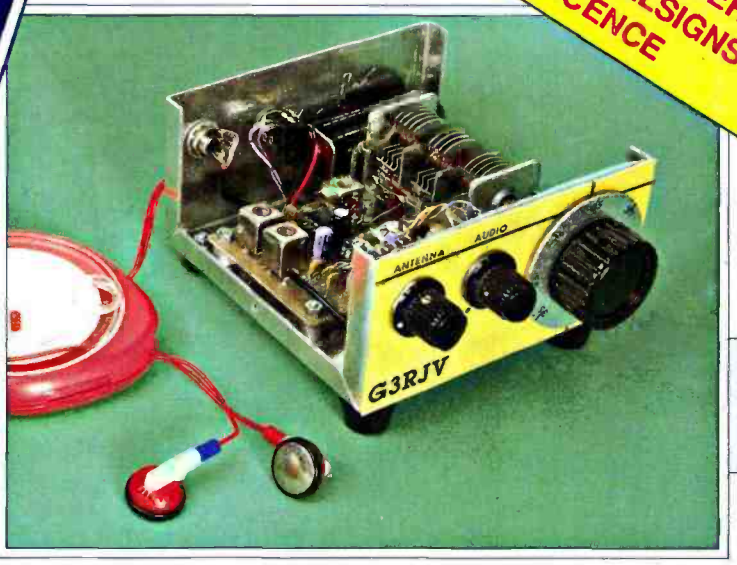
PRACTICAL WIRELESS
PW
THE RADIO MAGAZINE

LATE NEWS!
50MHz UP-DATE, REPEATERS, PERSONALISED CALLSIGNS & NOVICE LICENCE

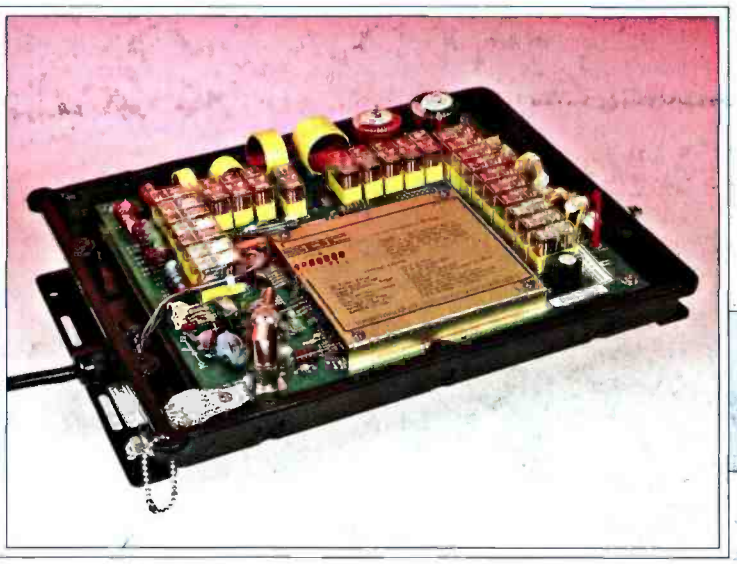


Build
The 'Sudden' 3.5MHz Receiver

A 'Home-brew' Soldering Station

Introducing
Getting Started - The Practical Way
Preparing You For The Novice Licence

CB High & Low
For 934 and 27MHz CB Enthusiasts



Review - SGC Smartuner
Automatic Computerised Antenna Tuning Unit

Features
Maths For The RAE
Protective Multiple Earthing

Antennas
A 3.5MHz Loop Project

London Amateur Radio Show Pull-Out Guide

MARCH 1991
£1.60

ISSN 0141-0857

Plus
Backscatter - Packet Panorama - Satellite Scene - Reflections - Competition - Radio Diary and Lots More!

The affordable way to be heard on HF, VHF and UHF.

Listen for Yaesu's FT-767GX everywhere you might hear it: HF, 6 meters, 2 meters and 70 cms.

You'll hear operators calling it the ideal HF/VHF/UHF base station.

And they'll rave about its full-featured performance and highly attractive price.

You see, the FT-767GX continues the price/performance tradition of our popular FT-757GX. But with even more features.

When you're ready to expand beyond HF coverage, just plug in optional modules for 6-metre, 2-metre, and 70-cms operation.

As standard equipment, you get a built-in HF automatic antenna tuner, AC power supply, digital SWR meter, digital power output meter, electronic keyer, and CW filter.

And operation is smooth and intuitive with keyboard frequency entry. Dual VFOs that tune in 10-Hz steps. A digital display in 10-Hz steps. And ten memories that store mode, frequency, and CTCSS tone information.

The FT-767GX is ready to operate full duty cycle at full rated power output for up to 30 minutes. And it listens from 100 kHz to 30 MHz.

Plus your station is really complete with full CW break-in, our patented Audio Peak Filter for CW operation, a CW TX offset variable 500/600/700 Hz, IF shift, an IF notch filter, a Woodpecker noise blanker, a VFO tracking system for slaved A/B VFO tuning. And that's just a partial list!

But the best way to discover its full-featured performance is to visit your authorised Yaesu dealer today.

Yaesu's FT-767GX. The HF/VHF/UHF base station you'll hear about on the air.

YAESU

South Midlands Communications
S.M. House, School Close,
Chandlers Ford Industrial Estate,
Eastleigh, Hants SO5 3BY
Tel: (0703) 255111

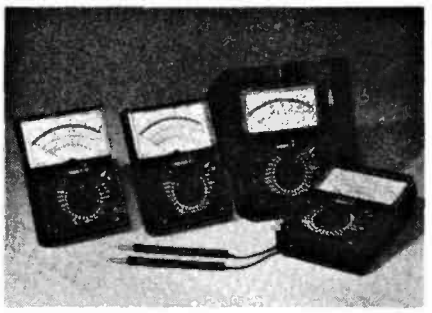
PRACTICAL WIRELESS PW

MARCH 1991
(ON SALE FEBRUARY 14)
VOL. 67
NO. 3
ISSUE 1008

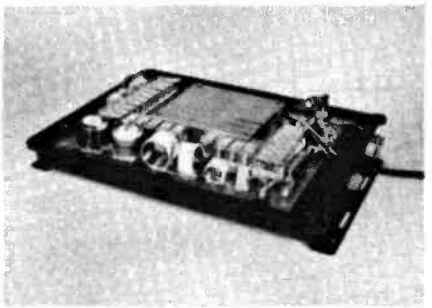
NEXT ISSUE (APRIL)
ON SALE MARCH 14

Editorial and Advertisement Offices:
Practical Wireless
Enefco House
The Quay
Poole
Dorset BH15 1PP
☎ Poole (0202) 678558
(Out-of-hours service by answering machine)
FAX Poole (0202) 666244
Prestel 202671191

Contents March 1991



19



25

PUBLISHED on the second Thursday of each month by PW Publishing Ltd., Enefco House, The Quay, Poole, Dorset BH15 1PP. Printed in England by Blackmore Press, Shaftesbury, Dorset. Tel: 0747 53034. Distributed by Seymour, Winsor House, 1270 London Road, Norbury, London SW16 4DH, Tel: 081-679 1899, Fax: 081-679 8907, Telex: 8812945. Sole Agents for Australia and New Zealand - Gordon and Gotch (Asia) Ltd.; South Africa - Central News Agency Ltd. Subscriptions INLAND £19.00, EUROPE £21, OVERSEAS (by ASP) £22, payable to PRACTICAL WIRELESS, Subscription Department, PW Publishing Ltd., Enefco House, The Quay, Poole, Dorset BH15 1PP.

ICOM

See the full range of Icom equipment on stand S, South Hall, at the London Amateur Radio Show on the 9th - 10th March 1991

Datapost: Despatch on same day whenever possible.
Visa & Mastercards: Telephone orders taken by our mail order dept. Instant credit & interest free H.P.

MasterCard VISA

Count on us!

Icom (UK) Ltd.
Dept PW, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 0227 741741 24 Hour. Fax: 0227 360155

COME AND SEE THE

LATEST and the GREATEST

AT OUR CHELMSFORD SHOWROOM

ANNUAL OPEN DAY

SATURDAY FEBRUARY 16TH OPEN 10AM

Come on down to ARROW. See all the latest big name equipment, including some of the greatest gear the hobby has ever seen! All the usual attractions, eats, drinks and special deals. *DON'T MISS IT!*

Test the new KENWOOD TS850S

Come and try it or send SAE for full specification. Price on application.

AR1000 Series II

Now covers down to 500KHz, SMD technique PCB. Same good price £249

New MVT7000

One to 1300MHz hand scanner. Phone for price.

NEW NRD535

Superb gen coverage receiver. Send large SAE for the amazing specification info! Price on application.

NEW C5608D

Standard's all mode, dual bander, full duplex etc. **£649**

LATEST YAESU DUAL BANDERS

See the 2m/70cm and 70cm/1296 models

NEW YAESU MINIS

Latest handies for 2m and 70cm

NEW ICOM W2

Dual band hand held **£385**

COMET — 3 NEW ANTENNAE

B10 — Black mini dual bander, non radial **£16.65**
B20 — Black slim line, dual bander **£23.20**
CHA6 — Vertical for 80, 40, 20, 15, 10 and **SIX** with loaded radials **£225**

0% FINANCE

Our special, zero interest credit terms are still available on selected products, including some of these items. Call to check out the figures — you will be amazed!

1991 MOBILE PACKAGE SPECIAL

ICOM IC-725 + MIC.
5 Band Aerial & Gutter mount (for 20-17-15-12-10M)
AMU400 400 watt Aerial matcher.
£759 the lot!! (Save £88.85)
(Finance available — 0% finance not applicable)

NEW AR 2800

500KHz to 600MHz, 805-1800MHz
All mode inc. SSB/CW.
Mobile, base and portable. **£365**

SWEDISH KEYS *Back at last!* **£79**

CASH PRICE? TELEPHONE FOR OUR STUNNING CASH OFFERS

Finance available subject to status. Typical APR 34.28%. Mail Order Finance also available — Please telephone any branch. 0% finance available on selected items from our wide range. List of qualifying items on request or please 'phone.

CARRIAGE and INSURANCE ADD £6 UNLESS COLLECTING

New "BONITO"

Reads colour Fax, etc, in 4096 colours.
New Software for PC now available

RADIOCOM/PC for IBM Comp. £189
RADIOCOM/AM for Amiga £189
RADIOCOM/AT for Atari £189
SUPERSET for Commodore 64/128 .....£119
C64/128 Expansion Disk £18.50
VLF VLF Converter £39.95
DEMODISKS £7.99

VLF Active Antenna available soon!

FULL DATA FREE ON REQUEST
SAE PLEASE

COMET ANTENNA

'The *effective* aerial'

NOTE REDUCED PRICES

NEW

GPX2010 Highest Gain Dual Band Base antenna in the WORLD!
7.9 Metres long 9.5dB/2M 13.2 dB/70cms £142.95
CDS150 DISCONE in S/Steel 25/1300 Mhz ONLY £59.95
CHL72S NEW 2/Band BNC whip for Dual Band Handhelds £11.85

NON RADIAL: Mobile antennas independent of vehicle ground plane
CHL21J 144/432 Mhz, Unity/2.15dB, 100W Only 29cms long £14.49
CHL23J 144/432 Mhz 2.15dB/3.8dB 100W Only .44 metres £16.95
CHL24J 144/432 Mhz 2.15dB/5dB 100W 0.8 metres long £25.30
CHL250H 144/432 Mhz 3.0dB/5.5dB 200 Watts 0.95 metres long £32.80

2x4 Series + Triband mobiles and base station antennas
2x4M 144/432 Mhz 4.5/7.2dB 150 watt 1.53 metres £37.65

2x4 SERIES & DUAL BANDERS featuring the unique super linear converter system
2x4MAX 144/432 Mhz 8.5dB/11.9dB 200 Watt 5.4 metres "N" G. Fibre £99.95
2x4WX 144/432 Mhz 6.5/9.0dB 200W 3.18 metres Glassfibre £78.95
2x4SUPER II 144/432 Mhz 6./8.4dB 200W 2.43 metres Glassfibre £77.35
2x4FX Compact 144/432 Mhz 4.5/7.2dB 200W 1.79 metres £55.80

DUPLEX & TRIPLEX Zinc alloy diecast
CFX5140 50/144/432 Mhz 800/800/500 Watt PEP 55dB isolation £38.10
CF413N 432/1296 Mhz 500/200W PEP 55dB isolation "N" ...£36.65
CF416 144/432 Mhz 800/500W PEP 60dB isolation £26.80

SR Series to order only. MONO BANDER MOBILE ANTENNAS
CA285 5/8 wave 3.5dB 300Watt 1.32 Metres Base loaded ...£15.00
CA287C 7/8 wave 52.dB 200W 1.89 metres double co-phase £22.50
CA430TM 3 x 5/8 wave 432 Mhz 6.8dB 150W 1.47 metres ...£29.95

MONOBAND BASE ANTENNAS
ABC21 5/8wave Ground Plane 144 Mhz 3.4dB 200W 1.4 metres £24.50
ABC22A 2 x 5/8 wave 144 Mhz 6.5dB 2.87 metres £36.00
ABC23 3 x 5/8 wave 144 Mhz 7.8dB 200 W 4.5 metres £59.50
ABC71 5/8 wave ground plane 432 Mhz 3.4dB .54 metres £21.56
ABC72 2 x 5/8 wave GP.432 Mhz 200W 5.8dB 1.07 metres £34.85
CA712EF 432 Mhz Twelve x Hall wave! 9.5dB 3.10 metres ...£55.00

HF & 50 MHZ
CHA-5 Vertical with Loaded Radials for 80/40/20/15/10 M 200W SSB 5.29 Metres. Features trililier wound toroidal core .....SPECIAL OFFER £199.00
52HB4 4 El.HB9CV Beam 10.4dB for 50 Mhz 400W SSB 3.2M £67.90
CBL30 HF 1.7 — 30 Mhz Balun 1:1 1kw £20.85

CRZ/DISCONE & HANDHELD ANTENNAS
CRZ12DB A Unique wide band Active antenna 500Hz to 1500 Mhz 1.24 Metres with controller £96.30
CDS180 Discone 28-1300Mhz + TX 6/2/70/23 .....£69.50
CRZ-07 Mobile Wide-band Active £66.50

New "Prestige" range of ultra-high quality antennas now in stock.

Send SAE for new catalogue and full price list

ARROW RADIO

For a good deal - a fair deal - the best deal

HEAD OFFICE:
5 The Street, Hatfield Peverel, Chelmsford, Essex CM3 2EJ
Tel: 0245 381626/381673
Fax: 0245 381436
Hours: 9-5 (Closed Thursdays)

GLASGOW:
Unit 17
Six Harmony Row
Govan
Glasgow
Scotland G51 3BA
Tel: 041 445 3060
Hours: 8.30-5.30 Mon-Fri (closed Saturday)

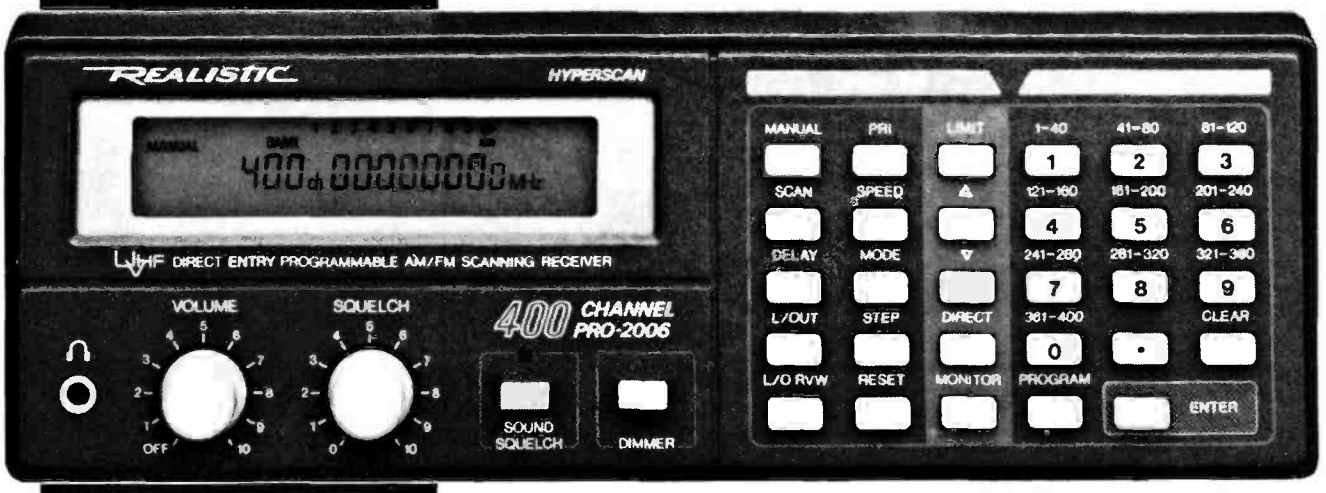
WIGAN:
Greensway Arcade
Gerrard Street
Ashton-in-Makerfield
Wigan, Lancs
Tel: 0942 713405

LEICESTER:
DAVE FOSTER (Agent)
Telephone: 0533 608189
Latest calls 8.30pm please!

VISA RSGB

YOUR ORDER CAN BE TELEPHONED WITH CREDIT CARD DETAILS & DESPATCHED IMMEDIATELY!
FREE FINANCE ON MANY MAJOR ITEMS AT RRP.
(Ask for details of qualifying items — see examples above).

REALISTIC



PRO SCANNERS

Covers: 25 - 520 MHz
And 760 - 1300 MHz

400-Channel With Hyper Scan

£349.95

20-9145

Realistic PRO-2006. Features ten 40-channel memory bands, a 10-channel monitor bank for temporary storage, plus search and favourite channel priority functions. Hyper scan doubles the scanning speed - 13 or 26 channels per second. Backlit LCD display with dimmer. AM, FM-narrow and FM-wide modes. Jacks: tape out, 3.5mm headphone, external speaker, external DC power and BNC aerial input. Memory backup requires 9v battery. Measures: 76 x 222 x 209mm. Mains operation (or 12 VDC cord, extra).

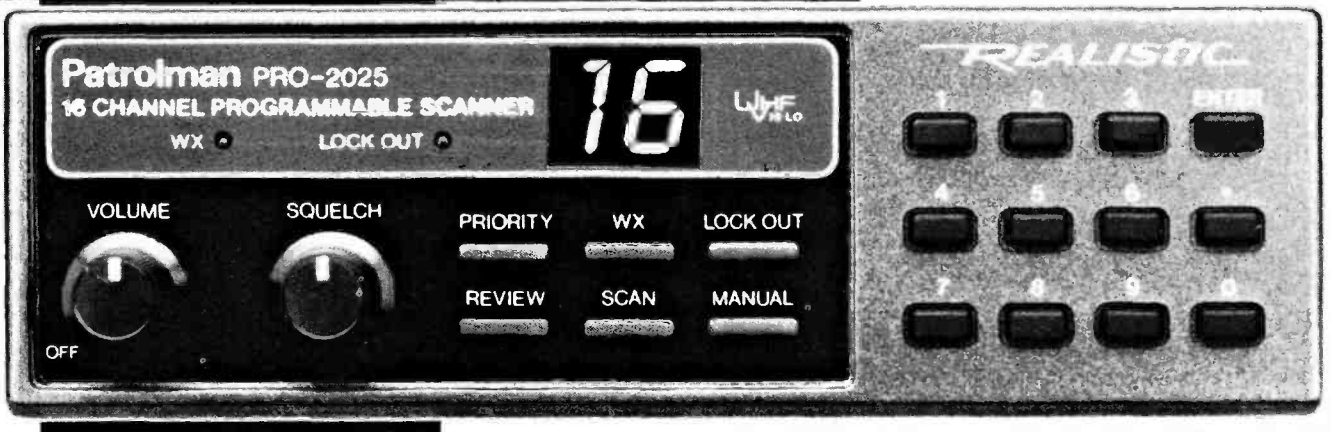
16-Channel Mobile Scanner

£99.95

20-9146

Covers: 66-88, 136-174 MHz
And 406-512 MHz

Realistic PRO-2025. This scanner gives you direct access to different frequencies. You can select up to 16 channels to scan and you can change your selection at any time. Features automatic two-second scan delay, memory backup, priority channel and lockout function that lets your scanner skip over specified channels. Squelch and volume controls. Jacks: power, external speaker and aerial. 12 VDC neg. gnd. only. Measures: 45 x 140 x 175mm.



Tandy

All The Action
As It Happens

Over 500 Tandy Stores And Dealerships Nationwide.
See Yellow Pages For Address
Of Store Nearest You.

InterTAN U.K. Ltd., Tandy Centre, Leamore Lane, Walsall, West Midlands. WS2 7PS Tel: 0922 710000

ARE COMMUNICATIONS

THE SHOP WITH THE SMILE

WE SELL ALL WELL-KNOWN BRANDS LET US QUOTE FOR YOUR CHOICE

KENWOOD — ICOM — STANDARD

ONLY FROM US - WITH SSB

ICOM IC-R100

Phone for Best Price

IC-R100 Mobile/Base Receiver now with **SSB!**

WHY SETTLE FOR ANYTHING LESS!

For the enthusiast who prefers a more permanent installation the IC-R100 is ideal giving full frequency coverage of 500kHz-1800MHz and AM/FM. FM wide modes of operation. The IC-R100 boasts 100 memory channels to store your favourite stations and has features similar to the little pocket receiver. 48 monthly paymensts of 17.97.

IC-R1 and voucher

STAR ITEM

This scanning receiver now at a new AMAZING price

£369

Frequency range 100kHz to1300MHz no gaps AM or FM Also available on easy terms.

48 payments of £13.65 per month.

Other Scanners Available - JUPITER II FAIRMATE UNIDEN

The London Amateur Radio Show March 9 & 10

LONDON AMATEUR RADIO SHOW

This will be the second Amateur Radio Show at Picketts Lock and once again we will have some of the best value at the show.

SPECIAL SHOW OFFER
WE WILL BE OFFERING BONUS VOUCHERS ON **ALL STAR ITEMS SHOWN AND MORE!**

STAR ITEM

STANDARD C528

Probably the most versatile dual band hand held available!

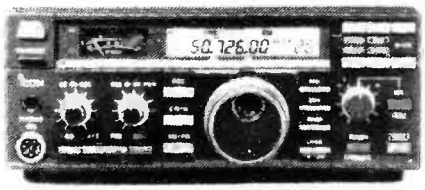
£339

Packed with so many features that we haven't the room to list them all. But we will try a few:

Full Duplex
Dual Receive
Extend Cover
Programmable Offsets
CTCSS DTMF
5 TONE PAGER
RECEIVE 130-175
330-470
820-960

ICOM IC-726

HF Transceivers for both mobile or base - the 726 has 6 metres inc.

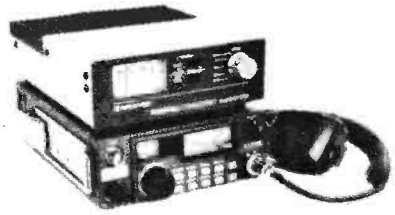


PHONE FOR OUR PRICE

YOU WILL BE AMAZED BY THIS DEAL

A DREAM COME TRUE

Bored with two metres? Then why not turn that 2m rig onto the HF bands



FT290R II £395 2 METRE TRANSVERTER
TOKYO HX240 Transverter £249
NOW WITH AUTO SWITCH

With the HX 240 feed in 3 to 10 watts on 2m and transmit on 10-15-20-40 or 80 with 40 watts output.

KENPRO

Once again **ARE** COMMUNICATIONS BREAK THE PRICE BARRIER!
Now a 2 Metre Hand Held transceiver made by Kenpro. Model

KT22E

Package includes NICAD pack charger and antenna

- ★ Fully synthesised
- ★ Thumbwheel tuning
- ★ 10MHz cover on RX
- ★ 1750kHz Tone Burst
- ★ 600kHz Shift for repeater operation
- ★ Low and High power switch

£139

or 12 Monthly payments

PHONE 081-997 4476

Access VISA

Opening Hours Monday-Friday 9.30-5.30
NOW OPEN SATURDAY 10.00-5.00pm
Car parking at rear of shop.

ARE Communications Limited, 6 Royal Parade, Hanger Lane, Ealing, London W5A 1ET. England
Tel: 081-997 4476 Fax: 081-991 2565

Keylines

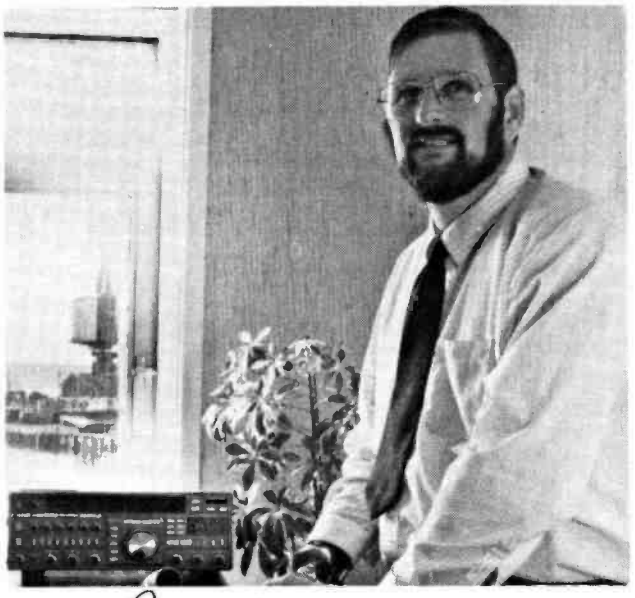
Learning is a continual process. Every day brings new knowledge to all who read, write, talk to, or listen to others. In this job, a continual flow of information comes my way - like it or not! Much of the information finds its way into *PW*, and a lot more seems to find its way into the overloaded 'memory bank' between my ears. Unfortunately, although it goes in okay, the only problem seems to be retrieving the information when I need it!

The learning process is well and truly in 'top gear' when I'm researching for a major feature article, such as the 'Amateur Radio Repeaters - The Story Behind Your QSO' published in February's *PW*. This feature is a particularly good example of the learning process, and it certainly left its mark on me.

This was because after the feature was finished, I felt ashamed for my lack of support of the repeater network. I also realised I had not supported the people who dedicate so much time and effort in keeping the repeaters operational.

Until I'd researched on the subject, spoken to people who've spent much of their leisure time (and money) in planning, building, operating and generally looking after the various repeaters, I really had no idea how much organisation there had to be. In other words, I had also 'taken them for granted'. After all - they are there for **EVERYONE who wants to use them** aren't they?

Well now, after my guilt complex had set in, I realised that if repeaters are there for everyone to use - surely **EVERYONE using the repeaters** should support them. Despite my new and long overdue charitable state of mind, to send a cheque to each repeater group and management committee, it was an idea that wouldn't get very far. My bank manager would see to that! In spite of this, we should all make every effort to support the various groups, who after all, work for **us all**.



Rob Mannion G3XFD

Good News CARRIES!

It's obvious that each repeater group has a constant battle to raise funds, and a method which would allow us to help groups throughout the UK - could help a great deal. The answer, as far as I'm concerned, is for a new central agency (run by the repeater groups themselves) to co-ordinate investment. This initiative would allow us to pay, let's say £20 a year, to support **ALL** the repeaters in the UK.

Because very many more people could be contributing centrally, the CARRIES (Central Amateur Radio Repeater Investment Exchange System) would be able to channel far more money to each group. Individual members of CARRIES would know that as well as supporting their local repeater, they would be also helping others. This knowledge will help many of us sleep easier when we use other repeaters - especially when on holiday.

Central Funding

The central funding system would also allow the various repeater groups to share the burden of the proposed £25 a year charge by the RSGB which, according to my postbag, many groups feel is unjust. If the CARRIES idea (or a similar scheme) 'got off the ground' it could lead to the repeater network in the UK being self-financing nationally. The national system could then (to reduce the RSGB's workload and lower their expenditure) negotiate directly with the licensing authorities.

Alternatively, if the members of the national repeater system wished, they could remain under the 'wing' of the RSGB while financing themselves. This method would allow the nationwide investment exchange to remove the need for any surcharge to members (for that's what it is) and allow them to 'spread' any necessary charges amongst themselves.

Any system such as I've proposed, would also effectively remove objections from non-repeater users that they were 'subsidising' a network they did not want to use.

However, in my mind by far the biggest advantage of the CARRIES scheme is that it would provide a potentially large central funding system. We would see the benefit immediately after one of our (regular) spells of bad weather, when the purse could be opened to assist repeaters that had suffered damage.

I would be most interested to hear your comments on my proposal. Do you think it would work? I'd like to think that good news carries, and that it 'repeats' itself!

New President

On Saturday 12 January, Dick Ganderton G8VFH (Editor of *Short Wave Magazine*) and I drove to Cardiff Castle. We had been invited to the installation of the new President of the RSGB, which was to take place at a dinner held to celebrate the event.

The venue was a stunning, medieval-style (although it was built in Victorian times) banqueting hall in the castle. Marvellous people, marvellous place - pity about the meal! The least said about the meal and service the better - suffice it to say that we stopped to eat at a motorway service area on the way home. I managed to persuade them to make me a breakfast, even though it was just after midnight!

It was very pleasant to meet old friends, witness the ceremony and congratulate the new President John Case GW4HWR. We also heard a particularly delightful speech from the Northern Ireland Regional Representative, Terry Barnes GI3USS, who also brought a gift and greetings from friends in Northern and Southern Ireland.

Video Premiere

Following the presidential installation, the other important event of the evening was the premiere of the new joint RSGB/Yorkshire TV video programme featuring amateur radio. We weren't to be disappointed. The video, despite one or two surprising omissions - is an excellent 'first edition'.

Professional broadcaster Jim Bacon G3YLA, he's a weather man on Anglia TV, was a superb choice as the 'front man'. In this role, Jim's smiling and (can I say cherubic?) friendly face and easy manner cannot be bettered in my opinion.

The main 'cast' was extremely well chosen. The young people (after all - it's aimed at them) featured in the video, may well help remove the 'old men's' image that our hobby has unfortunately gained. The inclusion of so many young people may also persuade others that it's worth joining us. We need that 'young blood' so we can 'retire' the image of a society of 'doddery old men' **NOW**.

I enjoyed the video and look forward to showing it to a school radio club I help run, although I know there's a glaring omission from the production. Would you believe there's not a single mention of what literature is available to help beginners? Not even the RSGB's own *Radcom* gets a mention!

So, when you get the opportunity to show this otherwise excellent video - look into your local library and at the shelves in newsagents to see what's available. Make a list of the books and magazines for loan and on sale, and don't forget to mention *PW* and *Short Wave Magazine!*

73s DE Rob Mannion G3XFD

Receiving You...

★★★★★
STAR LETTER
★★★★★

Dear Sir

I felt I had to write to *PW* about the excellent and informative article on amateur radio repeaters, published in the February issue of the magazine. I must also tell you of my experience when I first came on the air for the first time, after receiving my licence in 1985.

I used my local repeater GB3BC, quite oblivious and totally ignorant of the fact that I should have been a 'paid up' member to use it. No-one had previously informed me of this fact and I just thought that it had all come free - as part of my licence fee.

Fortunately, the committee members were polite enough not to tell me over the air, and it was one of my local club members who gave me the full facts behind the repeater operation. So, I soon put matters right by sending my contributions to the repeater secretary and became an official member of the repeater group.

Nowadays, when I hear that my local repeater has gone 'off the air' for some reason or other, my mind immediately thinks of the poor guys who have to turn out in all weathers to see to it. I just want to say thank you all, through *PW's* 'Receiving You'

Edgar Powell GW1TDW
Penygraig,
Rhondda
South Wales.

Editor's reply: The *PW* team were pleased you found the repeater feature of interest Edgar. I can't claim any real credit for it - it's the repeaters and their 'crews' who provided the feature's 'fish on the plate' so to speak. The 'basic ingredients' only needed slicing and serving! Keep supporting your repeaters - they're an important aspect of our many-faceted hobby.

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

Dear Sir

I was interested in your SMD feature in January 1991 *PW*, particularly so as I saw the small transmitter from Jack Glennon G4ZQK (page 42). Could you please let him know, that if he doesn't publish the design etc. in *PW* soon, I'll re-possess his teeth! Thanks.

A. Crofts
Warwickshire

Editor's reply: I'm not sure if we'll pass on the threat Mr. Croft, but we can try to arrange the eventual appearance of the project in *PW* if readers want it.

Dear Sir

I very much enjoy reading *PW* in its new form. Now retired, I purchased it first on my way to work in 1939.

These days I have to travel to a local town some three miles to obtain my copy. Could you please include the next publication date in the current issue?

I have a callsign and think it's a little odd that that I have to obtain the next issue's 'on sale' date from *Radio Communication* every month!

Continued success to *PW*.

Kenneth Hutley
G1EFN
Maldon
Essex

Editor's reply: G1EFN's request is an easy one to grant. Publication dates for future issues of *PW* will be printed on the contents page of each issue.

Dear Sir

Eighteen months ago I received a packet of QSL cards from the Inwards QSL Bureau in our State (Victoria/VK3), Since then I have not received any more cards.

Repeated enquiries, as to the fate of my cards, brought no response.

However, after much pressure the Secretary of the Victorian Division of the Wireless Institute of Victoria (Mr Barry Wilton) finally admitted to me that a **QSL Bureau for incoming cards no longer operates in this State.** He has also informed me that **all** incoming cards are now **destroyed.** The reason he gave me was that due to the poor state of the Australian economy, the WIA can no longer afford to offer such 'luxuries'.

Could you please inform your members/readers not to send any more cards, via the Bureau, to VK3 calls.

I personally, am very sad that I can no longer receive cards 'via the bureau' as I particularly enjoyed answering the cards from s.w.l.s all over the world.

Terry Robinson VK3DWZ
Victoria
Australia

Editor's comment: I found Terry Robinson's letter most disturbing. It was particularly distressing to me, that no one had the decency to tell him that the cards were being destroyed. For many people in our hobby, QSL collection provides great enjoyment. Does anyone have any suggestion as to what he can do to reduce the now inevitable rise in the cost of his hobby - other than starting his own bureau?

Dear Sir

I pondered for a long time before putting pen to paper in response to your December 'Keylines' comments on repeater abuse and censorship.

You say "We must act and the RSGB must also act...". Let us take the latter first. The RSGB, of which I am a member, represents around 50% of licenced amateurs and say 25/30% of all those interested in the wireless hobby. It is thus of limited muscle.

