Sharward Promotions, Upland Centre, 2 Upland Road, Ipswich, Suffolk IP4 3BT. Tel: (01473) 272002.

May 17/19: The Dayton Hamvention, the largest amateur radio show in the world, is taking place at the Hara Convention Centre in Ohio. Doors open at 12pm on the 17th and the event runs until early afternoon on the 19th. For the early risers, the Flea Market is open from 6am on the 17th. You will be able to visit many trade stands, attend lectures and meet amateurs from all over the world.

May 18: Yeovil Club’s Amateur Radio Convention Weekend. Note! This year’s it’s at a new venue in Sherborne, Dorset. Saturday 18th is an amateur family day and convention dinner and Sunday 19th is the 12th QRP Convention at the Digby Hall, Sherborne. Talks, competitions, displays, selected traders, food, etc. Open 9am to 5pm. Admission/entry draws is £2. Talk-in on S22. For full details contact G3CQR, QTHR or telephone on (01935) 813054.

May 19: Trufallo Rally (The Great Northern Rally), new venue, The George H. Cartmill Leisure Centre, off Loston Road, Uttoxeter, Mancheaster (junction 4 M63). There will be the usual traders and attractions, ground floor location, refreshments, catering and licensed bar. Admission is £5.00, OAPS £1 and under 12 free. Free parking for up to 300 cars. Doors open 10.30am, nil 5pm. Talk-in on 2m S22 via G1YFR. Graham G1FMY on 0161-748 9804.


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* June 9: The 27th Eltonon Castle National Radio Rally is being held at the usual venue, which is the showground of the Eltonon Castle Country Park. Keith Ellis G1ZLV on (01332) 662896.

* June 16: The Newbury & District Amateur Radio Society are holding their 9th Annual Radio Boot Sale at the Recreation ground. Cold Ash, Newbury, Berkshire. The site is just under two miles from the A4/A34 road junction and is well signposted. Admission and parking free for buyers and a generous plot will be available at £8 to those selling. Access allowed to the site for setting up from 8am. Refreshments/disabled parking and children’s playground on site. Talk-in with G3WBS on S22. Further information from George on (01488) 682814.

* June 30: The 39th Longleat Amateur Radio and Electronics Rally organised by the Bristol Group of the Radio Society of Great Britain will be held at Longleat Park, near Warminster, Wiltshire. A major feature of the rally will be the Bring & Buy section. There are also all the other usual Longleat facilities such as the Safari Park, House and beautiful lake and grounds. Gordon G0KGL on 0117-940 2950.

* July 13: Cornish Radio Rally. More information from Ken G0FIC on (01209) 821073.

* July 14: The 16th Sussex Amateur Radio & Computer Fair is being held at the Brighton Race Course from 10am to 4pm. There will be over 100 trade stands, free parking and admission is only £1.50. The rally is one of the largest in the South of England. Refreshments and bars at reasonable prices. A rally not to be missed!

If you're travelling a long distance to a rally, it could be worth phoning the contact number to check all is well, before setting off.

The Editorial staff of PW cannot be held responsible for information on rallies, as this is supplied by the organiser and is published in good faith as a service to readers.

If you have any queries about a particular event, please contact the organisers direct.

Editor

Practical Wireless & SWM in attendance

Practical Wireless, June 1996
John Goodall GOSKR took the latest offering from Yaesu - a high power 144MHz mobile rig on holiday over Easter and enjoyed himself as usual!

It would seem that most new mobile rigs seem to have just about exhausted all combinations for the usefulness of all the gongs, bells and whistles. But that's not so with Yaesu, the FT-3000M 144MHz mobile transceiver appears to have gone just one step further.

The move? it's a transceiver providing a maximum output power of no less than 70W! Not satisfied with stopping at simply a power output increase, Yaesu have also crammed the FT-3000M full with a host of useful features.

Upon removal from its packing, the FT-3000M reveals none of its hidden secrets, other than its twin rear-mounted fans. Its size, 220mm (from the tip of the front mounted tuning knob to the rear of the twin fans) x 140mm width x 40mm in height is around that of the average dual band rig.

The twin rear mounted fans give some idea of the unit's power. Things within the rig get somewhat warm with all that r.f. power!

Front Panel

The front panel of the FT-3000M sports only five buttons besides the normal volume and squelch and tuning knobs. To say the front is uncongested is an understatement.

The tuning knobs, inner and outer, are for the size of the rig, exceptionally large. The outer being 29mm in diameter and the inner being 22mm diameter. These make operation, even mobile, extremely easy.

To the left of the front panel are located the volume and squelch controls. Immediately adjacent and to the right of these controls are found two clear i.e.d. indicators. The one next to the volume control, shows red when the transceiver is in transmit mode, the other, lights green to show a received signal.

The liquid crystal display (l.c.d.) unit on the front panel is a healthy 65 x 29mm. The one large and clear display giving visual confirmation of almost all the rig's functions.

To the right of this display are located the main tuning knobs.

The Microphone

Now where does the microphone go? Well, 44mm along the left side of the transceiver can be found the module socket for the plug on the microphone lead. (Oh, how manufacturers really make it difficult for hands free mobile operation!).

It's yet another type of module plug having only six contacts against the more popular eight contacts. The size again makes it even more of a problem, 10 x 7mm, and it appears not to be available from the average component supplier.

It may be legal to drive while holding a microphone on the other side of the Atlantic. But come on manufacturers, isn't it about time you considered the UK and European market for once? After all the FT-3000M is supposed to be a mobile transceiver and us humble UK Amateurs do try and operate within the bounds of the law, that is 'Hands Free' when mobile.

At least with the standard eight pin screw-on collar microphone plug we had a certain standard to work from, although the pin-outs varied with manufacturers.

Extra Controls

While on the subject of the microphone, besides the normal p.t.t. the following extra controls can be found. These, mounted on the front of the microphone (the MH-42 Condenser Microphone supplied with the review model) are two medium sized buttons, and two smaller controls.

The two medium sized buttons recall of a Home, Call or often used frequency.

The lower button (F2) allows reverse repeater mode or allows you to simply listen on the repeater input.

Both F1 and F2 can be programmed by the operator to almost any of the functions available to the rig.

Control Buttons

Above the main tuning control knobs are two (large and easy-to-find and use) push buttons. The left one toggles between VFO and Memory Channels, while the right is used for Power On/Off and for Audio Record. (The audio record facility requires the installation of the additional DVS-4 Digital Voice Recorder).

To the right of the main tuning knobs can be found two similarly sized buttons, F1 and F2. The upper of the two (F1), allows instant
are marked ACC for the upper and VFO/MR for the lower control. The ACC button in fact operates the 1750kHz toneburst. The VFO/MR control toggles between the VFO and Memory Channels.

Of the smaller buttons, the left-hand one marked P1 toggles the four transceiver power output levels. These are Low 1 (10W), Low 2 (25W), Low 3 (50W) and High (70W). P2 selects the bands.

On the top edge of the microphone can be found two medium sized buttons. One is for moving UP frequency or to a higher Memory Channel, and the other for DOWN frequency or Memory Channel.

Transceiver Memories

The FT-300M transceiver has 70 Regular Memories, 10 Programmable Memory Scan memories, 5 pairs of 2 frequencies. It also stores one Home Call or often used frequency.

Yaesu’s new rig also has an extremely clever Interactive Menu Programming system. Pressing and holding the VFO/MR button on either the rig or the microphone reaches this facility. The lower display on the screen prompts each query.

Alphanumeric display can be used for identifying memory channels. The set offers band scanning in VFO mode, memory bank scanning, programmed memory scanning, and priority memory scanning.

Many Secrets

Once installed, the FT-300M revealed many of its hidden secrets. The extended receive facility being just one of the many. For example, the receiver covers the v.h.f. ‘Airband’ from 110 - 137MHz with a.m. being automatically selected within this range.

There’s also no less than 50 (Yes fifty!) separate pages of scrolling menu functions are to be found within this rig. Quite amazing!

Powering up is achieved by pressing and holding for half a second, the PWR button, which is above the main tuning knobs. The display is clear and easy to read and is illuminated in a fluorescent orange.

Main Menu

The Main Menu is accessed by pushing and holding the inner main tuning control for over half a second. And in the upper left of the display can be seen the Menu Page Number.

By turning the outer tuning knob each page can be selected in numerical order. For example; select page 34 with the outer tuning knob and then with the inner knob, select one of eight display backlight levels: 1 = bright, through to 8 = dim.

To return from Menu display to the Main display simply push briefly the inner main tuning knob. The display shows in large numerals, the frequency in operation with smaller numerals underneath showing the Memory Channel.

The Sub-Display can show one of five modes to be found on Page 33 of the Menu. Sub-Channel frequency can be displayed; Alphanumeric display to operators choice; Scrolling guide showing short messages across the lower display; Voltage of the power source displayed; Sub-Display OFF.

By a simple brief push on, the inner main tuning knob toggles between Main and Sub frequencies. With other menu pages this facility can be used for Dual-watch, Menu Page 26; Split frequency operation outside normal repeater offsets, Menu Page 44; Full Duplex (telephone style) operation with transmit on v.h.f. and receive on u.h.f., is also featured on Menu Page 44.

Spectrum Scope

The FT-300M incorporates a very useful Spectrum Scope. This views channels or frequencies above or below the displayed frequency. It will operate in either VFO, displaying frequencies above or below that displayed, or in Memory Mode displaying Memory Channels above.
Manufacturer's Specifications

General
Frequency range
Receive only
Transmit
Channel Steps
Frequency stability
Repeater shift
Emission type
Supply voltage
Current consumption
Receive
Transmit
Operating temp. range
Case size
Weight

Transmitter
Output
Modulation system
Maximum deviation
Spurious emissions
Microphone type

Receiver
Circuit type
Intermediate frequencies
SINAD Sensitivity
Selectivity
Image rejection
Squelch sensitivity
Audio output
Output impedance

or below that displayed.

Strong or weak signals are
identified as such by a single zero for
weak and stacked zeros for strong
signals. To operate the Spectrum
Scope, Menu Page 41 has to be
selected. Then with the inner tuning
knob, it was switched On.

The display Signal and Power
Meter, which is an unconventional
upward indicating display on the
extreme left of the LCD, rolls
upwards in Scope Mode to
maximum, and returns to zero during
Scope operation.

Setting-Up

Setting-up of the FT-3000M was
accomplished with the help of several
local and willing Amateurs. These
Practical Wireless, June 1996

included John G0TZW who assisted
in the vehicle, and Don G0UJE and
Doug G0CZG who assisted with
reports from their respective home
locations.

Doug G0CZG lives near the PW
editorial offices in Broadstone and
Don G0UJE towards the northern
boundary of Bournemouth (both
some distance from my home). A
couple of hours of test transmissions
followed.

With the various power output
levels, the Voltage at Supply Display
proved very useful. On High power
the output of the vehicle battery was
soon taken down to just over 11V. It
wouldn’t present any problem mobile
with the engine running but even
when stationary it would be best to
keep the engine running.

Personally, I feel that for the
average mobile f.m. operation 10W
for the lowest setting is a little on the
high side. I think 5W would have
been more favourable.

Incidentally, the rear mounted
twin fans are temperature operated
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35°C (That’s hot!)

Fine Engineering

In conclusion, with the couple of
points against the microphone, plugs
and sockets, it’s still a fine piece of
engineering and a great deal of
tought gone into its production. I
enjoyed using this remarkable
transceiver with its many facilities.
During many QSOs it got good
reports on audio and provided good
audio on receive.

I’m grateful to all those amateurs
who helped during the review,
particularly those mentioned. And
also those who helped whilst I
worked mobile into GW land over
the Easter Holidays.

Personally, I feel that for the
average mobile f.m. operation 10W
for the lowest setting is a little on the
high side. I think 5W would have
been more favourable.

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the Easter Holidays.

My thanks to Yaesu (UK) Ltd., of Unit 2, Maple
Grove Business Centre, Lawrence Road,
Hounslow, Middlesex TW4 6DR. Tel: 0181-
814 2001, for the loan of the review transceiver.
The FT-3000M costs £479 and is available from all
Yaesu dealers.
The PW Easy 144MHz Amplifier

By Ben Nock G4BXD

Ben Nock G4BXD describes a 144MHz amplifier converted from a surplus a.m. transmitter which he says is both easy on the pocket and easy to build.

I don’t know about you, but the hardest part of any construction project I find is the metal chassis bashing. This project simply takes a commercial item of gear, with all the required bits already fitted, and adapts it to Amateur Radio use. It also takes, what is in effect, turns an unusable bit of gear into a useful item.

The heading photograph shows the transmitter before modification. After the modifications you have a mains powered 50W amplifier. And there’s no drilling, no cutting large holes in steel for meters or valve bases, the p.s.u. is already built and the set only requires a simple tune up.

**Pye Base**

The gear in question is the Pye T30, a base station unit. It runs a QQV060-40A in the p.a. stage, with built-in mains power supply. The transmitter is a 30W a.m. unit, available very cheaply on the surplus market.

There are six versions available and versions A, B & C should tune to 144MHz straightaway. Versions D, E and F are suitable for 70MHz and P are suitable for 430MHz. (An S, V or N in the number refers to the original channel spacing and is of no real interest).

Warning: All the modifications I’m describing should only be carried out with the set fully isolated from the mains supply.

**First Stage**

The first stage of the project is to remove all the unwanted items from the set. The p.c.b.s that need removing are PCB 4 (the oscillator), PCB 12 (multiplier strip), PCB 10 (TX a.f. unit) and PCB 44 (audio pre-amplifier).

The crystal oven, if fitted, can be removed along with the modulation transformer. Then T2 and R37, fitted to the antenna changeover relay also needs removing but will be covered later.

Note: PCB 1, the a.f. driver board, must NOT be removed.

On PCB 12, unsolder the coaxial cable at the end of the p.c.b. nearest the p.a. compartment then cut the rest of the wires. On all the other p.c.b.s to be removed, you simply cut all the wires leading to them.

You will find that a few wire links come away completely. Remove them and then simply follow the wires back, cutting them at the other end. All the screened leads coming from the multi-pin socket at the rear (marked ‘Facilities’) can be removed.

**Modulation Transformer**

On the modulation transformer, the h.t. feed to the p.a. valve goes to Tag 5, and the p.a. to Tag 4.

Follow the wire from Tag 4 through to the stand-off just to the side of the p.a. underside. The wire that went to Tag 5 (a thick brown wire) is now routed and soldered to this stand-off. This connects the h.t. to the p.a. direct.

Now remove the modulation transformer by cutting the other wires off and un-bolting it. You’ll need to carefully lift the a.f. driver (PCB 1) to get at the bolts holding the transformer to the chassis.

Next, remove R37 (2.2kΩ), this is found attached to the antenna changeover relay, under a small cover, itself under the bottom screening shield. Remove the shield, then locate the relay cover by following the coaxial cables down. Then unscrew and lift the cover and R37 can be seen attached to the relay along with one of the coaxial cables. You’ll have then completed the ‘what needs to be removed’ stage!

Only a few additions are now needed, but no drilling, cutting, bashing, etc. of the chassis is required.

**Antenna Relay**

A further antenna relay is now needed along with some method of activating the changeover. If the driving rig has a p.t.t. output then this can simply be used, but assuming a hand-held or similar is to be used then some form of r.f. switching is probably the best method.

The circuit in Fig. 1 provides the necessary function. The new relay does not need to be an expensive SOA.

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Alignment is a simple matter using the built-in front panel meter and a s.w.r. meter in line with the dummy load (we should never tune up with the transmitter connected into the antenna should we?).

Next, apply 144MHz r.f. to the input and, with the meter switched to Ig Drive, tune the variable capacitor situated just outside the p.a. cage behind the On/Off switch. Now tune the driving rig can be derived from one of the now redundant modulation transistors. These are 2N3055 types, situated on the small heatsink pad behind the h.t. chokes.

The circuit, Fig. 3, is what's needed to help provide another power supply. The supply for the new regulator being taken off pin 4 on PCB 9, the existing regulator.

As there is a 5A fuse in the

Fig. 1: Circuit providing modification for r.f. switching on the modified Pye transmitter unit (see text).

Fig. 2: Antenna change-over relay modification details (see text).

Fig. 3: Circuit of simple regulator unit employing otherwise redundant modulation transistors used in the a.m. Pye transmitter (see text).
The time is nearly here again to dust off the 144MHz portable equipment and take to the hills for a day of v.h.f. activity with your low power transmitter. It's great fun!

Anyone with a 3W transceiver, preferably s.s.b., can run an effective station in this event. And you compete on equal terms with the other stations in the contest.

Whether you go all-out to win the coveted Winner's Cup, to gain a certificate in one of our various categories (we issued 23 for last year's event), or just to enjoy the high level of QRP activity, you are sure to have a rewarding day.