Now the 'we' certainly is, I fear, the lesser of the evils. I lived through World War Two, in which my brother fought; censorship was necessary when, even with the best of will, people failed to conform. Today, many do not even recognise the need to conform.

Finally, in today's traffic conditions do we really need a further distraction? Maybe the best course would be to close them down.

J.W. Barker G3WAL
Rugby

Dear Sir

With regards to the abuse of repeaters as stated in 'Keylines' December 1990, I am afraid that the DTI and RSGB are entirely to blame.

By making the RAE so ridiculously simple, that a person with average awareness can pass the exam with ease, has resulted in a mass of 'zero' IQs coming onto the 'airways'.

By implementing the Novice Licence this pollution will spill over into the h.f. section of the bands. The c.w. test is the only filter which is effective against this pollution, and far from making it easier to obtain a licence, the time is long past when it should be made more difficult.

While quantity may suit vested interests, I can assure you that it is quality that counts.

As you say the foul behaviour on 144MHz is a deterrent to people taking up the hobby although you deplore the use of a censor button, but what other way is there?

Seeing that the damage has already been done, I think that repeaters in any area where abuse occurs should be shut down permanently.

These idiots, with their 'hand-helds', and 'rubber duck' antennas would then find some other means of exercising their meagre brains.

The old hands will tell you that repeaters were the demise of the 144MHz band. No skill whatsoever is needed to operate them, and as I said, with a 'hand-held' and a 'rubber duck', and you are 'away with it'.

It has also been said on several occasions in the past two years that amateur radio is a dying hobby. Nothing could be further from the truth, there are over 2 000 000 amateurs in the world today and that figure is

PLEASE NOTE THAT FROM NOW ON WE WILL ACCEPT PHOTOCOPIES FOR COMPETITION ENTRIES.

Competition Corner Wordsearch

P M D C V S P F I X V V C L J O A S S W P T V L A F R M Z U Q P
X C H P A H Z K E A O K Y J M B K X V W G O M S S H B X H W J L
S Y Q G Z L J Z V I E C J T U L Y R O X D F N T B M G P B Y U S
Q Y K E S H U A N F W R A E G Z H I E A X L U G Y S H J R Q N I
T L T A T I M D R N I C X J G B Q M W N G Z L J B L Z W O U F O
U O N F J E T X U H V U Z W J G J M Q Z U H B T A J P F A C U C
U O I B Z X B U R X N G R T I M S Q E C P T J B X N I A D X J K
U P O S Y X Q F Z C Z B Z C B L A J I S X S T A A M J R C A O F
R A P M F Z Z G Y E V U Y K Y X H Q K Y O N K R V D N O A B E I
O N L A L A P B L S F A T A Y Z X W C S Z C Z O A Q T D S T M M
C T A B D Q U N O I T A T S G N I R E D L O S B I M H J T E A Q
X E C A A C B H I G H A N D L O W X L E M S S X M J S G R J T J
M N O R D J X A J A K R T U H X U Z N M J N O G R S O K O M H Q
S N F U Q I Y F C S M Z K V F Y Q C G W H Y L X R Q E A U S E W
P A C K E T P A N O R P A C K E T P A N O R A M A Y D F N E M P
N K X S V S A Z J P H S Y E N Y S I S V B G I J L P A O D U A F
R Y S S N O I T C E L F E R A M T Y Q W D W O I V D I B U C T I
N U X E N E C S E T I L L E T A S Q M K V V N J O T O B P E I B
P A G V X L Y T T B W C B G J V O Z K H D E X R O H X E Z Y C K
W Y D D M R H S Z P D J U G J D Y W I R S T B E G X V Y K Z S V
C X R S J I M I T E Q C A V W M L W N S L U F W P J N H H N F B
N O A B S G B S L K U D E S Y N Z K P L E P H Y V Y B P M C O A
F P M N C G X P M J T G Y F V Y U P O Z G H N L U X Y X A W R C
Y A W L A C I T C A R P E H T D E T R A T S G N I T T E G X T K
Z I X S F P P R N U P K D L Q C Q Y W P K C D P O P H U Z D H S
O T Q N B K O G H E Z O S D U U Q A N L G M L G W Y J I T H E C
Z Z T A I N L V U M E R R M L A C E E Q O I R B V Y S W M P R A
U H X Q K Z Q J Z R U N D T M J D K A G Q J L K J F B N W H A T
V U E D J N M Q Q J J C S U K D R E U L Q U Y T T T A U A N E T
W Y C U X E Z I V Y B W V P U Y P R B A X N T M E S E B F N I E
K J P T I W Z E D C O B J S I F M R F Q A O S G D W U R R N G R
G N I H T R A E E L P I T L U M E V I T C E T O R P H Y O E X G

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

Send your entry to PW Publishing Ltd., March 1991 Wordsearch Competition, Enefco House, The Quay, Poole, Dorset BH15 1PP. Closing Date last post received Friday 29 March 1991. The Editor's decision on the winner is final, no correspondence will be entered into.

First prize is a years subscription to *Practical Wireless* or a £20 Gift Voucher to spend on *PW* Services , two runners-up receive six months subscriptions or £10 Gift Vouchers.

Sudden
Protective Multiple Earthing
Mathematics for the RAE
Smart Tuner
Getting Started the Practical Way
CB High and Low
Reflections
Satellite Scene
Packet Panorama
Keylines
Soldering Station
Loop Antenna
Backscatter
Broadcast Round-up
Focal Point

Name .....

Address .....

.....

Postcode .....

☐ Subscription
☐ Vouchers (please specify)

increasing at the rate of 7% per annum. At that rate we can expect 4 000 000 amateurs by the year 2000.

These figures can be verified by the IARU. One problem will be to find space on the spectrum for this increase along with all other different modes.

If the 'powers that be' want to do something constructive, I would suggest an A+ licence where a c.w. test at 20 w.p.m, and a successful construction project be the requirements. This would certainly weed out the 'wallies'.

PS. If by a ghost of a chance you print this letter, please give the voucher to some deserving amateur in the UK.

William Mitchell E15G0
Co. Wicklow
Ireland

Editor's reply: Mr Mitchell will be pleased to know that a voucher will be sent to the Radio Amateur Invalid & Blind Club on his behalf.

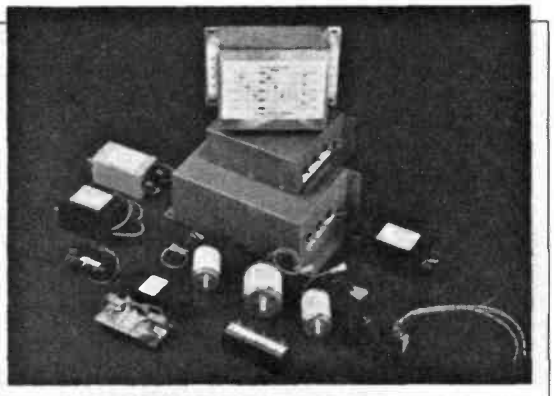
Dear Sir

With respect to Mr Milton's letter in January *PW* about readers that relate their hobby to the name of their house, I wish to point out that I live at **'Ohm'**!

John Taylor G0AKN
'Ohm'
Twickenham
Middlesex

Editor's reply: Any more examples?

Newsdesk '91



Customised Power Line Filters

A comprehensive facility for dealing with the problems emanating from radio frequency interference, has been established by Sussex based Alexander Maple & Co.

The company has design, consultancy and manufacturing capabilities which can overcome most r.f.i. related problems for both manufacturers and users of electronic equipment.

The company is also able to produce a wide selection of bespoke coils and windings, together with a range of toroidal transformers to suit most voltage and output requirements.

The highest recommended materials together with the latest technology ensure that all products meet present and forthcoming European requirements.

For further information, contact:
Andy Maple
(0323) 412330.

Plug-in Relays Offer 2 Channels

Klippon Micro-Systems introduce its latest range of relay modules for TS32 or TS35 DIN rail mounting.

50 Series 2-channel relays are available with 24, 48 or 110V d.c. operating voltages with operating currents of 18, 13 and 6mA respectively. Each module incorporates reverse polarity, coil suppression and l.e.d. indication as standard. The silver nickel plated contacts are 1 Form C and can switch 8A resistive at up to 250V a.c.

Other features include a mechanical life of 10×10^6 and an electrical life of 1×10^5. Operate/release time is 10ms typ. and I/O isolation is 4kV.

Klippon Micro-Systems
DPTS House
Cramptons Road
Sevenoaks
Kent TN14 5DZ.
Tel: (0732) 460066.

Be On The Safe Side

The all new metal panic button from Maplin Electronics is the essential product for all concerned about personal safety. It is also invaluable where property and environmental security is required.

The lightweight unit, which measures just 65mm high, 50mm wide and 25mm deep, can be easily carried in a pocket or handbag.

A red button housed in the metal case, only requires a push to activate the alarm. Once depressed, the strident alarm can only be disarmed by use of the key provided, or from the control panel.

Be safe, be secure, take along the Maplin Panic Button.

Priced at £6.95 for one unit or £5.73 each for 5+ (incl VAT). Order details YZ67X (Metal Panic Button).

Maplin Electronics
Tel: (0702) 552911
(Enquiries).

The Setmakers

To celebrate one of the century's most remarkable and far reaching inventions, radio and television, a major new book called *The Setmakers* was recently published by the British Radio and Electronic Equipment Manufacturers' Association (BREMA).

The Setmakers was formally launched on January 30 at the Institution of Electrical Engineers in Savoy Place, London. The book charts the British story of companies and people who powered one of the greatest engines for social change the world has seen since the invention of the printing press.

In less than three generations a 'wireless trade' making primitive radios from a few simple components has grown into a multi-billion pound industry bringing mass information and entertainment to all corners of the globe.

The Setmakers (commissioned by BREMA two years ago) was written by Keith Geddes in collaboration with Gordon Bussey. It has 464 pages and includes nearly 500 photographs.

The book recalls some of the great brand names of the past (Edco, Vidor, HMV to name but a few) and contains a mass of intriguing archival material much of which has never previously been made public. It charts the fascinating development of technology that has led to the modern marvels of television, VCR and compact disc, which we now take for granted.

Authoritative yet eminently readable it concludes by looking at the current state-of-the-art as the industry faces new challenges. These include changing conditions as a result of the Broadcasting de-regulation, the introduction of satellite and the prospects for high definition television.

The Setmakers is priced at £12.45 + £2.50 p&p and is available from:
BREMA
Landseer House
19 Charing Cross Road
London
WC2H 0ES

BBC World Service

Highlights of a momentous year of world news, captured through scripts of one of the BBC's longest-running and most successful radio series, are now available in book form. *The Best of From Our Own Correspondent 1989/90* is one of the first two titles in a new joint publishing venture announced between BBC World Service and Broadside Books Ltd.

Also published is *They Made Our World* based on the popular science series which is now getting a repeat airing in Britain on Radio 5.

The 272-page *Best of From Our Own Correspondent* (UK price £17.95 hardback, £8.95 paperback), edited by one of the programme's producers, Mike Popham, gives readers an opportunity to sample a selection of despatches from all corners of the world. They range from the aftermath of Tiananmen Square and the dismantling of communism in Europe, to the unification of Germany in October 1990. And in the true spirit of the programme, there are some unexpected stories from those parts of the world which are all too often overlooked in the media scramble to cover the year's main events.

They Made Our World, edited by Dr John Hamilton, is published in hardback at £13.50, with 120 illustrations in colour and black and white. The book features a gallery of great scientists, engineers, inventors and thinkers who have shaped today's world. It spans four centuries of scientific achievement from Sir Francis Bacon in the seventeenth to Robert Oppenheimer in the twentieth, taking in the struggles and achievements of great names like Newton, Darwin, Einstein and developments from antibiotics to the atom bomb.

The original 26-part radio series presented by John Newell, the BBC World Service's Science Editor, first broadcast last year, is currently being repeated on World Service and on Radio 5 at 11.50pm on Sundays.

BBC World Service and Broadside Books Ltd. have agreed an eight year exclusive publishing deal. Three further titles are already in preparation for next year.

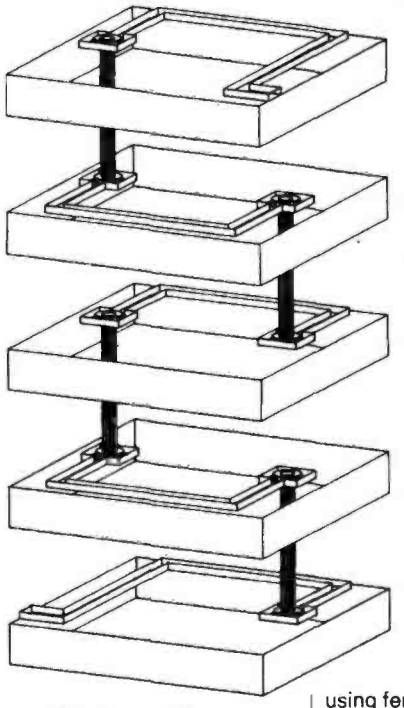
The above two books are available from the **BBC World Service Shop, Strand, London WC2. Tel: 071-257 2575** and other bookshops.

Dubus 1991

The magazine *Dubus* (German English) is now better than ever and includes many v.h.f./u.h.f./s.h.f. articles and projects and many extra pages of useful information to members interested in the higher frequencies. Unfortunately, the subscriptions have been increased to £9.50 for four issues. Subscriptions are now due for 1991 and cheques should be made payable to M. Hatton Account 2 and crossed.

Anyone wishing to obtain copies of *Dubus* should contact:
Ken Hatton G4IZW
Hamilton House,
Boat Road,
Bellingham,
Northumberland
NE48 2AP.
Tel: (0434) 220636.

Newsdesk '91



Electroustic Limited

Hampshire-based Electroustic Limited are proud to announce the availability of surface mount inductors. The idea of an inductor as a lump of iron with some wire wound round it, is an old view. This idea, along with the fact that it is extremely difficult to manufacture such components on a small scale, has meant that with the advent of surface mount technology the inductor has been left trailing behind the widely available capacitor.

The inductor has caught up with the capacitor in the surface mount world by using techniques borrowed from the manufacture of the capacitor. An inductor can be constructed in a similar way to a multilayer chip capacitor by using ferrite instead of ceramic - the difference is that each plate has to be connected in series by means of plated through holes instead of in parallel.

The range of values in currently limited to 0.22µH to 22µH, but is being extended all the time as the product is developed. This product has many applications in the Electronic and telecommunication industries where surface mount technology is now extensively used.

For further information, please contact:
Mervyn Edwards or Sally Doherty
Tel: (0264) 333664.

Alpha Electronics

Now freely available from Alpha Electronics is their 1991 Instrument Catalogue. Sixteen colour pages feature nearly 200 electrical and electronic test and meauring instruments plus their BS5750 Repair and Calibration service.

Equipment featured includes the latest from such well known manufacturers as Megger, Fluke, Philips, Edgcumbe, Robin, Heme and Clare, to name but a few. Complete with price and order information this latest catalogue is available free of charge.

For further information, please contact:
Fred Hutchinson, Quiswood Ltd.
Tel: (0756) 799737.

GB3GU – Guernsey Repeater

There's good news for Channel Island repeater users as GB3GY on Guernsey came back 'on air' in late January. After being 'off air' for a year, the 430MHz repeater re-entered service on Saturday 26 January at 7pm from its new site.

Mike Allisette GU4EON, requests that u.h.f. operators listen out for it on RB13. Mike would also appreciate reports to his home QTH. (QTHR).

Club News

Braintree & District ARS meet 1st & 3rd Mondays, 8pm at the Community Centre, Victoria Street, Braintree (except Bank holidays). March 4 is a Junk Sale and the 18th is a social evening with Braintree React. **Mrs M. Andrews, 22 Arnham Grove, Braintree, Essex. Tel: (0376) 27431.**

Poole RAS meet last Fridays of the month, 7pm at Russell-Cotes House, Lower Constitution Hill Site, Bournemouth & Poole College of FE. February 22 is a talk on Electricity and Shack Safety. Details from **Vernon Cotton G3BCI, 45 Branksome Hill Road, Bournemouth BH4 9LF. Tel: (0202) 760231.**

Spalding & District ARS meet 1st Fridays, 7.30pm at The Ship Albion, Albion Street, Spalding. Details from **Tom Simpson G3NSF, 184 Boston Road, Holbeach, Spalding, Lincs. Tel: (0406) 24523.**

Bromsgrove & District ARC meet 2nd & 4th Tuesdays, 8pm at Aston Fields WMC, Bromsgrove, Worcs. Details from **Jeff Porter G4OHJ, 77 Westholme Road, Bidford-on-Avon, Alcester. Tel: (0789) 773286.**

Verulam ARC meet 2nd & 4th Tuesdays, 7.30pm at the RAF Association HQ, New Kent Road, (off Malborough Road), St. Albans. 2nd Tuesdays are activity evenings and 4th Tuesdays are their monthly main meetings. On February 26, Norman Fisher G8ATO will give a talk entitled 'UHF Compendium'. Further details from **Walter Craine G3PMF, 5 The Crescent, Abbots Langley, Watford, Herts WD5 0DR. Tel: (0923) 262180.**

Keighley ARS meet Thursdays, 8pm at The Cricket Club, Ingrow, near Keighley. February 14, March 7 and 14 are natter nights, February 21 is a Visit to Menwith Hill (7.30pm) and the 28th is Caribbean Experience by Julia Fearnside. **Kathy Conlon G1IGH on Bradford (0274) 496222.**

Sutton & Cheam RS meet 3rd Thursdays, 7.30pm at Downs Lawn Tennis Club, Holland Ave, Cheam, Surrey. Natter nights are 1st Mondays in the Downs Bar. February 21 is 'Wireless Before Radio' by Steve Cook G8CYE and March 4 is a natter night. **John Puttock G0BWV, 53 Alexandra Ave, Sutton SM1 2PA.**

Brentwood ARS has had to change its venue from 'The Hermitage'. They have now moved to the Bardswell Social Club, Bardswell Close, Brentwood, Essex and the club are now known as the **Bardswell ARS.** Meetings are on Thursdays on an informal basis in the bar and it is hoped to have a club station on the air at least one Thursday a month. Details from **Joe Wentworth G0FED, 5 St. Charles Road, Brentwood, Essex CM14 4TS.**

Southgate ARC meet at Winchmore Hill Cricket Club Pavilion, Firs Lane, Winchmore Hill, London N21. February 14 is a talk by Ron Broadbent G3AAT on 'AMSAT Communications', the 28th is Antenna Noise Bridge Amnesty Night and March 14 is a talk by Steve Reynolds of Icom UK on Phase Lock Loops. **Brian Shelton G0MEE, 22 Berkeley Gdns, Winchmore Hill, London N21 2BA. Tel: 081-360 2453.**

A new radio club is being formed in Glasgow and they are looking for members. Known as the **No Airs and Graces Amateur Radio Club**, nicknamed the Naggers, they will be holding their meetings in the Nautical College, Glasgow. For details contact **GM0LKS on 041-885 0716.**

Denby Dale (Pie Hall) & District ARS have a new correspondence address:
Eric Stewart G0DBU
24 Ingleton Road
Newsome
Huddersfield HD4 6QX.
They meet Wednesdays, 8.30pm at Denby Dale Pie Hall.

On 1 March 1991, **Port Talbot ARC** will be activating GB2SDD, March 1 being Saint Davids Day. There has been a change in the co-ordinator and GB2SDD award details. The route for the QSLs and award applications is now via GW3WWW, 18 Mount Pleasant, Tonna, Neath West Glam SA11 3HX. The cost of the award has been reduced for 1991, due to the changing of the supplier. All contacts will receive a QSL card from the 24-hour operation. The event takes place at BSC, Port Talbot Sports & Social Club. Visitors are welcome

Services

Queries
We will always try to help readers having difficulties with a *Practical Wireless* project, but please note the following simple rules:
1: We cannot give advice on modifications to our designs, nor on commercial radio, TV or electronic equipment.
2: We cannot deal with technical queries over the telephone.
3: All letters asking for advice must be accompanied by a stamped, self-addressed envelope (or envelope plus IRCs for overseas readers).
4: Make sure you describe the query adequately.
5: Only one query per letter please.

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

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

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

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

Wireless Line
This is an information service for the radio enthusiast, updated each Friday. Calls cost 44p per minute peak time and 33p per minute off-peak. The number to ring is: (0898) 654632.

Newsdesk '91

NICAM Digital Stereo Sound

As a final technical achievement prior to becoming National Transcommunications Ltd (NTL), IBA Engineering successfully completed the frist phase of installations bringing NICAM Digital Stereo sound to ITV and Channel 4 throughout the country. The targets for end-1990 of making NICAM available to 79% of viewers, and to every ITV region (except Channel) have been reached.

The NICAM service allows viewers to receive stereo programmes and to hear all programme sound in near Compact Disc quality. An increasing number of programmes are now being produced with stereo sound and these are indicated in the *TV Times* and on Oracle teletext pages 213/7 (ITV) and 414/5 (Channel 4). NICAM TVs and VCRs are now widely available from most receiver manufacturers.

On 1 January 1991, IBA Engineering became National Transcommunications, in preparation for its privatisation later in the year. NTL is already committed to a second phase of NICAM, which will increase the coverage to over 90% of the population from the following additional transmitters:

Approx date	Transmitter	ITV area
1991	Hannington	TVS
	Oxford	Central
1992	Waltham	Central
	Stockland Hill	TSW
	Tacolneston	Anglia
	Craigkelly	STV
	Heathfield	TVS
	Sudbury	Anglia
1993	Redruth	TSW
	Selkirk	Border

These transmitters will carry NICAM on Channel 4 and TV-am as well as from the local ITV contractor. In addition NICAM will also be carried by dependent relay stations.

STOP PRESS.....
The *1991 ARRL Handbook* is now available from our *PW* Book Service, priced £16.95 + 85p p&p.

News From Australia

Some amateur radio news from Terry Robinson VK3DWZ in Australia, who is a member of the Wireless Institute of Australia. He wrote to tell us of some news regarding the Inwards QSL Bureau for Victoria (VK3).

Eighteen months ago he received a packet of QSL cards from the Bureau. But since then he has not received anymore cards. Repeated enquiries, as to the fate of his cards brought no response.

However, after much pressure, Mr Barry Wilton, the Secretary of the Victorian Division of the Wireless Institute of Victoria, finally admitted that a QSL Bureau for incoming cards no longer operates in the Victoria state and that all incoming cards are now destroyed. The reason given was that due to the poor state of the Australian economy, the Wireless Institute of Australia (WIA) can no longer afford such luxuries.

Siskin Electronics Ltd.

Siskin Electronics Ltd. recently announced the completion of a powerful new packet radio/multimode program for the Atari ST range of computers. Features include:

Full split screen operation, mouse driven routines, drop down menus, excellent back-scrolling receive buffer, selective save and print to disk from buffer, user definable menu commands (ideal for multimode controllers), command recall facility, full user manual, future enhancements to follow (tell us what you want!)

The driver program requires an Atari ST with 512k ram (or greater), Monochrome hi-res display, single or double-sided 3.5in diskette drive, TOS 1.0 or later.

This program has been compiled by the UK's leading packet radio suppliers Siskin Electronics Ltd., so consequently it supports most popular TNCs including PaComm, AEA, Kantronics and AEA products.

Recommended retail price is £19.95 incl p&p, mention *Practical Wireless* or *Short Wave Magazine* and you can claim an immediate £5 discount!
Further details, from:
Siskin Electronics Ltd.
PC House
2 South Street
Hythe
Southampton SO4 6EB.
Tel: (0703) 207155/ 207587.

Price Pulse For Amateur Radio - To Be Launched At Pickett's Lock Show

Whilst radio amateurs and short wave listeners are amply provided for in the supply of new and used equipment, there has been a void of information on current second-hand prices.

Technology Partners (publishers of the G4NKH Buyers & Selllers Register), of Lytham St. Annes, Lancashire, announce the release at the London Amateur Radio Show, of their latest publication, *ECG*, a pocket guide to new and used prices, covering the last ten years of transceiver manufacturer.

Not only is this guide concise and easy-to-read, it covers most station accessories including antennas, etc.

Two issues a year are planned, coinciding with the RAE results, with a third issue if values change significantly, due to the advent of the Novice Licence. Newcomers and veterans alike, will benefit from this insight into current equipment values.

The *ECG* (Equipment Costing Guide) is priced at £2.99 and will be available from:
Technology Partners, PO Box 82, Lytham St. Annes, Lancashire.

Newsdesk '91

Beat The Recession

The perfect solution for every computer user. Pay less for everything. A lot less! The All Formats Computer Fair is now well established as the definitive bargain hunters paradise in the computer industry. Anything and everything you could possibly want is there. Hardware including new, ex-demo' and second-hand computer, monitors, keyboards, memory, disk drives, printers, joysticks, modems, etc. Software from the latest games to business and personal productivity. PD and Shareware, books, media and consumables, user groups and clubs, the list is endless. All this at amazingly low prices.

Part of the success of the All Formats Computer Fair is the low cost of exhibiting (£75). This attracts all sorts of exhibitors who wouldn't pay for more expensive shows. Also, this low cost allows exhibitors to charge their customers lower prices. Exhibitors and visitors both beat the recession.

All Formats Computer Fairs are held at the New Horticultural Hall in Westminster, London. Admission is £3. The next show is on March 23 running from 10am to 5pm.

Further information from:
John Riding
Tel: (0225) 868100.

Maplin Introduce

The Maplin Electronics Home and Business Telephone Exchange system is designed to make the best use of your telephone. Any one of up to four extensions can make an external call in privacy, and if the exchange line is busy you can tell it to let you know when it becomes free.

Incoming calls can be answered from any extension and transferred to another if required. Intercom calls can be made between extensions even if the outside exchange line is in use. In addition, any extension can be used as a baby 'phone to monitor a sleeping child. If required, extensions can be barred from making external calls.

Installation is simple and no special tools are required. The unit is an advanced microcomputer controlled system, which combines a combination of telephone control and premises security. Here, advantage is taken of the special features to set the alarm from any telephone and automatically dial a local number should an intruder break in or a fire start - in this respect the system acts as fire alarm.

Price £199.95 (to include VAT). Order details XP22Y (Home & Business Xchnge).
Maplin Electronics.
Tel: (0702) 552911 (Enquiries).

Help!

We recently received a letter from a Mr Ken Hatton, who represents the NOT Forgotten Society, an organisation helping ex-servicemen who are disabled.

They have a s.w.l. who requires an h.f. radio receiver, and immediate funds are available.

Mr Hatton would be very grateful to any reader who can assist in supplying a suitable receiver, and his contact address is:
Hamilton House
Boat Road, Bellingon, Northumberland NE48 2AP.

Television Transmitters In Safe Hands

NATIONAL TRANSCOMMUNICATIONS

As the Independent Broadcasting Authority disappears, viewers of commercial television need have no fears about receiving their favourite programmes after December 31. Emerging from IBA Engineering, National Transcommunications Ltd. (NTL) takes on transmission responsibilities following new broadcasting legislation. The company is to be privatised during 1991.

The NTL plans to continue the high engineering standards set by the IBA on a network of nearly 2000 television transmitters, built up over some twenty years. They are the vital link in the television chain, virtually a life-line for those in remote areas, but usually taken for granted by the population at large.

The NTL will also be building new business in other areas of broadcasting and telecommunications, capitalising on its special skills and experience. Sites and services to telecoms operators, satellite engineering, network linking, radio transmission and maintenance, consultancy work and a Research & Development facility are all likely to feature strongly in NTL's future business.

Unlike its public-service predecessor, NTL will be a market-led, commercial organisation. Under an executive board of five, its staff are drawn largely from the engineering division of the IBA. With significant re-structuring, a 20% reduction in the work-force has been achieved. The company intends to provide quality, reliability and efficiency, and is set to thrive in an increasingly competitive market.

(Left to right)
Ronald McKellar
(Dir. of Finance)
Derek Chambers
(Dir. of Operations)
John Forrest
(Executive Chairman)
John Okas
(Dir. of Business Devpt.)
Martin Stokes
(Company Secretary)

Enware

Enware announce the release of ENLOG. The ENLOG system is a comprehensive computerised amateur radio log book and data base for the IBM PC and compatible computers.

Available on 3 1/2in or 5 1/4in IBM format diskettes, with full documentation, features include:

Full colour 'pop up' windows and menus.

Immediate access to all information on any previously worked station.

Information includes: callsign, operators name, locator, full details of all previous QSOs (dates, times, power, mode, frequencies, etc), records of QSL cards sent/received and comments. Automatically calculates and displays antenna bearing and distance from 4 or 6 figure maidenhead locator. Main display includes 'real time' clock and current date.

Full listings (in standard log book fomat) on screen or printer of all QSOs between any two dates.

ENLOG is available via mail order from ENWARE at £29.99, please state disk format required, (inclusive of VAT and UK postage).

For further details, contact:
Steve Damon
49 Wimborne Road West
Wimborne
Dorset BH21 2DQ.
Tel: (0202) 842443.

Newsdesk '91

Novice, Six Metre & Repeater News

A new era of co-operation between the Department of Trade and Industry, the Radiocommunications Agency and Amateur Radio was launched on January 18. The RSGB and the Amateur Radio press were invited to a meeting to discuss the the Novice Licence, 50MHz restriction reductions, the possibility of 'personalised' callsigns and 144MHz repeater abuse.

At the meeting in London, attended by Rob Mannion G3XFD on behalf of *PW* and *Short Wave Magazine*, and freelance amateur radio journalist Chris Lorek G4HCL, the DTI and the RA confirmed that they hoped to issue the first Novice Licences in the summer.

The meeting, the first of a regularly planned series between the various parties, also discussed the many anomalies associated with the Novice Licence - including the enforcement of a Morse code training element in the Novice Licence Training courses. The contentious subject of specifications for Novice Licence constructional kits, was also covered in the wide-ranging discussions.

No Specifications

The DTI and RA were able to confirm that no specifications had been 'laid down" for the technical standards of kits suitable for a 'Novice' licencee. A spokesman for the DTI and RA stated that the aim of the Novice facility was to "encourage activity" and pointed out that no specifications were laid down for the full Class A and B licencee's transmitting and receiving equipment.

In reply to the concern expressed by G3XFD and G4HCL, the DTI and RA spokesmen agreed that there were also some doubts in official circles regarding examination facilities for Novice Licence candidates. In particular, the possible intimidating effect on younger candidates sitting the City & Guild's examination, where hundreds of people can attend, was discussed.

Personalised Callsigns

The DTI and RA spokesmen announced that in future, they would look favourably at the introduction of 'personalised' callsigns, although commercial considerations would be taken into account. It was also stressed that any such facility could not operate to the detriment of the system in general.

Relaxation On Six

Further relaxations of restrictions on the 50MHz allocation were announced. Although no date or firm details were given by the DTI and RA, it's hoped that restrictions will be eased further in the summer of 1991, as a direct result of negotiations with a neighbouring EEC country.

Repeater Abuse

The DTI and RA spokesmen expressed their departments' concern at the level of 144MHz repeater abuse, and stressed that officially, more co-operation was needed from radio amateurs in reducing this persistent nuisance problem. Some concern was also expressed by the DTI and RA, regarding the organisation of some repeater management groups.

The meeting was concluded by a request from the Radio Investigation Service spokesman, that radio amateurs should co-operate fully with the Amateur Radio Observation Service* to overcome this problem. The spokesman finished by stating that: "to overcome the problems, the RIS and AROS require the full support of radio amateurs, and this includes the full provision of evidence, names and locations and the willingness to increase their levels of self-policing."

***AROS, Co-Ordinator - Geoff Griffiths G3STG, 11 The Grove, Asfordby, Melton Mowbray, Leicestershire, LE14 3UF.**

New Eurorack Brochure

SRS - the Harlow-based enclosure specialist - has produced an 18-page brochure on its range of Eurorack systems which are designed to meet DIN 41494 and associated IEC 297 and BS 5954 specifications.

Extremely well illustrated, the publication provides comprehensive details on the company's subracks; connector and motherboard mounting options; modules and cassettes; panels; card guides and accessories.

Further information on handles, fixings, finishes, earth continuity and vibration testing is also included.

Copies are available free-of-charge.

For further details, contact:

Martin Deards
SRS Products
Tel: (0279) 418401.

Radio Diary

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

February 17: The Kidderminster & District ARS will be holding their Rally at the Harry Cheshire School, Habberley Lane, Kidderminster, Worcestershire. Doors open at 10am. There will be a Bring & Buy, and all the usual activities. Talk-in on S22. **G0MJY on (0562) 746207 or (0746) 780255.**

February 23: The Rainham Radio Rally will be held at the Parkwood Community Centre, Parkwood Green, off Deanwood Drive, Gillingham, Kent. The entrance fee is £1 and the doors open at 10am. **Mr R. Mullett on (0634) 362154.**

***February 24**: The East Coast Amateur Radio and Computer Rally will be held at the Clacton Leisure Centre, Vista Road, Clacton-On-Sea. Doors open 10.30am. Major suppliers of Radio & Computer Equipment, large Bring & Buy stand plus Auction, Test Bench Facility and ample car parking. Only five minutes walk from Railway Station. Bring the whole family! There are sports facilities, swimming, a childrens adventure playground as well as bar and cafe. Easy access for disabled. Talk-in on 144MHz. **ClockPak, 18 Litchfield Close, Clacton-On-Sea, Essex CO15 3SZ.**

February 24: The Bideford Bay ARC are holding their 4th Taw and Torridge Rally at Bideford, Devon in the BAAC Halls starting at 10.30am. Talk-in will be on S22. **John Oenford G0GFK. Tel: (0237) 476402.**

***March 9/10**: The London Amateur Radio Show will be held in the Picketts Lock Centre, Picketts Lock Lane, Edmonton, London N9 0AS.

***March 17**: The Norbreck Radio, Electronics & Computing Exhibition will be held at the Norbreck Castle Hotel Exhibition Centre, Queens Promenade, North Shore, Blackpool. Admission is £1, DAPs 50p and under 14s free. Free raffle ticket and exhibition plan. **Peter Denton G6CGF. Tel: 051-630 5790.**

March 17: The Wythall Radio Club will be holding their 6th annual Radio Rally at Wythall Park, Silver Street, Wythall, Worcs., which is on the A435 near Junction 3 on the M42 south-west of Birmingham. Doors open 11am. There will be three halls plus a marquee, trade stands, Flea Market, Bring & Buy, a bar and snacks will be available, talk-in on S22 and admission is only 50p. **Chris Pettitt G0EYO. Tel: 021-430 7267.**

March 17: Tiverton South West Radio Club have the 1991 Mid Devon Rally at the Pannier Market, Tiverton. Easy access, only minutes from junction 27 on the M5 with excellent free parking. Two halls of trade stands, Bring & Buy stall and mobile snack bar. Further displays and full refreshment facilities in the club room bar, which is open throughout the day. Doors open at 10am. Talk-in on S22. **G4TSW, Mid Devon Rally, PO Box 3, Tiverton, Devon.**

March 24: Bournemouth RS will be holding its fourth annual Amateur Electronics Sale at the Kinson Community Centre, Pelhams, Millhams Road, Kinson. Doors open 11am to 5pm. Talk-in by G1BRS on 144MHz on S22. Further details from **Vic Sievey G4PTC, 3 Stratton Road, Bournemouth BH9 3PG. Tel: (0202) 516593.**

***March 24**: The RSGB VHF Convention will be held at Sandown Park Exhibition Centre, Esher, Surrey.

March 24: Pontefract & District ARS have their 12th Annual Components Fair at the Carleton Community Centre, Carleton, Pontefract. Doors open 11am to 4.30pm. Trade stalls, bookstall, Bring & Buy, licenced bar and refreshments. Talk-in on S20. Admission by Prize programme (three prizes). **Colin G0AAO, QTHR. Tel: (0977) 615549.**

Getting Started - The Practical Way

Feature

The Novice Licence is here - the first examinations will take place in the summer of 1991. To help you prepare for transmission 'The Practical Way', The Reverend George Dobbs G3RJV, looks at tools, techniques and an appropriate quotation!

Learning any new skill can be "venerably dull", and that can apply to a hobby just as well as anything else. Amateur Radio has its own skills, rules, techniques and vocabulary. All these facts have to be learned by the newcomer. Dipping straight into a text book or even an amateur radio magazine can be quite daunting. What do all these strange terms and things mean?

Practical Route

This series will take the **PRACTICAL** road to understanding amateur radio transmission: it will be 'learning by doing'. Each stage along the way will be illustrated by simple practical projects to build. This will require you to have no more than inexpensive handtools, using easy to obtain component parts, without the need for expensive or sophisticated test equipment. It won't cost much, it should be fun and you may learn from the experience!

So, if you are a 'would be' novice licencee, a licensed radio amateur with a fully commercial station but limited practical knowledge, or just merely interested in amateur radio, I hope you will join me over the coming months and enjoy projects, circuits and a little plain talk on theory. But first we need to prepare the ground!

Tools And Workshop

For any practical work there is a necessary list of tools. Thankfully the tools required by the radio builder and experimenter are few, and are relatively inexpensive. It is, however, worth buying the best examples of each tool required. As any old craftsmen would say, 'buy the best tools and look after them, and they will probably outlive you'. Fortunately many of the tools required will already be common items in a household toolbox.

A small range of screwdrivers is required in medium and small sizes, offering both flat-blade and cross-head ends. Only buy good quality cross-headed screwdrivers. This type of screwdriver 'chews up' with great ease even on the smallest screws and bolts.

You'll also require an insulated trimming tool. These look like screwdrivers and are used for adjusting the cores in coils. I like the ones with phosphor-bronze blades and plastics handles (Maplin BR51F or Marco TOOL/TRIM/PC) and I have several because they are easy to lose in the toolbox.

Main Range

The main range of tools are used to cut, strip and dress wires. You will require a small pair of pointed nose pliers. As with all pliers, check that the end of the blades meet when fully closed. For cutting wire a small pair of lap-jointed side-cutters are ideal.

I also use these for stripping the pvc coating from wire, but others favour the use of side-action wire strippers. An alternative, or addition for both of these jobs is a snip cutter, a cheaper cutting tool designed for cropping leads on the underside of printed circuit boards.

It's a good idea to avoid using the complex double action wire cutting and stripping tools. I find them too large. I also keep a knife on the bench for removing pvc sleeving from screened leads. A disposable modelling knife is cheap and does the job well, providing you use it carefully!

Panels And Cases

The tools required for working on cases and front panels will be described later in the series. At this stage I will just mention the use of a small adjustable spanner to hold nuts, especially the fixing nuts of potentiometers. I have a nice one with a jaw opening of 19mm.

Small holes for mounting controls can be drilled with a conventional power drill and the holes opened with a hand reamer. Other useful items include Allen Keys in both AF and Metric sizes and spanners to fit BA and Metric 'M' nuts.

Test Equipment

There is a mistaken idea that the amateur radio constructor needs to amass an expensive array of test equipment. In fact, it's possible to progress a long way in the hobby with the minimum of test equipment.

Oddly enough one of the most useful pieces of test equipment usually already exists in the amateur's shack - and that's the station receiver. A receiver, especially a general coverage short wave model, is a useful test item as we shall see later in the series.

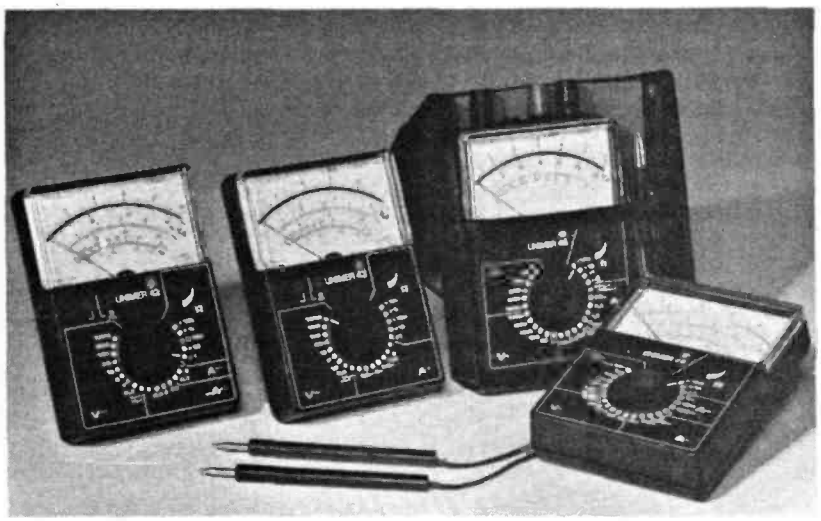
The main item of test equipment is a multimeter, what our American friends call a VOM Meter (Volts/Ohms/Milliamps). Do **NOT** buy a digital multimeter as the basic instrument. They are useful if you want to measure, say, 3.87V but I rarely, if ever, want to do that! More often than not I wish to know that I have about 4V. Also I very often want to measure a circuit change, a dip or a peak in voltage, which is almost impossible to do with 'dancing digits'.

Buy yourself an analogue meter (one with a needle and calibrated dial scale). Only buy a digital meter after you already own an analogue type.

Your new meter need not be very expensive. Without being complex at this stage, I will just say that the internal resistance of the multimeter should be such that it does not interfere overmuch with the accuracy of the readings.

To this end, look at the ohms per volt (Ω/V) figure quoted for the meter. This should be 20kΩ/V or greater. The meter should have several d.c. volt ranges (the lower ones are the most useful) a useful a.c. volt range, d.c. current in several milliamp

"With various readings stored his empty skull, Learn'd without sense, and venerably dull"
Charles Churchill (1731 - 1764)



There are many multimeters on the market and a good quality model need not cost very much.

ranges and several resistance (Ohms or Ω) ranges.

A suitable meter is the Maplin supplied M-2020S (Cat: YJ08J) or the Marco supplied HM102BZ. There are many such meters on the market. Go for a useful set of ranges and a large mirrored scale.

Other Equipment

Other items of test equipment can be gathered as needed or finances allow. An r.f. probe, which is easy to build, will be a useful addition to the meter.

A digital frequency counter is handy but not essential. I would get a 'dip meter' for checking tuned circuits before I bought a frequency counter because it can also be used as a signal source. A radio frequency signal generator will come in useful later, although much can be done with a crystal calibrator, which we will build later in this series.

Many amateur radio work benches seem to sport an oscilloscope, and sometimes bargains may be had at the various radio rallies. But beware, many of these are just 'audio 'scopes' without the bandwidth required to make them useful for amateur radio work.

They may look good on the bench, but for useful work, the rather more expensive oscilloscopes capable of 'seeing' high frequency signals are required.

The Work Place

In amateur radio, this should be the age of the constructor Never before have electronic components been so cheap and the techniques so easy to perform at home. It is possible to be an electronic constructor in a very limited space and even in no permanently 'sacrificed' space if necessary!

I know of radio constructors and experimenters who work on the kitchen table using an old, large, tea-tray or trolley. They work and solder on the tray. The tools are all contained in a small tool box. Their stock of components are housed in small boxes or envelopes, in a fold-down tool box.

At the end of an evening's work, everything can be packed away. All that's required is a small amount of elbow space, good lighting, and a surface that will not be spoiled by soldering 'accidents'. There can be few more convenient hobbies!

Sometimes slightly more messy work needs to be carried out, such as metal work on a case or box, or the etching of printed circuit boards. For this sort of work, it's possible to move into the garage or shed just for those processes. With a little thought practical amateur radio can be 'household friendly'.

Soldering Skill

The basic skill for the 'practical' radio amateur is soldering. Without mastering the art of good soldering, no really useful work can be done.

Over the years I have been asked by novice constructors to sort out non-working projects. The single commonest fault has been poor solder joints. Get your soldering techniques right before embarking on construction projects!

It IS worth spending some money on obtaining good soldering equipment. Avoid unbranded, cheap, soldering irons. The soldering irons manufactured by Antex and Weller usually represent good quality.

A small 25, 17 or 15W (Watts) soldering iron is a good starting point. It will need a solder tip of 3mm diameter or less, and a small range of interchangeable bits can be useful.

The Antex C or CS range of soldering irons are popular. For an excellent iron, but at a price, I would choose the Weller TCP soldering iron. These are 24 volt irons, and require a power unit but are temperature controlled according to the type of tip used. A lot of professionals use this type, but they aren't cheap.

A Good Stand

A good soldering iron stand is also essential. The spring type stands are common, useful and help prevent accidents. Many stands include a holder for a soldering sponge. The sponges are very useful, and are essential in keeping the tip clean.

You should cultivate the habit of wiping the soldering iron tip on the sponge each time it's removed from the holder. The sponge must of course be kept damp more than wet.

Resin Cored

Modern electronic component soldering techniques demands that we use resin-cored solder. This comes in the form of a solder wire with a synthetic 'resin' core, or cores running through the centre in similar fashion to the lettering in a stick of seaside 'rock'.

The most common sizes are 18 and 22 gauge, although I prefer the use of 22 gauge. The solder is a 60% tin, 40% lead alloy, with a melting temperature of approximately 188°C.

The solder is available in both small packs and reels. I would advise the purchase of a reel, running out of solder in the middle of a project is no joke!

Helping Hand

A very useful aid to soldering is a tool called a 'Helping Hand'. This is one or more crocodile clips held in a jig which allows the board, or other items to be soldered, to be firmly held while the work is carried out.

Many soldering jobs do require three hands, and the jigs are very useful tools. Some people make them by fastening a crocodile clip onto a piece of stiff wire which is then held on a heavy base.

These aids are also sold with built-in magnifying glasses to help close-up work. Suitable 'Helping Hands' include the Maplin YK53H and the Marco "TOOL/HELP/P".

Successful Soldering

There a a few simple rules for successful soldering:
1) Soldering is not glueing! Make a good physical joint, bend wires around tags, bend leads in printed circuit boards to secure them, twist wires together, or whatever it takes to hold the component parts together, before soldering.
2) Only solder clean surfaces. Scrape wires clean, expose clean and shining metal before making a joint.
3) Ensure the components are hot enough to allow a good joint to form. The best way to do this is to melt the solder on the joint rather than the iron tip.

A process called 'tinning' (sometimes called 'wetting') is a useful way of achieving successful soldering. This technique is carried out by spreading a layer of solder onto a surface before the joint is made.

The tip of the soldering iron should also be tinned. You can do this, by wiping the hot tip across the damp sponge. The process is completed by wiping some solder across the surface of the tip and again wiping the tip on the sponge. This produces a clean shiny surface on the tip. Once tinned, the iron only has to be wiped clean on the sponge each time it is used, until it looks dirty enough to tin once again.

Component Leads

Component wires may be tinned by scraping them clean with a knife or glass paper, and then heating the wire with the iron and spreading solder on the surface. Likewise, a terminal, a solder pin or the solder pad of a printed circuit board can be tinned by applying heat and melting solder across the surface.

The typical stages in making a solder joint might go like this:
1) Clean and tin the surfaces to be joined. Many components already come tinned, but if in doubt re-tin the surface.
2) Hold the job firmly and ensure that the two component parts to be joined are securely held together. Solder should neither 'glue' nor bridge components.
3) Wipe the tip of the soldering iron clean on the sponge and apply so that it is heating both surfaces.
4) Keep the iron in place and apply the end of the solder to the joint. Use the joint, **NOT** the iron tip, to melt the solder.
5) The solder should melt and flow freely over the joint giving it a 'wetted' look. As soon as a small layer of solder has covered the joint, remove the iron.
6) Check the joint when it is cool but don't blow on it or artificially cool it down. It should look bright and clean. If it's grey and dull, the joint may be bad. Such a joint is called a 'dry joint' and must be 'remade'. The Americans call it a 'cold joint' ... but perhaps that sounds too much like Monday's lunch!

The soldering technique is very simple and soon becomes second nature, but get it right. It you don't, radio construction will simply be a waste of time and a cause of frustration. Practice makes perfect!

Buying Bits

During this series, to follow the build-as-you-learn process, the reader will have to buy electronic components. In most cases I will give suppliers of the parts required. The seasoned constructor tends to keep a 'basic stock' of the common components used in radio projects.

A soldering station is a wise investment - but they're not cheap.

This practice is a sound idea because they can be bought from the cheapest sources, and are at hand for a whole variety of projects. Such a stock would be the commonest values of resistors, capacitors, some hardware and perhaps the popular types of semiconductors.

A good starting point for a beginner who wishes to adopt this approach is to buy starter packs of components. Marco sell a popular 0.25W resistor kit of 1000 resistors, the values biased towards the more commonly used values. They also sell a ceramic capacitor kit with all the common values as well as an electrolytic capacitor kit. These component kits are all good value.

Component Storage

Storing the components for easy retrieval is important. It is possible to spend more time sorting out components from an untidy mass than to actually build a project. There are all kinds of very good little sets of storage drawers but these can be expensive.

For components like resistors and small capacitors there are so many values to sort that a good many drawers would be required. My simple method is to store small components in cheap manilla envelopes (150mm x 90mm) with the value of the resistors or capacitors written in a top corner. The envelopes are stored sequentially in a shoe box or other suitably sized container.

Radio Rallies

The ideal places for buying components cheaply are the many Radio Rallies held around the country. They're usually advertised in the 'Radio Diary' section of *PW*.

These events may contain a bewildering array of dealers, often with small stalls, who can sometimes offer very good prices. It is best to go with a shopping list.

For those out of range of, or unable to attend such events, there are several major mail order companies for electronic components. Many of these companies do a 'next day' service on telephoned credit card orders.

A list appears at the end of this article. Naturally, these companies have larger overheads than the stall holders at radio rallies and are a more expensive, but reliable, way of obtaining components.

What's This?

Identifying components can be confusing to the beginner. I'll help the beginner to recognise the values and types of electronic components as this series progresses.

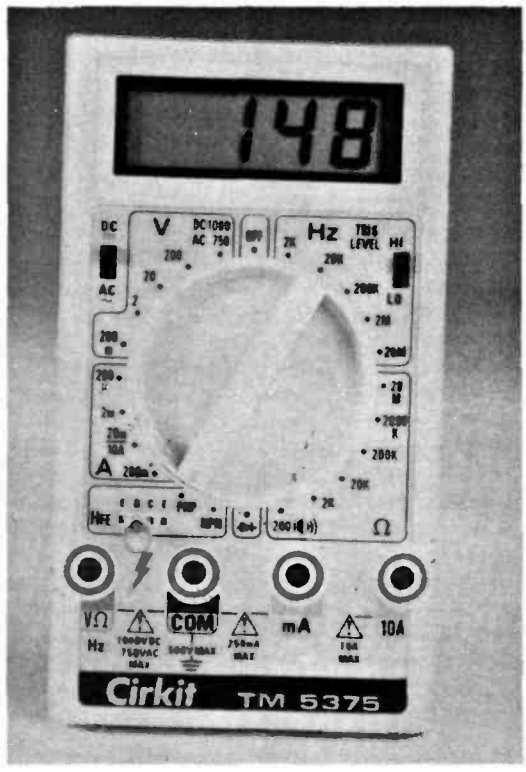
However, as a general rule, you should never begin a project before all the components have been obtained. If you do, it's a certain recipe for frustration!

Also, when building a project, you should identify all the components before beginning and, if possible, lay them out in some kind of order. I find that a piece of polystyrene tile makes a good sorting out and holding place for components with wire leads. Arrange them according to value, sticking one end of the wire into the polystyrene.

From Basics to Building

This first part of 'Getting Started' has quickly explored the basics of practical amateur radio. The only way forward is to do it! As the series progresses we'll begin to build things, learn construction techniques and the simple theory of how things work.

Get to work - and I'll be back next month!



It's best to buy a digital meter after you have had experience with an analogue model.

Component Suppliers

Maplin Electronics, P.O. Box 3, Rayleigh, Essex SS6 8LR.
Very extensive Catalogue (£2,45) by post or from W.H. Smith

Cirkit Park Lane, Broxbourne, Herts EN10 7NQ.
Large Catalogue (£1.60) by post or from W.H. Smith

Marco trading, The Maltings, High St. Wem. Shrewsbury SY4 5EN.
Comprehensive Mail Order Catalogue (£1.50)

Electrovalue Ltd., 28 St. Judes Rd. Englefield Green, Egham, Surrey TW20 0HB. Tel: (0784) 33603.
Free Catalogue of Electronic Components.

JAB, 76 Wensleydale Rd. Great Barr, Birmingham B42 1PL.
Recent company with growing stock, Catalogue 50p

J. Birkett, 25 The Strait, Lincoln LN2 1JF. Tel (0522)520767
My favourite 'bargain' component trader, issues lists from time to time.

Errors And Updates

Low Cost NiCad Tester
February 1991 Page 26

Many of you have expressed an interest in Alastair Downs's splendid NiCad cell power capacity tester. The circuit was ingenious, the building simple, but where are the battery connections?

The simple answer to that question is, that we forgot to label them on the drawing. The positive of the cell under test is connected to the pin marked 'G' (above R4 in the circuit diagram of **Fig. 3**). The negative of the cell can connect to either pin '**C**' or '**D**'. The battery load resistor R_L is of course connected directly across the battery holder contacts.

Our apologies to all.

APPROVED KENWOOD DEALER

YAESU ICOM

AX700E

AT LAST – a scanner from Standard! For longer than I care to remember people have been asking why Standard do not make a scanner – well now they do. I now have 'English speaking' leaflets available which an s.a.e. will bring you post haste. You can see from the photograph that the AX 700E has maintained Standard's reputation for innovation. The strange looking liquid crystal display not only shows the frequency, mode and so on, it is also a panadaptor! For those of you who are new to scanning I had better explain what that is. The vertical line on the left hand side of the display is to show signal strength and the horizontal line along the bottom is the frequency range. This range can be set to 100, 250 or 1000kHz. The frequency displayed at the top is the frequency at the centre of the line. In other words, if the displayed frequency is 145.50MHz and the width of the display is set to 1000kHz, then the left hand side would be 145.00MHz and the right hand side would be 146.00MHz. Now comes the magic. Every time a signal comes up within that frequency range (i.e. 145–146MHz), it will show up as a spike on the display. The height will show the signal strength and the position will indicate the frequency. By simply turning the tuning knob a cursor can be slid along to line up with the new signal and its exact frequency will be displayed at the top of the screen!! To receive the new signal, just press a button and that signal becomes the one that is heard and the display will shift to place it in the middle of the screen. The width of the spikes is governed by the setting of the step size (10, 12.5, 20 or 25kHz) so you can see that it is possible to monitor the activity on up to 100 channels simultaneously. If, for instance, you are looking for a specific signal but you only know the band that it is in and not the spot frequency, just set up the appropriate baedges and then sit back and watch the display. Any signals that then appear can be instantly sotted and tuned to in seconds. That's what a panadaptor can do for you!

As for the rest of the scanner, it covers 50 to 904.995MHz with AM and FM (wide & narrow). It is powered by 13.8V dc and it measures just 180mm W x 180mm D x 75mm D. Come into the shop and see for yourself. You can even play with our new active antenna which should be ideal for use with this set. **Norman G4THJ**

£575 inc P.S.U.

C500

New low price of £335

*including CNB III Nicad Pack and charger

SR STANDARD

C5608 Dual Bander

FEATURES

- ★ Handmic with bright LCD frequency readout.
- ★ All functions on keypad microphone.
- ★ DTMF (when optional CDT5608 fitted) programmable two tone only is possible.
- ★ CTCSS (when optional CTN5608 fitted) keyboard programmable.
- ★ Memory scan
- ★ 1MHz band scan
- ★ Single band operation
- ★ Key lock
- ★ Separate volume and squelch controls on both bands
- ★ Cross band repeater for authorised users (i.e. Raynet)
- ★ Keyboard expandable frequency ranges
- ★ Cellphone receive capability
- ★ Possible to receive AM
- ★ Extension mic lead. Lets you remote the set. 2 mtr. or 4 mtr. length
- ★ Twin mic lead, to run hand and boom mic together
- ★ Multifunction keypad
- ★ Pageing alert
- ★ Programmable offset
- ★ Dual displays

The proposed introductory price will be

£650

Come and see us at:

LONDON AMATEUR RADIO SHOW

We are now authorised Kenwood dealers

APPROVED KENWOOD DEALER

STANDARD ACCESSORIES

CNB151	£39.00
CNB152	£60.00
CSA150	£69.95
CWC150	£12.95
CWC151	£15.95
CAW150	£7.50
CLC520	£10.50
CLC521	£11.50
CMP111	£32.50
CMP113	£39.00
CMP115	£34.50
CHP111	£32.50
CBT151	£10.50
CMB111	£9.50
CTN520	£45.00
CAX02	£4.00

C528 Dual Band Hand Held

Standard have done it again!

You all know how popular the C500 is, well now here is their latest dual bander – the C528 (not to be confused with the Japanese only version, the C520).

The European version has all the facilities that you want in a base station, let alone a hand held!

- ★ Direct 13.8M in for 5 Watts out
- ★ Programmable offsets
- ★ VHF 2.5W, UHF 2W with CNB151 NiCad pack
- ★ Coded paging function
- ★ Dual Displays
- ★ Various scanning modes
- ★ Power save function
- ★ Programmable step sizes
- ★ Multiple memories
- ★ 144–146 VHF, 430–440 UHF, 800–975 Rx only
- ★ Priority Channel
- ★ Separate Vol. and Squ. controls for each band
- ★ Tone Squelch (option)
- ★ Hand held
- ★ 2m & 70cm
- ★ 5 Watts output
- ★ Repeater function

£379

TRADE ENQUIRIES WELCOMED
PLEASE 'PHONE 071-450 9755
★ STRICTLY TRADE PLEASE ★

400 EDGWARE ROAD, LONDON W2
071-723 5521 Tlx 298765

OPENING TIMES: 9.30am-5.30pm Mon-Fri. 10am-4.30pm Sat.

VISA Access

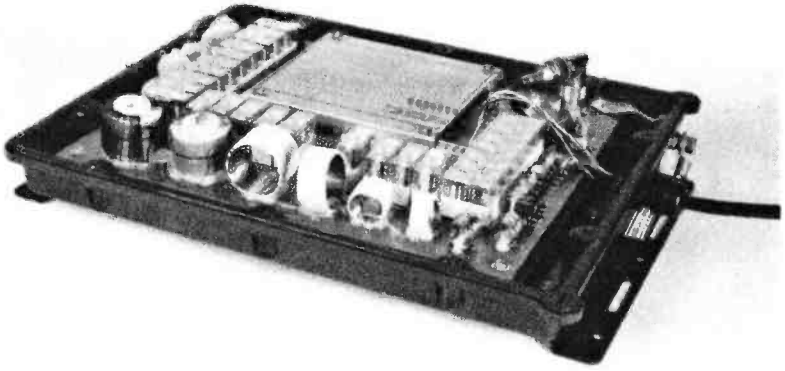
Normally 24hr despatch but please allow 7 days for delivery

leelectronics

NORMAN G4THJ

SGC SG-230 'Smartuner'

REVIEW



Very few radio amateurs can erect the ideal h.f. bands antenna. Rob Mannion G3XFD, tried the SGC 'Smartuner' automatic 'intelligent' antenna tuner, and considers that it could be the solution for many operators on the h.f. bands

There must be very many radio amateurs in the United Kingdom and elsewhere who have to rely on 'long wire' antennas for h.f. band operation. At the moment - I'm one of them and until I've managed to erect a trapped dipole at my new QTH - it's a long wire for me!

It was fortunate that my need to use a 'jury rigged' antenna coincided with the chance of trying out the SGC-230 'Smartuner' from the USA. The company had just started advertising in *PW* and when the opportunity arose - I thankfully agreed to try it out when the unit arrived from America.

The arrival of the 'Smartuner' in the *PW* offices coincided with the first bad weather of the winter. I was only able to 'jury rig' a wire to a tree in our front garden and the length only totalled 20m or so.

Despite the short antenna length, I was pleased to be able to erect anything, as in common with many other radio amateurs, I feel that I'm neglecting my hobby without at least an attempt at a temporary antenna!

The New Arrival

When the new arrival duly appeared on my desk, I was immediately impressed by the sturdy, watertight ABS plastics housing. There's no doubt in my mind - the designers know that the SG-230 will have to face bad weather and they've taken every precaution to keep the water at bay.

Apart from the sturdy 'black box' housing, the unit looks singularly unimpressive. However, I was soon to find that the 'Smartuner' really does 'hide its light under a bushel'!

Because this 'intelligent tuner' is designed to match a 50Ω output transmitter to antennas of approximate lengths between 2 and 26m long, it's designed to be placed outside. The r.f. input to the 'Smartuner' is fed by standard 50Ω cable via a special sealing gland. So, you can be reasonably sure that even our climate will be kept a bay for a while.

Apart from the r.f. feed cable, there's only a very simple control and combined power supply cable to the transceiver and the antenna and earth connections to worry about. The external appearance is as uncomplicated as that - and in operation it's even more simple.

How It Works

Basically speaking, the SG-230 'Smartuner' is a high technology antenna coupler which will 'intelligently tune a 'long wire' unbalanced h.f. band antenna (1.8 to 30MHz) from approximately 2 to 26 metres long. The unit can also cope with power levels from 10 to 150W p.e.p.

No preliminary 'tuning up' or adjustments are necessary and the unit is designed to operate with any h.f. bands transceiver within its operating specifications. It's obvious to me that the unit was originally designed for commercial and military applications - especially as a 'rough terrain' mounting is an available option.

The coupler works by automatically selecting 64 input and 32 output capacitance combinations, plus 256 inductance combinations, in a π network which results in over half a million different ways to ensure a perfect match for the transceiver. Once the unit has been tuned to a particular frequency, the on-board microprocessor circuitry 'remembers' the frequency and the tuning values.

The memory facility ensures that when the transmitter is tuned to the same frequency in the future - the SG-230 re-selects the values in less than 10ms.

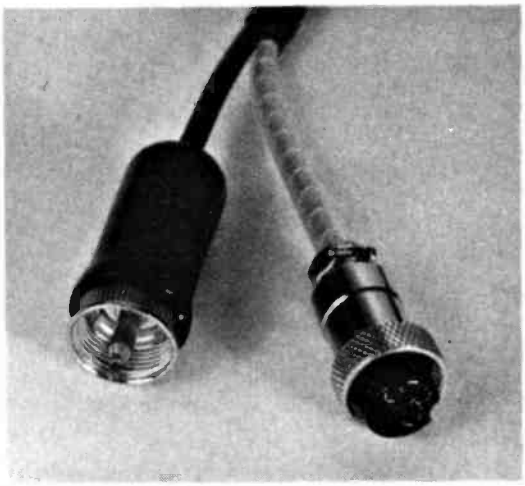
On The Air

The 'Smartuner' is deceptively simple-looking, and in operation, it's simpler still. In fact, after using the unit I think that it could be the answer for the many problems associated with tuning antennas experienced by severely disabled operators or radio amateurs with visual handicaps.

The manufacturers warn you that when the unit

Look out for our special competition in the May issue of* PW. *You could win a Smartuner!

REVIEW



The control wiring is very simple & straight forward.

is first switched on, it's a little 'slow' while as it 'learns' the new antenna combinations, but you can be assured that in operation - it's very quick in human terms!

When the operator starts to transmit, the microprocessor equipped circuitry 'senses' the r.f. output of the transmitter, and immediately sets about selecting the right combination of capacitance and inductance. Although the comprehensive manual states that the unit initiates the process when a speech waveform is detected, I found that the 'Smartuner' responded to the 'tune up' tone on my transceiver.

This response worked to my advantage. It even made operating with the SG-230 easier! As I adjusted the control knobs on my faithful KW2000B, I clearly heard the circuitry in the 'Smartuner' springing into action.

Much to my surprise, and despite the fact that there was a microprocessor on board the SG-230, even when the unit was located close (five metres or so) to the transceiver, I was unable to detect any interference from the computer.

This fact, plus the ability to hear the circuitry in the tuner working (albeit quietly) would - in my opinion - make the unit ideal for a visually-handicapped operator. You can tell when the unit has successfully matched the antenna (as you speak into the microphone) because the unit returns to its normally 'quiet' state. You don't have to do anything - it does it for you!

I tried the tuner out on a very temporary antenna at a school radio club 'shack'. It soon proved itself better at tuning into this particular antenna than I could - even when I used the transceiver with an otherwise excellent 'home-brewed' tuning unit.

The 'Smartuner' really came into its own using the radio club 'short' long wire - especially on 1.8, 3.5 and 7MHz. It also worked very well on the other bands. I even ventured onto the WARC bands with another rig and found that my unfamiliarity with 'tuning up' on these bands didn't matter.

Conclusions

You've probably gathered by now that I liked this amazingly simple-to-operate unit, despite my natural suspicion of 'computerised' equipment. It works extremely well, efficiently and very quickly and obtained excellent signal reports for me via otherwise uninspiring antennas.

In operation I found that I noticed the difference in antenna matching on reception much more than I'd expected. Suspicious as always (I'm not really computer-compatible!) I double-checked and connected the antenna directly to the rig. I was pleased to find that the 'Smartuner' had done its job correctly, as it was better with the unit in circuit.

As a keen c.w. operator, I was pleased to find that the SG-230 **did** respond to the c.w. output of the rig, despite the impression gained from the manual that it wouldn't operate with an un-modulated signal.

In other words, the 'Smartuner' tuned itself to the new working frequency and my relatively low-powered c.w. signal was matched to the antenna for best advantage. If the operator ever has any doubts that the 'Smartuner' has not correctly matched the antenna to the line, the SGC-230's power supply may be switched off for approximately two seconds.

I tried this method and it worked well. The unit very quickly 'checked' itself on the next transmission and clearly demonstrated (by the improved reception) on the working frequency that it had done so when it returned to the receiving mode.

The manufacturers stress that for the best results, the length of the antenna should be at least a quarter-wavelength at the operating frequency. The 'Smartuner' should also be used in conjunction with an effective earth.

Good results can be obtained at stations where there are limited antenna facilities. I consider that 'temporary stations' at shows etc., will find the SG-230 an ideal aid for better matching to less-than-ideal antennas. The 'Smartuner' will be ideal when using 'end fed' antennas, in conjunction with a modern transceiver equipped with limited 'automatic tuning' designed to match into an approximate 50Ω load.

The 'Smartuner' will also, I feel, be in great demand by operators who find other antenna matching aids difficult or impossible to adjust due to a disability. I have no hesitation whatsoever in recommending the SG-230 to any h.f. bands operator.

I am grateful to **SGC Inc, of Washington USA** for the loan of the test unit which is available from them at $555 (inclusive of shipping costs). **PW**

Specifications

Frequency Range:	1.8 to 30MHz
Power Input Range:	10 to 150W p.e.p.
Input Impedance Range:	45 to 50Ω
VSWR:	Less than 2:1
Power Supply:	13.8V d.c. (24V optional)
Operating Voltage Range:	10 to 15V d.c.
Power Supply Current Consumption:	900ma (average)
Random Set Time:	Typical: Less than 2 seconds
Recurrent Set Time:	Typical: Less than 10ms
Antenna Lengths:	2.5 to 26m, approximate lengths 3.3 to 30MHz, (8 - 26 metres approximately 1.8 to 30MHz)
Installation:	Any position
Operating temperature:	-35 to +70°C
Size:	127 x 279 x 76mm
Weight:	3.5kg

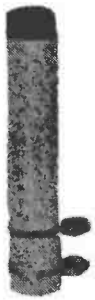
See SGC's advertisement on Page 62 for further details.

SPECIALISTS IN DRESSLER ACTIVE RECEIVE ANTENNAS

NEW ARA 1500

50-1500MHz
Now UPGRADED Sept 90

'N' Type Connection



Gain 11.5dB
Noise 3.0dB
Intercept point
3rd Ord
+21dbm

£159.00

Now with fully tuneable interface.

EXCITING NEW SHORTWAVE ACTIVE ANTENNA

ARA 60

30 Kc/s to 60MHz up to 100MHz.

Size: 940mm high
64mm diameter

Gain: 11dB

Intercept point 3rd order + 44dbm

£159.00

Also a wide range of masthead pre-amps available for most V.H.F. and U.H.F. frequencies, including scanner pre-amps from £89.

LARGEST ICOM YAESU DEALER IN LONDON

dressler COMMUNICATIONS LTD.

191 FRANCIS ROAD
LEYTON · E10 6NQ · LONDON
TELEX 8953609 LEXTON G
PHONE 081-558 0854 081-556 1415
FAX 081-558 1298
24hr Hotline answaphone No: 081-558 0854

OPEN MON – FRI 9AM – 5.30PM
OPEN SAT – 9.30AM – 4.30PM
INTEREST FREE HP FACILITIES AVAILABLE
ON MANY ITEMS PROMPT MAIL ORDER

Prices correct at time of going to press. Please phone for latest quote.

Or contact your local agent anytime on the following numbers: Stuart (Bromley, Kent) 0860 634526. Terry (Biggleswade, Beds.) 0767 316431.

SPECIAL OFFERS

IC–R9000

INCLUDING ARA 60 + ARA 1500(N) £3,995

IC–R7000

INCLUDING ARA 1500(N) £999

IC–R71

INCLUDING ARA 60 £855

KENWOOD R5000

INCLUDING ARA 60 £899

LONDON AMATEUR RADIO SHOW

See us there!