For stations in Scotland, there is the Tennamast Trophy 'In Memoriam To Frank Hall GM8BZX' to strive for. This trophy, renamed and dedicated to the late Frank Hall GM8BZX (RSGB President 1990) will be awarded to the leading OM or MM station.

This year's First Prize for the Overall Winner is a Yaesu FT-10R 144MHz hand-held transceiver, worth £249, kindly donated by Yaesu (UK) Ltd.

The prize for the Runner-Up this year is a Solar Laminate Panel providing 2.5W at 12V, donated by Bob Keyes GW4IED, of Key Solar Products.

Presentation of the Winner's Cup and Yaesu Prize, and Runner-Up prize will take place on Saturday 18 October at the 1996 Leicester Show. The Tennamast Trophy 'In Memoriam To Frank Hall GM8BZX' will be presented by Beth Hall, widow of Frank, at a venue (to be confirmed) in Scotland.

**New To Contests?**

New To Contests? If you've not entered a v.h.f. contest before, here's a great way to get started. You'll be joining many other regular v.h.f. contesters who had their first taste in the PW QRP Contest.

First of all though, how about getting together with some friends. Perhaps gathering a group together from your local club? Then choose a site to use, a good hill-top portable site is best, but try to make sure no-one else is hoping to use the same spot!

Next, then get together the equipment you'll need. It's a good idea to have a 'dry run' long enough before the day to put right anything that needs attention!

A good s.s.b. transceiver, efficient antenna(s), low loss feeder, and of course some means of powering the station if you are going to be portable - these are the minimum requirements.

Of course, the more antenna gain you have, the better your signal. Some groups have used enormous arrays in past PW QRP Contests. But don't be over-ambitious for your first attempt!

To encourage simple stations, I publish a separate list of stations using only one antenna, with a certificate for the leader of these. So, you too could do well, even with a simple antenna.

**Group Entry**

Having a group entry made up of friends makes setting up and operating the station on the day of the contest a good deal easier. But don't be put off from having a go as a single operator, if you prefer.
Read The Rules

If you’re entering the contest for the first time, you will, of course want to read the rules below thoroughly. And even if you’ve entered before (and are tempted to skip them) I ask that no matter how familiar you think you are with the rules that you read them again carefully!

And when preparing your entry, please make sure you include all the information asked for. It really does help my job as adjudicator if you do your part of the job well in the first place.

Important Rule Change

There is one very important change in the rules this year. The contest is one hour shorter than it has been before. As discussed after last year’s event, seven hours now seems to be long enough for the number of contacts that most stations manage to find. So, the 1996 contest will finish at 1500UTC.

We welcome comments from entrants about this change after we have seen how it works out.

As last year, the second session of the RSGB Backpacker’s Contest takes place on the same day as the PW QRP Contest. But this year the start times are co-ordinated at 0900UTC, and the required contest exchange is the same for both contests (but note that the Backpacker’s event ends at 1300UTC). This will make it straightforward for operators who want to submit their logs for both contests.

Internet Pages

Finally, if you have access to the Internet, you might like to look at the PW QRP Contest pages on the Web. These contain an archive of the results of previous years’ events, and a sample log sheet and Practical Wireless, June 1996 covering information sheet for you to download. The Internet address is http://www.rpmcle.co.uk/cdweb/sitees/mayor/pwqrp.html.

Let’s hope for good summer weather, and really good propagation to give us all some DX contacts. Good luck, and I look forward to receiving your logs!

Neill Taylor G4HLX

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Contest Rules

1. General: The contest is open to all licensed radio amateurs, fixed stations or portable, using s.s.b., w.o. or f.m. in the 144MHz band. Entries may be from individuals or from groups, clubs, etc. The duration will be from 0900 to 1600UTC on 16th June 1996.

All stations must operate within the terms of the licence. Entries must observe the band plan and must keep clear of normal calling frequencies (144.300 and 145.500MHz) even for QO contacts.

Avoid frequencies used by GDRS during the morning (144.250 and 145.525MHz) and any other frequency that is obviously in use for non-contest purposes. Contest stations must allow other users of the band to carry out their activities without hindrance. The station must use the same callsign throughout the contest and may not change its location.

Special event call signs may not be used.

2. Contacts: Contacts will consist of the exchange of the following minimum information:

(a) call signs of both stations
(b) signal report, standard RST system
(c) serial number: a 3-digit number incremented by one for each contact, starting at 001 for the first contact (i.e. full 6-character ARU Universal Locators for the location of the stations)

Information must be sent to, and received from, each station individually, and contact may not be established with more than one station at a time. Simultaneous operation of several different stations is not permitted.

If non-competing stations are worked and is unable to send their full universal locator, their location may be logged instead. However, for a square to count as a multiplier (see rule 4), a full 6-character ARU universal locator must have been received in all at least one contact with a station in the square.

3. Power: The output power of the transmitter final stage shall not exceed 3W e.p.e. If the equipment in use is usually capable of a higher power, the power shall be reduced and measured by satisfactory means. The simplest way is to apply a variable negative voltage to the transmitting a.c. line, reached via the accessory socket.

The output power can be accurately measured using the simple circuit in, Fig. 1. Connect this to the 5051 output of the transmitter and adjust the power so that the voltmeter does not exceed 16.7V on a good whistle into the microphone.

4. Scoring: Each contact will score one point. The total number of points gained in the seven hour period (note rule change regarding length of contest) will then be multiplied by the number of different locator squares in which contacts were made (a ‘square’ here is the area defined by the first four characters of a universal locator).

Example: 50 stations worked in 3011, 3012, 3013, 3017 and 3001 squares; final score = 5 x 62 = 310.

Only one contact with a given station will count as a scoring contact, even if it has changed its location, e.g. gone /M or /R. If a duplicate contact is inadvertently made, it must still be recorded in the log, and clearly marked as a duplicate.

5. Log: The log submitted as an entry must be clearly written and must detail the following information asked for. It really does please make sure you include all the information asked for. It really does help my job as adjudicator if you do your part of the job well in the first place.

(a) name and address for correspondence
(b) name of entrant (or of club, etc., in a group entry) as it is to appear in the results table
(c) sheet number and total number of sheets (e.g. "sheet no. 3 of 5")
(d) a description of the methods used (i) to reduce and (ii) to eliminate a poor signal, e.g. by aver doping or excessive speech compression.

For example, a poor signal. Before reaching this conclusion, try heavy attenuation at the receiver input.

(ii) whether single- or multi-operator (a single-operator is an individual who received no assistance from any person in operating the station, which is either his/her permanent home station or a portable station established solely by him/her); if multi-operator, include a list of operators’ names and call signs

(iii) total number of contacts and locator squares worked

(iv) total number of contacts and locator squares worked

(v) list of the locator squares worked

(vi) a full description of the equipment used including TX p.e.p. output power

(vii) the transmitting equipment is capable of more than 3W p.e.p. output, a description of the methods used to reduce and (ii) to measure the output power

(viii) antenna used and approximate station height a.s.l.

(ix) a large s.a.e. should be enclosed if a full set of contest results is required.

Failure to supply the previous information may lead to loss of points.

6. Entries: Accompany each entry must be a separate sheet of A4 sized paper bearing the following information:

(a) station name or callsign (of club, etc., in a group entry) as it is to appear in the results table
(b) call signs used during contest (including any suffix)
(c) name and address for correspondence
(d) details of location of station during contest; for portable stations, a national grid reference is preferred
(e) locator as sent
(f) whether single- or multi-operator (a single-operator is an individual who received no assistance from any person in operating the station, which is the either his/her permanent home station or a portable station established solely by him/her); if multi-operator, include a list of operators’ names and call signs
(g) total number of contacts and locator squares worked
(h) list of the locator squares worked
(i) a full description of the equipment used including TX p.e.p. output power
(j) if the transmitting equipment is capable of more than 3W p.e.p. output, a description of the methods used to reduce and (ii) to measure the output power
(k) antenna used and approximate station height a.s.l.

Entries must be postmarked no later than 1st July 1996. Late entries will incur a heavy points penalty.

Comments Welcomed

Any other general comments about your station, the contest and conditions during it are welcome. But please write them on a separate sheet of paper.

Photographs of the station are also invited (but please note that these cannot be returned). If these are not available by the time the contest rules are printed, photographs will be accepted.

Please make sure you include all the information asked for. It really does help my job as adjudicator if you do your part of the job well in the first place.

A breach of these rules may lead to disqualification. In the case of any dispute, the decision of the adjudicator will be final.
The Dipole Antenna

By Matt Probert

Matt Probert who is an experienced and keen short wave listener, takes a look at the basic dipole antenna to demonstrate that it’s a really ‘flexible friend’!

One of the most common amateur radio antennas is the dipole. It’s both simple to construct and convenient to erect.

The basic dipole is comprised of two straight conductors of equal length placed end-to-end close together. At the centres, where the conductors come together, they are fed by a twin conductor cable to a radio transmitter or receiver, see Fig. 1.

For transmission, radio signals supplied to the conductors forming the dipole should have a wavelength twice the combined length of the conductors. Standing waves are set-up on the conductors which energise the surrounding atmosphere, and thus radiation occurs. Similarly, incoming radio signals with a wavelength twice the combined length of the conductors cause voltages to be induced in them which travels to the connected radio receiver.

The relationship between the antenna and the frequency at which supplied radio waves cause standing waves to be set up is referred to as ‘resonance’. A dipole antenna exhibits resonance at frequencies where the total antenna length is a multiple of half wavelengths.

The property describes the dipole antenna as being ‘harmonic’. It means that in practice a dipole antenna cut to a half wavelength at a frequency of 7MHz is also resonant at 14, 21 and 28MHz.

Fig. 1: A dipole antenna is mounted horizontally, it radiates its maximum radiation within an arc of 78° either side of the antenna (see text).

Harmonic Operation

To the radio amateur harmonic operation of a dipole can mean that just one, cheap and simple antenna can be used for a number of wave bands. Very useful!

A dipole antenna may be erected either horizontally, in which case it will radiate and receive horizontally polarised radio waves. Or it can be erected vertically, in which case it will radiate and receive vertically polarised radio waves.

The impedance at the centre of a half wavelength long dipole is approximately 7552. This is a conveniently low value for easy matching into most modern radio equipment.

When a dipole antenna is mounted horizontally, it exhibits a bi-directional radiation pattern. In the horizontal plane it has a maximum radiation occurring within a 78° arc either side of the antenna, as shown in Fig. 1a. The centre of the arc is at right angles to the dipole.

If the dipole is mounted vertically, however, in the horizontal plane it exhibits an omnidirectional radiation pattern. In other words it’s transmitting and receiving radio waves unidirectionally.

Higher Impedance

The basic half wavelength dipole may be given a higher feed point impedance of 300Ω by amending the basic antenna into the folded dipole illustrated in Fig. 2. This design is also resonant over a wider band of frequencies than the basic dipole and as such is more suitable for use on wide frequency bands, such as the 28MHz band.

Loop Antenna

Although it’s not strictly speaking a derivation of the dipole, the loop antenna, illustrated in Fig. 3, is interesting. It exhibits very similar properties to the basic dipole, but can be erected where space does not permit a dipole to be erected.

The loop antenna exhibits the same bidirectional characteristics of the dipole. These, in the illustration shown are in the plane of the paper, just like the dipole in Fig. 1, and the folded dipole in Fig. 2.

From the receiving station’s point of view, the loop antenna is more suitable than the dipole. This is because the loop antenna’s greater physical size results in higher voltage levels being induced in it than are developed in a dipole.

Full Wavelength

Returning to the dipole now, and as the relative length of the antenna increases from one half wavelength through a full wavelength and onwards there are marked effects. The radiation pattern exhibited by the antenna becomes more.

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pronounced, and with the reduced angle of radiation so the ‘gain’ of the antenna increases.

The feed point impedance of the long dipole also increases which can provide some matching problems. To combat this impedance problem, a quarter wavelength matching section (often called a ‘stub’) may be connected perpendicular to the dipole as illustrated in Fig. 4. The impedance is thus reduced to a manageable level.

Going back to the radiation pattern of the long dipole, it will be seen from Fig. 4a that when a dipole is one full wavelength long, the angle of maximum radiation is reduced to 47°. Regrettably, when the dipole exceeds one full wavelength long, the radiation pattern becomes ‘splattered’ with minor lobes appearing which reduce the true bidirectional characteristics somewhat.

**High Frequencies**

At medium and high frequencies (below 30MHz) it’s not often practical to erect a dipole vertically due to the height required. However, since most communications at these frequencies are with both horizontally and vertically polarised radio waves, the reduction in reception of vertically polarised signals is unimportant.

On the other hand, on v.h.f. and u.h.f operating, radio waves tend to be either vertically or horizontally polarised. Because of this factor the limitation of not being able to receive one polarisation is more significant.

A pair of dipoles constructed into a cross design and fed in parallel, as illustrated in Fig. 5, are responsive to both forms of polarisation. However, a significant factor to bear in mind is that the feed point impedance is halved by this arrangement, to 40Ω with standard dipoles, and 150Ω with folded dipoles.

**Radiation Pattern**

The radiation pattern of a dipole may be compressed into one direction only. This is achieved by the placing, one quarter wavelength behind the dipole, of a second parallel element called a ‘reflector’.

The reflector should be 0.52 wavelengths long. The directivity may be further enhanced by the addition of a third parallel element called a ‘director’ 0.14 wavelengths in front of the dipole.

The director should be 0.45 wavelengths long. This antenna arrangement is called a ‘Yagi’ and is illustrated in Fig. 6. But, you must bear in mind that (as with the basic dipole when extra dipole ‘elements’ are added) the feed point impedance is affected by the addition of extra ‘elements’.

Each extra element lowers the feed point impedance. Because of this impedance change, some form of matching is required to bring the Yagi antenna to either 50 or 75Ω (the latter being the commonly used impedance for radio and TV broadcast reception antennas).

The radiation pattern for a three element Yagi is illustrated in Fig. 6a. Further directors may be added to enhance the directivity of the Yagi.

**Horizontal & Omnidirectional**

A contrary situation occurs when it’s desired to combine horizontal polarisation with an omnidirectional radiation pattern. A dipole may be bent into a circle so that the far ends come close together. But while this gives some resemblance of omnidirectionality, the radiated and induced voltages are both reduced resulting in poor performance in all directions.

A more effective solution is to connect three dipoles together in parallel as illustrated in Fig. 7. In this way the radiation patterns of each dipole complement the others to provide an omnidirectional radiation pattern.

Since the three antennas are connected in parallel, any transmitter power supplied is split three ways. This results in each dipole radiating less power than it would if the other two were not present.

However, as a receiving antenna the arrangement works very well due to its large physical size. The feed point impedance may be very low if basic dipoles are used (as mentioned with the Yagi configuration), but if folded dipoles are used then the feed point impedance is approximately 100Ω.

The basic dipole antenna is interesting. It’s worth a second look and with care you too can get the best from our ‘flexible friend’ the dipole antenna.

Further Reading

- *Radio & Television Engineers’ Reference Book*, J. P. Hawker (G3VA), Published by Newnes (1960).

Editorial note: Both Gonion King’s book and that of Pat Hawker are (still available at public libraries.

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You could attend the Air Tattoo for FREE by entering the joint PW and RAFA Benevolent Fund 'Spot The Difference' competition. Many radio amateurs have an interest in aircraft, so here's your chance to enjoy a wonderful weekend and support a good cause at the same time, as 30 adult tickets (15 pairs) are on offer (worth £40 a pair)! And when you're on the way, don't forget to listen in to the show's own radio station on medium wave. Look out for the station's frequency on approach road signs, to hear the latest information.

Join the celebrations as the world's biggest military airshow marks its Silver Jubilee with the most spectacular flying display of the year. Watch thrilling flying as up to 400 aircraft from 35 nations arrive at RAF Fairford for the IAT 1996 birthday party.

Crack aerobatic teams will be there too - including the RAFA's 'Red Arrows' with their brand new routine for 1996 created for their world tour. Also showing their skill will be the Turkish Stars, La Patrouille de France and other top teams from the international circuit. So don't miss the air show of the year!

Even though the RAFA haven't let our cartoonist, Worthington loose on aircraft since the Second World War, he managed to get a 'sneak' preview of the flying rehearsal for the 1996 IAT. But, John's memory is failing him (although his humour never fails!) and he's made a few mistakes in the second picture. Find them all and you could win one pair of the 15 pairs of adult tickets we've got to give away in the competition.

Good luck and 'chocks' away!

How To Enter

All you have to do is to mark the 12 differences on the second version of the cartoon, good luck. Then send your completed entry form (photocopies acceptable with corner flash) to Practical Wireless, AIR TATTOO Competition, June 1996, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. The Editor's decision on the winner is final and no correspondence will be entered into.