SPECIAL OFFERS ON ICOM

KENWOOD

NEW TS950 H.F. TRANSCEIVER £P.O.A.

ALSO PANORAMIC DISPLAY SM 230 STATION MONITOR AVAILABLE P.O.A.

AVAILABLE TS850

Kenwood R5000 + ARA 60	£899
Kenwood R5000	£799
VC20 Converter	£160
TS680 HF + 6 Mtr inc. Microphone	£895
TS440 inc Auto ATU inc. Microphone	£1,150
TS940 inco Auto ATU	£2,000
TS790 2/70 + SAT	P.O.A.
TM241 2mtr FM NEW	T.B.A.
TH77 Dual Band Handie	£379
TR751E 2mtr Multimode	£575
LOWE HF 225 receiver, 30KHz-30MHz	£425

ICOM

IC781 H.F. TRANSCEIVER £P.O.A.

ICOM IC24ET
Inc. Soft Case, HH46 Speaker Mic, + MB30 Car Mount, + CP12 Car Cord

£389

All ICOM stocked including accessories

IC 2SE	IC 229E/H	IC 970E/H
IC 2SET	IC 3220E/H	COMPLETE
IC 4SE/SET	IC 2400	VHF/UHF
	IC 2500	BASE STATION
NEW MODEL	IC 1275	IC 765
ALPHA 6	23cms Base	IC 735
50 MHz	IC 272	IC 725
6 CHANNEL	IC 21	IC 726
HANDIE	IC 100 + SSB	IC 751A

SPECIAL OFFER – ICOM R1 RECEIVER £399
including the following accessories:
HP4 Headphones, CP12 Car Lead, BP90 Battery Box & 2 Carry Cases

STANDARD

WE ARE STANDARD AUTHORISED DEALER

C500 DUAL BAND	£335
C150 2 MTR	£230
C528 DUAL BAND	£379
AX700 SPECTRUM RECEIVER	£575
New Model C56080 Dual Band Mobile	£650

SPECIAL OFFERS ON YAESU

YAESU

FRG 8800 HF RECEIVER £585.00

VHF CONVERTER	£100
FRG9600M 60-950MHz	£500

LARGEST LONDON YAESU STOCKIST

FT747GX COMPLETE WITH FILTERS & FM UK SUPPLIED	£549
FT736R + X500 DIAMOND ANTENNA	£1195
FT470R (inc. Nicad & Charger)	£385
FT767GX inc. 2 mtr Module	£1599
FT23 + Nicad + Charger	£239
FT411 Nicad + Charger	£249
FT470 inc. Nicad/Charger	£375

JRC–NRD

NRD 525 HF RECEIVER Special Price £1075 Inc. ARA 30 £950 without

NEW 535 Available Soon

SCANNERS

AOR

AOR 1000 Mk III 500Kc-1300MHz no gaps	£269
AOR 3000 FM/AM/SSB	£695
AOR 1000 Mk II	£239
AOR 2515 5MHz-1500MHz	£575

We can modify your existing MOR 1000 Mk II 500 Kc–1300MHz
£49 inc. return carriage

STANDARD AX700
PANADAPTOR DeLuxe
£575.00
INC. PSU

FRG 9600
50 – 950 MHz
£500.00
INC. PSU

Our new, regular CB contributor 'Quaynotes', takes over from Rick Maybury this month and welcomes you to the page where the high and low frequency CB allocations meet. This time he kicks off with some interesting news about 934MHz.

CB HIGH & LOW

By 'Quaynotes'

The many dedicated 934MHz operators can be forgiven for thinking that they're being 'mucked about a bit'. The utter confusion surrounding the future of the u.h.f. allocation has grown worse since the news from the continent regarding the Swiss proposals was announced.

It turns out that the Swiss authorities have decided that an allocation at the 'top end' of the u.h.f. band be granted to CB operators. This news came only a few months after CBers in the UK had apparently finally given up hope of retaining the band in the long term.

So, what is the future for 934? In the UK it's regarded as the 'elite' CB band. Price alone has kept the 'wallies' away, and the dedicated '934' people have carved a niche for themselves in this fascinating far corner of the radio spectrum.

As a regular reader of *PW* I have seen the complaints about interference to 934MHz from 'Poser-'phones' and the like. I've also heard (and read) about the apparent lack of interest from the Radiocommunications Agency, when it comes to keeping interference at bay.

Perhaps they really do intend to finally 'kill off' 934MHz as regards CB, but I've got my doubts. Surely, and the pressure and demand is growing, if 934MHz as a CB allocation is needed - we should at least try to keep the UK allocation. After all - it's only a very small part of the band!

Come on 934MHz operators, let's hear from you! I haven't got a 934MHz rig myself (although I'd like one!) but we'd like to see photographs and hear about your activities. You get up to some really interesting 'tricks' 'up there'. And from what I hear - propagation conditions can be fascinating. Don't forget to write to 'Quaynotes - 934' care of the *PW* office in Poole.

Scene On Twenty-Seven

When I'm driving, I do more listening than calling. My job takes me throughout the UK, but particularly the south and west. I never cease to be amazed at the multitude of uses that CB is used for, and recently I discovered several 'White Stick' operators.

I'm not sure if we've got a special 'handle' for blind operators on CB, but on the amateur radio bands they're known (in a friendly way) as 'white stick operators'. I came across several blind CB operators in my travels in Dorset - and it was a pleasure to hear - and have a good, long 'copy' with one of them.

Living in a remote north Dorset village, this operator was able to chat, with his friends in the village, and to the local garage. I eventually ended up at this garage - it was easy to spot because of the antennas - and found out a lot more about the 27MHz 'chat' services.

It turned out that many housebound operators had been supplied with rigs from money raised at a local 'Car Boot Sale'. The garage was the central station and - during opening hours - was the focal point for 'copies' and urgent messages.

Unusually, I found that none of the operators were younger than 60! I also felt rather babyish to be able to join in on the channel being only a mere youngster 'around 50!'

It was an excellent service, and it had proved itself in the bad weather of the 1989/90 winter. Even power cuts hadn't stopped them from keeping in contact - the rigs had been 'floated' on a 12V car battery - 'trickle' charged from the 'mains'.

Have you heard about similar 'caring copies' like this? If so, drop me a line. There must be many blind and other disabled people who'd love the chance to sit and talk to other housebound people - without running up a huge telephone bill! Perhaps we'll be able to put those in need of a rig - with those people who've got a spare one. We must never forget that CBers have always been in the forefront of helping others to 'come on the air'.

Future Copy

Next month I'm going to look at some practical antennas for 27MHz and at ways of keeping 'on the air' when the power goes down. After all - why should we lose our 'copy' when we don't need the 'mains' anyway? You should also be aware that there are some very interesting 'bargains' to be found at 'car boot sales'. As well as being an excellent way of raising money (I've already mentioned this above) I've managed to buy two very good quality 'base stations' for less than £20 each. It may be of interest to those radio amateurs who 'look down' on CBers to know that both transceivers came from CBers, who had graduated to licensed amateur status and needed the money for new h.f. band rigs.

That's the lot for now, but keep writing. Rick Maybury has passed on some of your letters to me - and I'll be using most of them on this page - which is dedicated to you, 934 and 27MHz operating.

See you next month and keep 'copying' on both 'high and low'.

READERS' ADS
MAR 91 COUPON

NEW SERVICE TO READERS

PW 'Bargain Basement'

Need Some Cash? Want To Buy A New Rig?

Now you can buy and sell your equipment in the new *PW* 'Bargain Basement' readers' advertisement feature.for only £2.30 ! (Free Service To *PW* Subscribers' Club Members).

The rules are simple. You can advertise any radio, electronic or associated equipment for sale or wanted, **PROVIDED** it can be licenced, and be legitimately used in the UK. You could raise money for your new transceiver or w.h.y., by advertising your video camera or other consumer equipment for sale in 'Bargain Basement'.

The advert itself must not exceed 30 words, plus 12 words for the address. You must enclose your full address, post code, telephone number and callsign where appropriate. Subscribers' Club Members must include the dispatch label bearing their address and subscription number to qualify for their free advert.

All adverts MUST be typed or handwritten in BLOCK CAPITALS and be accompanied by the corner flash printed in *PW*, a £2.30 cheque (payable to PW Publishing Ltd.) and a stamped, addressed postcard. No corner flash *or* label - no advert! (photocopies not acceptable).

The postcard will be used to acknowledge receipt of your advertisement. All adverts will be used in strict rotation. No trade adverts accepted and no responsibility will be taken for errors. Please make your requirements as clear and concise as possible.

Address your adverts to:
Donna Vincent, PW 'Bargain Basement',
Enefco House, The Quay, Poole, Dorset BH15 1PP.

BOOK REVIEW

World Radio TV Handbook 1991 Edition
Edited by Andrew G. Sennitt
Billboard Ltd (Publishers) under licence from Billboard A. G., Amsterdam, The Netherlands.
574 pages £17.99 (See special offer)
Available from *PW* Book Service, 85p post and packing.

The hobby of short wave listening is growing in popularity. In the past, many people have built their own receivers and started listening 'on the bands'. Nowadays however, the most likely introduction for s.w.l.s is when they buy a 'scanning' receiver. Once they've bought a scanner - the search for information on where to listen starts!

The *World Radio TV Handbook* has some unique features and is presented in a very readable style. It covers the world's broadcasters and their services listed by country, it also has a special hour-by-hour guide to broadcasts in English directed to your area.

The essential station information is provided for the keen QSLing enthusiast and this includes frequencies, transmitter powers, operating times, languages and addresses. You'll also find maps showing principal transmitter sites throughout the world.

With a host of extra information, including a section on the ever-growing satellite broadcasting scene, the *WRTH* comes as a highly-recommended addition to your bookshelf.

Special Offer (for subscribers only)!

Buy Your 1991 Edition of the *WRTH* for only £16 including post and packing.

If you're a subscriber to *PW*, you can take advantage of a further reduction to the Subscribers' Club members. This month - in addition to the usual Member's competition - you can buy a copy of *WRTH Handbook* for £16 including post and packing. Don't delay - join the *PW* Subscribers' Club Today!

Offer closes 1 April 1991. This special offer (stocks permitting) will be open to readers at the London Amateur Radio Show at Pickett's Lock on March 9 - 10.

SUBSCRIPTIONS TO PRACTICAL WIRELESS

Be sure of your copy every month and qualify for the subscribers club too. Start off with our special offer on the book reviewed above, the WRTH.

Please indicate the type of subscription required:

PRACTICAL WIRELESS 1YEAR
❑ £19.00(UK)
❑ £21.00 (Europe)
❑ £22.00(Rest of World)

SHORT WAVE MAGAZINE 1 YEAR
❑ £19.00 (UK)
❑ £21.00 (Europe)
❑ £22.00 (Rest of World)

SPECIAL JOINT SUBSCRIPTION 1 YEAR ONLY
❑ £32.00 (UK)
❑ £35.00 (Europe)
❑ £37.00 (Rest of World)

Prices current at February 1991
Subscription to commence with issue dated...

❑ **Please include a copy of the WRTH with my first issue at the special subscribers club price of £16.00 inc. P&P. (£16.50 inc. P&P overseas).**

To: PW Publishing Ltd., FREEPOST, Subscriptions Dept., Enefco House, The Quay, Poole, Dorset BH15 1PP

Name.....

Address.....

.....

.....

❑ I enclose cheque/PO (Payable to PW Publishing Ltd) £.....

❑ Charge to my Access/Visa Card the amount of £.....

Card No. | | | | | | | | | | | | | | | | |

Valid from ..... to .....

Credit Card Orders can be taken on (0202) 665524.

Signature.....

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

Protective Multiple Earthing & The Radio Enthusiast

When the use of PME was questioned recently in PW, *Southern Electric supply engineer Henry Muldoon thought it time to have another look at the system and dispel a few myths and fallacies.*

I have to confess that I'm not a radio enthusiast. But as an engineer involved in the application of Protective Multiple Earthing (PME) for many years, you can imagine my shock at seeing PME described as a "questionable technique" in the November issue of *PW*.

On reading the article further, however, I realised that the writer was looking for that elusive goal - the low resistance to earth - which I've no doubt that many other enthusiasts are seeking. The PME system was never intended to provide this facility, and it uses the supply neutral conductor to carry fault currents back to the supply transformer without using the earth path.

Widely Used

The use of PME is now so widespread that it's worth looking at what it does, and at the same time considering its advantages and disadvantages and putting it in some historical context. Naturally, this is a subject which covers a large number of applications and I intend only to give a brief overview in relation to domestic premises.

In The Beginning

In the beginning, so it's written, God created the earth and saw that it was good. But unfortunately electrical engineers, over the years, have found 'Mother Earth' remarkably fickle when it comes to carrying electrical currents.

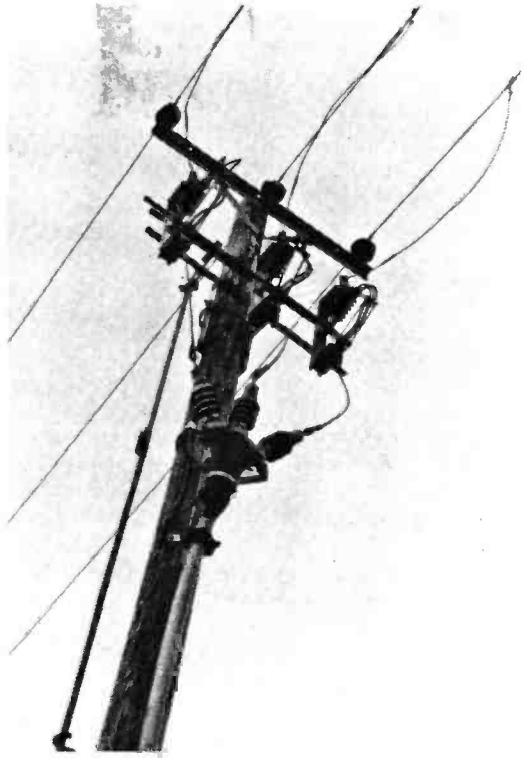
The main difficulty is making a reliable, low resistance connection with earth as this depends both on the chemical composition of the soil and (particularly) its moisture content. Connections which have a low resistance when the soil is wet, can change dramatically for the worse when they dry out. Although this problem can be alleviated by large systems of earth electrodes, they are generally speaking, beyond the scope of the domestic customer.

There was a time, when such a system existed - courtesy of the various local water supply companies. Their large networks of metallic pipes connected to virtually every property, were widely used for electrical earthing.

However, once the water supply companies found non-metallic substitutes for pipework, their system could no longer be regarded as reliable for this purpose. The practice ceased in 1966 when the 14th edition of the IEE Wiring Regulations forbade the use of water pipes as the sole method for earthing new installations, although examples of older installations earthed via the water pipe can still be found in everyday use.

Customer's Responsibility

The earthing of an installation is the customer's responsibility but, in view of the difficulties already mentioned, the electrical supply authorities will assist, wherever possible, by providing direct metallic connection from the customer's installation to the supply transformer for the passage of fault currents.



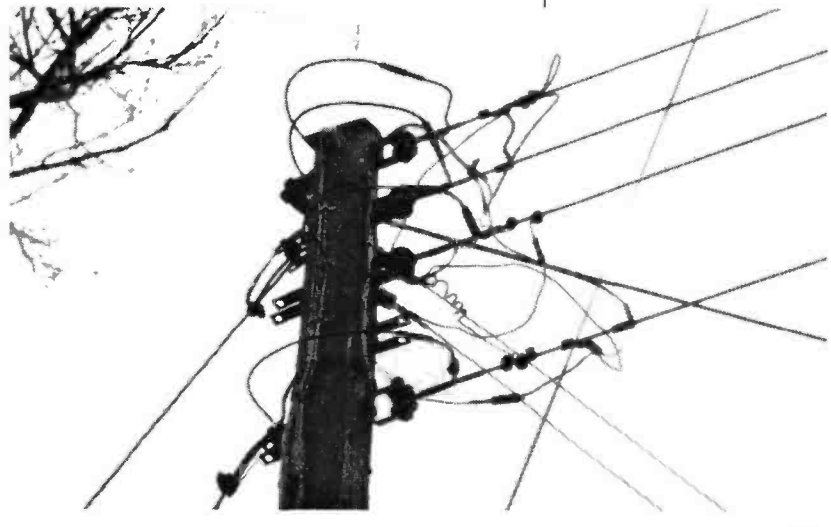
The metallic sheath of underground cables (as shown on this overhead route-fed example), provides one form of PME pathway.

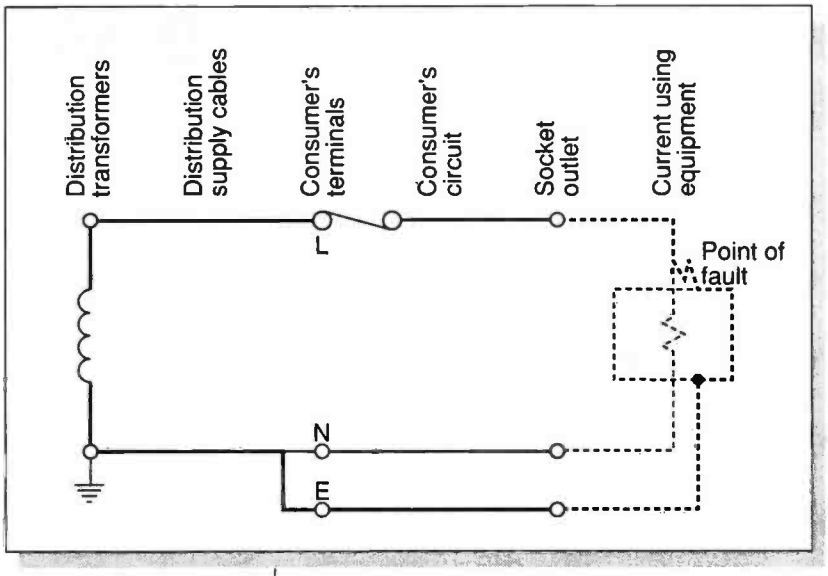
This facility can be provided in a number of ways, such as by using the metallic sheath of underground cables in urban areas or by using continuous earth wires erected with overhead lines in country areas. These methods do, however, create problems of reliability and expense for the supplier.

The Good News!

With the PME system, the supply neutral conductor is used to provide a low impedance path for fault currents. Approval for this method of earthing existed as long ago as the 1940s but it was to be another 20 years before, with the introduction of combined neutral and earth (CNE) type cables, that the installation of PME really 'took off'. From that time PME has been widely used on all types of

The main disadvantage with PME is the danger that results from an open-circuited neutral conductor.





If the consumer has no local 'earth', the nearest real 'earth' is at the local supply sub-station.

network, and is now virtually the only method of earthing offered by supply companies for domestic premises.

The PME system enables the supply companies to provide a safe, efficient and relatively cheap system of earthing to large numbers of customers who would otherwise have to adopt a more expensive and/or less reliable system.

So, with this in mind - is PME the perfect solution or are there hidden snags? No earthing system is perfect, they all have their good and bad points, but with PME we can take steps to mitigate the consequences of its problem areas. So, it's not really a question of the good news and the bad news, but rather, the good news and the not-quite-so-good news!

Main Disadvantage

The main disadvantage associated with PME is the danger that results from an open-circuited neutral conductor. If this happens, the voltage on the earthed metal work in the customer's premises can rise to approximately 240V above true earth, although the actual value will depend on loading and the neutral earth resistance values.

Clearly, it's very important to prevent a break in the neutral, and the PME Approvals, now incorporated in the 1988 Electricity Supply Regulations, impose stringent requirements on the supply companies before they are permitted to offer PME facilities to customers. For instance, all mechanical joints on the neutral conductors of overhead lines must be replaced with compression fittings and all networks overground or underground, must have additional earth electrodes (hence 'multiple' earthing) at the end of each distributor.

Equipotential Bonding

It would of course, be foolish to assume that, having taken these precautions, there was absolutely no danger of a broken neutral, so the Electricity Supply Regulations also require all metal work within the customer's installation to be bonded to the neutral, thus creating an 'equipotential zone' within the premises.

The zone is normally created by connecting incoming metallic services and the metallic structure of the building (if any) to the main earthing terminal via conductors known as 'main equipotential bonding conductors'. This bonding technique ensures that, if the neutral conductor breaks, all metalwork in the premises rises to the same potential and assures the safety of the customer.

Fault Currents

It's important to note that, if the neutral conductor does break, the load and/or fault current can return to the distribution transformer via the bonded service system. This means of course, that the bonding conductors must be large enough to carry the fault currents.

The cables are sized in relation to the incoming supply neutral conductor, the minimum (which would apply to most domestic premises) being 10mm^2 copper. These conductors, which should be pvc insulated and coloured green/yellow, must be in position and properly connected before the final connection to the neutral is made by the supply company's engineer.

It may seem that PME brings a lot more work, but bear in mind that equipotential bonding conductors are required for compliance with the IEE Regulations whatever method of earthing is used.

The Earth Fault Loop

Well, so much for the safety precautions, but what about this low impedance earth fault path that doesn't make use of the earth return? This time we are considering a fault on the customer's installation (not a break in the supply neutral) which is what the PME system is really all about.

From the diagram shown in **Fig. 1**, you will see that the earth fault path (known as the earth fault loop), starting at the point of fault, comprises the circuit protective conductor, the customer's earthing conductor, the supply neutral conductor, the transformer winding and the phase conductor from the transformer to the point of fault.

The impedance of the loop outside of the customer's premises is, in fact, the phase/neutral impedance of the supply and is thus very low. It will vary according to the location of the premises, but is unlikely to exceed 0.35Ω.

Clearly, the total earth fault loop impedance is the sum of the supply network impedances and the impedance of the customer's circuit. This is an important figure because it dictates the amount of current that will flow in the event of a fault which, in turn, will decide the operating time of the fuse or circuit breaker which 'clears' the fault.

The low network impedance gives the designer of the customer's installation greater scope with regard to circuit length and conductor size. The designer must, of course, comply with the fault clearance times which are specified in the IEE Wiring Regulations and apply them to all installations, however they are earthed.

Your Own Earth

Whilst providing a very low earth fault loop impedance, the actual value of the resistance to earth of a PME network might be quite high. In fact the Electricity Supply Regulations permit a maximum value of 20Ω. This value is for the network as a whole, individual electrodes can be much higher.

It has to be said, however, that older networks which have been converted to PME, which supply customers with a mix of earthing methods, are likely to have a very much lower value of earth resistance, in some cases as low as 1Ω.

How does this affect you, the radio enthusiast, who may prefer to have an earth system buried in the garden? Well, the problems occur when you bring your earth connection into the house, so we'd better have a look at what's likely to happen!

When PME is in use, the regulations require that any metalwork that is in contact with earth, and is simultaneously accessible with any metalwork of the electrical installation should be bonded to the main earthing terminal.

In other words, if the metal case of your equipment is connected to the PME earthing terminal and you can touch that at the same time as you can your earth connection from the garden, your earth should be bonded to the PME terminal.

Furthermore, your earthing system should be bonded at the point where it enters the house with a pvc insulated bonding conductor of a minimum size of 10mm^2. This could be easier said than done!

It should also be borne in mind that when you've made the connection, the PME bond does of course, provide a parallel path for other customer's neutral/earth currents.

Neutral Breaks

The equipotential zone is part of the PME system which is intended to ensure the safety of the customer if the neutral breaks and a voltage is imposed on his metalwork. Clearly, there would be much greater danger if contact was made while outside the zone (in the garden for example) where contact could be in contact with 'true' earth.

Consider then, the situation described in the November issue of *PW* where a tinned copper wire was loosely connected around a galvanised wire fence. Metal fence posts do not make good earth electrodes and if that wire was in contact with the PME earthing terminal (either deliberately or by accident) at the time of a neutral break, it could liven up the whole neighbourhood!

Earthy Advice

You may have got the impression by now that I'm saying "Don't dabble with earthing if your house has PME" and I must really state that this is my general advice. If you must install your own earthing system, it could be worth considering asking your electricity supply company to disconnect the PME terminal (**YOU MUST NOT DO THIS YOURSELF**) and install a residual current device to protect your electrical installation.

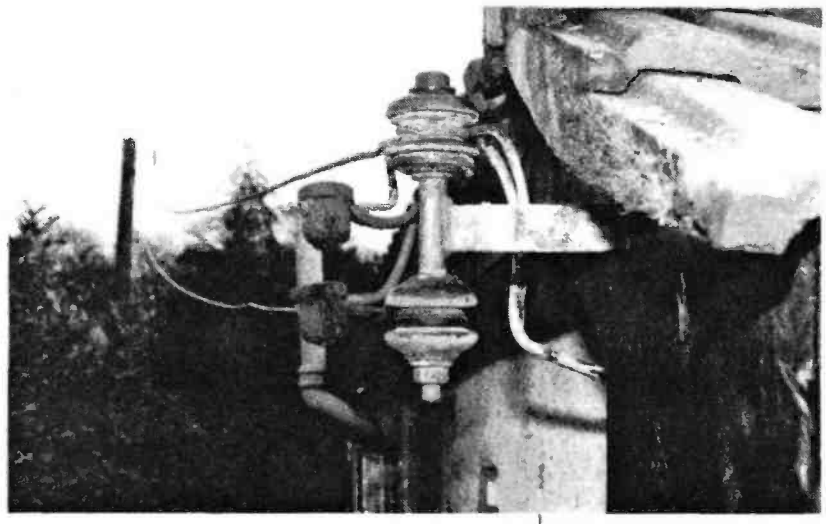
The PME system is normally provided automatically for new domestic installations, and most customers will never give the matter a second thought, but you are not obliged to use it.

Unfortunately, the use of residual current devices and especially the added safety that such equipment can provide, is a subject for another article and we cannot cover them this time round!

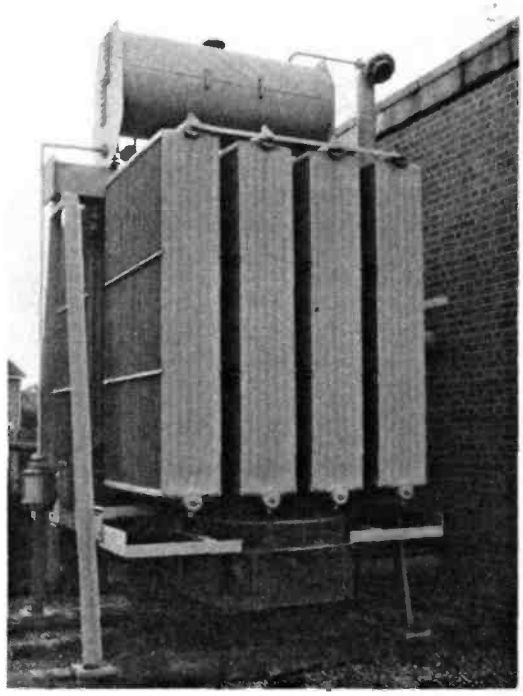
However, whatever you decide to do, take advice from your supply company and/or your electrical contractor so that you can ensure, as fast as possible, that your improved reception will not be accompanied by unpleasant side-effects. **PW**

OBITUARY

As Henry Muldoon's feature was being prepared for press, we were informed that he had died on January 5. He was 52 years old. The editorial team express their sympathy to his wife and family, and with their agreement are pleased to publish the feature as a suitable tribute.



The PME system uses the supply neutral conductor to provide a low impedance pathway for fault currents.



With the PME system, fault currents have a low impedance return path to the local transformer and protective switchgear.

Construction

The Sudden

A Compact Receiver For The Amateur Bands

From the workshop and pen of George Dobbs G3RJV, we bring you the Sudden, a two-chip single-band receiver.

"...teach us to delight in simple things" wrote Kipling.

Perhaps that's not such bad advice in amateur radio these days. The hobby is becoming more complex. Many radio amateurs do not know what goes on inside their 'boxes', and some even admit to not knowing the function of all the controls on the front panel. Opening the lid of a modern transceiver and seeing what "looks like a robot's vomit", as G3VTT once put it, can discourage many amateurs from taking up a soldering iron in the pursuit of their hobby.

Why Sudden?

I showed the circuit, described later, to Ian Keyser G3ROO, on one of his visits to my house, and he thought it should be called the Sudden receiver. Why Sudden? Well, when I am not soldering up little pieces of radio equipment, I'm the Vicar of Sudden. That is, I live and work in an area of Rochdale, in Lancashire, called Sudden. After all the receiver is very quick to build and I suppose I am still the Vicar of Sudden even when I am soldering!

Small Is Beautiful

One area in which many amateurs still build and experiment in, is QRP operation. During the time I have edited *Sprat*, the journal of the G QRP Club, we have attempted to produce articles that are suitable for the novice constructor. These are projects which cost very little to build, are within the capabilities of a technical beginner, and yet give a sample of the pleasures which can be had from building station equipment. Most of these projects have been simple amateur band transmitters, to be used alongside an existing receiver, to get a home-made signal onto the air.

For some time people have been requesting a simple-to-build receiver suitable for a beginner, yet capable of acceptable results on the amateur bands. In response I have tried out various permutations of the existing circuitry for receivers. The main problems, for a beginner seemed to be: winding coils, a simple oscillator which is stable, and finding suitable mixer circuits which use readily available and cheap devices.

Linked with this request was often the additional request that printed circuit boards, and possibly kits, should be available. The direct conversion seemed ideal for such a project because it holds up the chance of acceptable performance from simple circuitry.

Direct Conversion

Most radio amateurs will be familiar with the technique of radio reception by direct conversion. A block diagram of a basic direct conversion receiver is shown in **Fig. 1**. The signals from the antenna are fed via input tuned circuits to a mixer or product detector. Here the r.f. signals are turned into audio signals, by mixing them with a local oscillator. If that difference is within the audio frequency range, say 50Hz to 5kHz, it will appear as an audio signal out of the mixer.

If a received signal at 3.5600MHz is mixed with a local oscillator tuned to 3.5608MHz, an 800Hz audio tone appears. Incidentally, it will also be possible to produce an 800Hz tone from the same signal by tuning the local oscillator to 3.5592MHz, (800Hz away from the signal on the other side). This is the principle of the product detector for receiving c.w. and s.s.b. signals on superhet receivers.

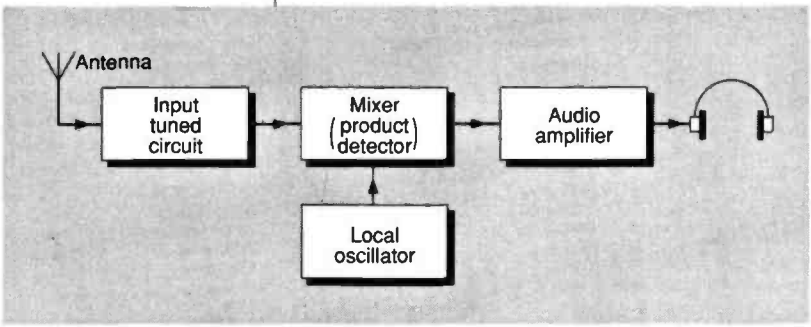


Fig. 1: Block diagram of a direct conversion receiver.

Gilbert Cells

The NE602, see diagrams of **Fig. 2**, is an integrated circuit which contains a balanced mixer with its own on-board local oscillator and voltage regulator. The mixer can provide up to 18dB of gain at 45MHz, and the oscillator will operate up to 200MHz. Compare the block function of the NE602, **Fig. 2(c)**, with the block diagram of the receiver

(**Fig. 1**). The mixer circuit is of the 'Gilbert Cell' multiplier configuration, offering the choice of balanced or single ended (against ground) mixing. The oscillator circuit uses two pins on the i.c., giving access to the emitter and the base of the oscillator transistor, allowing v.f.o. operation.

I set about trying the 'chip' in several direct conversion circuits. The aim was a simple, reliable, circuit using easily available components. The original circuit used the i.c., with balanced input and output circuits, which precluded the use of commercially available inductors. After trying several circuit combinations, one of the simpler options proved to give good results and worked well on a range of bands using commercial coils.

...perhaps Kipling was right!

The Circuit

The eventual circuit for the receiver is shown in **Fig. 3**. It uses only two i.c.s., the NE602 and an LM386 audio amplifier. The inductors are all commercially available Toko coils. A chart, **Table 1**, gives all the values of the required inductors with their associated capacitors for the five amateur bands from 1.8MHz to 14MHz. With the exception of the local oscillator coil for 7MHz, all the inductors are from the KANK range of short wave coils made by Toko. The 7MHz coil is the KXNK4173AO from the same 10K coil series as the KANK range.

The signals from the antenna are fed through R1, a simple r.f. attenuator, to the input winding on T1. Filters T1 and T2 with their associated capacitors, form a band-pass filter for the required band. The values have been calculated to allow 'flat' tuning across the required band, without the need for a variable capacitor in the input circuit. Once set up by adjusting the cores of T1 and T2, the input circuit requires no further adjustment.

Oscillations

The oscillator circuit is based upon the trusty Colpitts oscillator, and with capacitor C8 provides the coupling to the tuned circuit or T3/C11. A 27KΩ resistor, R2, increases the bias of the oscillator transistor. This is a tip offered by the manufacturers of the NE602 to reduce the oscillator sluggishness. This resistor should not be lower than 22KΩ and 27KΩ, added here, ensures the oscillator works well in any bands.

The audio output from the mixer is fed to a volume control, R4, with some r.f. decoupling provided by C14, to an audio amplifier. The LM386 has probably become the home constructors 'workhorse' audio amplifier as it's simple to use. The total current drawn by the receiver, about 10 to 15mA, makes it ideal for battery operation. The low comsumption reduces the chances of mains ripple appearing as hum in the audio output, a common fault in direct conversion receivers.

Take care with the LM386, some constructors manage to destroy them with supply over-voltage. The common LM386N is rated for 8V maximum on supply pin 6. This receiver is designed for an operating supply of no more than 9V, and should NOT be used on 12V supplies.

Building The Receiver

The track pattern and overlay are shown in **Fig. 4**. The section of the board under the tuning capacitor may be removed if the constructor does not wish to mount the capacitor on the board, or if an alternative variable capacitor is used. The removal of this ground plane section reduces the board size significantly.

Though the board is compact, the layout is not cramped and the project is suitable for a beginner to build. Small, modern components are used to minimise board size. Sockets should be used for IC1 and 2. Even experienced constructors place i.c.s into boards in reverse. I know!

The whole board can be built in one session of soldering, but the more wary constructor might like to build and test the project a little at a time.