If you do not wish to receive future mailings as a result of entering this competition please indicate. Entries to reach us by Friday 28 June 1996.

Practical Wireless, June 1996
I've looked at many hand-held v.h.f. and u.h.f. transceivers in the past, so the Editor asked me if I'd like to try another one. That's when I was offered the chance to try a new one from the Icom stable.

So, let me start with what I found in the box. What did I think of this set? Ah well! You'll have to wait for my opinions while I describe it first!

The controls on the IC-T7E are in four main areas. The main keypad with 16 (some have four separate functions) keys takes over the lower middle of the front panel. Above and right of the keypad are the Band, Tone and H/L (High-Low and Set) buttons (all three are dual-function controls). The electronic power on/off switch is just above the keypad.

Hand-Sized

The IC-T7E is a small hand-sized transceiver that almost immediately fell into the right position in my left hand. I prefer the radio in my left hand, and I noted that it felt right without any experimentation at all. The transceiver sat on the heel of my left hand with the p.t.t. switch neatly under my left thumb. My fingers although curled around the set were not in any danger of pressing keys at the wrong time. A good start!

What astounded me was the p.s.u./battery charger. It's enormous compared to the rig! The output of 12V at some 200mA (nominal) is not enough to give full power on its own, but it looks as though it should.

If anything, I think the rig (including battery pack) is lighter than the charger. Mind you it pays to have a charger this size. I found I had inadvertently left it plugged in for about a week at one point and it wasn't even warm!

But back to the radio! It produces an incredibly clear audio signal, from what can only be a 25mm loudspeaker. I must also assume that the microphone is also somewhere behind that grill, as I cannot find a hole marked 'Mic'. The 'on air' reports I received from those who know my voice were that the transmit audio was life-like. So, the hidden microphone was obviously working well!

Combination Sockets

Nestling in the middle of the IC-T7E's top panel is the combination of 3.5 and 2.5mm microphone and earphone sockets (the microphone is 2.5mm). The manual provides a suggested circuit for wiring your own microphone and headphone. Interestingly enough, both...
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After seeing a copy of G1TEX's review, Dennis Goodwin of Icom (UK) sent us the following comments:

Thanks for letting me see a copy of the Icom IC-T7E review. I have nothing extra other than the fact the reviewer makes no comment on the price of the transceiver.

For a long time, Icom equipment has suffered criticism over high pricing, but although we've now managed to reduce the price of equipment, there's no mention of this (The IC-T7E is currently priced at £329, this is £100 less than our IC-W31E model in the review). Other competing models are considerably more expensive. So, come on, if we have to suffer adverse comments on pricing, please be fair and give good reports when we can reduce prices!

Dennis Goodwin

Editor's comment: The reviewer, G1TEX was unaware of the IC-T7E's price when he had the rig over Easter. When I had the price confirmed by Icom, the comments were that the transceiver was "Good value for the money...and I can't fault it at that price".

Rob Mannion G3XFD

My Opinion

So coming back to the original question, what is my opinion of the IC-T7E? In answer, I've a difficult job...just how can I pack my feeling into the time and space I have?

In fact, the transceiver is very capable and it's capable of far more than I'll ever need. I'm sure anyone would find that this set will suit whatever they wanted from a dual band handheld.

It's difficult to see how more functions and ease of use can be packed into a set (but you must read the manual to get all the information). I think the Icom IC-T7E is a rig to buy now and use for several years. The build quality would lead me to think it will give excellent service over that period.

I enjoyed using the rig for two reasons. I had a very capable rig that covered both 144 and 430MHz f.m. Additionally, I could verify that the dual-band antenna tuner unit that I looked at a few months ago actually does work with a single antenna and a dual-band transceiver.

My thanks go to Icom (UK) Ltd., Sea Street, Herne Bay, Kent CT6 8LD. Tel: (01227) 741741, FAX (01227) 741742 for the loan of the review unit which is available for £329 from Icom dealers.

Rob Mannion G3XFD

Practical Wireless, June 1996

Manufacturer's Specifications

<table>
<thead>
<tr>
<th>Category</th>
<th>Specification</th>
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<tbody>
<tr>
<td>General</td>
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<tr>
<td>Frequency Coverage</td>
<td>144.000 - 146.995MHz</td>
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<td></td>
<td>430.000 - 436.995MHz</td>
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<tr>
<td>Tuning Step rates</td>
<td>5, 10, 12.5, 15, 20, 25, 30 or 50kHz</td>
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<tr>
<td>Frequency accuracy</td>
<td>±5ppm (lower - 50°C range)</td>
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<td>Antenna connector</td>
<td>BNC 500</td>
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<tr>
<td>Battery pack</td>
<td>4.8 - 8.6 NiCd rechargeable or 4 x AA battery pack.</td>
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<tr>
<td>External power</td>
<td>4.5 - 16V (at a maximum of 1.3A)</td>
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<tr>
<td>Dimensions</td>
<td>122 x 57 x 28 (w. d.) excluding antenna</td>
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<td>Weight</td>
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<td>Usable temp range</td>
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<tr>
<td>Transmitter</td>
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<tr>
<td>RF Power</td>
<td>v.h.f. 4.0 (13.5V)</td>
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<td>u.h.f. 3.6 (13.5V)</td>
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<td>u.h.f. 1.3A High 0.6A low power (13.5V)</td>
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<tr>
<td>Modulation Mode</td>
<td>F3E (FM), variable reactance</td>
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<tr>
<td>Deviation</td>
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<td>Spurious emissions</td>
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<td>Microphone impedance</td>
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<td>Receiver</td>
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<td>Receive system</td>
<td>Dual conversion superheterodyne</td>
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<td></td>
<td>(1.6 ± 0.5MHz and 400kHz)</td>
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<tr>
<td>Sensitivity</td>
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<td>Squelch sensitivity</td>
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<td>Less than 30kHz, 4dB</td>
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<td>Image rejection ratio</td>
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<td>Audio Power</td>
<td>u.h.f. 140mA at 25W output or 60mA on power save</td>
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<td>u.h.f. 150mA (at 25W output) or 18mA on power save</td>
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<td>Receive Mode</td>
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<tr>
<td>Audio output socket</td>
<td>3.5mm 'stereo' (see text for limitations)</td>
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</table>

sockets are stereo type but only the tip and stem seems to be used in both cases. So, if you have stereo 'phones only one side will be 'live'. On the microphone plug a 3.5V supply is available to the ring connection, but doesn't seem to be used.

Under the power socket on the right hand panel of the rig is what I at first took to be the function button. That was until I found that the dual-band antenna tuner that covered both 144 and 430MHz was being used. It was at this point I found that the greatest part of the IC-T7E also has built-in dual tone multi-frequency (DTMF) and continuous tone sub-audible squelch (CTCSS).

If the other station has DTMF, then you can set the IC-T7E up to act as a pocket 'bleeper'. You can hide it away and on reception of a signal with the correct squelch tone, it will beep for up to 30 seconds. You don't have to concentrate on all incoming calls, or even listen out for your callsign.

Pressing the 'Scan' button for about one second sets the set scanning the range of the frequencies until the squelch has lifted. So, if a repeater uses tone squelch, you can find out what call tone it is, easily and with minimum fuss. The manual is simple (Once I had determined to read it!) and has easy to follow instructions. It contains illustrations of what to expect on the display when carrying out the operation described. In all I found it a good example of how to create a helpful and informative manual.

Reading The Manual

I gave up looking for the Function button to get the other functions for the buttons - score 'minus one' to the big-head who thought he at first took to be the function button. That was until I found that the battery of the battery pack.

It's becoming the norm with hand-helds to provide many ways of storing channels frequencies into memory. Once there they may be scanned, skipped, or listened to depending on the mode the rig is working in.

With the IC-T7E there's a simple 'Channel' operating mode available. With this mode of operation (this function is selected by pressing MR while powering the set on. Repeating the action sets the rig back to normal use). Only frequencies programmed into memories are actually used.

The simple 'Channel' mode makes life so much easier when different operators have to use the set on several frequencies. This is especially helpful when the frequencies may be on either 144 or 430MHz.

Memories can contain an independent mixture of frequency, band, tone and offset information. The Icom IC-T7E also has built-in...
This month continues with super low prices across the range. Competitors may match my prices, but who can match our standard of customer service?

<table>
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**YAESU**

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RRP £476
Deposit £29. 12 payments of £32.14. Cost of loan: £35.72

Yaesu FT-51R *FREE ADSMS SOFTWARE WORTH £399*
RRP £539
Deposit £49. 12 payments of £33.14. Cost of loan: £35.72

Yaesu FT-51R
RRP £539
Deposit £49. 12 payments of £33.14. Cost of loan: £35.72

Icom IC-775DSP
RRP £309
Deposit £49. 24 payments of £119.39. Cost of loan £263.12

Icom IC-775DSP
RRP £319
Deposit £49. 24 payments of £119.39. Cost of loan £263.12

Icom IC-736
RRP £199
Deposit £29. 12 payments of £119.39. Cost of loan: £132.10 or
Deposit £29. 24 payments of £65.13. Cost of loan: £255.12

Icom IC-706
RRP £119
Deposit £29. 12 payments of £82.65. Cost of loan: £91.87

Icom IC-820H
RRP £399
Deposit £69. 12 payments of £36.73. Cost of loan: £40.83

Icom IC-2710 *NEW*
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Deposit £99. 12 payments of £51.04

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RRP £649
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Yaesu YF-114SN 455kHz/2.0kHz SSBN Filter £84.00
Yaesu YF-114CN 8.2MHz/250Hz CWN Filter £94.00
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Kenwood DNU-3 Digital recording module...£99.95
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Icom FL-103 9MHz SSBN Filter £55.00
Icom MR-62 Mounting bracket £10.00

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Discount......£126.00
Total value...£993.00
Deposit (or trade-in)...£399.95
Balance (or trade-in)...£593.05

12 payments of £79.17. Cost of loan: £913.51. APR 19.9% or
24 payments of £40.62 Cost of loan: £244.90. APR 19.9%

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Example:
Total invoice value...£1284.65
Discount......£46.70
Total value...£1237.95
Deposit (or trade-in)...£399.95
Balance (or trade-in)...£838.00

12 payments of £108.68. Cost of loan: £1204.16
APR 19.9% or
24 payments of £65.20 Cost of loan: £404.80.
APR 19.9%

All the list price of the radio!

IC-706
Offer extended for one month!

Example:
Total invoice value...£1619.00
Discount......£126.00
Total value...£1493.00
Deposit (or trade-in)...£399.95
Balance (or trade-in)...£1093.05

12 payments of £111.17. Cost of loan: £1331.51. APR 19.9% or
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Maurice Schofield

G4WUP describes the PW Brassica, a vertical antenna that will fit in a 'cabbage-patch', and is suitable for most of the higher h.f. bands.

This antenna project was designed to fit in a small garden, hence the name 'Brassica' - 'Cabbage patch' antenna. It's actually a vertical monopole with loading coils and an 18.1MHz trap with a capacity hall.

The prototype, as designed, could be used on the 14, 18, 21 and 28MHz bands. On the 14 and 18MHz bands, no tuner is required, but the assistance of a tuner is needed on the 21 and 28MHz bands.

The Brassica should give an s.w.r. of better than 1.5:1 on both the 14 and the 18MHz bands. But on the 28MHz band the antenna only covers about 28.15 to 28.6MHz with a reasonably efficient coverage.

Have a look at the drawing of the overall antenna as shown in Fig. 1. The overall height is about 3.3m from the ground.

When cutting the various lengths of aluminium tube, leave some 50-100mm extra on the length of the topmost (12mm diam) section. This will be trimmed to resonance later.

It's important that the base of the antenna is close to the ground (within 25-50mm) and is insulated from the ground mounting pole. (You must also keep the grass trimmed around the base if it's on the lawn).

The two main coils are made from 6mm aluminium rod (or tubing) wound around a 45-50mm former. This should give an internal diameter of around 55mm after winding. Pull the coils to the length shown, hammer the ends flat and drill suitable holes as shown in Fig. 2 and Fig. 3.

Joining the antenna sections together (under the two large coils) are two Nylon 66 parts. The dimensions are as a guide and they should be made a tight fit on the aluminium tubing used. These items are shown in Figs 4 and 5.

Dimension B should fit inside the lower tube and dimension C inside the middle tube. It may be necessary to modify the sizes of the holes in the tops of the joiners to suit different diameter tubing.

The next part to be made is the antenna feed point adapter shown in Fig. 6. The main idea with this part is that the outer of the SO239 socket must be insulated from the bottom antenna element. It might be possible to modify the base of a CB 'Silver Rod' style antenna by taking the base loading coil out, but I haven't tried that.

The outer of the SO239 socket must be taken, via a thick wire, to a ground spike close to the bottom of the antenna. This ground spike must make a good (low resistance) bond to earth to be effective.

Adjustments And Tuning

Now once you've built the antenna, it's come to the time of adjustments and tuning of the various sections of the antenna. After assembling the three main vertical elements and coils mount the antenna in the operating position.

Fig. 1: The PW Brassica as shown must be mounted within 25mm of the ground for best results. You could use the mounting pole as the earth connection as well.
Fig. 3: Details of the upper coil. Made like the lower coil, (Fig. 2) it should also have an internal diameter of some 55mm.

Fig. 4: The Nylon 66 joiner for the two lower sections of the antenna. Dimension B to be a tight fit inside the lower tube.

Fig. 5: The Nylon 66 joiner for the two upper sections of the antenna. Dimension C to be a tight fit inside the lower tube.

Fig. 6: The base plate is made from a block of aluminium with an insert of Nylon 66 (or other insulating material) for mounting the SO239 socket on. The outer of the socket must not touch the metal section, but must be taken to a good earth point.

You must now trim the topmost section of the antenna (without the trap section) to the centre of the 18MHz band. Or alternatively to the frequency of interest in the 18MHz band.

To tune the antenna, trim 5-10mm length off the top element while checking the s.w.r. above and below the frequency of interest. When the tuning is correct the s.w.r. will be at the lowest point at the centre frequency. At frequencies above and below the centre tuned frequency the s.w.r. will have risen a little.

Now you can fit the trap and capacity hat section. These are shown in Figs. 7, 8 and 9. The ‘top-cap’ has the effect of allowing the whole antenna to tune to the 14MHz band. The trap itself is pre-tuned and needs little in the way of adjustment.

When fitting the vertical (9mm diameter) rod start with it a little overlong. To tune the antenna to the section of the 14MHz band the length of this section is adjusted, a few millimetres at a time, to give the lowest s.w.r. within the 14MHz band. Again the s.w.r. will rise above and below this centre frequency.

With my prototype Brassica I’ve had contacts over most of the world. So just because you only have a cabbage patch doesn’t mean you can’t ‘propagate’ well.

Maurice Schofield has said that he is willing to manufacture and provide the various pieces that go to make up the PW Brassica. For the cost of the various sections please contact Maurice direct at 15 Holm Oak Gardens, Broadstairs, Kent CT10 2JF.
Auroras are a magnificent sight in the Polar night sky, taking the form of beautifully coloured glows gracefully changing and sweeping in and fro like shimmering curtains. The colours are usually greens and reds, although on occasions blush tints can be seen.

Sometimes, very spectacular displays can consist of streamers of colours. These can change their shapes quite noticeably over a period of a few minutes.

Few people who have seen an aurora can fail to be moved by their magnificence. Unfortunately, most of us who live in the United Kingdom, are too far south to see one. (Although there was a remarkable event in the Autumn of 1989 which produced a pink, diffuse sky and was visible all over the south of England).

However, even if you’ve not seen the beautiful displays, you can get other benefits! This is because to radio amateurs, an aurora means that v.h.f. radio propagation will be greatly affected and there’s the possibility of many DX contacts to be made.

Dramatic Effect

An aurora can have such a dramatic effect on radio propagation. So it’s interesting to look behind the scenes to see exactly what causes them and how they happen.

Auroras have been seen in the skies since the very earliest times. And although they have been studied down the centuries there are still very many questions to be answered.

The way in which auroras occur is very complicated, and it has only been since the advent of satellites that some of the vital data has been able to be collected.

Until the 1950s and the early 1960s very little was known about the process behind auroras. But, even with satellites, the data which is collected is not always easy to analyse and interpret.

In fact there are still many aspects about auroras which are not fully understood. Indeed not all the authorities on the subject agree with one another. Various theories are put forward by different scientists and then are modified in the light of new data, from month to month.

The effects of auroras on radio are not well documented in the books on propagation. At most they give a short explanation of some of the results.

Very few books investigate the causes. This is possibly because they have not been understood at all well for long. Also the way in which they occur is very complicated.

In fact it was the lack of information which started me investigating them as a home project. The results are given here, and hopefully the description will give a basic understanding of the topic which I found very fascinating.