Build And Test Method

Begin by building the receiver audio stages from C12 to the output. When the job's completed, connect head-phones, R4, and power from a 9V battery. A finger applied to C12 or the slider of R4, should produce hum in the 'phones. Check that R4, has been wired so it will operate correctly.

The next stage is to build up the circuitry around the NE602. The input stages and C11, may be

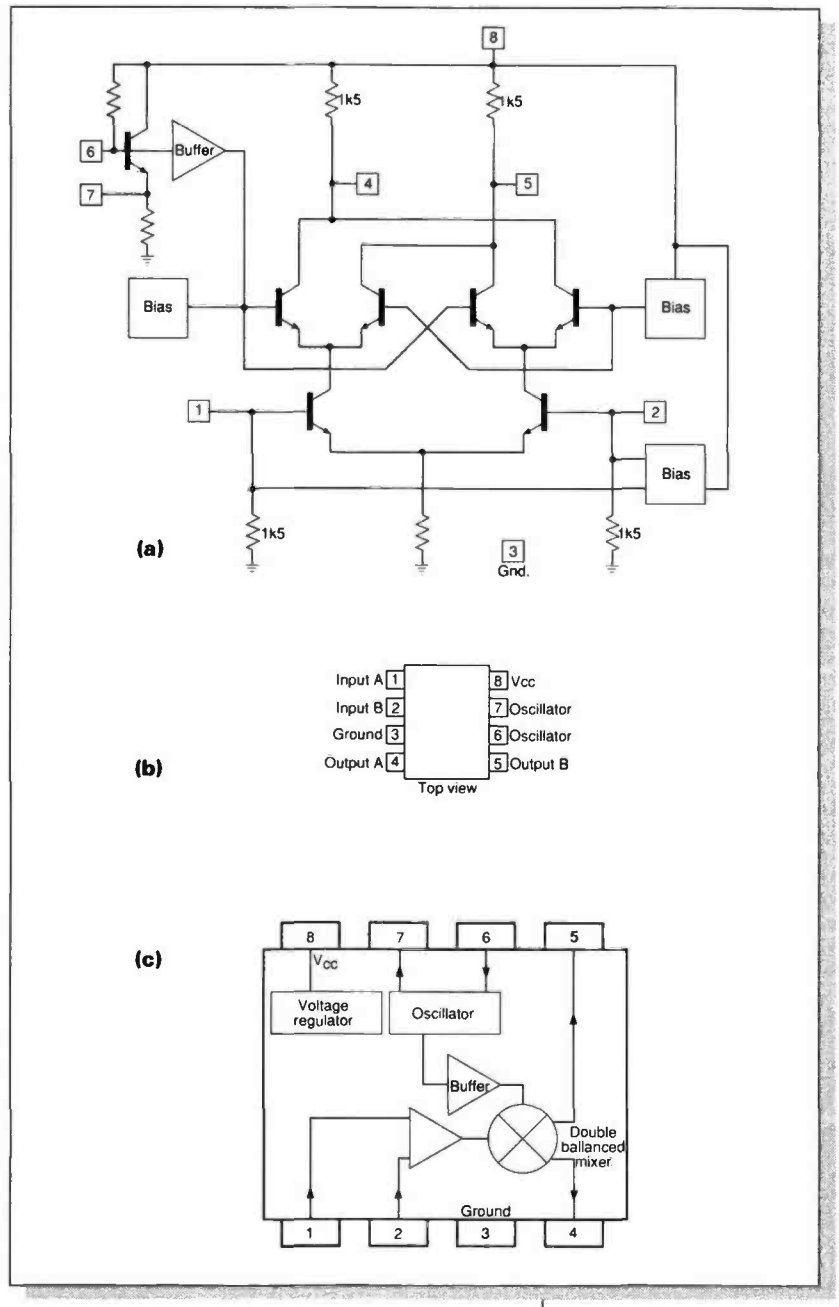


Fig. 2(a): Skeleton internal circuitry of the NE602 showing the 'Gilbert Cell' balanced mixer in the middle, and the oscillator stage top-left.

Fig. 2(b): Pinout of the NE602.

Fig. 2(c): Functional pin connections for the dual-in-line version of the NE602.

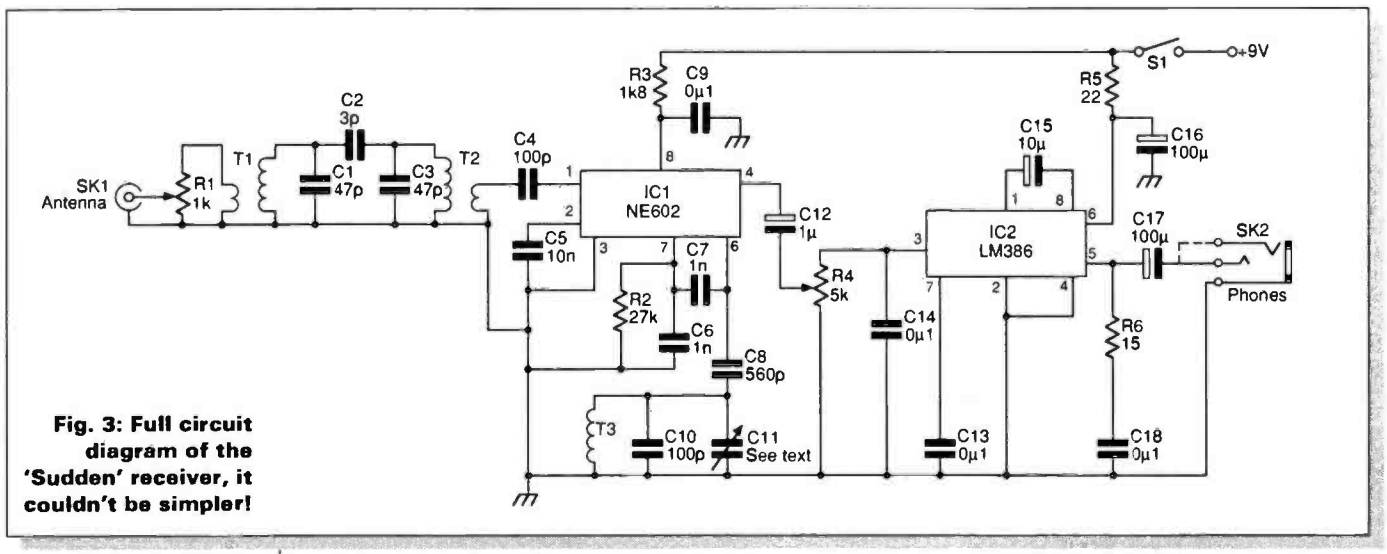


Fig. 3: Full circuit diagram of the 'Sudden' receiver, it couldn't be simpler!

omitted at this point. It's easiest to mount the inductor, T3, first and then the other components. Insert the NE602, apply power again and place a finger on pin 1 of the NE602, or the input of C7. Again, this should produce noise in the 'phones.

Add C11, and apply power. Rotating C11 should now produce a change in the 'noises' in the 'phones. Try adding a short antenna to pin 1, C11 should then show evidence of receiver tuning when rotated. At this point, without input filtering, all manner of broadcast stations will probably then break through. The final operation is to add the input filter components around T1 and T2.

Setting The Range

Setting up the receiver is simple and it can be done with or without test equipment, although the minimum requirement is a receiver which covers the required band.

The first operation is to ensure that the local oscillator covers the required frequency range. This is achieved by adjusting the core in T3. To do this you should take a short wire from the antenna socket of a receiver, tuned to the required band, and lay the end near to pins 6/7 of IC1.

The receiver you're using for testing should be set to receive c.w. or s.s.b. signals at the low edge of the required band. You should then rotate the tuning capacitor C11, until the vanes are fully meshed. Using a plastics trimming tool, rather than a metal bladed screwdriver, rotate the core of T3 very slowly until the oscillator is heard on the test receiver. This marks the low end of the band. Turn C11 to the minimum capacity position, and tune the test receiver to re-find the 'Sudden's' oscillator. The 'Sudden' should cover the required band with the combinations in **Table 1**, but if using an alternative variable capacitor, some experimentation may be required.

If the coverage is too great, a series (padding) capacitor may be added to C11 to reduce the capacitance swing. The more confident constructor may wish to remove vanes from the variable capacitor to give a smaller coverage, but replacements are expensive if this procedure goes wrong.

All that now remains, is the 'peaking' of the input stages. Constructors with a signal generator might like to inject a suitable signal for this operation. Though I have a signal generator, I actually prefer to tune up 'live', using antenna signals. You should connect a suitable antenna to the 'Sudden's' input and tune the receiver until a signal is heard. Begining with T2, you can now adjust the cores on T1/T2 to peak the signal, reducing the signal with R1 as necessary. The input filter is now basically tuned. A better tune-up is by 'peaking' a not-too-strong signal in the centre of the band, followed by a signal at either end of the tuning range. Finally, return to the centre for a final check and re-tune, if required.

Using The Receiver

The 'Sudden' is a simple receiver, but it's capable of good results on the bands if wisely used. The input, in common with most amateur radio equipment, is designed for 50Ω impedance. Using an a.t.u., or antenna matching unit, with a simple receiver is generally a wise procedure, as it assists in the reduction of unwanted signal breakthrough.

Take a tip from me - careful use of the two gain controls improves the operation of this receiver. To provide further help, resistor R1 is an attenuator, as direct conversion receivers are prone to overloading. Too much signal, reaching the mixer, causes distortion.

In use, the best operational procedure is to set the audio volume control quite high, just short of the point where the internal noise of the audio amplifier becomes obtrusive, then using R1 as the main gain control. Keeping the setting of R1 to the minimum usable level really does help the performance of the 'Sudden'.

Several versions of the 'Sudden' have been built for all bands from 1.8 to 7MHz, and so far the comments received express surprise that so few

Continues on page 43 ➡

Table 1: These are the components which may be changed to suit the desired band.

Band MHz	C1/C3 pF	C2 pF	T1/T2 KANK	C11 sections (Original)	C10 pF	C6/C7 pF	C8 pF	T3 KANK
1.8	220	10.0	3333	all sections	100	1000	560	3333
3.5	47	3.0	3333	all sections	100	1000	560	333
7.0	100	8.2	3334	1 section	47	560	560	**
10.1	47	3.0	3334	1 section	68	680	220	3335
14.0	100	3.0	3335	1 section	68	220	68	3335

** Type KXNK 4173A0

RECEIVERS COMPONENTS CABLES COMPUTERS TRANSCEIVERS SOFTWARE ANTENNAS TRANSMITTERS MONITORS CONNECTORS

TNC'S VALVES TOWERS KITS BOOKS LINEARS ROTATORS KEYERS SCANNERS MASTS FILTERS GUYING MICROPHONES +more

You are cordially invited to the most comprehensive Amateur Radio event in Britain today.

LONDON
AMATEUR RADIO SHOW

Saturday March 9th
10.00 am - 6.00pm

Sunday March 10th
10.00am - 5.00pm

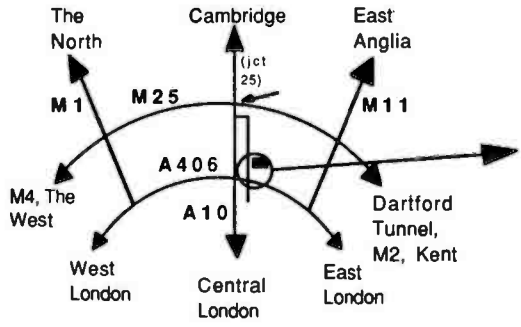
Picketts Lock Centre, Picketts Lock Lane,
Edmonton, London, N9 0AS.

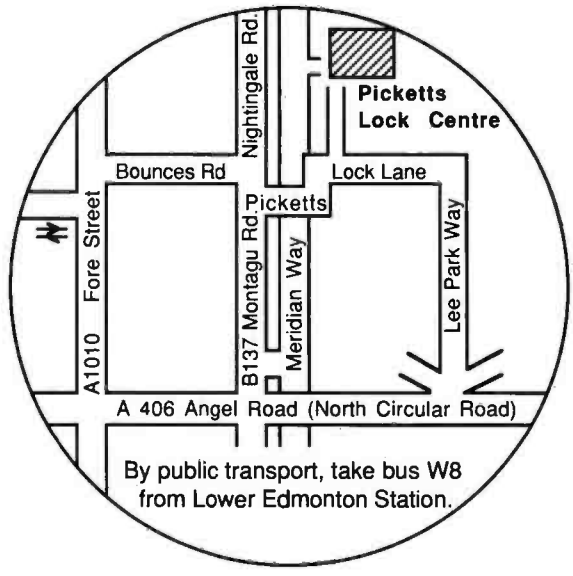
Check these details!

Free parking for 3000 cars
Morse testing facility
Talk-in on 2m and 70cm
40,000 sq ft exhibition area
Bars and restaurants
Facilities for the disabled
Easy access by road
Grand prize draw each day
Bring and Buy sale
On-site leisure and camping
Lectures each day
Special Interest Group section
Over 100 exhibitors

Admission: Adults..... £1.50 OAPs..... £1.00
Under 14..... FREE (if accompanied by an adult).

Lee Valley Leisure Park





London Amateur Radio Show,
126 Mount Pleasant Lane,
Bricket Wood, Herts, AL2 3XD.
Tel 0923 678770.

Presented in conjunction with
Southgate Amateur Radio Club.

LONDON
AMATEUR RADIO SHOW

In it's debut year, the spaciously laid-out London Amateur Radio Show set new standards of quality, variety and service.

This year, with the introduction of lectures on a wide variety of subjects, the event which was described by many as the best they had ever been to has even more to offer.

Don't miss it!

Lecture programme:-

Saturday March 9th

12.00 - 2.00 "The Ongoing Development of Packet BBS Software", by Steve Coleman, G4YFB.

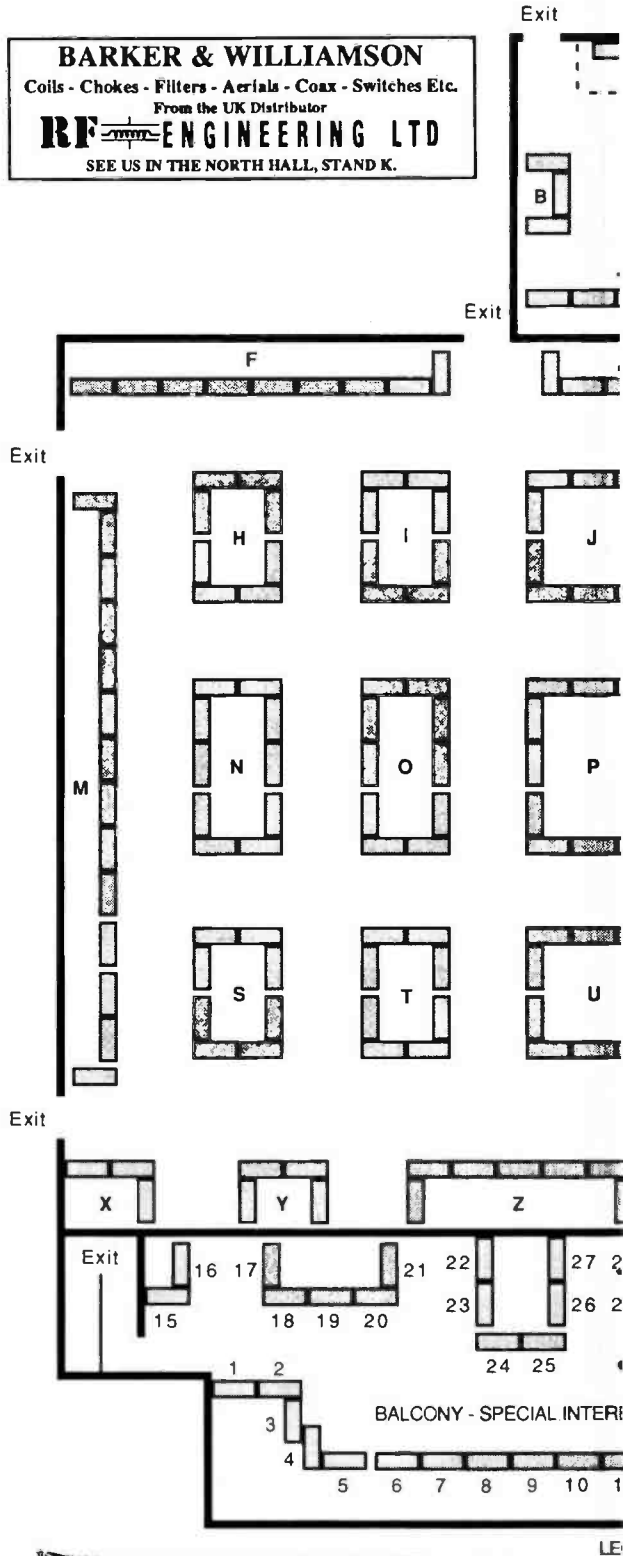
2.00 - 4.00 "QRP: Build it!", by Rev. George Dobbs, G3RJV.

Sunday March 10th

12.00 - 2.00 "Simple Sideband", by Ian Keyser, G3ROO.

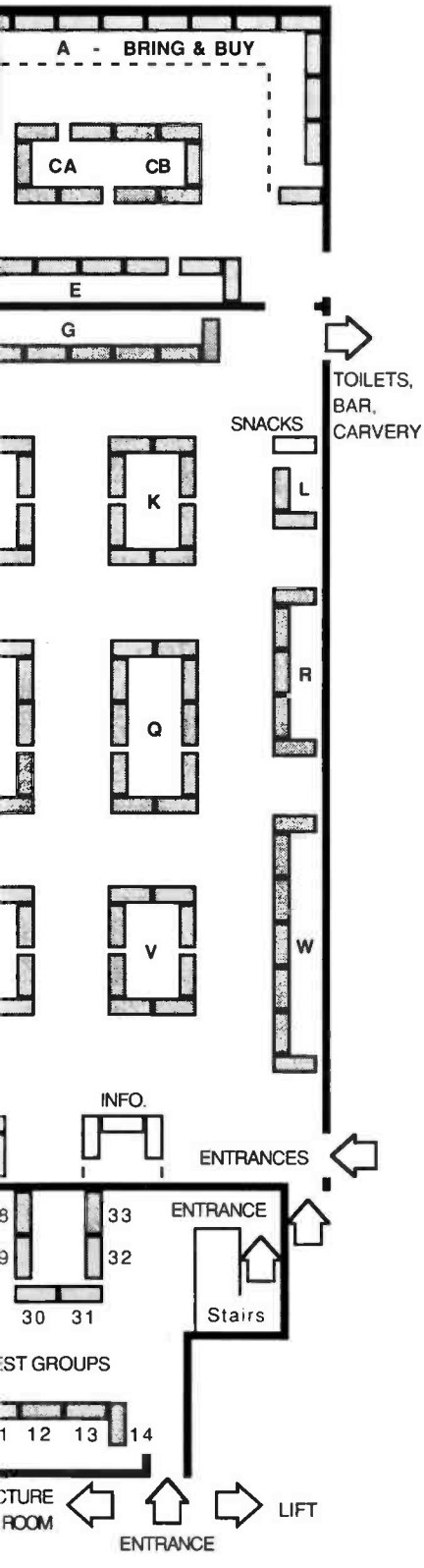
2.00 - 4.00 "Sporadic-E Across The Amateur Spectrum", by Dr. Geoff Grayer, G3NAQ.

NORTH HAL

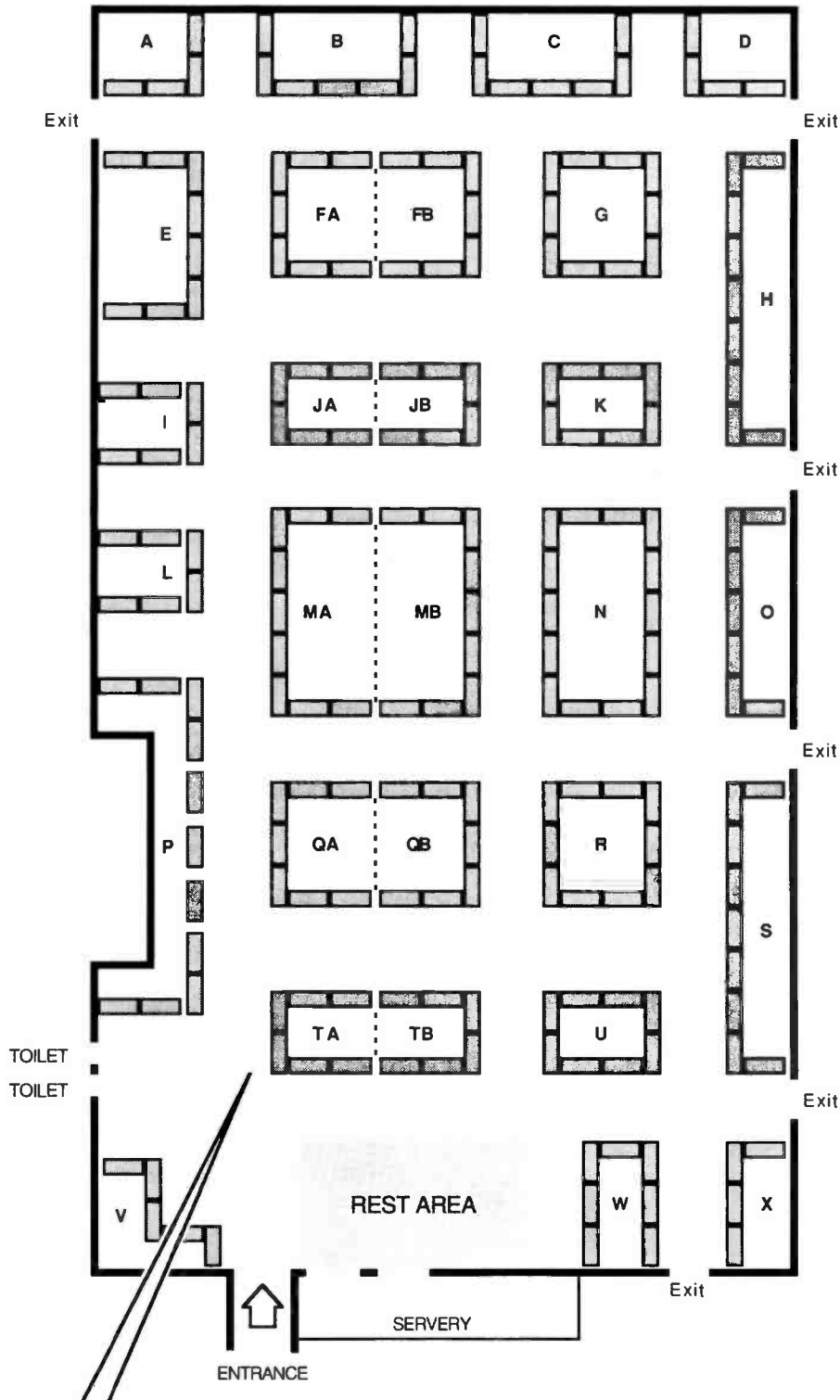


Welcome to the second great London Amateur Radio Show - the event with something of interest to every Radio Amateur and S

L



SOUTH HALL



WL.

LONDON AMATEUR RADIO SHOW

Guide to exhibitors and stand locations.

NORTH HALL	Stand
A1 Electrical Services	N
A1 Electrical Supplies	C
AJP Communications	X
Arrow Radio	U
Computer Junk Shop	Y
DeeComm	F
Dewsbury Electronics	E
Direct Disposals	C
Fisher Products	C
Giacomelli	H
G-QRP Club	K
Howes, C.M., Comms	L
I.C. Electrical	K
Instrotech Ltd	V
K.W. Communications	Q
Kanga Products	K
Kent, R.A., Engineers	V
Loutronics	J
Mainline Electronics	C
Malsor Kits	S
Marco Trading	P
Merlin Systems	J
Morgan Smith, H.J.	N
New Cross Radio	T
Nipco	B
PTV Electrical Svces	N
Poole Logic	S
Procomm-UK	R
Quartslab Marketing	X
R.F. Engineering	K
Radio Shack Ltd	G
Radio Society of G.B.	O
S.A.R.C. - Bring & Buy	A
SGS Electronics	P
Squire, V.	E
Stevens Electrical	K
Strikealite	M
Suredata	M
Taurus Electrical Svces	Z
Telecom	I
Telford Electronics	M
Tennamast	N
Trident Computer Centre	S
Waters and Stanton	W
Weirmead Ltd	V
Wilson Valves	T
Southgate A.R.C.	Info stand

SOUTH HALL	Stand
A.R.E. Communications	E+I
Argus Publications	J
Badger Boards	L
Bonex Ltd	C
Bricomm	B
Browns	Q
Capco Electronics	Q
Cheshunt & D.A.R.C.	L
Comar Electronics	W
Compelec	P
Display Electronics	F
Dressler Communications	O
G.S. Electronics	N
G4NKH	P
G4ZPY Paddle Keys	P
Garex Electronics	D
Garibaldi	L
Gemini Electronics	F
Icom-UK Ltd	S
I.C.S. Electronics	V
Lee Electronics	M
Lowe Electronics	M
Martin Lynch	U
MFM Supplies	L
Mollmac Computer Systems	K
Nevada Communications	H
Newton Engraving	L
Oasis Computer Systems	M
Petch, B.	W
Photo Accoustics	R
PW Publishing Ltd	T
RJH Comms & Electronics	J
R.N. Electronics	W
R&D Electronics	Q
S.E.M.	P
S&S Electronics	P
Sandpiper Communications	Q
Siskin Electronics	U
Surplus Electronic Equip	A
Syon Trading	B
T.A.R. Communications	G
Technical Software	P
Westlake, W.H., Elec.	X
Wraith, T.W.	N

OUTSIDE

T.A. 36th Signals Regiment

NORTH HALL BALCONY

AMSAT-UK
ATC (85th Enfield)
BARTG
BYLARA
Grafton R.S.
Guide Dogs Association
ISWL
Military Comms Museum
Radio Bygones Magazine
RAFARS
Remote Imaging Group
RAIBC
RAOTA
RNARS
RSARS

LONDON AMATEUR RADIO SHOW

➡ *Continued from page 38*

components, on such a small board, can produce such a useful little receiver.

PW

How Much £25(approx)
How Difficult Beginner +

Shopping List

Resistors
Carbon Film 5% 0.25W

15Ω	1	R6
22Ω	1	R5
1.8kΩ	1	R3
27kΩ	1	R2

Rotary Panel Mounting

1kΩ	1	R1 (linear carbon track)
5kΩ	1	R4 (logarithmic track)

Capacitors
Miniature disc ceramic

C1-3	see Table 1	
100p	1	C4
10n	1	C5
0.1µ	4	C9,13,14,18

Miniature Polystyrene
C6-8,10 see Table 1

Miniature Electrolytic 16V (radial leads)

1µ	1	C12 (50V this size)
10µ	1	C15
100µ	2	C16,17

Variable Capacitor
10p+10p+20p (three gang)§

Semiconductors‡

LM386	1	IC2
NE602	1	IC1 ‡

Miscellaneous
Sockets for both i.c.s, a suitable box (Minffordd), p.c.b. (*PW* services), miniature coaxial cable, other connecting wire, suitable plugs and sockets for r.f. and audio. Various knobs for controls, slow-motion reduction drive for C11.

A full kit of parts for a 3.5MHz version of the Sudden, including p.c.b., but less hardware, is available from: Kanga Products, 3 Limes Road, Folkestone, Kent CT19 4AU for £17.45 (+ 85p postage/packing).
§ Capacitor C11: 3 gang (10/10/20pF) J. Birkett, The Strait, Lincoln LN2 1JF. Tel: (0522) 20767.
‡ NE602N: BCD Electronic Services, Somerset House, Somerset Street, Hull HU3 3QH. Tel: (0482) 225437.
Minffordd All-Aluminium Box type A32: Minffordd Engineering, Sun Street, Ffestiniog, Gwynedd, LL41 4NE. Tel: (0766) 762572.

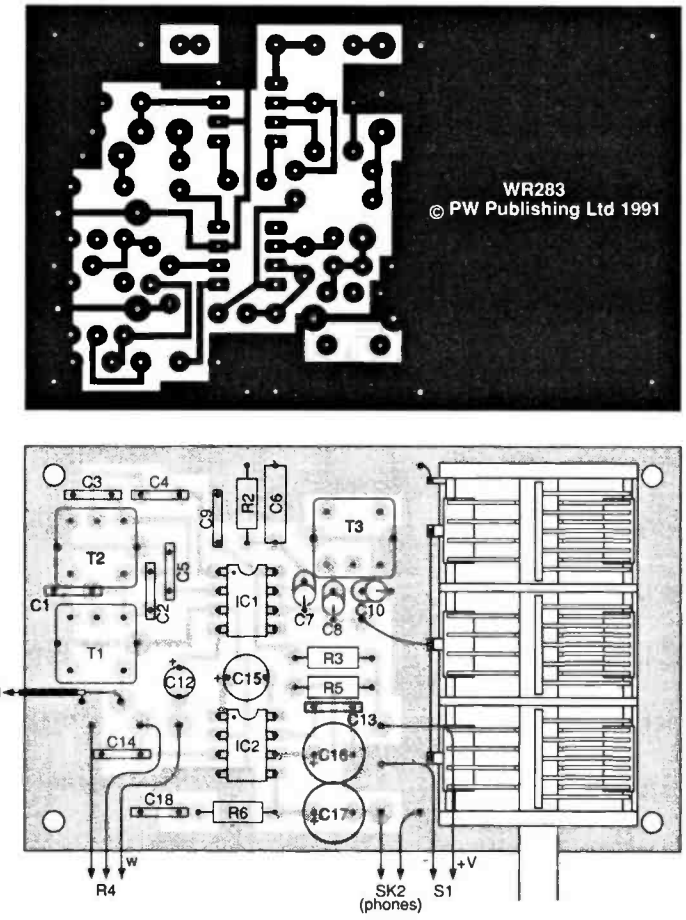
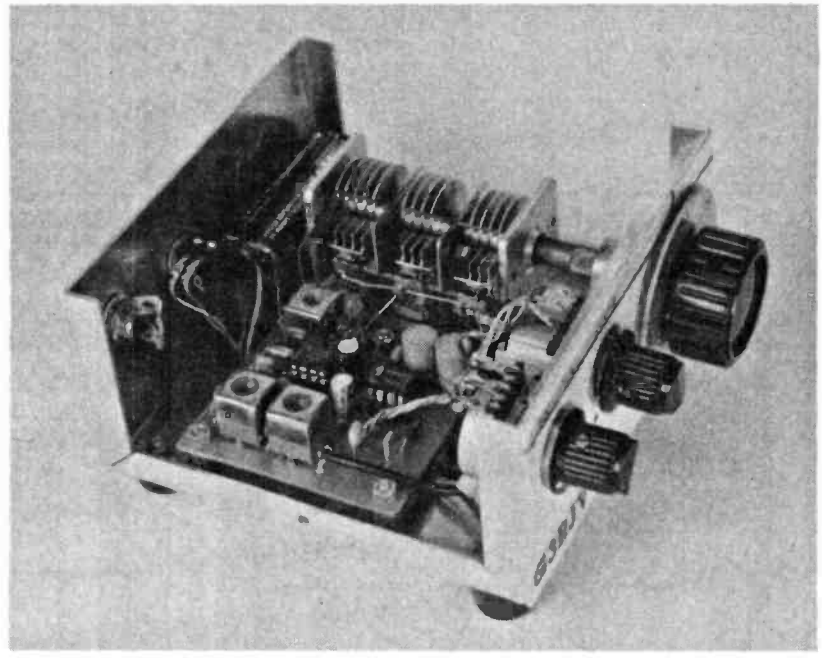


Fig. 4: Track pattern and overlay of the p.c.b. The section under the tuning capcitor may be trimmed off, if not required.



The completed receiver.

VISA 0202 665524

PCB SERVICE

Printed circuit boards for *Practical Wireless* constructional projects are available from the PW PCB SERVICE. The boards are made in 1.5mm glass-fibre, and are fully tinned and drilled. All prices include postage, packing and VAT for UK orders.

Orders and remittances should be sent to: **PW Publishing Limited, FREEPOST, Enefco House, The Quay, Poole, Dorset BH15 1PP,** marking your envelope **PCB SERVICE.** Cheques should be crossed and made payable to PW Publishing Ltd.

When ordering, please state the Article Title and Issue Date as well as the Board Number. Please print your name and address clearly in block letters, and do not send any other correspondence with your order. You may telephone your order using Access or Visa. A telephone answering machine will accept your order outside office hours.

Please allow 28 days for delivery. Always check the latest issue of *PW* for the current details of price and availability. Please enquire for p.c.b.s not listed here.