Magnetic Storms

Let’s take a look at the historical perspective where it has long been noted that there’s a correlation between magnetic storms and visible auroras. Then in 1741, the Swedish scientist Celsius, famous for his development of the centigrade scale discovered that the auroral images aligned with the magnetic field.

Other observations were also made and one important factor discovered, was the number of sunspots. These were first observed by Galileo back in 1611.

Since Galileo’s discovery, the number of sunspots has been continuously monitored. During the years 1645 and 1715 a distinct minimum was noted, and it was also found that very few auroras occurred during this time.

A study of auroras was made by Stormer in the early part of this century. In his studies, published in 1911, he put forward one of the earliest theories for their formation, saying that they were caused by the motion of charged particles in the geomagnetic field.

However, the main advances occurred with the advent of satellites. Some of the first were sent aloft in 1958. The American scientist James Van Allen studied the results from them and gave his name to some of the major ‘players’. And of course, the sun is the ‘lead player’!

Sun Important

The sun is very important, being the source of heat for the earth on which we live. In fact it’s a phenomenal source of energy of all forms giving very large amounts of energy to us even at a distance of 93 million miles.

To be able to provide the heat, the surface of the sun reaches a phenomenal temperature - 6000°C. However, the sun spots are comparatively cool - only about 4000°C!

In fact it’s because the sun spots...
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39
Those Amazing Auroras

Continued from page 38

Fig. 3: The mechanism of an aurora.

Fig. 4: Backscatter (see text).

Both beams are directed into the auroral area and not at each other.

Disturbances on the sun's surface. They vary in size, some being quite small compared to the others. But by any standards they are all colossal when compared to anything on earth.

Apart from varying in size, solar flares also vary in their formation and their effects. Some can be clearly seen using the correct visual apparatus, which projects an image of the sun onto a screen.

Warning: Never look directly at the sun, even through sunglasses or other dark material. (And don't even think of looking at it through a telescope).

Others flares cannot be seen, but instead they emit energy in the radio spectrum as well as X-rays and colossal amounts of plasma. In fact these 'invisible' flares are the most likely to cause auroral events.

Upper Reaches

The upper reaches of the atmosphere are also very important. This is where, extending up to altitudes of about 400km above the earth, the familiar D, E and F ionospheric layers, see Fig. 1, which give the normal h.f. propagation over long distances, are to be found.

Above the D, E and F layers are the areas of the magnetosphere, Fig. 2, where the earth's magnetic field extends. This magnetic field extends many thousands of kilometres out from the earth, but it's influenced by many factors from outer space.

Even so, a simplified illustration of the earth's magnetic field can treat our planet like a bar magnet. This magnet has its North pole inclined at about 11.5° away from the true northsouth axis giving the magnetic north at about 78.5°N 29°11E and the south pole at 78.5°S and 111°E.

The magnetic field provides many functions. And the most obvious is that it's possible to use it to give an approximate indication of north and south. And although it's not particularly accurate and varies with time, travellers have used it for centuries, and even today with sophisticated satellite forms of navigation, the magnetic field is still widely used.

As Fig. 2 shows, the earth's magnetic field also extends out from the earth, reacting with the solar wind. The two interact, and the solar wind compresses the magnetic field on the sunward side of the earth.

However, on the other side of the earth the field becomes distorted, as shown in Fig. 2. In general the magnetic field prevents the particles from the solar wind from entering the ionosphere, however some can enter through the cusps in the polar regions.

Van Allen Belts

One important area of the magnetosphere are the Van Allen Belts. These consist of two 'doughnut' shaped areas as shown in Fig. 2.

The lower of the belts extends from about 1000 to 5000km above the earth. While the outer one is between about 15000 and 25000km. The Van Allen Belts consist of areas of electrons or protons with a surprisingly high energy which are trapped in the earth's magnetic field. The inner layer contains protons whilst the outer one contains electrons.

Solar Wind

Under normal conditions the earth's magnetic field is able to deflect the solar wind and the magnetosphere is not disturbed. However, on occasions, the solar wind increases and the magnetosphere is disturbed.

Solar flares are one of the main causes of disturbances. And as their frequency is closely related to the sunspot numbers it's found that they reach their peak just after the sunspot maximum.

Another source of solar wind is a coronal hole, a phenomenon which can occur even during solar minimum conditions. This explains why ionospheric disturbances occur even during periods of the absence of any apparent solar activity in terms of the number of sunspots visible.

When the solar wind increases a number of effects are noticed. One is that visible auroras are produced.

Visible auroras occur because the Van Allen Belts become overloaded with particles. This results in many of them 'spilling out' along the magnetic lines of force towards the earth. As they do so they collide with other particles.

Ionised atoms may then collide with other particles causing the molecules to split or they may combine with free electrons. In either Practical Wireless, June 1996

are slightly cooler that they emit less light and appear as dark spots when an image of the sun is projected onto a card. However, these temperatures are nothing when compared to the core of the sun where the energy producing nuclear fusion reactions occur.

At the sun's core, the temperature is estimated to reach 10 000 000°C. Although this heat energy takes in excess of a million years to reach the surface of the sun.

In view of its colossal temperature, it's hardly surprising that the sun can be very violent often reaching the earth. Fortunately, it's affected by any magnetic fields and plasma is conductive, and as a result their electrons. Because of this the sun is a steady stream of material called plasma which streams out from the sun.

Hydrogen And Helium

Plasma consists mainly of hydrogen and helium molecules, and they are so hot that they are ionised, losing their electrons. Of course the plasma is conductive, and as a result the sun can be very violent often throwing off copious amounts of plasma. And in fact there is a steady flow of material called plasma which streams out from the sun. And although it's not enough to cause auroral events.

Solar Flares

Solar flares are also very important. These are actually enormous interruptions on the sun's surface. They vary in size, some being quite small compared to the others. But by any standards they are all colossal when compared to anything on earth.

Apart from varying in size, solar flares also vary in their formation and their effects. Some can be clearly seen using the correct visual apparatus, which projects an image of the sun onto a screen.

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Ionised atoms may then collide with other particles causing the molecules to split or they may combine with free electrons. In either...
instance, light can be produced (the colour depending upon the elements involved).

In general the auroral colours are white, green and red. This is a result of the nitrogen and oxygen which are usually involved in these collisions.

As the particles are charged they represent a current. This can result in a number of other effects being exhibited. In the late 1980s a particularly intense aurora resulted enormous current surges on the power lines in North America. This caused very large areas of the continent to be blanked out and a large degree of embarrassment and cost to the electricity companies.

Radio Auroras

The way in which radio auroras occur is very complicated. A vast number of different effects occur, some of which are in the upper reaches of the atmosphere while others are at great distances away from the earth.

As might be expected there are many stages to an aurora, and conditions vary widely during its course. The h.f. bands probably vary most of all, being enhanced sometimes, and totally blacked out at others.

After a flare has occurred, many effects are noticed. And one of the key elements in an aurora is that the plasma sheet on the side of the earth away from the sun becomes ‘pinched’ due to the variations in the plasma flow.

The ‘pinching’ effect draws plasma back up towards the earth as shown in Fig. 3. It then enters the upper reaches of the atmosphere at the north and south magnetic poles.

The particles pass through the outer parts of the ionosphere with little effect. However, as the altitude decreases they reach the E layer and things begin to happen!

In the E layer the particles start to collide with the gas molecules. This increases the levels of ionisation in these areas to a very large degree.

The result is that the ionisation reflects signals at much higher frequencies than normal.

Communications can be established well into the v.h.f. portion of the spectrum and sometimes reflections have been detected at frequencies up to about 1000MHz. (This top figure is somewhat exceptional although the normal maximum for amateur communications is around 430MHz.)

It's unfortunate for h.f. enthusiasts that many of the plasma particles travel on downwards into the D layer. This is where (again) the levels of ionisation are greatly increased.

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The increased level of ionisation serves to absorb radio waves at much higher frequencies than would normally be affected. In this way much of the h.f. band communications can be blacked out.

During the course of a normal aurora the polar regions are affected first. Usually the polar cap absorption is confined to latitudes greater than 60° although during some of the larger events this will extend a little further towards the equator.

**Events Very**

Although different auroral events will vary widely from one to the next they will have many similarities. And often the event will commence with a number of small flares.

The small flares cause the level of solar radiation to increase and this brings an improvement in h.f. band conditions. Coupled to this, the solar noise also rises.

The small flares are only a precursor to the main flare which occurs causing a sudden ionospheric disturbance. At this point the h.f. bands close for a short while. However, they soon recover as there's an increase in solar flux.

About 20 to 30 hours after the original flare the solar wind hits the earth causing a magnetic storm. The h.f. bands fail and a full aurora starts.

Propagation on v.h.f. will then be enhanced and contacts can be made over distances of a several hundred kilometres. Then having reached a peak the aurora ends and the h.f. bands slowly recover, with the low frequencies being usable first.

For the h.f. operator there is little that can be done during an aurora except to patiently wait while the bands are recovering. This (unfortunately) can take up to a week before they are back to the state they were before the storm.

However, for the v.h.f. operator there are exciting possibilities of DX, and contacts can be made over many hundreds of kilometres. But, as the ionisation is concentrated around the poles communication is only possible to certain latitudes.

In the UK v.h.f. operators in Scotland, Northern England and Northern Ireland are best placed. Despite this, it's possible for stations in Southern England to use it when there is a large aurora.

Interestingly though, stations in Southern Scotland and Northern Ireland seem to be well placed for making some of the longest distance contacts, although stations further north will see more auroras.

**Beams Essential**

Beams are essential for auroral working. They should be turned towards the north, pointing into the auroral zone. Signals will be reflected back, i.e. using back-scatter. 'Back scattering' means that the beam heading for the optimum signal will not be in the direction of the station being contacted. Indeed, the direct path may be more likely to be off the back or side of the beam as shown in Fig. 4.

Auroral propagation distorts any signal badly. Speech transmissions can be very difficult to copy, particularly wide band modes. However, on occasions s.s.b. can be used. Naturally c.w., occupying a very narrow bandwidth as it's very resilient to distortion. So, because of this, c.w. is by far the best mode to use.

But even c.w. becomes distorted, having a very rough tone superimposed onto it. This can vary from one aurora to the next, or even during the course of an event.

Typically, signals flutter very rapidly because of the changes occurring in the ionosphere. This flutter can even be so fast that it appears as a low frequency tone or buzz up to 50 or 60Hz.

In addition to the auroral tone, there's a Doppler shift added to the signal. This is caused by millions of plasma particles entering the ionosphere. Each particle will give a minute point for reflection and each will have a different velocity. This means that the Doppler shift will have a spread of frequency shifts, resulting in the very distinctive hissing sound. As a general rule the average frequency shift at 145MHz is about 500Hz.

**Nature Simplified**

My quick look into the nature of auroral events has been simplified to a large degree. The full explanation is not fully understood by those involved in its study full time and I've no doubt that any of you who saw the recent BBC TV 'Horizon' programme on BBTV found it as fascinating as I did!

What we do know about auroral effects is that it's caused by an exceedingly complicated interaction between a large number of effects. Research involves a complicated mix of astronomy, physics and radio. But despite its complicated nature any radio amateur or short wave listener can benefit from a study of the nature of propagation. It's fascinating!

Even though the basic concepts of auroral propagation have been understood for many years there's still a vast amount to learn about the subject. In fact in writing this article I have discovered just how little I know!

PW
All is not 'square' in locator 'circles'!
Patrick Allely GW3KJW explains the mysteries behind the various locator systems.

My locator is IO72p, or if you prefer the old system, it is XM17j and my WAB location is SH122”. That statement, and hundreds of others similar, heard regularly and especially on the v.h.f. bands, have become accepted as part of the mystique of amateur radio.

The 4, 5 and 6 symbol codes mean a lot to some people and absolutely nothing to others! They are the cause of great confusion and listening around the bands, and I find that surprisingly few people know how to relate a geographical location to a locator code.

Once upon a time, when radio amateurs spoke to each other, not only did they give their name, but also the name of their location. Or they stated its distance from the nearest well known place. For instance, I might say, 'I am located 15km south west of Pwllheli in the village of Y Rhiw'. And to anyone with a reasonably good knowledge of my part of Wales, such information is sufficient.

However, to the average amateur, this does not convey any useful idea of location. Additionally, the listener's perception of the correct pronunciation of 'Y Rhiw or Pwllheli' may vary so widely from the true one as to make it unrecognisable.

To avoid the location problem on the h.f. bands, it would be easier to say, 'I am located in North Wales'. This is precise enough for, say an American, who states that he is located in Texas, a state bigger than the United Kingdom!

On v.h.f., amateurs desire to know what distances they can work. They like to 'collect' squares and they wish to know bearings.

Generally they don't wish to struggle to understand a location known in a tongue foreign to them, especially when band conditions may be marginal.

Locator systems obviate the necessity for tackling sometimes 'jawcracking' place names and speed up the whole process, although my knowledge of geography suffers somewhat.

### Longitude & Latitude

Two of the locator systems in use are based on longitude and latitude and can easily be written into a simple computer program. But, more satisfactorily (and with a little bit of patience) can also be worked out with pencil and paper. The third system is based on a true grid system.

The systems are:
1: The Maidenhead of World Wide Locator system.
2: The European Locator system.
3: The Worked All Britain locator system. (This is a simplification of the Ordnance Survey National Grid, and used as such, is not an accurate means of establishing a precise location).

To understand any of the systems, you must have the basic knowledge of how to read a map. You must also be able to obtain your bearings in degrees and minutes.

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**Fig. 1:** ‘Fields’ of Western Europe (see text).

**Fig. 2:** Showing numbered ‘squares’ (see text).

**Fig. 3:** Showing the final grid of the Maidenhead System (see text).

Continued on page 44
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The European Locator System, which is now little used came into being in 1969 and is very similar to the Maidenhead. (I'm including it in this article because a number of "diehard" v.h.f. enthusiasts dislike the Maidenhead and insist on using the older system. Fortunately, for all intents and purposes, the systems are interchangeable and conversion can quickly be made!).

Since the system was intended for use in Europe, there being comparatively little interest in long distance v.h.f. communication in other parts of the world, the European system is not valid outside Europe. The European system is also based on a series of "squares". Its basic unit being bounded by 1°N by 2°W.

In the European system "squares" are designated by two letters using all 26 letters of the English alphabet. They commence with A bounded by the reference co-ordinates 40° to 41°N and 0° to 2°E then working upwards and outwards, as in Fig. 5. The 'squares' are subdivided into 80 smaller squares in a grid of 8 upwards and 10 across each smaller square being 7.5' by 12'. These squares are number 1 to 80, as in Fig. 6.

Finally, the small 'squares' are again subdivided into 9 by forming a grid of 3 by 3. Each small 'square'
survey National Grid and is not based on longitude or latitude. The origins start over 200 years ago when mainland Britain was mapped accurately for military purposes and a grid system was devised to correctly locate any spot. This system, refined and corrected is still in use today and is based on squares which are true squares. The British Isles are divided into 500km squares each labelled with a single letter from A to Z, missing out the letter I to avoid confusion and set in a grid of 5 by 5. The point of reference being the bottom left hand corner of the S square which is in the Atlantic south west of the Scillies (see Fig. 8).

Each of the big 500 by 500km squares is again divided by 25 smaller squares in a grid of 5 by 5 and lettered in the same way. And it follows that there's now a grid of 100 by 100km. The 100 x 100 area is designated by the primary letter for the 500km square and the secondary letter from the secondary grid, ie SH. This 100 x 100 square is divided again by 100 giving a grid of 10 x 10, reducing the area to 10km x 10km. These squares are numbered 0 to 9 both vertically and horizontally. The final position is indicated by combining the number east of the lettered square with the number north of this square. or example, SH22 will be 20km to the east of the SG/SH border and 20km north of the SN/SH border. This puts a location within an area of 100 square km - in fact, two locations in SH22 could be 14km apart (this is not an accurate system of location and was not intended to be).

To continue with the Ordnance Survey National Grid and show it's precise accuracy, the 10 by 10km grid is again divided by 100 in a 10 by 10 grid. Each area is now being 1km by 1km and this again is divided by 100 leaving a final area of 100 x 100 metres, precise enough for most purposes. (As a matter of interest 52°48’50”N 4°40’30” corresponds to SH228279).

Only The UK

The WAB system can only apply to the United Kingdom. And I often feel slightly irritated when I hear UK amateurs asking Irish amateurs for their WAB location! Fortunately, the Irish are very tolerant and take the mistake in good humour. One day, no doubt, an amateur from Dublin or Cork, perhaps, will ask a UK amateur for his 'Worked All Ireland' locator!