Board	Title of Article	Issue	Price £
WR283	SUDDEN RECEIVER	MAR 91	4.46
WR282	REPEATER TONEBURST	FEB 91	5.00
WR281	HIGH VOLT REG PSU	JAN 91	4.60
WR276-80	MARLAND SET (7 BOARDS)	SEPT 90	21.50
+263/4	TRANSMITTER		
WR272	NICAD RECYCLER	JUNE 90	6.92
WR275	LOW VOLTAGE ALARM	JUNE 90	6.36
WR273	VALVE PSU	MAY 90	6.86
WR274	RX ATTENUATOR	MAY 90	5.72
WR271	PRODUCT DETECTOR	APRIL 90	4.95
WR270	BADGER CUB	APRIL 90	4.94
WR269	GLYME	FEB 90	6.70
WR268	IRWELL (r.f. p.a.)	FEB 90	6.00
WR264	IRWELL (relay)	FEB 90	5.00
WR263	IRWELL (vfo)	JAN 90	6.00
WR267	FORTYNINER	JAN 90	6.00
WR266	TUNED ACTIVE ANTENNA	JAN 90	5.60
WR265	TUNED ACTIVE ANTENNA (psu)	JAN 90	5.60
WR262	REPEATER TIME-OUT	DEC 89	4.82
WR261	AM TX FOR 1.8MHz	NOV 89	6.50
WR260	10MHz RECEIVER	OCT 89	5.00
WR259	10MHz RECEIVER	OCT 89	5.00
WR258	10MHz RECEIVER	OCT 89	5.00
WR257	LOW BATTERY WARNING	SEPT 89	5.88
WR256	ACTIVE FILTER	AUG 89	6.96
WR254	TX CONTROL FOR MOBILE USE	JULY 89	5.08
WR253	TS940S MODIFICATION	JUNE 89	5.54
WR252	TWO TONE OSCILLATOR	MAY 89	6.52
WR251	RF OPERATED RELAY	FEB 89	3.80
WR250	DC/AC POWER CONVERTER	JAN 89	3.22
WR249	"MARLBOROUGH" MF CONVERTER	DEC 88	4.60
WR248	"BADGER" 144MHz RECEIVER	OCT 88	9.10
WR247	ZENER DIODE TESTER	AUG 88	3.56
WR246	"PORTLAND" RF VOLTMETER	JULY 88	3.59
WR244	PRACTICE MORSE KEY	JULY 88	2.96
WR245	STOPBAND FILTER FOR PW BLENHIEM	JUNE 88	2.90
WR243	VHF MONITOR RECEIVER (AUDIO)	APRIL 88	2.30
WR242	"ORWELL" VARICAP TUNE OPTION	MAR 88	6.00
WR241	"ORWELL" MED. WAVE RECEIVER SET	MAR 88	
WR240	.. ..	..	9.10
WR239	.. ..	..	
WR238	"OTTER" 50MHz RECEIVER	JAN 88	7.10
KANGA	HIGH STABILITY VFO (see issue)	OCT 87	-
WR236	"BLENHIEM" VHF CONVERTER	SEPT 87	7.00

Board	Title of Article	Issue	Price £
WR235	MAINS ON/OFF FOR BATT RADIOS	SEPT 87	3.00
WR234	SIDE-TONE OSCILLATOR	JUNE 87	2.70
WR233	"DOWNTON" F-V CONVERTER	JUNE 87	3.90
WR232	"AXE" SIGNAL TRACER	MAY 87	
WR231	.. ..	..	9.20
WR230	.. ..	..	
WR228	"BLANDFORD" RECEIVE CONVERTER	APRIL 87	
WR227	.. ..	..	9.70
WR226	.. ..	..	
WR298	"ITCHEN" LCR BRIDGE	APRIL 87	5.85
WR225	"WOODSTOCK" SW CONVERTER	MAR 87	4.10
WR219	MASTHEAD PRE-AMP PSU	FEB 87	2.50
WR218	MASTHEAD PRE-AMP FOR 144MHz	FEB 87	4.20
WR224	"WESTBURY"BASIC WOBBULATOR	JAN 87	3.50
WR214	MOD SRX-30D (AUDIO)	DEC 86	3.00
WR223	HIGH-IMP MOSFET VOLTMETER	DEC 86	2.90
WR222	"TAW" VLF CONVERTER	NOV 86	5.80
WR216	LF BANDS ACTIVE ANTENNA	NOV 86	2.40
WR220	GET STARTED LOW-COST CONVERTER	OCT 86	2.40
WR215	SIMPLE 50MHz CONVERTER	SEP 86	3.60
WR213	MOD FRG-7 (CARRIER Osc)	JUN 86	2.70
WR210	"ARUN" PARAMETRIC FILTER	MAY 86	8.10
WR211	"MEON" FILTER (SMALL)	APR 86	3.10
WR209	SIMPLE AUDIO OSCILATOR	MAR 86	4.30
WR208	RF SPEECH PROCESSOR	MAR 86	4.10
WR207	CRYSTAL CALIBRATOR	JAN 86	2.10
WR206	RTTY/MORSE MODEM (Plug-in)	JAN 86	2.80
WR205	RTTY/MORSE MODEM	JAN 86	5.40
WR203	SIMPLE CAPACITANCE METER	OCT 85	2.80
WR199	"MEON" 50MHz TRANSVERTER	OCT 85	6.70
WR202	ECONOMY UHF PRE-SCALER	SEP 85	3.70
WR201	ADD-ON BFO	AUG 85	2.50
WR200	LOW-COST CRYSTAL TESTER	JUL 85	2.50
WAD302	BATTERY CHARGER CONTROLLER	JUN 85	3.00
WR197	"COLNE" (Osc/Converter)	JUN 85	3.90
WR198	"COLNE" (Product Det/Audio)	MAY 85	3.90
A005	"COLNE (VFO)	APR 85	3.10
A004	"COLNE" 3.5/114MHz RX (RF Amp)	APR 85	3.10
WAD249	MOD FRG-7 (BFO)	FEB 85	3.00
WAD280**	TRIAMBIC KEYER	FEB 85	7.10
WA002	"TEME" (RECEIVER)	JAN 85	6.55
WA001	"TEME" (VFO/DOUBLER)	DEC 84	5.19
WR178	DART (Audio / change)	DEC 83	3.00
WR177	DART (p.a.)	NOV 83	3.00
WR176	DART (v.f.o.)	NOV 83	3.00
WAD246	"DART" FOLLOW-UP	DEC 84	4.00
WR196	"TEME" 7/14MHz WRP (TX)	NOV 84	3.70
WR195	STABLE TONEBURST	NOV 84	2.60
WR189/92 Pair	BUG KEY WITH 528-BIT MEMORY	OCT 84	8.50
WR185	AUTO-NOTCH FILTER	JUN 84	6.50
WR183	TOP-BAND DF RECEIVER	APR 84	6.50
WR179	TRANSCEIVER VOX UNIT	MAR 84	7.50
WR161	"MARCHWOOD" 12V 30A PSU	JUL 83	4.20
WR165 ect set	"SEVERN" 7MHz QRP TX/RX	-	14.90
WR169	"SEVERN" (TRANSMITTER)	JUL 83	6.50
WR168	"SEVERN" (CH.OVER/SIDETONE)	JUL 83	6.50
WR166	"SEVERN" (RECEIVER/AUDIO)	JUN 83	6.50
WR165	"SEVERN" (VFO)	JUN 83	5.20
WR167	RTTY TERMINAL UNIT FOR ZX81	JUN 83	7.80
WR160	LMS REGENERATIVE RECEIVER	FEB 83	5.20
WR156	REPEATER TIME-OUT ALARM	NOV 82	5.20
WR143	ATV CONVERTER	APR 82	7.10
WR144	IAMBIC KEYER	MAR 82	6.50
WR126	"EXE" 10GHz TRANSCEIVER	AUG 81	7.70
WR095	TRANSCEIVER POWER SUPPLY	SEP 80	3.85
WR068	AF SPEECH PROCESSOR	JAN 80	5.20

TX-3 RTTY CW ASCII TRANSCEIVE

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

GX-2 FAX SSTV TRANSCEIVE

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

RX-8 MULTIMODE RECEIVE SYSTEM

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

RX-4 RTTY CW SSTV AMTOR RECEIVE

Still a best-seller. BBC, CBM64 tape £25, disc £27. VIC20 tape £25. SPECTRUM tape £40, +3 disc £42 inc adapter board. All need our TIFI interface. SPECTRUM software-only version £25. TIFI INTERFACE for best HF & VHF performance with our software. Kit £25, ready-made & boxed £40. Only with TX-3 or RX-4 software.

APT-1 WEATHER SATELLITE MODULE

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

FAX AND WEATHER SATELLITES

Full resolution charts and greyscale pictures from any **SPECTRUM** computer to a dot matrix printer. FAX £80 or WX SATS £99, both £139.

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

Full info available on everything. Please ask. PRICES INCLUDE VAT AND P&P BY RETURN

VISA **technical software (P.W.)** LONDON AMATEUR RADIO SHOW

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

MARTIN LYNCH
G4HKS

THE AMATEUR RADIO EXCHANGE CENTRE

286 Northfield Avenue, Ealing, London W5 4UB.

IMPORTANT NOTICE

MARTIN LYNCH
is consistently paying high prices for good clean amateur radio equipment.
I now have a large amount of customers who urgently require complete equipment and accessories.

If you have any **YAESU, KENWOOD, ICOM, STANDARD** or any other main-line equipment, please ring or fax your details through immediately.
The items can either be sold on your behalf or bought outright for cash.

CALL: 081 566 1120 or
Fax: 081 566 1207

SPECTRUM OWNERS

No more waiting for programs to load, switch on and your program is ready to use!!

We are now able to supply our Spectrum programs on EPROM, together with a suitable EPROM loader board and all hardware housed in one unit.

The many advantages are too numerous to mention here.

Please contact us for details. An SAE would be appreciated.

NOW available for **all** versions of the Spectrum.

We may also be able to install your existing software.

J.&P. ELECTRONICS LTD.

VISA **Unit 45, Meadowmill Estate, Dixon Street, Kidderminster DY10 1HH Tel: (0562)753893** MasterCard

---

ENTERPRISE RADIO APPLICATIONS LTD.

VISA

5 Clarendon Court, Winwick Quay, Warrington WA2 8QP
Tel: (0925) 573118

All products British made & Guaranteed for 2 years

MKII MICROREADER £154.95

A small self-contained unit that decodes Morse & RTTY without using a computer. Displays text from amateurs, Press Agencies, Shipping, etc. Selectable shifts & auto baud & polarity.

BP34 AUDIO FILTER £99.50

Simply the most powerful active filter you can buy. 34 Orders of filtering removes noise & interfering signals allowing you to hear the weak DX. A must for keen CW OPS, contest groups, etc. Exceptionally flat passband is ideal for data & cleaning up FAX signals.

ALL PRICES INCLUDE VAT & POST/PACKING.
Ring or write for more details personal callers by appointment.

LONDON AMATEUR RADIO SHOW

SUREDATA

AMSTRAD REPAIR AND SECOND USER SALES

We will be loading the contents of our showroom, workshop and junk box into a van and bringing it to Picketts Lock next month. So if you want something special, let us know in advance.

We've set up a database of customers who want AMSTRAD PCWs and PCs so we can now sell on your behalf (you get a better price) or buy in for cash if you are in a hurry. All units sold with a three month warranty. Don't forget our **AMSTRAD REPAIR** service, it's our main business. We take money and plastic. So pick up the phone and let us help you.

73 John G3TLU

SUREDATA
TELEPHONE: 081-902 5218

DEPT PW, UNIT 5, STANLEY HOUSE, STANLEY AVENUE, WEMBLEY, MIDDX HAO 4JB (opposite Dorothy Avenue)

TRAFFORD RALLY
The Great Northern Rally at G-MEX Greater Manchester Exhibition and Events Centre Sunday 14th April 1991

All the usual attractions including
FREE DRAW and BRING & BUY. MORSE TESTS. Licensed Bar, Hot & Cold Meals, Tea & Coffee. Large, Single Ground Floor for Easy Access. 30,000 sq. ft. of space - lots of room. Many more Amateur Radio Traders than ever before with all the best equipment. Plenty of parking, both free & paid for. Open 10.30am for all. Close at 5pm. **PRIORITY QUEUE FOR THE DISABLED** Admission £1 all classes.

Trafford Amateur Radio Club invite you to attend this event, which will be the rally to attend in 1991. Talk-in on S22 *via* GB1GMX.
All enquiries on 061-748 9804 or 061-748 8046
Don't miss out on the best in amateur radio - come to the one and only Great Northern Rally

DEWSBURY ELECTRONICS

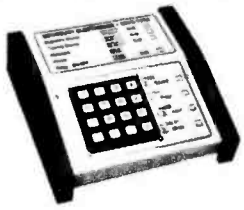
G4CLX

Come and see us at: LONDON AMATEUR RADIO SHOW

NEW

PRESENTS THE SUPA RANGE OF PRODUCTS

SUPA-TUTA

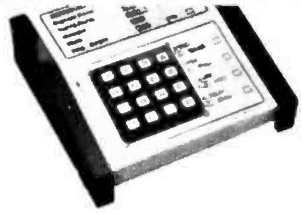


TO TEACH YOU MORSE — QUICKLY

£69-95 + £2.50 P&P

STOP PRESS . . .
Now available — SUPA-TUTA PLUS (includes keyer) £82.50 + £2.50 P&P

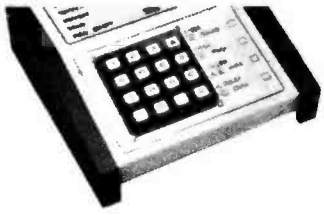
SUPA-KEYA



THE MOST USER FRIENDLY KEYER AROUND

£97-50 + £2.50 P&P

SUPA-TUNA



MAKES SELECTING FREQUENCIES EASIER

£65-95 + £2.50 P&P

C.M.K. S.M.K.

£95.00 **£59.95**

£3.00 P&P

SEND S.A.E. FOR DETAILS OR ORDER NOW BY PHONE.

ALL PRICES INCLUDE VAT.

FULL RANGE OF KENWOOD PRODUCTS STOCKED
We are also stockists of ICOM — YAESU —JRC — TAR — WAVECOM — VIBROPLEX

Dewsbury Electronics, 176 Lower High Street, Stourbridge, West Midlands DY8 1TG
Telephone: Stourbridge (0384) 390063/371228
Fax: (0384) 371228

VISA

Access

Instant finance available subject to status. Written details on request.

Mathematics for the Radio Amateurs' Examination

In this, Ray Fautley G3ASG's first article, he gives you an idea of the scope of the series, which aims to include all you want to know about RAE maths and are afraid to ask!

We'll start by going right back to school-days with fractions and decimals. The reason for this is that without a good grounding in these two basic subjects, what follows could appear to be unnecessarily difficult.

After solving those problems, we'll look at indices, or the powers of numbers. Then I'll take you on to some elementary algebra. This will ensure that any formulae encountered, can be rearranged (or transposed) enabling an unknown in an equation to be evaluated in terms of the known quantities. After the algebra we'll encounter the units used in radio calculations, together with their multiples and sub-multiples.

Series And Parallel

Moving on, we'll look at resistors in series and parallel. Next from there, it'll be Ohm's Law and its application to determine series resistors and parallel shunts for d.c. meters.

We follow these by a look at sinewaves, including phase and the relationship between period and frequency.

Inductors and capacitors connected in series and parallel, and how to calculate the charge on a capacitor, will be followed by impedance, reactance, resonance and 'Q' of tuned circuits.

When we reach the principles of the superhet receiver, I'll include calculations of image (or second channel) frequency, mixer and modulation input and output frequencies.

How to determine the turns ratio for a.f. and r.f. transformers will be followed by power level and decibel calculations.

Harmonics generated by frequency multiples used for transmitters, and the efficiency of r.f. power amplifiers will be covered, and also the relationship of peak to carrier voltage of a.m. transmission.

Wavelength, frequency and propagation of electromagnetic waves will be followed by calculations of velocity factor, and the transformer action of r.f. cables.

Power supplies, rectifiers, peak inverse voltage and voltage stabilisers will be discussed, showing the necessary calculations.

Finally, tolerance of frequency measuring equipment, two-tone transmitter power measurements and oscilloscope measurements will complete the series.

Maths Obstacle

Maths is one of the most off-putting aspects of the RAE. It's an obstacle for the majority of those wishing to obtain an Amateur Radio Certificate which permits operation on the amateur bands.

It's much more of an obstacle to those who earn their 'bread' in fields other than engineering or science. The latter will have received more than adequate mathematical training during their studies, leading to some sort of qualification in their chosen discipline.

This series is intended to provide help for those other 'budding' hams (no official age limit!) who say 'I'm no good at maths' and then just give up.

Please don't give up yet! Just because maths wasn't your best subject at school, it doesn't follow that you won't be able to master the little bit necessary to pursue your hobby and finish up with the Amateur Radio Certificate. At least have a go! For those of you who already have a maths background, just bear with those who don't and use the series as a bit of revision.

Backwards Look

The series starts with a backwards look at the basic mathematical building blocks of fractions, decimals, indices and some algebra (a rude word to many!) before going onto the application of maths to the type of radio problems encountered in the Radio Amateurs' Examination.

The reason for mastering some elementary algebra is that the formulae given in text books for solving radio problems is often **NOT** in the form the user requires. A little knowledge of algebra enables formulae to be rearranged into a usable state.

There will be problems for you to attempt at the end of each article. If your answers don't seem to work out, re-read the relevant text again, perhaps a bit more slowly and carefully, paying particular attention to the worked examples. Then have another go!

Fractions Again

When at school (a little or a long time ago!) you almost certainly encountered fractions. These represent quantities which are not 'whole' numbers like 1, 2, 3, 10, 55 and so on, but parts which are less than unity, such as half (1/2), third (1/3), eighth (1/8) etc.

Like ordinary whole numbers, fractions can be added, subtracted, multiplied and divided, but not quite as easily. As is the case in nearly all maths, there are **RULES** for operating with fractions.

Let's begin by adding a couple of fractions together. It's obvious (even without using the word maths!) that if we add a half to a half the result is one. Put in mathematical terms it's:

$1/2 + 1/2 = 1$

Here are a couple of definitions:

(i) The number on top of the fraction is the **NUMERATOR** (The '1' in each fraction above).

(ii) The number on the bottom of the fraction is the **DENOMINATOR**. (The '2' in each fraction above).

What about the rules for adding fractions?

The **GENERAL RULES** for adding fractions are:

(i) Convert all fractions to be added so that they have a **COMMON VALUE OF DENOMINATOR.**

(ii) Add together all the **NUMERATORS**.

A couple of questions arise from these general rules.

(i) Why do we need to convert the fractions to be added so that they all have a **COMMON** value of denominator?

(ii) If we do need to, how do we do it?

When we added 1/2 to 1/2 just now, we added together two fractions which were of the **SAME TYPE** (both were halves). The important thing to note is that **BOTH DENOMINATORS** were the same, '2'.

Adding 1/5 to 3/5, again both are the same type

of fractions (each is a number of 'fifths') and again the important bit is that **BOTH DENOMINATORS** are the same, 5. One fifth added to three fifths is four fifths or:

$$\frac{1}{5}+\frac{3}{5}=\frac{4}{5}$$

So long as the denominators are the **SAME** it's easy to add fractions. Another example:

$$\frac{2}{49}+\frac{11}{49}+\frac{5}{49}=\frac{18}{49}$$

Before fractions can be added they **MUST ALL HAVE THE SAME DENOMINATOR.** The usual case is where the fractions are NOT the same type, i.e. they have different denominators, for example:

$$\frac{3}{5}+\frac{2}{15}$$

How do we alter the fractions to have the same denominators without changing values of fractions?

To this end there are a few things that **MUST** be committed to memory.

(i) The value of a fraction **IS NOT ALTERED** if both numerator and denominator are **MULTIPLIED** by the same number.

(ii) The value of a fraction **IS NOT ALTERED** if both numerator and denominator are **DIVIDED** by the same number. (This operation is only useful if the answers are both whole numbers).

(iii) Adding or subtracting the same number to both numerator and denominator **DOES ALTER** the value of the fraction - **SO DON'T TRY IT!**

Let us try to prove the above statements.

(i) Take the easy fraction 1/3

Multiply both the top (numerator) and bottom (denominator) of the fraction by 5.

$$\frac{1}{3}=\frac{1\times 5}{3\times 5}=\frac{5}{15}$$

Five fifteenths is still the same as one third, OK?

(ii) Take the fraction 2/10. Divide both top and bottom by 2.

$$\frac{2}{10}=\frac{2\div 2}{10\div 2}=\frac{1}{5}$$

One fifth is still the same as two tenths, isn't it?

(iii) Now look at the fraction 1/4 (a quarter). We'll try adding 1 to both top and bottom of the fraction.

$$\frac{1+1}{4+1}=\frac{2}{5}$$

Now two fifths is certainly **NOT** the same as a quarter, is it?

(iv) Taking the fraction 1/3 (a third). Subtract 1 from top and bottom.

$$\frac{1-1}{3-1}=\frac{0}{2}=0$$

Which again is very different from the original fraction, as one third is **NOT** the same as zero! **NOTE:** If the numerator of a fraction is '0' then the value of the fraction is zero, **REGARDLESS** of the denominator number.

Going back a bit to our last problem:

$$\frac{3}{5}+\frac{2}{15}=?$$

If we multiply **BOTH** the top and bottom (numerator and denominator) of the first fraction by 3 we get:

$$\frac{3}{5}\times\frac{3}{3}=\frac{3\times 3}{5\times 3}=\frac{9}{15}$$

This multiplication does not alter the value of the fraction **BUT** it does now make it possible to add the two fractions together, for:

$$\frac{3}{5}+\frac{2}{15}=\frac{3\times 3}{5\times 3}+\frac{2}{15}=\frac{9}{15}+\frac{2}{15}$$

$$=\frac{9+2}{15}=\frac{11}{15}$$

Is there a way of ensuring that a denominator can always be found that is the **SAME** for each fraction, i.e. a **COMMON DENOMINATOR?**

Well, the easiest way is simply to multiply together all the denominators of the fractions to be added.

The result will **ALWAYS** be a number into which **ALL** denominators will divide giving whole number answers. This **COMMON DENOMINATOR** may not always be the LOWEST number into which all the denominators will divide giving whole number answers, but it can **ALWAYS** be used to provide the correct answer to the problem. It is particularly useful when the denominators are awkward numbers like 13,17,57, etc.

The following rules should ensure correct answers!

Rules for Additions of Fractions: Example

(i) Write down the fractions to be added

$$\frac{3}{16}+\frac{1}{15}+\frac{2}{5}$$

(ii) Multiply **ALL** the denominators of (i) together:

16 x 15 x 5 =1200. This is the **Common Denominator** (or CD)

(iii) Write down the first fraction to be added

$$\frac{3}{16}$$

(iv) Divide the CD by the **Denominator** of the first fraction.

$$\frac{1200}{16}=75$$

(v) Multiply the result obtained in (iv) by the **Numerator** of the first fraction.

$$3\times 75=225$$

(vi) Write down the result obtained in (v) **Over** the CD

$$\frac{225}{1200}$$

(vii) Write down the second fraction to be added

$$\frac{1}{15}$$

(viii) Divide the CD by the **Denominator** of the second fraction

$$\frac{1200}{15} = 80$$

(ix) Multiply the result obtained in (viii) by the **Numerator** of the second fraction

$$1 \times 80 = 80$$

(x) Write down the result obtained in (ix) over the CD

$$\frac{80}{1200}$$

(xi) Write down the third fraction to be added

$$\frac{2}{5}$$

(xii) Divide the CD by the **Denominator** of the third fraction

$$\frac{1200}{5} = 240$$

(xiii) Multiply the result obtained in (xii) by the **Numerator** of the third fraction

$$2 \times 240 = 480$$

(xiv) Write down the result obtained in (xiii) over the CD

$$\frac{480}{1200}$$

(xv) Repeat (xi) to (xiv) for any other fractions to be added.

(xvi) Add the fractions obtained in (vi), (x), (xiv) (and any others). (**Note** that they all have the CD as their **Denominators**)

$$\frac{225}{1200} + \frac{80}{1200} + \frac{480}{1200}$$

(xvii) Work out the arithmetic

$$\frac{225 + 80 + 480}{1200} = \frac{785}{1200}$$

(xviii) Reduce to simplest form by dividing **BOTH** the numerator and denominator by any number (as long as it's the **SAME** number) which results in **BOTH** answers as whole numbers

$$\frac{785 \div 5}{1200 \div 5} = \frac{157}{240}$$

Without a further worked example the rules will probably not sink in, so here is a very simple one.

Add the following:

$$\frac{1}{2} + \frac{3}{8}$$

The common value of denominator to use, if we can, is the **LOWEST** denominator into which all the denominators can be divided. In our example the denominator to use is '8'. It is the lowest number into which **BOTH** denominators, '2' and '8', can be divided.

For awkward numbers where the **LOWEST** denominator is not obvious, **ALWAYS** multiply **ALL** the denominators together to get the CD

$$\frac{1}{2} + \frac{3}{8} = \frac{4}{8} + \frac{3}{8} = \frac{4 + 3}{8} = \frac{7}{8}$$

A second example:

$$\frac{1}{6} + \frac{1}{4} + \frac{1}{3} = \frac{2}{12} + \frac{3}{12} + \frac{4}{12}$$

$$= \frac{2 + 3 + 4}{12} = \frac{9}{12} = \frac{3}{4}$$

In this case the **LOWEST** number that all the denominators would divide exactly into was '12' - a number not appearing in ANY of the terms to be added together! (We could have used 6 x 4 x 3 = 72 of course).

A final example of addition:

$$\frac{3}{4} + \frac{7}{8} + \frac{15}{16} = \frac{12}{16} + \frac{14}{16} + \frac{15}{16}$$

$$= \frac{12 + 14 + 15}{16} = \frac{41}{16} = 2\frac{9}{16}$$

(The answer giving a higher value numerator than denominator, i.e. greater than 1).

That's all for this month. Have a go yourself and keep practising. There's **nothing** to be afraid of in maths!

That wasn't too difficult. Was it? In the next part of the series Ray will deal with subtraction of fractions.

Further Reading

Readers following Ray Fautley's series, may find that they would like to follow up their new (or revised!) maths knowledge. As Ray says, "practice" is important, and you'll soon lose any fear you've got!

The 'further reading' suggested books are all available from the *PW* Book Service.

Practical Electronics Calculations And Formulae by F. A. Wilson and *Further Practical Electronics Calculations And Formulae*, by the same author and published by Babani (ref. BP53 and BP144 respectively) are packed with formulae and calculation with many worked, practical examples.

Ray Petri G8DDJ's, book *The Radio Amateurs' Question & Answer Reference Manual* (4th Edition) also contains many worked examples. Another recommended publication is the excellent *ARRL Electronic Data Book*. All the suggested 'further reading' books approach the necessary mathematics in a practical manner.

Construction

The Rally Solder Station

Here's a combined regulated soldering iron and bench power supply for your shack. You too can save space if you use this project from Bob Price GW3ECH.

Commercial solder stations have one main disadvantage, they and the soldering irons which they power are expensive. I began with a lump of copper on the end of an iron bar with a wooden handle. Poked through the bars of the coal fire, the copper became hot, often too hot.

The iron, and the items to be soldered, had to be cleaned with a corrosive fluid flux before tinning. I then progressed to a 240V powered iron. It was a bit easier but the bit still required frequent tinning. All that was back in the 1930's.

It was not until I used a solder station at a workbench that I realised what I had been missing - a soldering iron always ready, at the right temperature and needing only an occasional wipe to keep the bit in good order. The principal difference between an iron used in a solder station, and a mains iron is that the solder station allows you to set the correct soldering temperature so the iron doesn't overheat.

Name Of The Game

The Rally solder station, so called because most of the parts were obtained at radio rallies, has some refinements not found on commercial units. Parts however, are obtainable from most of the mail order suppliers who advertise in *PW*. The iron used was an 12V/25W model, sold in a car repair kit. The power unit is basically a 12V regulated supply, the output of which is switched to give the operating modes described below:

1). **Soldering** - the bit temperature can be set to suit the solder and bit in use.

2). **Resting** - the bit temperature is reduced to extend bit life.

3). **Boost** - the iron is operated at full supply output for a timed period to restore bit temperature when the iron is lifted from its rest.

4). **Supply** - the power supply unit variable output is made available for use as a bench power supply.

Commercial solder stations control bit temperature, but I doubt that many users would know what temperature, or even which bit size, to use with a particular solder or a specific job. A selection of bits are available for the Antex XS series, varying in size from 0.5mm to 4.7mm in standard shapes plus a 19mm desoldering bit for i.c.s, which should cover almost all possibilities.

The required bit temperature will therefore depend on the bit in use and the material it is in contact with. On the Rally solder station, the output voltage is metered and this is used as an indication of the working temperature. An experienced user will soon learn whether the bit is sufficiently hot. The setting of the resting temperature, and the duration of the boost, will depend on the bit size and the type of work and a table of settings should be created during use. The table of **Fig. 3** should give a useful starting point.

Soldering style	Soldering voltage	Rest voltage	Boost time
Light	10.5V	7V	15s
Medium	11V	8V	15s
Heavy	12V	10V	20s
Desoldering	12V	10V	20s

Fig. 3: Use this table as a starting point for your more personalised table of voltage and boost times.

Additional Applications

The 12V supply used for the solder station can be used as a normal bench supply, and provision is made for this by fitting two terminals on the rear of the case. A slide switch is used to disconnect the boost and rest circuits when the station is being used as a bench supply.

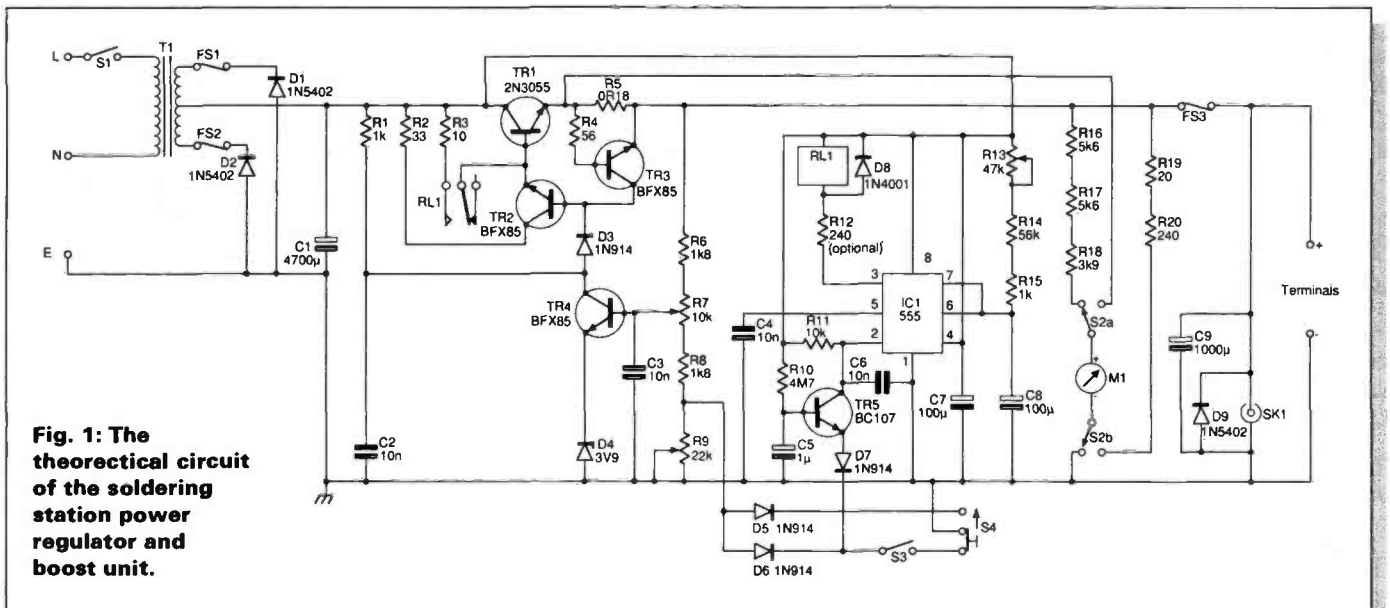


Fig. 1: The theorectical circuit of the soldering station power regulator and boost unit.

The output voltage may be varied over the range 5-12V from the front panel. The circuit gives excellent regulation up to 500mA at 12V. At output voltages approaching 12V, and at currents exceeding 500mA, there is some hum on the output due to the relatively low transformer secondary voltage. Commercial transformers go up in one step to about 15V. Such a transformer would improve the regulation, but considerably increase the heat dissipated by the series pass transistor, TR1, and its heat sink.

On the prototype the iron is connected to the power supply by a standard phono plug. If a similar fitting is made to a hand-held mini-drill, it could also be used with the power unit. It takes only a moment to connect, and the variable supply can be used to adjust the drill speed.

The Circuit

The drawing **Fig. 1** is of the theoretical circuit. The supply to the transformer is taken via a front panel mains switch, which has a built-in indicator. Primary fusing is provided by a 2A fuse in the plug. If a non-fused plug is used, be sure to fit a similar fuse within the case. Three core cable is used for the supply with the earth connection (green/yellow wire) connected to the case. The negative rail of the supply is also connected to the case.

Not shown in the circuit, but very useful in a radio environment, is a mains transient suppressor, connected directly across the transformer primary. This must be rated for at least 25VA continuous.

In the prototype, a transformer conservatively rated at 12-0-12V at 4 amps was used. The rectifier diodes D1 and 2, are rated at 3A continuous, but can carry more for short periods.

The diodes used in the prototype were two anode-stud rectifiers. The anodes (stud) were in fact mounted on the transformer frame. The d.c. output is then taken from the transformer centre-tap.

Secondary fusing is provided by two 3A fuses, FS1 and FS2. A 4700µF smoothing capacitor (C1) could be increased in value to 10,000µF, or even larger if space permits. This would reduce the hum on the output when used in power supply mode.

Series Pass

The single 2N3055 series pass transistor TR1, is mounted on a suitable heat sink. The resistor R5, connected from TR1 emitter to the output terminal, serves two purposes. It provides a current sensing, which is used to operate the short circuit protection. The same voltage drop is used to give an indication of output current. The meter is then scaled 0-3A. The meter switch S2, can also connect the meter via the resistor chain R16-18 to the output of the supply to indicate output voltage using the 0-15V scale.

The output voltage is sensed by the resistor chain R6-9. The voltage fed back to the base of TR4 depends on the setting of (in the soldering mode) R7 only, and R7 and R9 in the rest mode. The control voltage is fed to the base of TR4, which compares it with the emitter voltage, which is held at about 3.9V by D4. Transistors TR2 and TR1 form a Darlington pair, giving high current gain. The base current of TR2 is derived from R1, the collector load of TR4.

If the output current exceeds 3A (under overload conditions), the voltage drop across R5 tends to turn on TR3 which robs TR2, and thus TR1, of base current and so limits the current flowing through it.

Switch Mode

The microswitch, S3, shown in the rest position and closed by removing the iron from its rest, performs two functions. When closed, it clamps the top of R9 to 0.6V (via D5), so increasing the output voltage in the soldering mode. Resistor R7 alone, then controls the output voltatge. As the iron is lifted, and the switch closes, the microswitch provides a path to negative for the emitter of TR5. The resultant pulse of collector current triggers the timer IC1, a '555' type. The duration of the timer 'on' condition is set by R13. During this period a relay RL1 connects a by-pass resistor R3 into circuit. This forces a large base current into TR1, giving maximum output of the power fed to the soldering iron. This boost gives a quick return to operating temperature. The output of the supply is fused, since the current limit protection is inoperative during this boost phase.

Metering And Monitoring

A miniature toggle switch S2, mounted below the meter, switches between its two ranges, 0-3 amps and 0-15V. The output voltage is available permanently at the screw terminal posts when the shack is occupied. A small monitor receiver, left permanently connected, operates happily with the various voltages that appear on the terminals in use without complaint!