Once you have established your own locator and know the locator of a distance station it's a simple matter to then calculate the distance and the relative bearings. This can be done with a computer, pocket calculator or with a set of mathematical tables, the formula being:

$$\text{Cos}(D) = \{\text{Sin}(A) \times \text{Sin}(B)\} + \{\text{Cos}(A) \times \text{Cos}(B) \times \text{Cos}(L)\}$$

where

- $A$ = Home latitude
- $B$ = Distance latitude
- $L$ = Longitudinal difference between $A$ and $B$.
- $D$ = The angle of arc between $A$ and $B$

1' of arc = 111.1km or 69.00 miles

1' of arc = 1.85km or 1.15 miles = 1 nautical mile

Knowing $D$ then the bearing can be calculated using

$$\text{Cos}(C) = \frac{\text{Sin}(B) - (\text{Sin}(A) \times \text{Cos}(D))}{\text{Cos}(A) \times \text{Sin}(D)}$$

For stations in the Southern Hemisphere latitudes must be shown as negative. Cos(L) is positive between 0° and 90°. Negative between 90° to 180°. (Sin(A) and Sin(B) are negative in the Southern Hemisphere).

Finally, although it looks a little complicated...it's not. A simple pocket calculator with sine and cosine functions will do all the hard work and provide an accurate answer. Happy locating!
I know what you're all thinking - not another t.r.f. set! But the answer is yes, and for good reasons. One, it is almost impossible for this circuit not to work (great for beginners). And two, you have tried getting hold of intermediate frequency transformers (i.f.t.) suitable for use in valve designs? They're all but unobtainable.

Before I describe the circuit I ought to say a little about tuned radio frequency (t.r.f.) receivers and regenerative detectors. Tuned radio frequency receivers are so called because all r.f. amplification is done at the incoming signal frequency.

The t.r.f. is unlike superhet designs - which I shall mention next time. In the circuit, a r.f. amplifier of course, most of the radio frequency amplification takes place at a constant, fixed tuned intermediate frequency.

To be pedantic, the design I'm describing is not a t.r.f. receiver because it has no r.f. amplifier. It's actually simply a detector, albeit a regenerative one. Connect the circuit to an audio amplifier and you have a regenerative receiver. But it can be easily turned into a t.r.f. by adding an r.f. stage.

**Regenerative Detectors**

Regenerative detectors are usually based on the so-called 'grid-leak detector'. Add a little positive r.f. feedback and two interesting side-effects appear.

One side-effect is that the sensitivity of the detector increases. That is, a much smaller r.f. signal will be detectable.

The second side-effect is that the detector becomes more selective. That is, it is possible to increase the selectivity of the detector without affecting its sensitivity.

**The Circuit**

A few feet of wire should suffice for the aerial. This is capacitively coupled, via C1, to the tuned circuit L1/C2.

The capacitively coupled method of coupling is not really suitable for longer aerials which are better coupled via an over-wind of a few turns on L1.

Connect one end of the over-wind to earth and the other to your aerial.

Resistor R3, is the 'grid-leak' after which the detector is named. Variable resistor R1, allows the screen-grid voltage of V1 (and hence the amount of regeneration) to be varied.

The valve then amplifies the demodulated audio. On reaching the anode of V1, any r.f. signal is shunted to ground by C6 leaving just audio frequencies to pass through C7 and on to the following audio amplifier.

The h.t. supply should be taken from the positive of C2, shown in Fig. 1, of my March column. You can wire the EF80's heater in parallel with the other valve heaters shown in Fig. 3 of the same article.

You can use this circuit with a different amplifier. This is providing you can find 6.3V at 300mA for the heater and some 80 to 120V at a couple of mA for the h.t.

If the available h.t. is greater than 120V then it's possible to increase the voltage of R6 until the voltage across C5 is within the range 80 to 100V. If you do this then you must increase the wattage of R6 to 1W and increase the voltage rating of all the capacitors in the circuit to at least that of your source of h.t. For safety's sake, if in doubt, don't do it!

**Power Supplies**

While on the subject of power supplies, it has been pointed out that the power supply shown in my March column has no fuses. The mains supply should always be fused at no more than 1A and preferably by a fuse within the mains plug itself.

In addition, you can put a h.t. fuse rated at 250V/100mA in series with the secondary of transformer T3, shown in Fig. 1, in my March column. This will protect the transformer in the unlikely event of D1 or D2 going short-circuit.

**Tuning Coil**

The inductance L1, despite its importance in the circuit, is wound on a rather familiar item. I used the cardboard tube from an empty paper kitchen roll.

And although this is a long wave receiver there's no reason why L1 cannot be wound to cover other frequencies. However, the lack of selectivity will be much more of a problem on the higher frequencies than on long wave, especially after dark.

For those of you who wish to experiment I'll now go through the design procedure for L1. It's not difficult!

The receiver's frequency coverage is determined by the maximum and minimum capacitances that appear in parallel with L1. Naturally, the maximum value of the tuning capacitor will, to a very great extent, determine the lowest tunable frequency.

However, the highest tunable frequency cannot be predicted as easily as the lowest. The highest frequency is determined by all the stray capacitances in this part of the circuit plus the minimum capacitance of tuning capacitor C2.

For simplicity, you can ignore the stray capacitances. And if things don't work out quite right add or remove a few turns of wire.

**Coil Designs**

When I designed my prototype coil I took the hint from commercial designs. I decided that BBC Radio 4 ought to be received with C2 at about half-mesh, say 250pF.

The inductance of L1 can easily (honestly) be worked out by re-arranging the formula for resonance:

\[ f = \frac{1}{2\pi\sqrt{LC}} \]

Where \( f \) is the resonant frequency, \( L \) is the coil inductance in Henries and \( C \) is the tuning capacitance in Farads.

Re-arranging provides:

\[ L = \frac{1}{4\pi^2 f^2 C} \]
Practical Wireless, June 1996

Substituting \( C = 250 \mu F \) and \( f = 198 \) kHz (the frequency of BBC Radio 4 from Droitwich, for the benefit of readers living abroad) gives a value for \( L \) of 0.002584 H or 2584 \( \mu H \). It's usual to work in micro-Henries when dealing with c.r.f. inductors (as I did for the prototype, to avoid all the zeros after the decimal point.

All that's left to do now is to work out how many turns are needed to give an inductance of about 2500 \( \mu H \). Notice, you can ignore the cathode tap, it isn't going to affect the resonant frequency to any degree.

There are complex formulas for winding coils but I began with Wheeler's formula for single layer coils.

\[
L(\mu H) = \frac{r^2 n^2}{9 \pi x + 10x} 
\]

Where \( r \) is the radius of the coil, \( l \) is the length of the winding and \( n \) is the total number of turns. The measurements are in inches and the inductance is given directly in micro-Henries. Notice, you can ignore the cathode tap, it isn't going to affect the resonant frequency to any degree.

Wheeler's formula is accurate to 1% and that's good enough for me. Masochists with a penchant for imperial measurements can still use the formula with accurate inductor design if they get hold of a second-hand copy of the Radio Designer's Handbook by F. Langford Smith. (Incidentally this is an excellent book for theory anyone who can handle simple maths).

All these formulas use imperial measurements. Rather than give the metric equivalents, which are decidedly more messy, it is easier to convert the coil dimensions and use the formulas as they are.

Once you know the required inductance and have measured the radius of your cardboard kitchen-roller former (0.8 inches, in my case) two unknowns remain: the length of the winding and the total number of turns.

To the rescue comes a less well known version of Wheeler's formula in which the length of the coil is replaced by the total number of turns divided by the turns per inch. The formula is quite a mouthful because solving for \( n \) leads to a quadratic equation.

\[
n = \sqrt{\frac{4L}{\pi (l^2 - (2.6l)^2)}}
\]

The new term \( t \) is the number of turns per inch and \( l \) is still in \( \mu H \). If you use thin insulated wire, as I did for the prototype, then you'll only manage about twenty turns per inch. Fortunately, plugging-in the numbers gives a coil with 1560 turns, that's nearly 80 inches long! The only possibility of ending up with a sensible sized inductor for long wave use is to use a multi-layer coil.

Formulas for multi-layer coils are monstrous by their absence, the first mention of multi-layer coils I chanced upon was in the 1947 edition of the ARRL Handbook. It's quite simple, even if it's a touch inaccurate.

Where \( a \) is the mean diameter of the coil in inches, \( b \) is the length of the winding in inches, \( c \) is the radial depth of the winding in inches and \( n \) is the number of turns.

**Basic Program**

You should forget any chance of re-arranging that lot to solve for a coil design. I cheated and wrote a BASIC program which used a couple of FOR loops.

The outer loop varied the number of layers and the inner loop varied the coil length (and so the total number of turns) in steps of one wire diameter. When the inductance reached 2500 \( \mu H \) the program stopped.

My 'Basic' method produced a coil 5.2 inches long with four layers giving 416 turns in total. But beware, it's quite difficult to wind a multi-layer coil on a cardboard tube. You really need some end cheeks, a roll of sticky-tape and a lot of patience to wind one properly.

My ancient ARRL Handbook says that the cathode tap should be about 10% of the total number of turns on the coil. But that figure consistently gave me too much regeneration. My 'Basic' program worked up to 100% regeneration but the valves of yesteryear on which this rule-of-thumb was based. So I tried a 5% tapping point and this gave much better results.

Inductors for medium wave and higher frequencies need far fewer turns and so the re-arranged Wheeler's formula will give sensibly sized coils. For example, a medium wave coil (about 200\( \mu H \)) will only need a single layer of 140 turns on a 1.8 inch diameter tube.

**Adjustment Compromise**

The adjustment of Ri is somewhat of a compromise. As the screen grid voltage rises the gain of the valve increases and so does the amount of regeneration.

In addition, the operating point of the valve varies and this results in a change in the de-modulation characteristics. (The point of maximum regeneration is not necessarily the best point for detection).

To find the best compromise first disconnect the cathode of V1 from the tuning coil and connect it directly to h.t. Negative use as much aerial wire as you need to receive a station at good strength. Then adjust Ri till the demodulated signal sounds the best. The mark the setting of Ri.

Next, move V1's cathode back to the tuning coil. Then adjust Ri to the point at which the stage just oscillates.

Compare the two settings. If they are far apart change the cathode tapping point on L1 by a few turns. Then see at what setting of Ri the stage just oscillates. Repeat the procedure until the just-oscillating setting is reasonably close to the best demodulation settings.

One last thing, in normal use don't let the detector oscillate. If it does then it behaves like a tiny transmitter and may cause interference to neighbouring receivers! (As the BCC's Captain Eckersly used to say in the 1920s "Please don't do it"!).

For anyone wishing to experiment with either c.r.f. receivers or regenerative detectors I recommend getting hold of radio books published in the late 'forties or early 'fifties. The yearly ARRL Handbooks are one example. Later books concentrate on superfet designs and have little useful information on c.r.f. sets.

*Note: There's a classic c.r.f. design in the older RSGB Handbook (4th Edition), published in the 1930s. It's also a 'sure starter'. Editor.*

**Closing Time**

Before I put the shutters up this time I can make a plea for some information. Mr D. Long, of Warsan祠, is trying to find out about a Savoy radio. The name may be the manufacturer's name or the name of the model. And a rather unusual set has made its way into the hands of Robert Usher, of Medstead, Hampshire. It's a c.r.f. set type 74, made by Samwell & Hutton of Ilford. Rather interestingly its serial Number is 1. Any information on either set would be most welcome.

So, until it's my turn in the shop again I'll say cheerio. Please keep your letters and E-mails coming. You can send your letters to me either via the P.H. offices, via E-mail to phil@aldpark.demon.co.uk or direct to me at: 21, Scotts Green Close, Scotts Green, Dudley, West Midlands DY1 2DX.

A simple regenerative detector. Phil Cadman G4JCP says it's easy to build and provide good results. Build it and re-discover 'valved' radio!

Cheerio from Phil, see you in September.

**Fig. 1**

A simple regenerative detector. Phil Cadman G4JCP says it's easy to build and provide good results. Build it and re-discover 'valved' radio!
Putting Antennas to Good Use

G3MCK looks at a variety of ways of bypassing the need to apply for planning permission for your antenna system.

S

Success in amateur radio depends on the antenna, and for some amateurs erecting any antenna is a real problem. This is particularly true for those who live in areas where the planning restrictions appear draconian.

However, take heart, all is not lost! With a little thought and cunning you may be able to steer your way through what, at first, may appear to be insurmountable obstacles.

The antennas described in this article are unlikely to either cannot be seen, or are unlikely to be seen, or if visible are unlikely to upset the local authority planning officers. However, before looking at examples of antennas, provided it's not more than 3m (10ft) to those of us who believe in the superiority of the imperial system higher than the highest part of the house. Also find out what has already been allowed and what is accepted by common usage. With this background information you can now look at some possible solutions.

Invisible Antenna

The obvious members of the class of 'invisible' antennas, are all indoor antennas. This type of antenna can be surprisingly effective. The general rule with invisible antennas is to get them as high as possible. This usually means putting them in the roof space.

For example, some authorities allow an outside TV/f.m. antenna, provided it's not more than 3m (10ft) to those of us who believe in the superiority of the imperial system higher than the highest part of the house. Also find out what has already been allowed and what is accepted by common usage. With this background information you can now look at some possible solutions.

No Need

First of all it is essential to realise that you do not need to apply for planning permission to erect an antenna. If you erect one without permission nothing will happen unless someone makes a complaint.

Even after a complaint is made, unless the planning authority upholds it, you will be allowed to keep your antenna up.

Recognising this fact opens up a viable approach to antenna erection in one of three classes.

Namely these classes of antennas are: ones that are S-meter benders but they will enable you to radiate some signal. And, with care and good luck, it may be a good signal.

Closely related to indoor antennas are those which are wrapped round the outside of your house. For instance a dipole supported just clear of the barge boards or hung under the eaves. See Fig. 1, for an example of this type.

Unhappily this class of antennas is more likely to happen unless you want to wrap around the roof-space and feed it through a good a.t.u. connected to a good earth. It may be difficult to establish a good earth so there can be merit in using doublots or dipoles.

But if you use a dipole do not be surprised if the bandwidth is lower than expected and that the S.w.r. is higher than expected. Although there is one big advantage of indoor antennas - they are protected from the weather so they can be made from flimsy material. Also they are accessible so are easy to adjust.

For instance, one class of antennas is the 'inverted L' dipole hidden on the bargeboards of a building. Use insulated standoffs as support points.

Fig. 1: An inverted 'L' dipole hidden on the bargeboards of a building. Use insulated standoffs as support points.

Fig. 2: A low visual impact antenna wire with a remote a.t.u. could be the answer. For security the a.t.u. should be inside a secure building at the bottom of the garden.

Fig. 3: Burying the centre of an inverted 'V' antenna in a tree doesn't seem to harm the signal much, as long as the ends are in the clear. The house bricks keep the antenna stretched but allow movement when the tree sways.
to cause interference problems, but it's surprising what can be done with filtering and reducing power.

**Low Impact**

There are antennas that have a low visual impact. The classic example is a piece of wire from the chimney to a convenient tree or pole as shown in Fig. 2.

I've shown an inverted 'L' but it's possible that a dipole (trapped or straight) or G5RV is considered to have a sufficiently low visual impact. This solution assumes that you already have a tree for support at the far end. If you have to erect a pole then you are probably in the area of having to apply for planning permission.

Not only is the G5RV almost invisible, but there's also some doubt whether it constitutes a 'development' in the sense of planning permission. But remember, for this class of antenna to work well, a good a.t.u. and earth is required.

In a future article I will look at antenna tuning units, but for the moment you might like to seriously consider making your own. Use a parallel tuned circuit and link coupling, the older handbooks give plenty of guidance.

If you can erect a dummy TV/f.m. antenna this could be used as the support for an inverted-V dipole which can be made virtually invisible by using thin wire. Do remember to put some sort of TV/f.m. Yagi on top of the pole which you have clamped to the chimney to support your antenna.

People expect poles on chimneys to be topped with Yagis so don't disappoint them! If you have no front garden a sloper is another possibility.

Finally if all else fails run a length of coaxial cable to the top of your dummy TV antenna. Don't connect it, just tune the coaxial cable as a random length wire antenna.

Inverted-V antennas seems to work very well on the i.f. bands, even with their centres buried in a tree. But it is essential to ensure that the ends are in the clear as shown in Fig 3.

The v.h.f. operator will most certainly be able to get away with a 430MHz Yagi by claiming it is a TV antenna. Also it is possible that a small beam for 144MHz may be passed off as an f.m. antenna.

**Making Wires Invisible**

The human eye has an angular resolution of about 1°. This means that thin wires are invisible from a distance of only a few metres. The obvious, wire of about 0.5mm diameter (24/26s.w.g.) is not very bare copper wire is a good idea to leave it out to lose its shine.

A barge board dipole is virtually invisible if you use insulated wire whose covering colour is close to that of the paint work. For covered wire, the lightest rope and the best quality pulley you can find; still in a future article I will with 'rescue' extension.

**Using Trees As Supports**

The big problem with trees is that they sway in the wind and unless precautions are taken you will end up with a broken antenna. The classic way of dealing with this problem is to use a pulley system and weight.

However, due to friction and inertia pulleys and weights are not 100% effective. To make it work better the following precautions are advisable. Firstly install the antenna with some sag, this will allow the tree to sway a little without any problem.

Use the lightest rope and the best quality pulley you can find; your local marina is an excellent source. Marine gear is expensive but the quality is good and it may turn out cheaper in the long run. Use the lightest counter-balance weight and let it normally rest on the ground, this will allow you to have slack in the antenna.

A length of rubber band or light spring between the end insulator and the rope makes a good shock absorber. It may also be worth while installing a 'weak link' at this point to ensure that if a failure occurs then it's not in the middle of your antenna.

Fishing tackle shops sell lines of various breaking strain which are suitable for this purpose. However, don't forget to attach a insulator and the rope makes a good shock absorber. It

Finally if all else fails run a length of coaxial cable to the top of your dummy TV antenna. Don't connect it, just tune the coaxial cable as a random length wire antenna.

**Beating Planners**

There appears to be ways of beating the planners! Current planning rules don't require permission if the antenna is under three metres above ground. Within this restriction you can erect magnetic loops and loaded vertical quarter-wave antennas.

A very low dipole is also worth trying. I have recently been testing a low 7MHz dipole and find that running 30W of c.w. I can easily work round Europe. At times I've even worked the W1 call area of America.

**Antenna Performance**

The antennas described are not recommended as being high performance. But, with a degree of luck and good engineering you may be surprised at how well they do work.

To get the best performance you will have to experiment and perhaps it may be necessary to limit your operation to a few bands. With perseverance there is no reason why most amateurs cannot get on the air, make contacts and have fun.
As you can probably appreciate there are many different types of propagation modes that occur in the ionosphere. Among these are E-layer and F2-layer propagation, Aurora (Au), Sporadic-E (Sp-E), Auroral sporadic-E (Au-E), meteor scatter, ionospheric (i.a.i) trans-equatorial (i.e.p) and field aligned irregularities (f.a.i) to name but a few.

There's also propagation modes that involve some form of reflection from obstacles. These can include diffraction from hillsides or mountain tops, moonbounce (e.m.e) and scatter from objects such as buildings or aircraft.

By no means is my list comprehensive. But it serves only to indicate the variety of modes that can be encountered in the v.h.f./u.h.f./s.h.f. area of the radio spectrum.

Sporadic-E Principles

The mode that I want to look at this time is Sporadic-E. Although I've described this on a number of occasions over the years it's worth recalling the principles again for newer readers.

A v.h.f. signal normally travels horizontally through the troposphere and unless an enhancement occurs (giving rise to a tropo 'lift') the signal will weaken and disappear at some point beyond the radio horizon. Large proportions of the signal will also pass completely through the troposphere and enter the ionosphere.

The lower layer of the ionosphere is the D-region and this is virtually transparent to v.h.f. signals. Hence your signal will pass easily through this region.

The next layer the signal encounters is the E-region, located between 90-130km above the earth's surface. Again under normal circumstances the level of ionisation is insufficient to reflect v.h.f. signals back to earth.

However, on occasions some thin and dense layers (or clouds) of ionisation can be formed which are sufficient to reflect your v.h.f. signal back down to earth. This intermittent ionisation in the E-layer is termed sporadic-E. (In the September and October 1995 issues of PW. David gave an in-depth understanding of the mechanisms by which Sp-E is formed. Editor).

Mirror In The Sky

So, basically you have a 'wobbly' signal reflecting mirror in the sky some 100km above the earth's surface from which you can reflect your v.h.f. signals. Just imagine if you were a radio signal and could actually see this 100km high mirror. How far away could it be before you just start to lose sight of it over the horizon?

Surprisingly, from a radio point of view, it could be up to 1000km away. This means that you are able to communicate over a distance of twice this range. A distance of 1000km from you to the Sp-E cloud and then a further 1000km from the cloud to the distant station.

Wow! That puts your v.h.f. signal into both Europe or even North Africa! Can this be true? The answer is most definitely Yes. And it's done routinely year after year.

In reality the attainable distance is dependent on a number of factors. The geometry of the path depends to a large extent by the height of the ionisation. This can vary between 90-130km or so. The attainable distance is also dependent on how well both antenna systems can 'see' the horizon. So, in general terms the higher the better.

For maximum distance you need an antenna system that has a low angle of radiation. In other words one that places all the r.f. energy on the horizon rather than one that squints the signal up into the sky. All things being equal the distances normally encountered with 'single-hop' Sp-E will lie somewhere between 1500-2500kms.

Mode Recognition

In my opinion it's very important to know which propagation mode you are hearing signals by. Identifying what you're listening to and understanding its characteristics will enable you to work far more DX than someone who doesn't know what's going on.

So, how do you recognise Sp-E? Although this is fairly easy to answer it does assume you have a basic understanding of the other main types of propagation. With this knowledge you can eliminate other modes and at the same time know what to expect at any particular time of the year.

In common with all propagation modes that occur in the ionosphere there are external forces that, in general terms influence when any particular mode will occur. Most if not all ionospheric modes are solar driven and data from many years of Sp-E studies show that it is primarily a midsummer phenomenon.

Bear in mind though that Sp-E, in common with most other ionospheric modes, is frequency dependent. As an approximation, for every ten days of openings on the 50MHz band there may be only one day on which an opening at 144MHz might occur. This frequency dependency also affects the length of the traditional Sp-E season.

On the 50MHz band it normally occurs between May-August with a short mid-winter peak between December-January. On the 144MHz band however the peak months are between June-July with winter openings being virtually non-existent. It should be noted that it will never occur on the 430MHz or higher frequency bands.

To recap, Sp-E affects the 50, 70 and 144MHz v.h.f. bands during May-August with an occasional mid-winter peak affecting primarily the 50MHz band. It should mention at this point that it is also prevalent on the h.f. bands and can reach as high as the U.S. 220MHz band but that's another story...

To further determine the propagation mode by which signals are arriving the next important sign to look for is the location of the received
station. Tropo enhancements on the 50 and 70MHz bands are never spectacular and if the received signal is over 800km away it is more than likely to be via the E-layer.

On the 144MHz band however tropospheric ducting can occur over 1000km and beyond on occasions. So, if you hear an EAB station (Canary Is.) on the 144MHz band it doesn't necessarily mean it's via Sp-E.

However, there are a few more clues to look for. Signals propagated via single-hop Sp-E usually exhibit rapid fading, particularly on the 144MHz band.

Unlike auroral propagation (where the signal is augmented by doppler shift) a Sp-E signal exhibits no distortion. Signals are often present for minutes or hours at a time unlike meteor scatter where signals are only heard in intermittent bursts.

Geographical Openings

Finally and this is very important, Sp-E openings generally exhibit a high geographical selectivity especially on the 144MHz band. So it's very likely that you'll only hear stations from one or two locator squares whilst an operator a few kilometres away from you hears nothing at all.

A few minutes later you may hear stations in a completely different area or country. It all depends on the level of ionisation and the focusing affect of the Sp-E cloud. The same is true of the 50MHz band but of course the affects may not be so apparent.

The level of ionisation needed to support communication at this frequency is not so high and the focusing affects are much reduced. At times it appears that huge areas of the E-layer are sufficiently ionised allowing openings in many different directions at the same time.

Conditions In 1995

Now I'll take a look at the midsummer Sp-E season that occurred last year. The first recorded opening up to 3000km on the 50MHz band was on April 25 1995 with the last being October 11 and 12, when further openings occurred but I'm going to ignore these.

During this 146 day period the 50MHz band was open on 98 days, thus giving a 67% chance of finding a day when the band was open. This is reasonably high but it should be noted that the beginning and end of each season is rather sparse of openings.

For example although the first event was noted on April 25, the next didn't occur until five days later followed by a further gap of seven days until the next opening. Looking at my records it can be seen that the Sp-E season really got going on May 19 and continued for 97 days until August 23. During this period the band was open on 81 days giving an overall daily chance of openings of 83%. That's much better odds.

By comparison, during the same 97 day period the 144MHz band was only open briefly during 10 days, something less than a 1 in 10 chance of being in front of the radio on the right day! However, for those who were fortunate to choose the right day there was DX galore.

North Africa

For example John Nixon G7SMA (I093) running 25W s.s.b. and an indoor 8-element Yagi worked EA91B (IM85) in North Africa over a path length in excess of 2000km. Another operator, Graham Taylor G7UJC (I083), worked YU7BW, 9A1CCY and 9A1KDE on the 144MHz band. Graham used a multi-hop Sp-E system and was able to work 2A0DI s.s.b. into a 5V/8 over 5X/8 vertical antenna. You see, it really is a case of being in the right place at the right time!

As I've already mentioned the Sp-E band was also very good last year. In addition to the expected European openings the band was also open via multihop Sp-E to North America on eighteen days. There were a total of ten days of transatlantic openings in June and a further eight days of openings during the first two weeks of July. This was far greater than normally expected and supports the theory that Sp-E propagation is more prevalent during summer.

And it may interest you to know that sun spot minimum is predicted to occur during the summer so this year may be the best ever. Indeed 1996 got off to a very good start with a noticeable increase in 50MHz winter Sp-E and reports of the maximum usable frequency (m.u.f.) exceeding 100MHz on February 3.

If you want to work consistent DX on the v.h.f. bands (via any propagation mode) it is universally acknowledged that this is best accomplished by using single-sideband (s.s.b.) or Morse (c.w.). I'm not saying frequency modulation (f.m.) or other communication techniques can't or won't allow you to work long distances it's just that narrow-band modes are that much more efficient.

Because of the characteristics of Sp-E especially on the 50MHz band, the use of QRP powers and small antennas works very well. You'll be able to make contacts all over Europe and if you're lucky considerably further.

Low Power

I can't say it's particularly easy with low power but every operator you make will agree that this is very special. It's the same regarding the 144MHz band although I would recommend that you invest in some form of directional antenna. If you've only a few watts to play with it's always best to concentrate all of it in one particular direction.

One of the easiest ways of catching an opening on the 144MHz band is to keep your receiver tuned to 144.300MHz, the s.s.b. calling frequency. When the band doesn't make open up you will either (a) hear DX stations or (b) hear someone else working the DX. If it's the latter then don't worry.

As I've already mentioned Sp-E can be very geographically selective. So, all you need to do is sit tight and wait for propagation to enter your area. More often than not it eventually will.

I always find it useful to prepare before the event when it comes to log keeping. I've made up special 'scribble' sheets with columns for time, frequency, call sign, reports and locator.

During intense openings I can be working up to three stations a minute for as long as the openings last. In this case I can get down the information very quickly and then at my leisure transcribe the contacts into my station log book. It's also very useful to have a tape recorder running to pick up on mistakes!

Predicted Opening

There are some DXers, myself included, who try to predict a specific day when an opening on the 144MHz band will occur. None of these stand up to any form of scientific analysis but I feel I could let you in on my secret.

I always reckon that the Tuesday after the first weekend in June is a good bet. This year it's June 11th, having the day off so why don't you join me?

However a word of warning. The Sp-E season can be as fickle as the British summer so don't blame me if you hear nothing!

Be Prepared

On the other hand the v.h.f. bands could be wide open so now is the time to make sure your station is working correctly. If you have any doubts about the integrity of your antenna or coaxial cables attend to them now.

What about that interest in meteor scatter? Have you on the microphone cable or the flat battery in your Morse keyer. Get them fixed now!

Then you can relax in the knowledge that when you do encounter your first Sp-E opening everything should be working correctly. Please let me know how you get on.

Scandinavian Meeting

Finally the venue for this year's Scandinavian v.h.f./u.h.f. meeting is Espoo, Finland. The actual location is the resort of Nupurin Kartano, next to Lake Nupurinjarvi, 25km west of Helsinki.

The event will be held on June 7-9 and includes a barbeque on Friday, followed by lectures, flea market and dinner on Saturday. Indoor accommodation, camping and caravan facilities are available. Further details can be obtained from Jukka Sirvio OH6DD whose E-mail address is jsi@hut.fi.

Deadline

Please send reports, especially of Sp-E openings, or any other news (to reach me by the end of the month) to Yew Tree Cottage, Lower Moescoed, Herefordshire HR2 0HP. You can also contact me via the Dayton G3MAD DX Cluster or E-mail via davebu@mdilhr.1.giw.bt.co.uk Alternatively you can telephone me on (01873) 860679.

Practical Wireless, June 1996

END
Mike Richards G4WNC looks at some of the common problems associated with computing in radio in answer to readers’ queries.

O ne of the simplest, yet very common problems encountered by new Hamcomm users is failure to load the software. I’ve received many letters that either claim the disk’s empty, or that the file cannot be found on the hard disk.

Other than the occasional blank disk that escapes, the difficulty is usually caused by problems spelling the name Hamcomm! Yes I know this sounds silly, but when you’re completely new to computing and haven’t grasped the concept or operation of the computing system, confusion comes very easily. So, please check your typing before sending the disk back.

Run-Time Problems

Another common problem recently experienced by Peter Best and Tom Davies is run-time errors when using JVFAX for FAX reception.

There are many potential causes of run-time errors, but one of the most common is running JVFAX after a Windows session. Whilst in theory this ought to be alright, you often find that the extended memory configuration used for Windows does not match that needed by JVFAX.

The simplest solution is to create a separate boot disk for JVFAX. You can do this by putting a blank formatted disk in drive A and typing SYS A: from the C: prompt. This will copy across the COMMAND.COM interpreter plus a couple of hidden system files.

You can then create your own AUTOEXEC.BAT file using a text editor and add the commands: ‘C:’ is needed to get you onto drive C ‘CDJVFAX’ (or whatever you call your JVFAX directory) JVFAX. If you then boot your computer with this disk in drive A, JVFAX will automatically be loaded.

You can, of course, make the AUTOEXEC file very much more sophisticated by including menu systems, but I recommend starting with a very simple set-up and progressing from there. You also need to note that JVFAX will not operate successfully in a multi-tasking environment such as Windows. This is because it uses non standard system calls and relies on direct access to the computers timing facilities.

In a multi-tasking system the computer’s resources are shared between a number of programs so it’s virtually impossible to maintain the highly accurate timing required for FAX reception.

Ghosting

Mark Brickley G6VVV writes asking why he suffers permanent ‘ghosting’ when receiving FAX using his FT-840 transceiver. Mark has tried monitoring signals from lots of different stations, but the problem persists.

To understand this problem you need to think a little about the FAX receive process. Let’s use a typical amateur FAX signal of 120 r.p.m. and 288 IOC as an example.

Mark’s problem is the appearance of a second image just to the right of the main image. Now, as the lines of the FAX image build-up from left to right, this implies that there are two signals arriving at the decoder with a small time difference between the two.

A few simple calculations will even reveal the size of this time delay. First you need to calculate the horizontal speed of the scan line in mm per second.

To calculate the horizontal speed of the scan line you just measure the width of your screen or printed FAX image in mm and multiply this by two as there are two scans per second. With this information to hand, you measure the distance between the main and ghost images.

The signal delay in seconds is then the difference between the main and ghost: image divided by the scan speed in mm per second. I know it sounds complicated, but it isn’t really.

Here’s an example to illustrate the point. On my screen, the FAX image is 250mm wide so the scan speed becomes 200 x 2 i.e. 400mm per second. If I had a ghost image that was 1.4mm to the right of the main image, the time delay between the two would be 1.4/400 i.e. 0.0035 seconds or 3.5ms.

Now we understand what causes ghost FAX images, why does Mark suffer the problem all the time?

The interesting OSL card produced by John Densem G4KJV (see text).

One possible effect is what’s known as group delay distortion which can be caused by audio filters.

Group delay is where the reactive components in a filter cause different frequencies to be delayed by varying amounts. Ghosting or smearing can also be caused by ringing filters.

The golden rule for all FAX reception is to keep filters as wide as possible and only narrow them down to cut out serious interference. As soon as you reduce the receive bandwidth you start to lose the fine detail from the FAX image.

Inherited Amstrad

Les Mobley G2HPH has recently inherited an ageing Amstrad PCW8256 computer and would like to use it to transmit and receive RTTY. Although this is possible, there are a few significant problems.

The first problem is the Amstrad’s lack of a serial port. With most decoding software, the serial port is used to make the vital connection between the computer and transceiver, so no serial port spells trouble.

The lack of a serial port can be overcome by using the Amstrad serial port adapter. This is a plug-in expansion card with its own UART that creates a standard RS-232 serial port.

The only snag is that the plug-in expansion cards were not very common in the Amstrad’s heyday, so they will be even more difficult to find now. If you do manage to find a serial port, the next problem is to find some RTTY software.