Supply Mode

In regulated supply mode, perhaps when used for powering hand-held drills, the slide switch S4 disables both the boost timer and output reducing action of R9. The supply output is available on two terminals on the

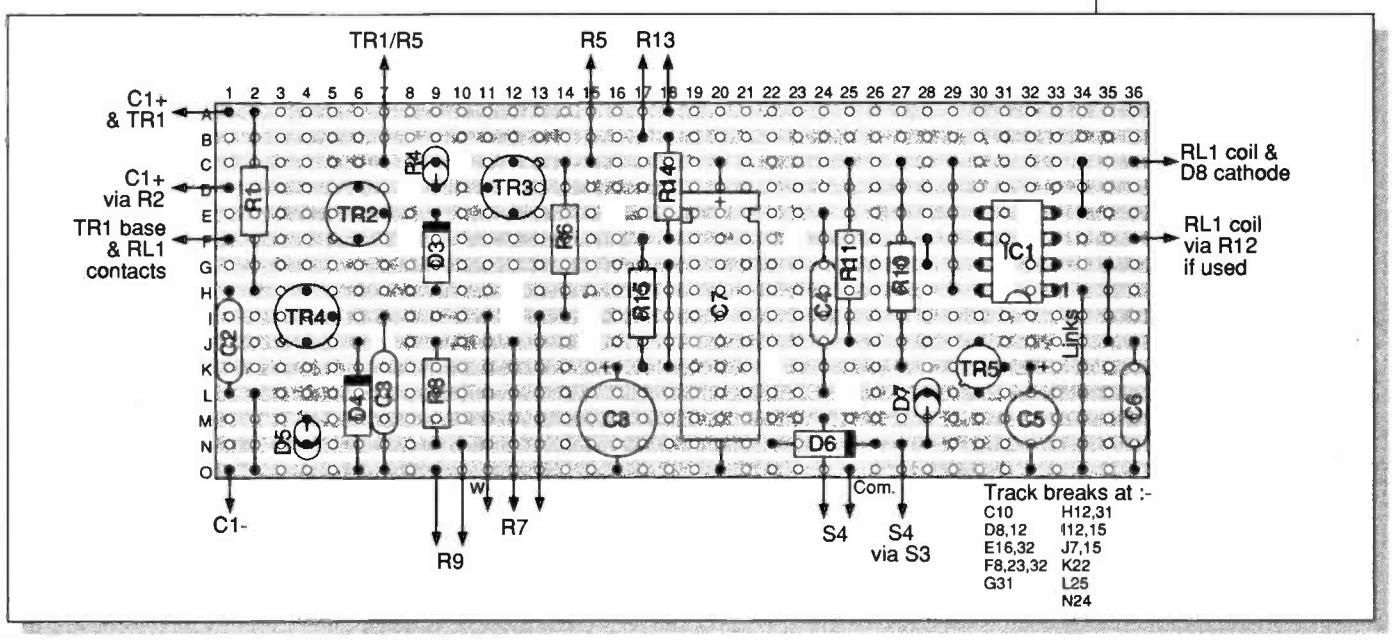


Fig. 2: The overlay of the stripboard used to construct the power unit.

rear of the cabinet. A 1000µF capacitor, C9, is connected across the output to give a low output impedance in supply mode. It was found when operating mini-drills, that the timer operated at random intervals even with the slide switch set to this position. This was due to negative commutation pulses, and was cured by the inclusion of D7 across the output terminals.

How Much? £10+ (prototype and shopping at rallies)
How difficult Intermediate

Shopping List

Resistors 0.4W 5% Carbon Film

20Ω 1	R19 (a.o.t.)*	
56Ω 1	R4	
240Ω	1	R12(optional), R20 (a.o.t.)*
1kΩ 2	R1,15	
1.8kΩ	2	R6,8
3.9kΩ	1	R18 (a.o.t.)*
5.6kΩ	2	R16,17(a.o.t.)*
10kΩ	1	R11
56kΩ	1	R14
4.7MΩ	1	R10

* (a.o.t.) adjust on test to give required ranges on the meter in use (15V or 3A f.s.d.)

Resistors 2W wire-wound

10Ω 1	R3	
33Ω 1	R2	

Resistor 5W wire-wound

0.18Ω	1	R5

Resistor variable rotary

10kΩ	1	R7
22k	1	R9
47kΩ	1	R13

Capacitors

Low Voltage Disc Ceramic

10n 4	C2-4,6	

Electrolytic 25V working

100µ	2	C7 (axial), C8 (radial)
1000µ	1	C9
4700µ	1	C1

Tantalum Bead 16V working

1µ 1	C5	

Semiconductors

Diodes

1N914	4	D3,5-7
1N4001	1	D8
1N5402	3	D1,2,9
Zener	1	D4 (3.9V / 1W)

Transistors

2N3055	1	TR1
BC107	1	TR5
BFX85	3	TR2-4 (or BFY50/51 as an alternative)

Integrated Circuits

555 1	IC1	

Miscellaneous

Transformer 12-0-12 @2A (min), fuses 2/3A and fuse holders, microswitch (normally open), switch s.p.s.t., switch d.p.d.t., suitable metal housing box (complete), mains switch (with indicator), cable and various interconnecting wire suitable for up to 3A. Suitable meter (original was 1mA 100Ω resistance, R16-18 and 19-20 to give 15V f.s.d. on volts and 0.6V on 3A scales). Relay, single contact normally open (R12 not needed if 12V coil), Various plugs, sockets, nuts, screws, washers and bolt to complete the project.

Construction

The control circuits were built on stripboard, and Fig. 2 gives more details of a suitable layout. Parts placing in the case is not critical, and you may need to rearrange them to suit the transformer and other large components being used. If a toroidal transformer is employed, I suggest mounting the transformer on the floor of the case, and using its fixing bolt to support a 'shelf' made of aluminium sheet. This can then be used to mount the stripboard and the bridge rectifier.

The soldering iron is supplied with a very long lead fitted with large crocodile clips. Reduce the length of this lead (unless you have a very large shack) to about two and a half metres, before fitting the phono plug.

Panel labelling is done with white 'rub-down-letters' and the meter face has lettering added using black lettering, all available in local stationers.

A suitable aluminium box is used to house the solder station. The on-off switch, meter and all variable resistors were mounted on the front panel. The provision of the supply terminals on the rear proved to be no great disadvantage.

The soldering iron rest is suitable for all but the 19mm de-soldering bit. If this desoldering bit is to be used frequently, a different design would be required. The rest is made from a piece of scrap aluminium tubing 18mm outside diameter and 130mm long. It is drilled with 3mm holes at intervals along its length to assist ventilation. One end is 'swaged' to make it easier to insert the iron. The other end is flattened and pivoted with a 4BA bolt through angle brackets at the rear of the case.

The microswitch is fitted to the top front of the case, with the operating lever extended with a piece of '00' gauge model rail. Springing of the microswitch I used, was sufficient to support the empty holder, but the weight of the inserted iron then operates the microswitch.

Sponge Box

Also mounted on the top of the case is the sponge box, which was a throat pastilles box in a previous life. It contains a piece cut from a sponge type cleaning cloth. If kept moist, this will clean the bit and should last indefinitely. When the station is not in use store the spare iron bits in the box. Hang onto the lid.

The heat-sink for TR1 is essential. When in resting mode there is about 10-12W dissipation in this device. The heat-sink used, measures 63x100mm and has four 15mm ribs either side of the centre area, onto which the 2N3055 is mounted. Remember to use silicon grease or heat-sink compound between the transistor and the metal plate.

Testing

Switch on, with the iron removed. The switch on the rear panel should then be set to disable the microswitch activated boost timer (S4 in upper position). The meter switch should be set to the voltage position. Turn all three variable resistor control knobs fully anti-clockwise. The meter should then read beyond full scale. After about ten seconds it should fall back to 5V.

You should be able to vary the output voltage, with R7, between 5V and full scale. Switch off and plug in the iron. Set the panel switch S4 to the position shown. Switch on, when the meter should read about 14V, and then fall back to about 5V after some 10 seconds.

Turn R13 fully clockwise and then remove the iron from its rest. The voltage should go up to about 14V, and fall back to the lower voltage after about 25 seconds. Increase the voltage, by adjusting R7, to 11V. Put the iron on its rest and set R9 to give 8V. Check that the settings repeat by lifting and replacing the iron, and you're ready to start. **PW**

STUDENT SPONSORSHIP

WOOD & DOUGLAS, a UK independent company specialising in Radio Communication Engineering in the VHF, UHF and Microwave spectrum, is now seeking candidates for sponsorship through Higher Education as part of their ongoing student sponsorship policy.

If you are considering a career in radio engineering, have an active interest in radio as a hobby and are expecting to enter full time University or Polytechnic training in Autumn 1991, then *WOOD & DOUGLAS* could have a package that will suit both your financial and industrial training needs.

Please enquire in writing initially giving full details of your personal situation, subjects under study and any placement offers received to date.

Send your details to:

Student Sponsorship
Wood & Douglas
Lattice House
Baughurst, Basingstoke
Hampshire RG26 5LL

Access
VISA

WOOD & DOUGLAS
VHF/UHF COMMUNICATIONS PRODUCTS

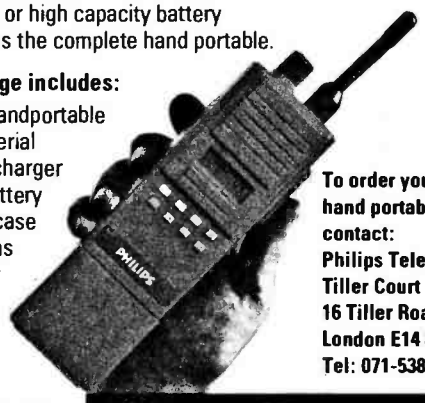
PHILIPS PR710 HAND PORTABLE RADIO

The latest hand portable from PHILIPS — the PR710 — is a versatile, cost effective frequency synthesised portable. Its rugged construction makes it a durable portable ideal for all situations.
Now available in a 2m version the PR710 has up to 10 channels and a clear LCD display.

With additional optional features such as:
- economiser to maximise battery endurance
- CTCSS and/or selcall signalling
- standard or high capacity battery

the PR710 is the complete hand portable.

The package includes:
- PR710 Handportable
- Helical aerial
- Battery charger
- Spare battery
- Leather case
- 12 months warranty
- Post and package.



To order your hand portable contact:
Philips Telecom
Tiller Court
16 Tiller Road
London E14 8PX
Tel: 071-538 9823

AND PHILIPS QUALITY!

FROM £350.00

PHILIPS

"Characteristics" for Amateur Radio

44 Hildethorpe Road, Bridlington, East Yorkshire YO15 3BG
Tel: (0262) 673635 Fax: (0262) 670568

Door Plaques
"The Shack"
£3.25

NEW!
Personalised Plaque

Personalised Mugs & Plaques
£3.75
(UK PRICES ONLY)
Allow 3 weeks for delivery of mugs.
Prices include P&P. Cash with order.

MAKE YOUR INTERESTS PAY!

Over the past 100 years more than 9 million students throughout the world have found it worth their while! An ICS home-study course can help you get a better job, make more money and have more fun out of life! ICS has over 90 years experience in home-study courses and is the largest correspondence school in the world. You learn at your own pace, when and where you want under the guidance of expert 'personal' tutors. Find out how we can help YOU. Post or phone today for your **FREE INFORMATION PACK** on the course of your choice. (Tick one box only!)

Electronics	☐	TV, Video & HI-FI Servicing	☐
Basic Electronic Engineering (City & Guilds)	☐	Refrigeration & Air Conditioning	☐
Electrial Engineering	☐	Car Mechanics	☐
Electrical Contracting/ Installation	☐	Computer Programming	☐
GCSE/GCE/SCE over 40 examination subjects to choose from			☐

Name _____ Address _____

ICS International Correspondence Schools, Dept. EES21 312/314 High Street, Sutton, Surrey SM1 1PR
Telephone 081-643 9568 or 041-221 2926 (24 hours)

LONDON AMATEUR RADIO SHOW

QSL

QUARTZ CRYSTALS

QuartSLab MARKETING LTD

P.O. Box 19 Erith Kent DA8 1LH
Telephone: 0322 330830
Fax: 0322 334904
Telex: 8813271 GECOMS–G
(Attention QUARTSLAB)
An SAE with all enquiries please
PRICES INCLUDE P&P and VAT

STOCK CRYSTALS

CRYSTALS FOR 2 METRES
HC25 £2.70 FOR ONE CRYSTAL £2.50 EACH FOR 2 OR MORE

TX CRYSTALS	RX CRYSTALS	
12MHz 30 & 40pF	44MHz Series Res	
	14/15MHz 30pF	R0-R7, S8-S23,
	Scanner Crystals	
	SR9 crystals £3.45	

HC6 £2.80 FOR ONE CRYSTAL £2.60 EACH FOR 2 OR MORE

TX CRYSTALS	RX CRYSTALS	
4MHz 30pF	44MHz Series res	R0-R7, S20-23

4 METRE CRYSTALS FOR 70.26 IN HC6/U at £2.80 each
TX 8.78250 RX 29.7800
70CM CRYSTALS £6.50/pr or £3.30 each.
For Pye PF1 PF2 & PF70 series and FDK MULTI U11 SU20 RB0 RB1 RB2 RB3 RB4 RB5 RB6 RB7 RB8 RB9 RB10 RB11 RB13 RB14 RB15. Also for MULTI U11 ONLY SU16 SU18
CONVERTER CRYSTALS IN HC18/U AT £3.30 each.
22.000, 38.666, 42.000, 96.000 116.000
FREQUENCY STANDARDS £3.20 each.
HC6/U 1000kHz 10.00MHz
HC18/U 7.00MHz 10.00MHz 10.70MHz 48.00MHz 100.00MHz
TONEBURST, I.F. & MPU CRYSTALS IN HC18 £2.80 each.
7.168MHz (For 1750 HZ Tone), 10.245 (for 10.7 I.F.)
3.2768 4.000 5.0688 10.245MHz 15.00000
YAESU CRYSTALS FOR FT101's FT901 & etc £4.80 each.
Many available ex stock (A list is available on request please send S.A.E.)

Full list available on request, please send SAE

MADE TO ORDER CRYSTALS

FUNDAMENTALS		OVERTONES	
FREQUENCY RANGE	PRICE	FREQUENCY RANGE	PRICE
1.5 TO 2.0MHz	£5.90	3rd OVT 21.00 TO 65.00MHz	£5.25
2.0 TO 6.0MHz	£5.50	5th OVT 60.00 TO 110.0MHz	£5.90
6 TO 21MHz	£5.25	5th OVT 110.00 TO 125.0MHz	£8.60
21 TO 25MHz	£7.50	7th OVT 125.00 TO 175.0MHz	£11.60

DELIVERY: Approx. 2 weeks.

Unless otherwise requested fundamentals will be supplied for 30 pf load capacities and overtones for series resonate operation.

HOLDERS — supplied for crystals above 2MHz.

HC6/U & HC33/U 1.5–175MHz
HC18/U & HC25/U 2–175MHz
HC17 Add £1.00 HC45 Add £3.75

DISCOUNTS. Price on application for 10 + units to same frequency spec. or bulk purchases of mixed frequencies.
COMMERCIAL CRYSTALS. available on fast delivery and at competitive prices.
EMERGENCY SERVICE. Add the surcharge for each XTAL. Days refer to working days. 4 days + £12. 6 days + £7. 8 days + £5. 13 days + £3.
CRYSTALS SOCKETS HC25 £0.25 ea. MINIMUM ORDER CHARGE FOR SOCKETS £1.50 unless ordered with crystals.
TERMS. Cash with order post inc. to UK & Northern Ireland. Cheques & PO's to QSL LTD.

PRICES INCLUDE P&P and VAT

A 3.5MHz Loop Antenna

Construction

Christopher Page G4BUE, has what appears to be a super full-wave loop antenna for 3.5MHz in his garden. Now you get the chance to make one and work the DX.

Apart from mid-summer months my favourite operating is c.w. DXing at the bottom end of 7 and 3.5MHz. During the last few years I have tried many different antennas in an effort to try and find the magical design, which will lift my signal above the European crowd. For 3.5MHz, I eventually settled on a full wave loop, and this has proved to be very competitive during the last four winter DX seasons.

The drawing in **Fig. 1** shows the measurements and how it is erected at my QTH. You can see that the top averages approximately 14 to 15m in height. The bottom run however, almost touches the ground in places. The design, which has a little gain (about 3dBd) over a dipole, could also be scaled down in size for 7MHz or the higher h.f. bands.

Full Wavelength

The loop is a full wavelength long, (307.5/ frequency in metres), and was worked out at the centre of the band of interest (3.510MHz). At first I fed it, in one of the bottom corners, through a quarter wave matching transformer.

The feed impedance of the full-wave loop is about 100-120Ω, and so it doesn't match into 50Ω coaxial cable. This was in the belief that I would obtain both horizontal and vertical polarisation for high angle work, (QRP QSOs around the UK) and low angle work (DX).

The transformer is constructed from a quarter wave length of 75Ω coaxial cable and changes the feedpoint impedance to much nearer the required 50Ω. From this point 50/52Ω coaxial cable was used to reach into the shack. The velocity factor of the 75Ω coaxial cable must be taken into consideration when working out the λ/4 transformer requirements. The correct figure was not available for the 75Ω coaxial cable I used, so I assumed it was 0.66. This means that all calculated distances must be multipled by 0.66 to give actual figures. For my λ/4 transformer the length was calculated as 14.45m [(307.5/3.510) / 4 x 0.66].

Other Band Options

I have worked out the dimensions for the other bands up to and including 50MHz. These are shown in **Table 1**, which gives the measurements of the loop and the λ/4 matching transformer, (assuming a velocity factor of 0.66) for these other bands. To make the loop, start with a metre or so more of wire more than you calculated. Then trim to resonance by adjusting the size of the loop, shortening the wire (10-20cms each time) to raise the resonant frequency.

The antenna coverage is very broad, and covers the whole 3.5MHz band with an s.w.r. of less than 2:1. This makes it ideal for both c.w. and s.s.b. The shape also is not very critical, and I know several amateurs who successfully use loops that are bent into various shapes to fit their gardens.

TABLE 1

Frequency in MHz	Antenna length (m)	Matching line (m)
3.510	87.55	14.43
3.775	81.41	13.43
7.050	43.58	7.19
10.110	30.40	5.02
14.200	21.62	3.58
18.100	16.97	2.81
21.300	14.43	2.39
24.900	12.35	2.05
28.500	8.71	1.77
50.500	6.09	1.00
51.500	5.97	0.98

Table 1: These are the dimensions which should apply to other bands. They may change slightly due to local conditions.

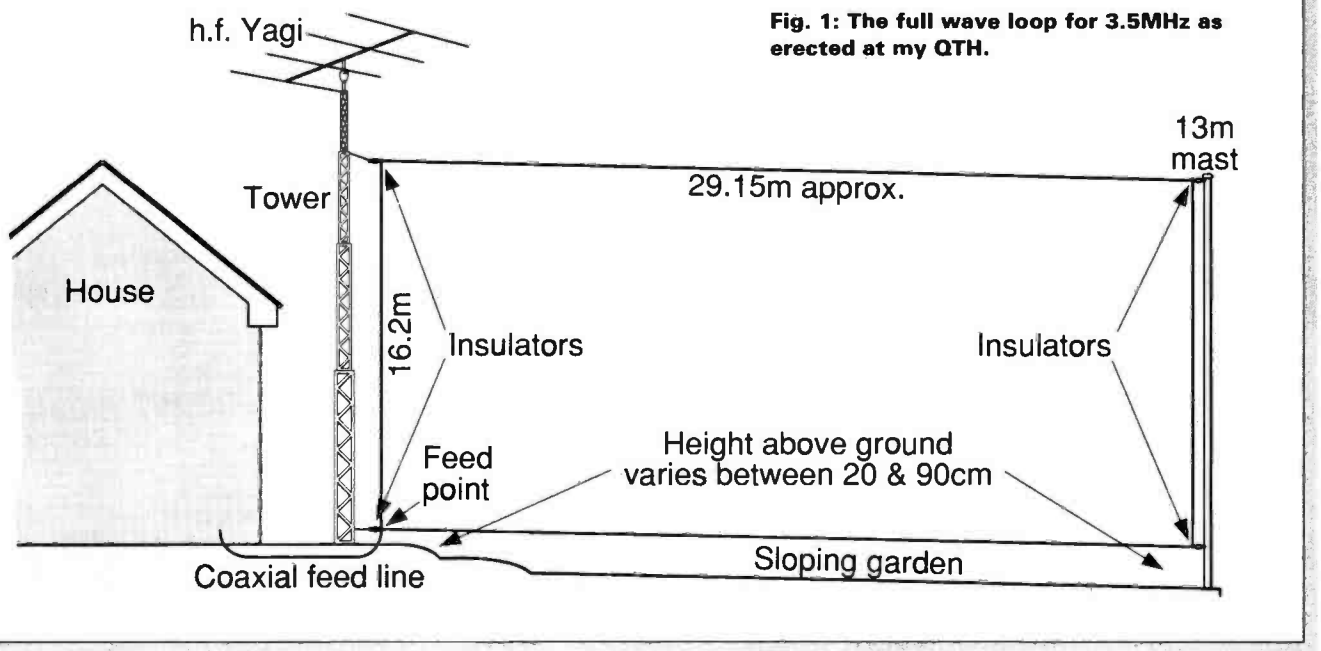


Fig. 1: The full wave loop for 3.5MHz as erected at my QTH.

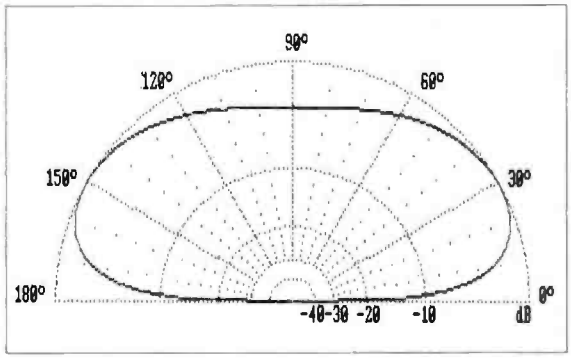


Fig. 2: Radiation pattern of the full wave loop with the feed point in a bottom corner near the mast. The 0dB reference curve is 0.63dBd at 3.510MHz.

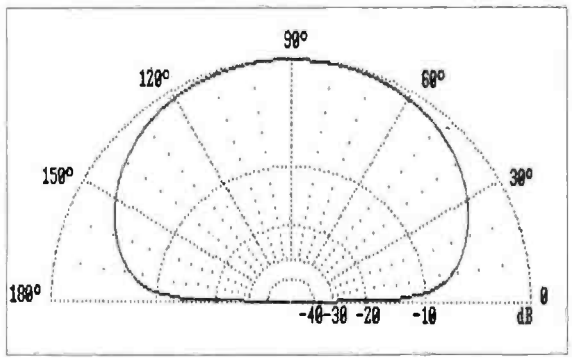


Fig. 3: Radiation pattern of the full wave loop with the feed point half way down one side.The 0dB reference curve is 4.98dBd at 3.510MHz.

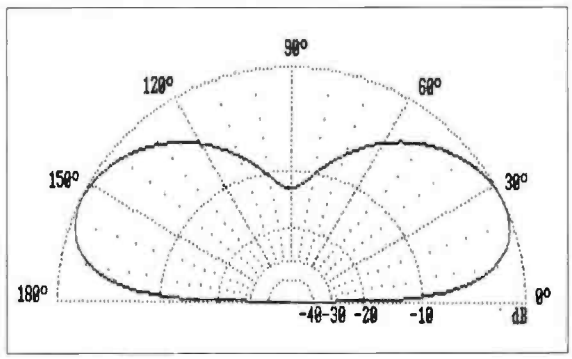


Fig. 4: Radiation pattern of the full wave loop with the feed point at the mid-point of the bottom run. The 0dB reference curve is actually 0.65dBd at 3.510MHz.

The loop has worked very well, enabling regular QSOs in the early mornings to the west coast of the USA, and in the evenings to Japan. In the 1990 ARRL c.w. Contest in February, I worked 473 W and VE stations in 43 states and provinces using the loop.

Computer Generated

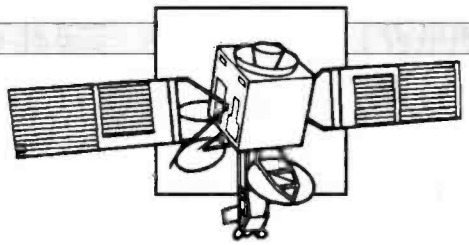
I have recently obtained a copy of the popular MN antenna modelling computer program for the IBM PC. I used it to see if I could improve the performance of the loop. Refer now to the drawings of the output of this program and you will see the results.

The pattern of **Fig. 2** shows the plot for the loop as I erected it, with the feed point in one low corner. It shows an angle of radiation of 30°. But look at the diagram of **Fig. 3.** Here you can see what happens when you change the feed point to half way up one of the sides. The angle of radiation drops to 26°, which is very useful for working DX. During the summer I changed the feed point from the corner of the loop to half way down one of the sides, and I'm now looking forward to the rest of the winter to see if the 4° difference indicated by the MN program is repeated in actual performance on the air.

Local Contest Use

For some particular contests I shall need to work stations around the UK. To do this I will move the feedpoint to half way along the bottom part of the loop. At this feed point the loop then becomes horizontally polarised with very high angles of radiation. This is great for local QSOs but hopeless for DX. The pattern of **Fig. 4** shows the high angle pattern generated when feeding at the bottom mid-point of the loop.

A bonus that comes with this loop, was discovering it could be used for the new WARC bands of 18 and 24MHz without an a.t.u. With the loop adjusted for resonance at 3.510MHz, the v.s.w.r. varies between 1:5:1 at 18.068MHz to 1.7:1 at 18.168MHz and from 1.7:1 at 24.890MHz to 1.6:1 at 24.990MHz. **PW**



SATELLITE SCENE

by Pat Gowen G3IOR

This month, at the expense of general satellite information which will re-appear next time, we shall be concentrating on the manned orbiting spacecraft, and the exciting amateur radio in space communications experiments coming from them.

The cosmonauts in MIR, Gennadiy Strekalov and Gennadiy Manakov have now left MIR, following the unloading of PROGRESS-M-5 and the first experiment involving the returning to earth of the supply capsule containing surplus materials, which was carried out in the last week of November. So, the front docking port of MIR was cleared for the arrival of SOYUZ-TM-11.

The December 20 813UTC launch of SOYUZ-TM-11 from Baikonur in Kazahkstan docked to MIR on December 4 at 0959UTC. The event provided interesting f.m. voice communications, heard by Chris Van der Bergh on 121.750MHz from SOYUZ-TM 11 and on 143.625MHz from MIR. During the flight of SOYUZ-TM 11, the telemetry transmissions were very strong on 166.140MHz and 922.755MHz on the passes over Europe just prior to the docking.

The crew of SOYUZ-TM 11 consisted of the flight commander V. M. Afanasyev, the engineer mechanic M. G. Manarov, and the Japanese TV reporter Tuhiro Akiyama. Whilst the reporter returned with the earlier crew, Afanasyev and Manarov are now scheduled to stay until May 1991.

U2MIR Activity

Musa Manarov was in MIR during 1988 for a mission of more than one year's duration. During this time he ably demonstrated his enthusiasm for amateur radio by contacting many hundreds of stations around the world, using his callsign U2MIR. Musa's QSLs, as depicted in the January 'Satellite Scene' for this, and later missions are still arriving, as John **G6SVJ** wrote, "I finally received, via the bureau, my QSL card from U5MIR. It said 'Cfm 2-way f.m. QSO with U5MIR op. Sergej Krikalev'. Needless to say it now takes pride of place in my shack!"

Just as expected, the keen Musa Manarov U2MIR is active once again on his second trip in the Soviet MIR orbiting space station. He first appeared calling CQ on 145.500MHz over Europe on December 6 with a very good signal, but no QSOs were made. He next came up announcing his presence saying "I am U2MIR, Soviet Orbiting Space Station" on 145.550MHz at 1304UTC on December 9, when I was fortunate to have the first brief QSO with him, soon followed by F3NW. In the past few weeks, more QSOs have been made by European stations as he flew across our continent, i.e. G0DLJ, G3CAG, DC8TS and F8EXK.

Some considerable confusion arose within the many who heard his first passes, as well as saying for instance "..I am U2MIR.." Musa would identify callers heard by saying (for instance) "..You are G3IOR..". The result was that many reported hearing IMU2MIR, URG3IOR, and many more variations on this theme!

Work Stops Play

Musa has obviously been heavily involved in his duties aboard MIR, and much as he would like to be more active, he is limited in the time he can allot. During a QSO with Hans ZS6AKV, Musa apologised for his rather intermittent appearances, saying that he was very busy and ".. didn't have much time for amateur radio right now". Even so, his appearances have been been reasonably frequent, particularly during his pre 9am Moscow time (0600GMT) and post 5.30pm MSK (1430GMT) rest periods before and after work, with the odd break in between. Activity during free weekends has been unrestrained by the regular weekday work load, and he is often found on the band for many parts of his waking day between 0445 and 1900GMT.

How To Work U2MIR

A lot of stations are wondering why when they are hearing U2MIR at S-9+ they are unable to make a QSO with Musa on the Soviet Space Station. Recognising that Musa runs only 2.5 watts output from a FT-290-R to a 0.625 wavelength externally mounted ground plane attached just below a main solar panel, callers have rightfully calculated that their 10 watts will be 6dB louder at MIR than MIR is with them. That, sadly, is only part of the story! Ten watts and a vertical is adequate, but one must remember the f.m. QRM effect when a multitude may be calling. You may just be hearing him alone on the frequency, but he will be in the footprint of possibly literally thousands calling him with very similar power levels. The resulting received product, as evidenced on the W5LFL tapes made from Owen Garriot's SAREX SHUTTLE mission, is pure 'white noise'. Indeed, on two occasions Musa has indicated that was just ALL that he was hearing!

Anyone who has listened to the two metre f.m. band from (even) an aircraft flying at 10km (30 000ft) will know that ALL the f.m. channels are blocked ALL the time from elevated situations, even when a pile-up is not on-going. Remember that whilst your earthbound coverage is some 4000 square kilometres at the best, Musa is line of sight to over 4 million square kilometres, i.e. he is capable of hearing ALL of Europe when above the UK! The effect of a multitude of similarly powered f.m. stations on a common frequency, is just to produce the 'white noise' which overcomes and even closes the 'squelch', with only the very strongest stations being partially readable.

QRO!

Although it is absolutely taboo with our amateur radio transponders, due to a.l.c. elevation and battery exhaustion, it is far more effective to use maximum licensed power when trying to QSO MIR, as the capture effect of QRO provides an absolute advantage. If you can use your full legal maximum power, do so, as if you can get only 3dB above the noise, you will become readable above the masses.

Antennas

If you can use cross or circular polarisation to overcome Faraday rotation and the linearity limitations of the MIR 144MHz antenna, and employ a high gain beam with ACCURATE tracking, your chances of being heard become much greater. If you are not sure as to exactly where the spacecraft is, then a broader lobe beam or even crossed dipoles are better, as you will more than likely miss him completely due to the nulls on a sharp beam.

Proximity

A further important point is to allow for the inverse square law, P = 1/d2, i.e. the power decreases by the reciprocal of the square of the distance. When MIR is first heard as it comes over your horizon, it is some 2241km distant from you, but when nearly overhead it is only 350km above you. The path loss difference is over 16dB, e.g. a power gain of 40 at the time of closest approach of the space station. It is the equivalent of you going from 10 up to virtually 400W! Thus, it is best to point your ELEVATED beam at a point close to the time of closest approach, accurate in the rapidly changing azimuth and elevation at that time, and use your full power. This approach worked well for me at 1305UTC on 9 December.

If you cannot track, or elevate your beam, then you are better off using your full power to a broad vertical lobe aspect antenna. Ideally you can use a turnstile mounted some one third of a wavelength over a 0.55λ, or greater, wire netting mesh or even a simple ground plane. Several successful contacting stations used only a half wave 'Slim Jim'!

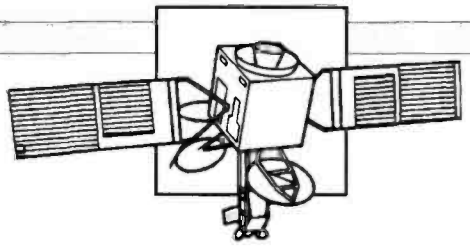
Yet a further advantage is to overcome the Doppler shift. On the first acquisition (AOS) of a near to overhead pass, U2MIR will be heard some 3.4kHz high in frequency, and when they 'set' (LOS) it will be some 3.4kHz low. Thus, at aquisition of signal you should transmit 3.4kHz LOW and listen 3.4kHz higher than the nominal f.m. channel which is fixed at the spacecraft, and thus create optimum readability of your upgoing signal. The frequency will be nominal at 'TCA', the time of closest approach of MIR, and then rapidly drop, so dictating that at 'LOS', loss of signal time, as the satellite goes to your horizon, you should transmit 3.4kHz HIGHER and listen for MIR 3.4kHz lower in frequency.

Calling

Make your calls short and sharp with clearly understood phonetics, as separation of signals is essential for Musa. If you can organise a serialised calling rota in your area, as the Californian lads did for W5LFL, then all may well be heard. If you all call at once, mutual blocking will undoubtedly prevent anyone from effecting a contact.

Tracking

John Branegan GM4IHJ, points out that MIR is an awkward beast to track even at the best of times, even when one has a smart computer and



lots of up-to-date Keplerian elements. The problem arises because atmospheric drag rapidly reduces MIR's height, requiring that it use its engines to alter its orbit at frequent intervals. Orbit height changes of 30 or 40km are frequent, and worse still for the would-be tracker is that such changes are not officially reported. Even NASA rarely catch up with them until a week or so later, and we do not normally get this report for several days, by which time, MIR's orbit timings and your computer predictions can differ by 16 minutes per day multiplied by at the least the seven day waiting period itself.

John writes, "MIR's tracking rules predict the station passing within range of the UK five times per day with about 96 minutes between each pass. An orbit one day can be followed the next day, by an orbit timed between fourteen and forty minutes later, depending on MIR's orbital height. In fact, if we know how many minutes later the space station is per day, we can work out its height and its orbit period". The table **Fig.1.** that John prepared works it all out for us.

John recommends that listeners note the time that MIR is heard passing each day, as he has done, showing shifts of 37, 41, 40, 39 and 40.5 minutes. The latter, giving a two day gap of 81 minutes, will indicate that MIR is near the top of its flight envelope. It can be expected to drag down slowly with the minutes later per day getting noticeably less each week, until suddenly it will be boosted up again to the higher plane.