As far as I’m aware there was only ever one program on the market and that was distributed by BARTG. The other alternative is to write your own software, but you will need machine code programming skills for this.

Now all this sounds a bit like a dead loss! But if you know different, please let me know so that I can pass the details on to Les.
Suitable Port?

Dick Stanbridge G8NT writes with a problem in selecting a suitable COM port to use with his Venus electronics JVFAX and Hamcomm interface. In his case, the system shows two COM ports available and they are COM 1 and 4. This is an unusual set-up as you would normally expect to see COM 1 and 2 available.

In Dick's computer, COM 1 is already in use for his serial mouse and he's proposing to use COM 4 for HAMCOMM/JVFAX. I would strongly recommend taking a look at the PC's manual and altering the jumpers to standardise the serial card configuration to COM 1 and 2. This is because there are a few oddities associated with PC serial ports.

The oddities come about because the interrupts that service the ports are shared so, COM 1 and 4. This is an unusual set-up as you would normally expect to see COM 1 and 2 available. Therefore, the configuration problems, whilst giving maximum flexibility.

Interesting QSL Cards

Whilst helping Elaine G4LFM with her 'Novice Natter' column recently I came across a particularly interesting QSL card produced by John Densem G4KJV. What struck me about the card was that it had been produced by overprinting an A4 sheet and folding it in the same way as a birthday card to make a very smart presentation.

In order to produce this type of QSL card you need to divide the A4 sheet into four quarters, print the cover and back panel on the lower two sections, with the inside printed upside down on the top two sections. While I can see that this could be done with a Word macro, I'm sure someone must have developed a program to do this.

Do you know where I can find such a program? If so please write and let me know.

Digital Signal Processing News

If you're interested in amateur radio d.s.p. software and developments, one of the main Internet sites to watch is the HFSIG upload site of the Tucson Amateur Packet Radio FTP site. The site can be found at ftp://ftp.tapr.org and the upload directory is: /tapr/SIG/hfsig/upload. There is a constant churn of interesting software and this is the site used by Johan Forrer for his new releases.

The latest goodie to arrive is the new MAXAS Macro Cross Assembler for the Texas TM320C26 digital starter kit. The software has been written by Mike Kerry of Grosvenor Software fame and corrects a number of problems with the Texas DISKA assembler. The new cross assembler also includes better validation, more assembler directives and full operand arithmetic. This looks to be a significant improvement for anyone seriously interested in TMS200 programming. I've written to Mike to see if he'll let me include this assembler in my DSP starter disk. Watch this space for more info.

The other new arrival is the latest version of Johan Forrer's PICTOR software for the Texas DSP starter kit. This is now at version 3.08 and includes a number of interesting enhancements.

The RTTY mode has been enhanced to work with 1.5 stop bits and any COM port can be used to connect the Texas DSK. I also note that the modem file contains DSK modem code for nine modem configurations.

The transmission parameters supported are: High tones f.s.k.: 170Hz/50baud, 170Hz/100baud, 200Hz/200baud 1600/1800Hz 300baud; Low tones f.s.k.: 170Hz/50baud, 425Hz/50baud, 850Hz/50baud, 170Hz/100baud. Another important attraction is that this is one of the few AMTOR/PACTOR systems that will operate comfortably under Windows. This is because all the critical timing and communications activities are carried out within the DSP unit, not the PC. I've added this latest version to my DSP starter disk, so please see the Reader's Offers section for full details of how to get your copy.

You can also download the software from the TAPR site as described earlier. The file name is TORSO8.zip. My thanks to Johan Forrer for his hard work developing this impressive package. If you find the software useful, please remember to register with Johan.

Special Offers

Here's the full list of reader's offers with all the latest software. Please leavate up to two weeks for delivery.

IBM PC Software (1.44Mb disks):
- Disk A (Order Code DKA) - JVFAX 7.0, HAMCOMM 3.0 and WEFAX 3.2
- Disk B (Order Code DKB) - DSP Starter plus Texas device selection software
- Disk C (Order Code DKC) - NuMorse 1.3
- Disk D (Order Code DKD) - UltraFax 4.0
- Disk E (Order Code DKE) - Mscan 1.3 and 2.0

Printed Literature:
- Beginners Utility Frequency List (Order Code BL)
- Complex Signals Utility Frequency List (Order Code AL)
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- FactPack 1 Solving Computer Interference Problems (Order Code FP1)
- FactPack 2 Decoding Accessories (Order Code FP2)
- FactPack 3 Starting Utility Decoding (Order Code FP3)
- FactPack 4 JVFAX and HAMCOMM Primer (Order Code FP4)
- FactPack 5 On the Air with JVFAX and HAMCOMM (Order Code FP5)
- FactPack 6 Internet Starter (Order Code FP6)

For the printed literature just send a self addressed sticky label plus 55p per item (£1.50 for four, £2.50 for seven and £3.00 for nine). For software send £1.00 per disk (£1.75 for 2, £2.50 for 3 or £3.00 for 4 and £3.75 for all 5) and a self addressed sticky label (don't forget I provide the disk!). Please make cheques payable to M. Richards.

That's all for this month, so until next time keep computing and keep those letters and news items coming to me Mike Richards G4WNC, 'Bits & Bytes', PO Box 1853, Ringwood, Hants BH24 3ZD. CompuServe 100411,3444, Internet mike.richards@dialog.pipex.com
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(Personal callers welcome)
The v.h.f. and u.h.f. bands are probably the greatest growth area in amateur radio today. The convenience of operation, with a wide variety of portable, mobile and hand-held equipment is part of the reason for this popularity.

Another reason for v.h.f. and u.h.f. being a growth area is the growing interest in data modes where it's possible to combine an interest in amateur radio with the latest in computer technology. Packet radio and TCP/IP are both being used increasingly. They are a convenient form of communication, and give the flexibility and facilities we've come to expect from modern day computer controlled facilities.

Even though computers are widely used, the more familiar speech based modes are still as popular as ever. It's only necessary to tune over the bands to hear a wide variety of conversations taking place.

Mobile operation is part of the reason for the popularity of the v.h.f./u.h.f. bands. It's possible to take the hobby outside the house and use the radio to talk to people during the ever increasing amounts of time we tend to spend travelling in cars these days.

**Frequency Modulation**

The aspects of amateur radio I've mentioned have one thing in common. They use frequency modulation f.m.

The f.m. mode operates by causing the audio signal to vary the frequency of the carrier in line with the audio voltage present at any instant, as shown in Fig. 1. The advantage is that all the audio is carried as frequency variations. The f.m. transmission makes the signal far more tolerant of signal level variations, a major facet of mobile or portable operation. If the receiver gain is made high, some of the later stages of the receiver can be driven into limiting, thereby removing any effects of level variation.

Linked to level variation is a reduction in noise level. And as most noise appears as amplitude variations, these two can be removed to give a signal which has a much better signal to noise ratio.

**Deviation**

In just the same way that the level of modulation for an a.m. signal is important the amount of frequency change (or deviation) is also important for an f.m. signal. This is so for a number of reasons.

If the deviation is too great then the signal could swing outside the bandwidth of the receiver causing severe distortion to the signal. It may also take up too much bandwidth, and interfere with stations on adjacent channels. Finally if the deviation is too small then the audio will appear very weak and additional audio gain will be required.

The deviation of a signal is normally measured as the number of kilohertz (kHz) the signal is shifted up and down. For example, the BBC v.h.f. f.m. broadcasts use a deviation of ±75kHz.

In other words for the peak audio levels the BBC signal moves up and then down in frequency by 75kHz. Because of the large amount of deviation this is known as wideband f.m. (WBFM on some scanners/shortwave receivers).

Amateur communications use much smaller deviations than the broadcasters and ±5kHz maximum is standard. This, along with other signals having low levels of deviation is known as narrowband f.m. (NBFM on many scanners/shortwave receivers).

**Signal Bandwidth**

The amount of deviation a signal occupies determines the amount of bandwidth it will occupy. For the v.h.f. f.m. signals transmissions with ±75kHz, it's accepted that a receiver bandwidth of 200kHz is adequate.

The reason that v.h.f. f.m. transmissions occupy a greater bandwidth than their deviation is that like a.m. signals, f.m. signals also have sidebands. However, the way in which these sidebands spread out from the carrier is much more complicated than those for a.m.

In fact the f.m. sidebands spread out to infinity either side although their level quickly falls as shown in Fig. 2. Fortunately it's possible to remove many of these low level sidebands completely without any noticeable effect to the signal.

For narrowband f.m. transmissions the bandwidth they occupy must be tailored to the band conditions. Currently amateurs operate on a channel spacing of 25kHz and the amount of deviation used means that signals on one channel do not unduly interfere with those on the next.

Many commercial systems use a 12.5kHz channel spacing and they require a lower level of deviation. This is why some commercial sets appear to have a low level of modulation when converted for the amateur bands.

However, if amateur band occupancy means that we have to move to a 12.5kHz channel spacing then we may have to reduce our levels of deviation.
Leighton Smart GW0LBI takes a look through your reports to see just what's been happening on h.f., to guide you to success working that DX!

At the time I'm writing this, we're entering April. And according to our reporters, it appears that the higher bands, particularly 1.8MHz, are showing signs of definite improvement, recently remaining open till around 2300. It's a sure sign that things are getting better for the DX operator!

Now over to Newsweek; edited by dedicated QRP operator Chris Page G4BUE, includes news that HH6JH (Haiti) is on the air every Sunday on 14 2800MHz s.s.b. for IOTA and prefix hunters (although no specific time is given). Javier XE2QO is operational on the WARC bands, mainly 10MHz at 0000UTC and/or 0600 for Europe on 10.150MHz, G3RJM, listening 1kHz up. QSL direct only.

Your Reports

Space is at a premium this month, and I'm starting your reports with John Hays G3BDQ in Hastings.

Although busy, John has been able to spend some time on 1.8MHz c.w. He's logged 28 US stations in 14 different States between 0600 and 0800UTC, as well as working a few VE stations (Canada).

Now over to the early bird, Ted Trowell G2HKU on the Isle of Sheppey. He's been 'up with the Lark', so to speak, on 1.8 and 3.5MHz of late. Sheppey also has his 'Top Band' c.w. contacts this month including K1KI (USA), all at 0500UTC.

The 7MHz Band

The 7MHz band now, with first report from our 'ace QRPer' Eric Masters G0KAT, in Worcester Park, Surrey, uses a 'powerful' 5W of c.w., and an 86 metre long wire antenna, hoisted up with EASELOL in Spain at 2045, 10WQ (Italy) at 2100, and YU1XJ (Serbia) at 2024UTC.

Terry Jubbs G3VIT in Wakefield reported working VR2U (Hong Kong) at 2038, and 3V8BB (Tunisia) at 2100 on 7MHz s.s.b., while c.w. accounted for a contact with 1A2J (Taiwan) at 2114UTC.

Also on 7MHz c.w. was Carl Masson GW0VSW in Skewen, West Glamorgan. Carl lists amongst many others, 7MHz c.w. contacts with VP3/SEV (Tokel & Caicos Islands) at 0700, NA8L (USA) and 9H1AL (Mali) at 0800, as well as ZB2S (Gibraltar), W7SW/MM off the coast of Greece at 1800, and K1Z2, N3RS, W0BLD and many other N American stations at around 2000UTC.

The 14MHz Band

Don McLean G3NOF in Yeovil starts off on the 14MHz band list. His monthly propagation report says that "14MHz has been open around 0800 to Australia, New Zealand and Asia on the long path. The band usually closes around 2000, but has been open recently as late as 2300. African stations were heard at around 1800UTC.

Don's log report contains s.s.b. contacts with 2E2Q (Ghana), 1E211F (Chad) at 1813, QSL via home call, and ZL1Y (New Zealand) at 1000UTC.

New reporter Dave Ditchman GW6WU from Deal in Kent, writes in as a newly licensed amateur.

Welcome aboard Dave! He's been busy on 14MHz, and lists his 100W DX contacts with 5N4KST (Nigeria), C56/G3RZ (Gambia), C6AC (Bahamas), 961BJ (Ghana), 9K2RX (Kuwait), PTAZ (Brazil), and finally AP2JZB (Pakistan). Seems he's enjoying himself!

A report now, from s.w.i. Len Stockwell in Grays, Essex. Len uses an FPG-100 receiver and 50W antenna, and reports s.s.b. reception of VE3B2U (Canada) at 1418, 9K2ZC (Kuwait) at 1401, ZB2CI (Gilbraltar) at 1400, SV5DOP (Godecanese Islands) at 1558, 424M (Israel) at 1408, and VE3ZB (Canada) at 1408UTC.

Bristolian s.w.i. Gordon Foote G7NCR with his monobander reports working VE6BZU (Canada) at 1418, 9K2ZC (Kuwait) at 1401, ZB2CI (Gilbraltar) at 1400, SV5DOP (Godecanese Islands) at 1558, 424M (Israel) at 1408, and VE3ZB (Canada) at 1408UTC.

Gordon also logged EA8/0LAU in Germany at 2004UTC, WWAYF (USA) working Gil G0G2CZ in Manchester, along with 9I4TUV in north east Ireland, VE2UO (Canada) in contact with Ron GOJD in Northampton, and finally 921VY (USA) working Dave GW6JU in Kent, Stan G2PUL in Cambridge, and Peter GW2WC.

The 18 & 21MHz Bands

Just enough time for a quick look at the 18 and 21MHz bands and I'll start with Don G3NOF. Don lists 18MHz s.s.b. contacts with D446C (Cape Verde), Don lists 21MHz s.s.b. contacts with DL5SVEW (French Saint Martin) at 1605, TN/KF4BTY (Congo) at 1848, VP2BDIO (Montserrat) at 1715, 2Z1CS (Zimbabwe) at 1732, WLO is around 18.150MHz most days at this time, and 7Q7KL (Malawi) at 1858UTC (QSL to 60AS).

Don's 21MHz s.s.b. provided contacts with EL2OT (Liberia) at 1639 (QSL to Box 3761, Monrovia, Liberia), 2Z50M (South Africa), and 5JZZ (Zambia) at 1638UTC (QSL via SP8D1P).

Finally for this month, John G3BDQ briefly reports working 5JZB (Zambia), FRSHA (Reunion Island), and 9K2RF (Kuwait) at 2100 UTC s.s.b., while Ted GW6KU offers up RA1PC (Noveya Zemlya Island), VP2EMW (Anguilla), 8P6DU (Barbados), 6OS/SPT7SE (Lebanon), and KP4SL (Puerto Rico) on 18MHz c.w. all at around 1100, and on 21MHz c.w. he adds CD5CW (Gambia), J28AJA (Djibouti), CE2LZV/MM in the Black Sea, 5N3/SPXAX (Nigeria) and F3N0USH (French Saint Martin Island) all at around 1100UTC.

Signing Off

It's signing off time! My grateful thanks to our reporters for their information and effort, which makes the column what it is.

All the best DX, and cheery for now. Don't forget - all reports, letters and photographs to me Leighton Smart GW0LBI, 33 Nant Gwyn, Tremlewis, Mid-Glamorgan, Wales CF4 6RD. Tel: (01443) 411459.

Canada on QRQ c.w. on 1.8MHz (see text).
Advance news from BBC World Service: it is to stop using the short wave relay station at Leshoto in southern Africa at the end of the summer frequency period. Instead of using its own transmitters, the BBC will be hiring more time on Channel Africa's transmitters at Meyerton in South Africa. The Meyerton units are 500kW senders as opposed to the 100kW transmitters at Leshoto, and should improve reception in the central area of Africa. This means that Radio Leshoto may also stop using short wave (4.6MHz is the frequency) as the transmitter is sited at the same station as the BBC World Service transmitters.
The BBC World Service has announced that it is to build a new relay station in Oman to replace its existing site on the island of Masirah. The station, which will cost around £30 million to construct, will have four 300kW short wave transmitters and two 600kW medium wave transmitters. This station should be operational by the year 2001 and will improve reception in the Middle East, Indian sub-continent and Central Asia.

Special Event
Radio Austria International ran an special programme for the annual Radio Austria International Day on 20 April. Around 25 special event amateur radio stations operate on the short wave relay station at Vienna to Europe is: 1230 on 6.155, 5.945, 6.155 and 9.88MHz. If you have invested in the new Astra Digital Radio (ADR) set-top box, you can hear Radio Austria International on one of the ADR channels in CD quality. If you have traditional analogue satellite equipment, listen on the World Radio Network audio subcarrier at 0430 and 1600UTC.

Mismane Station
An apology. In a recent edition, I misnamed a radio station, albeit completely unintentionally. Alfredo Cotroneo sent an E-mail to the PW Editorial Office pointing out that I had referred to the Italian Radio Relay Service (IRR). The IRRS is no more, and is now known as NEXUS-International Broadcasting Association. The NEXUS service relays UN Radio as well as putting out some of its own material. If you would like to tune in, here is the summer schedule: 0500-0930 (weekdays) on 9.955; 0500-0930 (weekends) on 7.125, 0730-1230 (weekends) on 7.125, 1330-2000 (weekdays) on 9.985 and 2000-2200 (Friday, Saturday and Sunday) on 3.985MHz. The address is NEXUS, PO Box 10980, I-20110 Milan, Italy.

Free Publicity
The HCJB's Japanese service received some of the most effective free publicity possible - something many international broadcasters would welcome - when NHK television (Japan's equivalent to the BBC) broadcast a 45-minute documentary featuring HCJB programme makers Kazuo and Hisako Ozaki. The Ozakis have run the Ecuador station's Japanese service almost unaided, they receive a huge number of letters. More than 4,500 were received in 1995. If you would like to listen to HCJB, English can be heard at: 0030-0700 on 9.745; 0700-0930 on 11.615 (to Europe); 0400-0530 on 5.90 and 1700-2000 (unaided). In Japan, the station is heard at: 0430-0500 on 9.765; 1130-1200 on 9.815 and 2200-2300 on 11.615MHz.

New Transmitter
A new 100kW transmitter has been installed at HCJB's transmitting site outside Guito. Like most of its other equipment, this transmitter was built by HCJB's engineering section in the USA. It should be on the air this summer.

Meanwhile, Japan broadcasts in English. The NHK service uses transmitters in Gabon, Canada, Singapore, Sri Lanka, French Guiana, the UK and Ascension Island to send its programmes world-wide. English to Europe is now at: 0500-0630 on 7.23, 11.725, 17.81; 0700-0800 on 7.23, 11.725, 5.985, 15.165, 17.81 and 21.61 and 2300-0000 on 5.965, 9.535, 9.56, 11.85MHz. You can also hear the Japanese broadcaster's national service at 2200 until 2400 on 11.665 and 11.91MHz.

Sunday Programme
Radio Denmark has a 15-minute English programme on the first Sunday of the month from 08.30UTC. This programme can also be heard via World Radio Network on the 1st and 3rd Sunday via satellite and certain cabled networks throughout Europe at 16.15UTC (Asia 11.538GHz and the audio subcarrier at 7.99MHz) and in North America at 15.5UTC (Galaxy-5, 3.820GHz and the audio subcarrier at 6.6MHz).

The producer, Julian Ishanwood, can be reached at PO Box 666, DK-1506 Copenhaghen, or via E-mail: jui@dr.dk European listeners can tune in at: 06.30 on 7.180; 07.30 on 7.180; 10.30 on 9.480; 11.39 on 7.295; 12.30 on 8.590; 13.30 on 9.590; 17.30 on 7.465; 18.30 on 7.485, 19.30 on 7.520 and 20.30 on 7.465MHz.

Bulgaria Schedule
Finally this month, the latest schedule from Radio Bulgaria, English is on the air at: 0400 on 9.70 and 11.72, 1130 on 13.78, 1230 on 15.62; 1900 and 2100 on 9.70 and 11.72 and 2300-2400 on 7.48 and 9.70MHz.
A remarkable example of microwave ducting, when attempting Amateur Television pictures skimmed across the surface of the North Sea, was reported in the December 1995 Focal Point. But you don't always need a vast stretch of water. The recent very cold winter produced more evidence of amazing microwave propagation.

Stoke on Trent reader A. Horsfall G4CBW, was receiving 10GHz signals from somewhere south. These later became P5 pictures (solid line and frame locking, low noise, correctly locked colours and/or good black and white definition) from G8XG, the Bristol 3cm (110GHz) Repeater. This was a path length of about 187km.

The weather conditions were fretting fog from the south coast to the Midlands. Thanks to Phil Smith G1HIA of the Severnside AN Group for that report. Phil put his own pictures into GB3XG, these were seen by G4CBW and the two stations finally signed their logs off at 3am! The Severnside AN Group are to appear locally on broadcast television soon. Their recent social night, and the GB3ZZ 1.3GHz Bristol Repeater, was recorded for transmission on HTV (formerly called Harlech Television) sometime in early June.

At the time of writing, precise programme title, date and time are not yet known. Readers in Wales keen to see this may wish to telephone HTV on 0117-977 8366.

Still with news from Wales. Brian Kelly GW6BWX writes: "There are outline plans to link the major TV sites at the proposed site - the Royal British Legion Club, Park Gate. Credits for the initial test go to Steve G7BVK (mounting brackets and transmitter), Mike Walters G3JVL (Alford slot antenna) and Ian GB8JN (20W power amplifier).

"Reported results were very promising - P4 (slight noise on picture but otherwise good detail and colour) from Frank GOLF, Portsmouth, Charlie GOLP, Gosport, and Ricky G0SBV, New Forest. A colour P3 picture (obvious noise) was seen by Alan G1APD, Hedge End, and a mono P2 (substantial noise, but recognizable content) by Charlie G7RNN in Swavenny." For anyone wanting to start on ATV, the Solent Club can supply a range of kits, p.c.b.s and test cards. Contact Mike Sanders GB8LES, 31 Telegraph Lane, Four Marks, Alton, Hants GU34 5AX.

Dartmoor Repeater

There is a new ATV repeater being tested in Dartmoor. Tony Reynolds G8EQG (ex VK6GZJ, Perth, Australia), Chairman of the West Devon ATV Harry Group, tells me: "The Group has been given permission to install a 24cm (12 GHz) repeater on North Hessary Tor mast. The repeater is presently putting P4 signals into Plymouth, Torbay and Newton Abbot during beacon transmissions.

Tony adds: "The final antennas will be corner reflectors on the 'bowie' design, to give several directional headings instead of an all-round radiation pattern".

Other News

Frequently Asked AN Questions

Q: Why is the vision signal amplitude modulated for 430MHz (70cm), but frequency modulated almost always on higher bands? A: There are several reasons. A common way of receiving 430MHz ATV is with a domestic TV set, which is designed for a.m. video. The power transmitters in 430MHz transmitters can handle a.m. without significant heat dissipation and de-rating problems. This is not so easily achieved with 1.3GHz power devices without significant cost, so f.m. simplifies the power output stages of 24cm transmitters.

Q: How do I know there is ATV activity in my area? A: One way is to listen on 144.750MHz, the 2m AN calling channel. Another is for local ATV Nets - several stations on-air in an area at certain times - to send details of their activity periods to 'Focal Point'. How about it ever gone?

Graham Hankins G8EMX has the latest news from the world of Amateur Television.
For Sale

AC current panel meter, 0-20A, 4.5 x 4 in, moving coil movement, manufactured by S.E.W., (Japan), brand new. £5.90. 1995 Passport To World Band Radio, £9.50. Tel: NW London 0181-954 1750 day/evenings.

Admiralty communication receiver B4OC, very good condition and good working order, very heavy. £325 or o.n.o. Base station equipment, extra. Buyer collects. G2FZU, Notts. Tel: (01636) 813847.

Kenwood TH-78E dual-band handheld, memory expansion, handset, soft case, hand strap, speaker mic., NiCad charger, manual, boxed, very good condition. £340 o/n.o. Joe G7VQS, Warwick. Tel: (09126) 651310.

Kenwood TH-78E handheld, CTSCS, soft case, spare NiCad, d.c. lead, charger, boxed, immaculate. £285. Pete, Surrey. Tel: 0181-393 9115.

Kenwood TR-9950 v.h.f. transceiver, good condition, £325 o/n.o. Mineg 70cm (430MHz) 100w amp, £225. 22-channel 70cm (430MHz) Yagi 16dBi, £35. Tel: Middlesex (01) 423 0576 after 6pm.

Kenwood TS-1295 100w f.h. mobile/base with matching bracket and manual, v.g.c., £300. 2GYM trap dipole. £160 (used), £50. Auto NiCad charger for h.f. dish and Rat Lode duals, £25. Derek GOEOW, Norwich. Tel: (0207) 658111.

Unica 200 converted to 29MHz f.m. nice rig with chrome front in excellent condition. £45 inc. postage. Tel: Cardiff (0222) 488723 after 5pm.

Yaesu 757 GX h.f. transceiver, box, manual and Warranty. £399. Also Yaesu h.f. hand-held, crystals for SU20 and SU18 with charger and batteries. £40. Roy GTDF, Birmingham. Tel: 0121-742 3832.

Exchange

Anega 1200, Phillips colour monitor, extra floppy drive, joystick, 200 programmes, 200 discs, nine boxed programmes, value £50, all boxed, exchange for good h.f. receiver, similar price and condition. Mark, Preston. Tel: (0772) 727159.

IBM PS2 50 series 386SX/20, VGA colour, 20Mb HD (doubled), Windows 3.1, Dos 6.21, mouse, 3.5 D.D., plus Yaesu FT-850 R XFR 1 filter, display, g.w.o. for f.h. transceiver. Tel: Greg (01453) 824136 after 6pm.

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Practical Wireless, June 1996
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Airband radio Receivers enable you to listen-in on the conversations between aircraft and the ground control team. is an absolutely popular and increasingly trendy hobby. A new chapter on military airband has been added. The authors are all air traffic controllers, explaining more about this interesting hobby.

Joerg Klinowski
Describes the principles of the World Meteorological Organisation Global Telecommunication System operating FAX and RTTY (radio teletype) stations, and its message format, with appendixes. Also detailed description of the Aeronautical Fixed Telecommunication on Networks amongst others.

Airwaves 86
The Complete HFNHF/UHF Aviation Frequency Directory
Includes a wide variety of the most useful frequencies used by aircraft and aeronautical ground stations. It's divided into sections, Military, Civil, etc. and is designed to be used by those who have previous little knowledge of air communications as well as those who are already 'hooked'. 124 pages. £5.95.

A Broadcast to the World's Radio Stations BP55
Peter Shore
As on Broadcast Round-up, this column in PM Peter Shore has now become part of this book in world areas, providing the listener with a reference work designed to guide you around the over 4000 most active radio bands. There are sections covering English language broadcast, programs for children and adults. Along with sections on European aviation and U.K. stations.

Pilot's Screen
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Radio Listeners Guide 95
Derek Woodcock
This is the eighth edition of this radio listener's guide. Simple-to-use maps and charts show the frequency for radio stations in the U.K. So you can see at a glance, what can be heard in your area, which stations are on, and what's that been going on over the past few days. All in one convenient, spiral-bound book.

Airwaves Euro-PE
Johannes Schreiber
This is a revised, spiral bound version of the Euro-PE guide. concentrating on those areas of the world not covered in the last edition. It is then an ideal introduction to the hobby of radio listening. It is a compact, spiral bound book covering all the most important European radio stations.

Flight Rounds 1996
Compiled by T. E. and E. J. William
This publication includes a complete listing picture to quickly find details of others, once you have identified an aircraft's callsign. Identifies the most important radio codes and frequencies.

High in the Sky
Chris Baker
This publication is an up-to-date guide to the world's radio programmes, and includes the core principles of short wave listening. It is the latest version of the shortwave list, covering over 100000 UK spot frequencies from 25MHz to 300MHz and 10000 World stations. 156 pages. £9.95.

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Shortwave Maritime Communications
R. E. Richardson
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Satellite

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B啽H-A. Ploquet
This book describes several currently available systems, their connection to an appropriate computer and how they can be connected with such software. The reader is equipped against various specific questions such as information on electronics and weather picture are demonstrated.

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PRactical Wireless, June 1996

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**BUILD!**
- The PW Sprat 3.5MHz Transceiver designed by George Dobbs G3RJV.
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**FEATURES!**
- Peter Barville G3XJS gives his ‘Key’ Tips for QRP c.w. operation.
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This Month - May

British Radio History revisited with The Colossus Rebuild Project
George Wheatley takes GPS further
John Wilson Concludes his Filters in Receivers
The Scanning Alternative - Ben Nock looks at an easy on the pocket option
Conclusion of the Audio Signal Processor Project by Robert Penfold
Second part of our STAR Competition Win the new AOR AR7030 hf. receiver

Plus Regular Columns covering
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Next Month - June

Antenna Special

Using Scanners and Longwire Antennas - Peter Rayner takes a look
CONSTRUCTION - Inexpensive Passive Pre-selector - Dr F. Crossley discusses his solution
Build A Remote Tuned Loop by Andrew Hewlett
Making Connections an in depth look at feeding antennas with Joe Carr
A Ferrite Loop Converter by Richard O. Marris
Billboard a novel v.h.f. LPDA scanning antenna
I Did It My Way - John Wilson tells all
REVIEW - AOR AR5000 Professional Grade
10kHz - 2.6GHz receiver

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The IC-736 has many features that make it superior; here are just a few to prove it:

- Built-in power supply and high-speed automatic antenna tuner on all bands to save shack space.
- Power MOS FET's (Motorola MRF174 x 2) to guarantee stable transmission.
- 100 watt output power for both HF and 50MHz bands.
- Quick-split function with one-touch offset.
- Newly developed DDS system to provide 1Hz tuning steps.
- Double band stacking registers.
- Memo pad function.
- XFC function.
- Split lock function.
- Built-in electronic keyer
- Full break-in.
- Bright and large LCD shows modes, receive and transmit frequencies.

Some typical operations:

- Push ANT to select antenna (two connections are available).
- Push FULL to activate full break-in (GSK) function.
- Push TUNER to instantly activate the internal 160-6m automatic antenna tuner.
- Adjust KEY SPEED to vary the speed of the internal electronic keyer.
- Press SSB, CW/N, AM, or FM to select desired operating mode.
- Press MP-R to recall memo pad memories for intermediate use.
- Press MP-W to automatically write the present operating frequency and mode to memo pad memory.
- Using the KEYPAD select a desired band or directly enter frequencies.
- Retain your last selected frequency and modes with DBSR (Double Band Stacking Registers - Two frequencies per band) use one for CW and one for SSB.
- Hold SPLIT down for one second to start the split mode function and initiate QUICK SPLIT feature, equalizing both VFOs to the same frequency.
- Press NOTCH and adjust to eliminate annoying beat signals.
- Rotate MEMORY CHANNEL SELECTOR to select a channel from 101 available memories (memories store frequency, mode, antenna selection and tuner on/off condition).
- Adjust PBT to reduce interference.
- Push RIT and/or ΔTX to change the transmit or receive frequency +/- 9999 kHz.

TRY AN ICOM IC-736 TODAY, WORDS CANNOT DO IT JUSTICE.

As you know, ICOM manufacture a top range of base-stations, mobiles and handheld transceivers and receivers covering all popular Ham frequencies. You can contact us any way you choose...

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INTERNET: http://www.icomuk.co.uk/
E-MAIL: icomsales@icomuk.co.uk.
The HF/VHF/UHF Wideband Active Aerial for SCANNING RECEIVERS

Ideal for HF/VHF/UHF Amateur radio bands, FM broadcast band, UHF TV band, CB, PMR bands, VHF Marine band, VHF Taxi band, etc.

Improve your scanner’s reception with this active, broadband aerial. The aerials supplied with most scanners are perfectly adequate for local reception, but a significant improvement can be made in the reception of long distance (DX) and weak stations by using a fixed, active aerial like the Super Scan.

★ INDOOR OR OUTDOOR USE
★ POWER SUPPLY THROUGH DOWN LEAD
★ NO TUNING REQUIRED
★ LOW POWER CONSUMPTION
★ MASTHEAD SIGNAL AMPLIFIER
★ HIGH GAIN ★ WIDEBAND ANTENNA

Available ready-built and tested or in kit form for you to build!

The ready-built and tested Super Scan includes:
- Super Scan antenna
- Power supply interface
- Mains power supply
- 15m coaxial down lead
- Adaptors to suit a wide range of scanners
- Ready assembled with 1m connecting cable
- Aerial clamp
- Instruction leaflet (XV54J)**

Order code 51274, Assembled Super Scan, £79.99 ★
UK Carriage £2.90
Information leaflet available, order code XV54J, price 30p NV

Build it yourself—save £££s

The Super Scan is available as a kit which includes all the parts to construct the basic aerial and preamplifier. To allow the aerial to be custom-constructed to suit your exact requirements, general items (those marked ★ above) are not supplied in the kit version. The 32mm plastic pipe is readily available from DIY suppliers. The kit contains comprehensive assembly instructions (available separately, order code XV32K, price 99p NV) and a constructors guide. A fairly high level of skill is essential in construction, however, the only test gear needed is a multimeter, and no setting-up is required.

Order code 51275, Super Scan Kit, £29.99

ORDER NOW ON 0800 136156
or phone 01702 552911 for details of your local Maplin or Mondo Store.

Super Scan power supply interface unit.

**Super Scan power supply interface unit.

Kit-only
£29.99
51275

£79.99
51274

All items subject to availability. Handling charge £1.55 per mail order. All prices include VAT. E&OE.