MIR 'AREM' Experiment

Radio amateurs of the Austrian OEVSV national society and the USSR RSF have been working together by building the 'AREM' project, this name being an acronym for 'Amateur Radio Experiments on MIR'. The first package was scheduled for taking up and installation to MIR by the January PROGRESS supply mission. Unfortunately, this flight was missed, as a months vibration tests on the package were found to be needed to prove that it endured a bumpy ride. Negotiations are now in hand to send it to MIR either on the PROGRESS M-7 or the M-8 supply flight. It is expected that it will take several days from receipt for Musa to find the opportunity to complete the integration of the packet experiment with the existing on-board 144MHz f.m. transceiver, but it is hoped that all will be operational by late March or early April.

The AREM system augments the current voice MIR operations on 145.500/500MHz f.m. with an automatic beacon transmitter on 145.805MHz. This will broadcast information alternatively in AX.25 1200 bauds standard packet radio and synthesised voice transmissions. The transmission schedule is planned as follows:

First, it provides one minute of speech synthesiser with general information which is updated on a regular basis by the ground command station. The voice synthesiser will use delta modulation, and messages of greetings and general information will be transmitted in the English, Russian and German languages, with data content alternating with the voice transmissions. The cosmonauts may at any time tasks permit, switch off the beacon and use the microphone for the odd rest time QSO, mainly 0430 to 0545 and from 1500 to 1730UTC weekdays, and at any time between 0430 and 1800 at the weekends.

Secondly, it provides two minutes of standard packet radio transmission sending status data and the same type of general information as above. This, like DOVE, can be received by anyone with a 145.805 f.m. receiver and a TNC, as no interface is necessary.

The third and last, will appear as a transmission break of one to two minutes. When Phase-II of the AREM project starts, uplink traffic will also be possible, and the AREM station will listen for calling stations during this break. This second phase is intended to be implemented by the end of 1991, when the first Austrian cosmonaut visits MIR in November 1991. The addition is an uplink using simple BBS software, to permit two way space/earth 145MHz communications when the Austrian cosmonaut joins the spacecraft crew with two other Soviet cosmonauts for a week's operations. A lap-top computer will be connected to both the TNC, modulator and voice synthesiser, which in turn will feed the current on-board 145MHz transceiver. The TNC will use standard 1200bps f.m. a.f.s.k. with the usual AX.25, so that all earthbound amateurs will be able to receive the transmissions and transmit back with their normal packet radio station equipment. For further information about the AREM project, you are invited to write to Wolf Hoeller OE7FTJ, Amraserstrasse 19, A-6020 Innsbruck, Austria, enclosing an s.a.e. and IRCs.

Yet another improvement may be brought about by the installation of a 25W transceiver for the use of the present and the following crew, both of whom are licensed. This, with the 5/8 wavelength 'mobile whip' externally hull mounted antenna, will provide an impressive signal.

Referring to the OE/UA AREM MIR package, John Branegan GM4IHJ says, "This is a very welcome addition to the space education facilities already provided by DOVE OSCAR-17. Putting this package in MIR will result in a facility which is rather different from that provided by DOVE, because the orbits of the two space craft are quite different. DOVE is in a Polar Sun Synchronous (approximately the same time every day) orbit passing the UK ten times at 100 minute intervals between 0820 and 0100UTC approximately daily. Whilst MIR, by contrast, comes past UK six times each day, these passes being about 96 minutes apart and spread over a period of about eight hours. For the remaining 16 hours of the day MIR does not come near the UK".

"In addition, with MIR at a height of approximately 340km, (as opposed to DOVE's 800km), its times in range are shorter, and they do not occur regularly at the same time each day. Over a period of 60 days the MIR orbit window time slips 24 hours, so, if MIR orbits on a given date are say between 2300 and 0700, they will be 1900 to 0300 ten days later, 1500 to 2300 twenty days after, and 1100 to 1900 after thirty days. This situation will require careful planning of ground station activity, and, worse still, results in MIR being useful during school hours only for twenty consecutive days every two months. None-the-less, this MIR facility will be just the thing for satellite beginners and for experimenters of all age groups".

John is now busy producing a MIR handbook which will include all facets of operation, details of which will appear in our news when it's ready.

PERIOD	MEAN HEIGHT	MINS LATER PER DAY	REMARKS
90.9	323km	14.4	MIR rarely below this height
91.1	333	17.6	
91.3	343	20.8	
91.5	353	24.0	Usual SOYUZ crew change height
91.7	363	27.2	
91.9	373	30.4	Regular cruising height
92.1	383	33.6	
92.3	393	36.8	
92.5	403	40.0	Recent highest height
92.7	413	43.2	

Fig.1.

SAREX/SHUTTLE

One of the projected experiments was an all time amateur radio first space-to-space QSO between U2MIR and WA4SIR before Columbia returned to earth. The first conjunction of STS-37 with MIR, when the two spacecraft were within 96km of each other, came about before Musa had settled in, but a second chance would have evolved on the final day of the SHUTTLE mission. Hopes for this expected QSO between Musa U2MIR in MIR, and Ron Parise WA4SIR in COLUMBIA were dashed when the Shuttle orbiter was brought home a full day earlier than scheduled, due to landing strip weather constraints.

The chance is not lost, as Musa should still be crewing MIR when the STS-37 ATLANTIS mission and its entire crew of five (yes .. FIVE!) amateur radio operators who also happen to be astronauts fly in April this year, hopefully without the delays that we have seen recently. They are: Ken Cameron KB5AWP; Jay Apt N5QWL; Lynda Godwin N5RAX; Steve Nagel N5RAW and Jerry Ross who recently passed his Novice examination but has yet to receive his callsign. This SAREX mission will have an upgraded station which should include fast-scan ATV.

The bad news is that ATLANTIS will be at a similar height (243 nautical miles) and inclination (28.5°) to STS-35 COLUMBIA, and will thus also be below the UK horizon. Only the 140nm 57° STS-39 DISCOVERY planned for 26 February 1991, the 150nm 39° inclination May STS-40 COLUMBIA ESA SPACELAB and the November 1991 planned STS-48 DISCOVERY at 292nm and 57° will be 'seen' from the UK, and it is not yet known if active amateurs will be in the crew of these missions.

STOP PRESS RS-12, 13 and 14

At press time, it has just been learned that the launch of the long delayed RS-12, 13 with the Soviet replacement NAVSAT is now destined for January 20. The RS-14 RM-1 + RUDAK-2 is to follow one week later, see earlier *PW* issues for all the details of frequencies, telemetry, beacons, passbands and operational requirements of these satellites. **PW**

FOCAL POINT
The World of ATV

Andy Emmerson G8PTH takes his quarterly look at the video activity on the airwaves.

As I write these words everyone is full of anticipation for Christmas, for the festive season is about to befall us. Of course, by the time you read these words Christmas will be just a memory, but I hope a pleasant one. Down to business, anyway, with our quarterly round-up of video activity on the airwaves.

Repeater News

The Kent Television Group has sent me its first newsletter and this makes interesting reading. They certainly seem to know where they are going.

The Group has now had three formal meetings to discuss proposals for the 24cm ATV repeater project and some site testing has been carried out by G6GHP and G4AYT. The most suitable site was concluded to be Dunkirk, a few miles west of Canterbury.

Various parts of the project have been allocated to members, the receiver to G6GHP, the transmitter to G8SUY and logic to G4BBH and G4CZJ. General testing and setting up will be carried out by G8GHH. The r.f. drive unit proposed is the familiar Solent 1W transmitter. The debate continues with respect to the most suitable antennas relative to the main coverage area - that of north Kent in particular. If all continues to go well, the Group hopes to have a system on test by the time you read these words.

Andy G8SUY has agreed to be Group Spokesperson (I doubt if there's anyone bigger than Andy who wishes to argue!), so the latest on progress can be obtained from him, either by telephone or calling on 144.750MHz during evenings and weekends. Some group members also monitor 432.750MHz to avoid congestion on the 144MHz channel.

At the time of writing, the group has nine members fully paid up - the subscription for the first year being £10. This may seem a bit expensive, but it was felt that costs would be high in the early stages. Any new subscriptions should be forwarded to G4AYT, group treasurer and general dogsbody (their words, not mine!).

Another member G4GJA, has volunteered to run a group Net weekly on Thursdays at 2000 local time on 144.725MHz (possibly starting on 144.750MHz). Part of the aim of the group is to increase the use of amateur television in the area, so any television related news input to the net will be most welcome (and to this column please!).

More Microwave TV

It is reported that the 1.3GHz repeater GB3GT is off the air for maintenance and that information on its re-appearance can be had from GM0GIB. Up on X-band, GB3RV the Rugby TV repeater should be on the air by the time these words appear in print, while near Burton-on-Trent, GB3XT will be on the air as soon as the licence is received.

From the 'Wess Vinglun' came a nice letter from **Viv G1IXE** (Bristol) with a videotape showing some of the features of GB3ZZ, their 24cm TV repeater and the news that manned trials are underway on their new 10GHz repeater, which is on the same site as the 24cm one.

The group continues to grow at a fast rate, she says, and even more developments are planned for the near future. Well done and thanks for the promotional video, perhaps other groups would like to send me similar tapes (I always refund their costs).

It's nice to see so much activity in the provinces, though it has always been a source of wonder to me that so little goes on in London or in other major cities.

South Midlands

A welcome letter arrived on the very day I put fingers (both of them!) to the keyboard to write this article. It is from **Jeff G8PX** and I like his opening line.

"I know that you cannot write your column unless members send you their news, and so I thought I had better let you know what is going on in the Oxford area.

"On 70cm the Oxford net meets on Tuesday and Thursday evenings and Sunday mornings. Those to be found are G1YDI, C3CU, C3UMF, G6YTW, G8PX and G8FKY. Chris, G1YDI is a new BATC member and is putting out a good signal from his QTH which is the top of a tower block. We must talk to him about installing a 10GHz repeater!

"Moving up to 24cm, over the last few months several stations have started up on this band. In Oxford there is Alan G3UMF who is putting out a fine signal from his hill top QTH, using a varactor tripler which uses nine 1N914 diodes, soldered to a brass bolt for a heat sink. Jeff G8PX has at last got his quad Yagi on the top of his mast, and is running about two watts from a Solent-type transmitter. Terry G0CFN has nearly finished building the 24cm f.m. transmitter as shown in the *ATV Compendium*, by DJ7OO.

"In Bicester there is Bill G6NB and Mike G8EKN, who have quad Yagi antennas and about 2W output. Bill runs the DD9DUK converter and can work through the GB3TV repeater at Dunstable.

"By the way, our party to Harlaxton Manor thought it was the poorest rally to date as there was not much ATV gear on show and no ATV lectures. We know that you depend on people coming along with the gear and to give the lectures. Maybe you have moved too far north. There was too much ordinary radio gear, which you can see at any of the other rallies."

Thanks for your words of wisdom, Jeff. I'm sure the BATC committee are sorry that you were disappointed by your day out at Harlaxton. I think a lot of people were unsure about making the trip to a new venue, but it should be better this year. Of course, I enjoyed it, so I see things in a different light. Thanks too for your news, but isn't it a shame about all those ATVers with only two-letter calls. It must be something in the water there. Perhaps the local club could have a whip-round and get them some "real" three-letter callsigns!

Tyne-Tees Territory

A letter arrived from **Johnny Lawrence G0KYL**, who resides in Dipton, County Durham. He writes: "I have just obtained equipment for 70cm fast-scan television. A brief description of the equipment is that it's based on a Wood & Douglas transmitter with 1W output, a 10W linear amplifier, Microwave Modules 70cm converter, Hitachi CCTV camera and a Multibeam 48-element antenna.

"Although I now have a great interest in fast-scan TV there is very little activity in this part of the country, and it is very difficult to get information and help on how to set up and use this equipment. I have a good take-off on v.h.f./u.h.f and I have realised there are more operators around the west of Scotland on ATV. It would be great to get my system into operation in order to both transmit and receive from that part of the country. I can talk into Scotland under flat band conditions on 144MHz f.m."

It sounds as if Johnny has all the right equipment, so let's hope people can listen out for him on 144.750 and give him some TV contacts.

East Kent

And now down the coast and all the way to Thanet, from where **Roy G6OKB,** sends another of his fascinating reports on the East Kent ATV Network.

"The 70cm Monday net is still going strong. It will have been running non-stop for two years this November (really? I know how some people drone on ... don't they ever sleep? They certainly send me to sleep! Anyway, tell the *Guinness Book of Records* immediately!). Two new stations are now active on 70cm - G1OJZ Cecil, at Kingsdown (waiting for his G0 callsign) and also G4NPM Brian at Whitfield near Dover. (Why on earth is Cecil waiting for a G0 call? Don't people know that the higher the digit, the more prestige? That's why G8s are the most select band of operators, and as for us G9s, well ... (only joking!).

"Dover Amateur Radio Club had two special event stations this year at which the EK Net set up ATV demonstrations. First came the Waldershare Vintage Vehicle weekend in June, at which Brian G8ZYZ and David G0DQI set up 70cm transmitters and 24cm receivers, working duplex sound and vision. The 24cm pictures were remarked on by visitors as being very impressive. The second special event station, was at a scouting camping weekend during September. ATV was again provided by Brian and David on 70cm and 24cm.

"Finally there was a special event station run by Bedford Amateur Radio Club at the old Hawkinge airfield to commemorate the Battle of Britain, the callsign being GB50BOB. The Dover club was helping out, and Brian provided a 24cm receive ATV station. Everybody was quite impressed by the improved picture quality on 24cm.

"A visit by a hovercraft to the Goodwin Sands (a submerged 'island' in the English Channel uncovered at low tide) during the summer carried some members of the EK Net. So the following Monday was devoted to viewing some very interesting video-footage shot on that trip.

"Some of my own DX activity has been on 70cm TV, including F6IFR, Dieppe (10.3.90); F6HEA, FC1GNV and FE1HKV, all in Lille (26.8.90); and F3YX relaying FC1DL, FC1HKT and F6FZO from 24cm (11.10.90). I also heard KS8JM/AM in a balloon on 144.750 calling for pictures on 70cm (14.10.90)."

Thanks for your detailed report Roy. The callsign KS8JM is an unusual one (to me, anyway) but I am assured it is for real as I had one phone call about it. Yours is the only written report I have received, so I conclude that no-one else worked him. Whether that's a safe assumption I'm not sure. From the lack of letters I would be bound to assume slow-scan TV was now

extinct, but there may be someone out there still ploughing a lonely furrow.

Germany

The regular newsletter from our German ATV colleagues, indicates that they have been having some 'aggro' from the primary users of the 2.3GHz band. This is quite a popular band for ATV repeaters over there, but it is also used for commercial TV links. A compromise solution has been reached. From now on the repeaters will switch off for a short period every five to ten minutes and check if there is a TV signal on the output frequency. If so, they must shut down.

The difficult part is distinguishing commercial TV signals from ATV operations. One solution would be for all ATV signals to have a pilot tone, but this would interfere with sub-carrier sound. The commercial signals have no accompanying audio signal, but not all ATV signals have this facility either. The commercial TV signals straddle the whole 13cm amateur band. They are used for surveillance in industry, at nuclear reactors, and also for police and military purposes.

Of course we have similar covert users who share our 70cm and 24cm bands, but they seem to hide themselves most of the time. I note, too, that the DTI has licensed portable video and audio links at 2.440GHz for commercial purposes, and some suitable transceivers for this job have recently been launched by Optex.

Weighing just one pound, the units clip onto a camcorder and can be powered by the camera's battery. Prices start at under £10 000. No further comment, but can anyone spot a business opportunity here?

Ireland

We don't get enough letters from the 'Emerald Isle', so this one from **Craig EI3FW** in Templecarrig, County Wicklow is all the more welcome.

"Just a short note to let you know that all is well here in EI and everything is going strong. After my last letter, I got a few phone calls and now have regular TV contacts with GW3FDZ and more recently GW7BZY. Picture quality varies wildly with conditions and is anything from P1 to P4. We still haven't managed a P5 but are working on it! At present the only other station I can work is Donal EI6EV, who recently put up a new antenna and is putting a great signal out down the EI coast. He is north of Dublin and is well placed to work the northern coast of GW.

"It would be nice to stir up a bit more activity from GW, even Derek GW3FDZ can't work anyone else on your side of the water, and he has had his ATV equipment for years. We are on the bands up to three nights a week, usually around 9 o'clock and even if we aren't, a phone call (877366) will get the rigs warmed up and ready!

Craig closed with this comment, "Had hoped to make it to the convention but it will have to wait for another year."

New Zealand

The indefatigable Mike ZL1ABS, has been busy in his workshop again but he has still found time to write a couple of letters to us.

"Lately, Wayne ZL1WK and myself have got stuck into teletext video generators. He builds 'em, and I program the EPROMs. An article on programming for *CQ-TV* is underway: it will be a good follow-up to the article in the *ATV Compendium*. I've sent an EPROM of some of the designs I've made to Trevor G8CJS (nice thought, Mike!).

"Spring-time has arrived in ZL - daffodils, daisies, irises and geraniums in my garden ... and lawns to mow! But with the warmer temperature and longer daylight there has been the opportunity to go portable and test 23cm antennas. Best gain is the 48-element loop Yagi from Down East Microwave (USA), a 4m monster but easy to assemble fortunately.

"At last I have been able to have a two-way TV contact through the Auckland ATV repeater. Bruce ZL1BLB was the man at the other end. It has taken so long because of the intermittent (until a month ago) operation of the repeater, and lack of someone with 615MHz antenna to receive via the repeater. At the moment, repeater mode is standard-selective and 625 line signals open the squelch, but 525 line signals don't. The XR2201 phase lock loop must have a narrow lock range and I must ask Ian ZL1TOQ (a repeater trustee) to build a second pll for 525/60 operation to be ORed with the existing pll, as NTSC tapes from the USA have been a feature of 70cm simplex operation. These days, reception is a bit better as I chroma-convert the colour to 4.43MHz false PAL, using the Panasonic VCR I bought in London. Sound is no problem either, as I modulate the separate sound TX which is 5.5MHz up from the vision frequency."

Old Film

Finally, a plea. If anyone has any old film of ATV activity of more than 20 years ago, please let me know. The archives of ATV are pretty thin and nobody has managed to trace any film records, even though they are known to exist (or used to exist). Please drop me a line if you can help - all costs will be refunded. **PW**

COMMUNICATION CENTRE OF THE NORTH

The largest range of communications equipment available in the North.
Full range of receivers, transceivers, antennas, power supplies, meters.
Ali tubing - wall brackets - rotators - insulators.

FULL KENWOOD RANGE IN STOCK.

BUTTERNUT

HF2V 40-80M vertical	£142.00
20MRK 20M add on kit	£33.49
HF6VX 6 band vertical	£167.00
TBR160S 160M add on kit	£53.99
HF5B Triband Mini Beam	£235.00
NEW R5 5 Band Vertical	£250.00

CUSHCRAFT

A3 3 element Triband	£329.00
A4 4 element Triband	£353.00
10-3CD 3 element 10m	£115.00
15-3CD 3 element 15m	£139.75
20-3C2 3 element 20m	£238.00
AP8 8 band 25ft vertical	£181.00
AV5 5 band 25ft vertical	£123.00
R5 5 Band vertical Antenna	£259.00
15 element 2 Boomer	£98.95

ANTENNA TUNERS

Kenwood AT230	£208.00
MFJ 962B 1.5kW Tuner	£241.00
MFJ 949C 300W Versatuner	£157.00
MFJ 941D watt Basic	£105.00
MFJ 1601 Random Wire Tuner	£42.02
Kenwood AT250 Automatic Tuner	£366.00
TEN TEC "254" 200 Watt Antenna Tuner	£150.00
ET-1 300 Watt Antenna Tuner	£99.00

SCANNING RECEIVER RANGE

AR300 Base Station	£765.00
AR2002 Base Station	£487.00
AR950 Base Station	£249.00
AR900 Hand-Held	£199.00
AR800 Hand-Held	£165.00
RS37S Airband Hand Held	£69.50
ICOM R7000 Base Station	£980.00
R535 Airband Base Station	£235.00
WIN 108 Hand-Held Airband	£175.00
AR1000 Hand-Held	£249.00

SWR/POWER METERS

MFJ815 HF 2kW SWR/PWR	£57.32
SX200 1.8-200MHz	£65.00
SX400 140-525MHz	£79.00
W510 1.6-30MHz	£79.00
DIAWA CN410M 35-150MHz	£61.72
DIAWA CN460M 140-450MHz	£65.40
NS660P 1.6-150MHz + PEP	£115.00
KOYO-100 1.8-60MHz	£75.00
KOYO-200 1.8-200MHz	£60.00
KOYO-400 140-525MHz	£62.00

DUMMY LOADS

MFT300 Watt D. load	£33.50
TenTec 300 Watt Dummy Load	£33.00
L20 20 Watt Dummy Load	£22.00
HF225 GENERAL COVERAGE RECEIVER	£425.00

A FULL RANGE OF RECEIVERS FOR AIR-BAND - MARINE - SHORT WAVE - AVAILABLE

G5RV full size **£18.50** half size **£16.00**. Full range of Antenna - NEW HIGH POWER G5RV ANTENNA £32.00
Accessories plus full range of VHF - UHF - HF mobile antennas.

Full range of RSGB and ARRL pulications in stock.
Part Exchanges welcome. Sencond hand lists daily.
Send S.A.E. for details of any equipment.
HP terms. Access/Barclaycard facilities.
Open 6 days a week. 24 Hour Mail Order Service.
Goods normally despatched by return of post.
POSTAGE-CARRIAGE EXTRA AT COST.

FULL TEN-TEC RANGE NOW AVAILABLE
"Paragon", "Corsair", "Omni V"
plus all accessories

Phone 0942-676790.

STEPHENS JAMES LTD.

47 WARRINGTON ROAD, LEIGH, LANCS. WN7 3EA

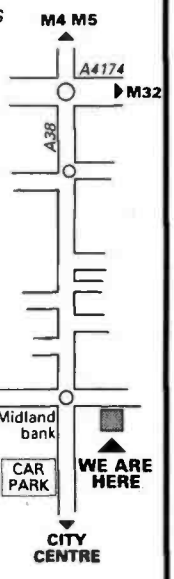
BRISTOL'S NEW RADIO SHOP

Have you heard about the NEW amateur Radio and Computing shop in Bristol. We are conveniently located for the South West of England and South Wales within a short distance of the M4/ M5 and M32.

We have displays of ICOM radio equipment, packet radio, satellite tracking and computer equipment.

So why not call in to discuss your requirements or just to pick up a bargain amoungst our general radio equipment.

Below are just a few of the items available. Send for our latest catalogue for the complete list.



JUNGHANS RUGBY MSF CLOCKS:

Black or white Digital Clock	£42.95
Analogue Mantel Clock	£63.95
Radio Controlled Wrist Watch from	£149.00

PACKET TNCs:

Tiny 2	VHF £129.00	TNC 320	VHF+HF ... £179.00
PK88	VHF+HF £129.00	KPC 2	VHF+HF ... £165.00
KPC4	Dual VHF ... £242.00	DRSI PC TNC	from .. £139.00

MULTIMODE TNC:

Kantronics KAM £285.00	LL Grace DSP-12 ..... £P.O.A.
HF+VHF Packet + Amtor + RTTY+ ASCII + CW + FAX	300/1200/2400/9600 Packet Free upgrade of Amtor/Weefax

SATELLITE TRACKING:

Kansas City Tracker PC Cards from £179.00
Full range of Azimuth and Elevation Rotators available.

AMDAT

4 NORTHVILLE ROAD
NORTHVILLE
BRISTOL BS7 0RG
(0272) 699352

CREDIT AVAILABLE
RSGB
VISA

SGC SG-230 SMARTUNER

HF ANTENNA COUPLER
SSB, AM, CW & DATA
FAST - INTELLIGENT - ACCURATE
OPERATES WITH ANY HF TRANSCEIVER

The *Smartuner* high technology coupler intelligently tunes any length antenna (8 to 80ft) in the HF band. The unit will operate with any HF transceiver within its specifications. The *Smartuner* switches 64 input and 32 output capacitance combinations plus 256 inductance combinations in a "pi" network resulting in over a half-million different ways to ensure a perfect match for the transceiver; and, *it remembers the frequency and the tuning values* and will re-select these values in less than 10 ms next time you transmit on that frequency.

SPECIAL HAM PRICE: $555.00

Includes shipping to U.K.

- MICROPROCESSOR CONTROLLED
- NON-VOLATILE MEMORY
- WATERPROOF
- B.I.T.E. INDICATOR
- 1.8 TO 30 MHz RANGE
- 10 TO 150W INPUT POWER
- 10ms RETUNING TIME
- 8 TO 80 FT ANTENNA (ALL Types)
- FOR MARINE, AVIATION, HAM AND PARA-MILITARY APPLICATIONS

Visa and Mastercard/Access Accepted

DEALER ENQUIRIES ARE WELCOME
DELIVERY FROM STOCK

SGC Inc. SGC Building, 13737 S.E. 26th St. Bellevue, WA. 98005 USA
P.O.Box 3526, 98009. Telex: 328834. Fax: (206) 746-6384 Tel: (206) 746-6310

ARE COMMUNICATIONS

THE SHOP WITH THE SMILE

Brenda G4VXL | Bernie G4AOG

WITH OUR **EVER INCREASING SALES OF SECOND-HAND EQUIPMENT** - WE ARE ALWAYS ON THE LOOKOUT FOR NEW STOCKS - SO BEFORE PARTING WITH THAT MUCH LOVED RIG, **GIVE US A RING AND WE WILL MAKE YOU AN OFFER.**

ALSO WE WILL SELL YOUR EQUIPMENT ON A **COMMISSION BASIS** - THAT WAY YOU MUST BE BETTER OFF, PHONE US AND ASK FOR DETAILS. OUR NEW FACILITIES INCLUDE CAR PARKING AT REAR AND LOTS OF FRESH COFFEE ON THE COUNTER.

REMEMBER WE GIVE GUARANTEES WITH OUR SECOND-HAND RIGS.

ARE Communications Limited, 6 Royal Parade, Hanger Lane, Ealing, London W5A 1ET. England
Tel: 081-997 4476 Fax: 081-991 2565

Opening Hours Monday-Friday 9.30-5.30
NOW OPEN SATURDAY 10.00-5.00pm
Car parking at rear of shop.

Bigger Steps Taken

The Azden PCS6000 transceiver, available from both Waters & Stanton and Maplin, has a general receive capability over the band 108-179MHz. This range is covered in two bands, 108-136, and 136-179MHz. The step rate is however 5kHz on both bands, and I felt it would be better to have a step rate of 12.5kHz on the upper band. This is achieved by the first modification.

Remove the top and bottom plates of the rig by removing the cross-head screws. Do not remove the screws nearest the speaker grille. Pull off both rotary controls and ease off the front panel.

Refer to **Fig. 1**, a minimal representation of the panel, and solder a diode (1N4148) in the position and orientation shown. To allow the transceiver to recognise the new step-rate, momentarily short out the reset contacts, located at the back right-hand side of the front panel.

Temporarily replace the panels and 'power up' the rig. On the higher receive band the step-rate should now be shown as 12.5kHz on the display.

Switchable Demodulation

Do you feel your confidence returning? How about being able to manually switch between a.m. or f.m. on any receive frequency? The on-board microprocessor, depending on the band in use, controls the r.f. amplifier, the antenna switching diodes and the i.f. mode detector. This second modification overides this last control change-over.

All that is required is to find a way of selecting which i.f. is used. To carry out this modification further dismantling is necessary. Remove top and bottom panels again, and this time take off the p.a. stage at the rear. Remove the four main screws, two either side, and pull out the three r.f. wire links and the two connection blocks.

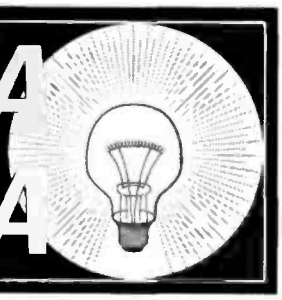
Undo all eight screws that hold the main board to the chassis. Carefully turning over this board, you should then solder a thin wire to pin 6 of the voltage regulator located at the rear of the board. The circuit diagram, supplied with the set, is useful in identifying this pin.

Refer to **Fig. 2**, and unsolder the brown wire from the indicated point on the board. This wire now has to be extended to a small on/off switch, the other side of which goes via a 47Ω resistor to the wire you've recently soldered to the regulator pin 6.

Other than finding somewhere to put this new switch, and after replacing all the boards and panels, this completes the modification.

Stephen Lovell G8XPZ
Newthorpe
Nottingham

WHAT A GOOD IDEA



Innovation Into Investment

We've always been proud of our authors and their work. Now you can join in - and win £25 - by sending circuits and projects to 'What A Good Idea'. It's the ideal solution to the advice often offered by friends who suggest that 'You should publish that!'

Circuits - accompanied by the minimum of text - must be neatly and clearly drawn in ink. Wherever possible the idea must be original, although your suggestion might be a significant improvement based on another idea. In which case you should always quote the original source. All entries will be acknowledged. Send your entry, with your name and address, to: **'What A Good Idea', Practical Wireless, Enefco House, The Quay, Poole, Dorset BH15 1PP.**

PLEASE NOTE: that we at *PW* may not have built and tested the circuit, but present it on an 'as-is' basis. We do take the greatest care in preparation of the article, but cannot be held responsible for the suitability of the original suggestion, or for any damage that may occur to property or equipment in implementing this idea.

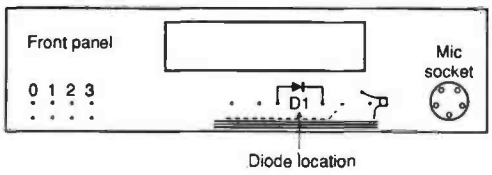


Fig. 1: This modification gives 12.5kHz step on the band 136-179MHz.

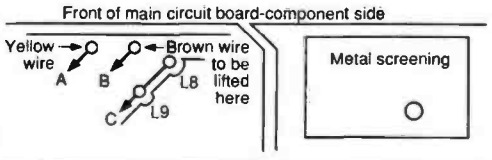


Fig. 2: The brown wire, gives user-selectable a.m./f.m., when removed and taken via a switch and resistor to the regulator output.

CW Side-tone on the Uniden 2830

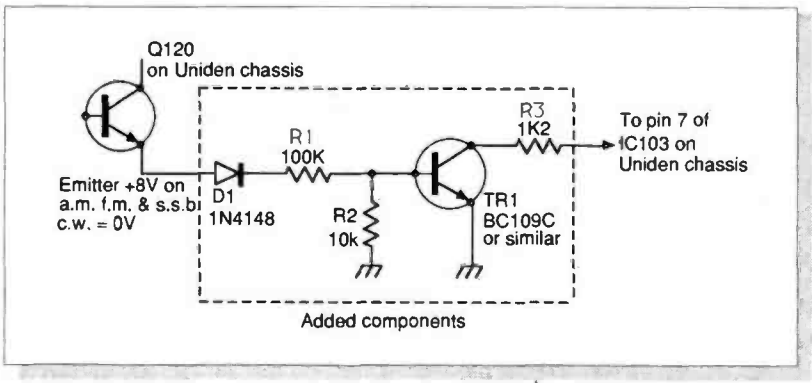
There is a Uniden 28MHz rig which bears a remarkable resemblance to many illegal c.b. rigs. This is the Uniden model 2830. It was modified to allow the in-built speaker to give side-tone on c.w. The first attempt to give side-tone, worked only partially. The resulting howl-round that happened on speech transmission, was hardly good operating practice.

Automatic

Obviously, the modification had to be enabled when using c.w., and disabled when in s.s.b. mode. This small modification does just that.

Find and identify Q120 and IC103 on the Uniden board. Look now at the small circuit of **Fig. 1**, a small addition of the circuit of D1/R1-3 and TR1 is sufficient to achieve the desired automatic change-over.

These additional components, on the original modification were mounted with very short leads, around the solder connections of IC103 on the solder side of the p.c.b.



In many months of using both modes of operation the modification has proved very reliable, and no other problems have been experienced.

Gerard Boylan
County Armagh
Northern Ireland

Fig. 1: These few components improve the c.w. capabilities of the Uniden 2830 rig.

PACKET PANORAMA

Roger Cook G3LDI, continues his review of the h.f. packet passing protocol discussion document written by Tom W3IWI containing a new protocol proposal

With the evolution of the h.f. packet network over the last five years has come a population explosion. It has become an extremely urgent matter to reorganise the frequencies in use. We must now press the case for h.f. Bandplans, especially with the approach of 1992.

The following proposal for a simple Bulletin Distribution Protocol called 'Bullpro' comes from Tom Clark, W3IWI, of 6388 Guilford Road, Clarksville, MD 21029 USA

Introduction

"This proposal is for a simple protocol for the efficient local distribution of bulletins by packet radio. One of the interesting changes that packet radio has brought to the amateur community, is the rapid national and international distribution of information for the entire amateur radio community. The introduction of the BID (Bulletin Identification Designator) by WA7MBL, and its subsequent implementation by all the major BBS software writers has made it possible for a bulletin posted in one area, to wend its way to hundreds of other PBBSs in a day or two. This capability has been used to provide wide and rapid circulation of AMSAT and ARRL bulletins, DX news, hamfest announcements as well as providing for a national 'soapbox' for individuals. This paper will not address the sociological implications of this capability. Neither will it look into the problems associated with mis-addressed bulletins, duplicates or corruptions of data due to transmission of that data.

"The intent of this contribution is to propose a more efficient distribution scheme for the local user in his local area network (LAN). Presently, the local user gets his personal copy of each bulletin by logging onto his local PBBS, then scanning the topics of interest. Then he or she must request and read particular bulletins. Other users in the area repeat the process, and a particular bulletin may be read many times. The act of fetching bulletins is left to the end user, who must log into his local BBS and manually initiate the read request for each bulletin he wants to read. Joe Kasser's (G3ZCZ/W3) Lan-link software frees the user from this manual operation by logging onto area PBBS automatically to fetch personal mail and bulletins. Other individuals set up personal PBBSs (sometimes called Personal Mailboxes) so that the material is forwarded automatically. Whether the end user reads the bulletins manually or lets his computer do the work, bulletins are transmitted repeatedly for each user. Such activity consumes a large fraction of the available Local Area Network (LAN) channel time.

Protocols

"The obvious solution to this wasteful use of LAN resources is for the bulletin to be broadcast to all users at the same time. The proposal is in essence a 'Broadcast Datagram Protocol' (BDP). Conceptually, one LAN 'superstation' sends the bulletins as unconnected packet frames (called <UI> frames or datagrams) and other stations in the LAN monitor the <UI> frames. In the AX.25 protocol <UI> frames are addressed from the originating station to a specific address (the UNPROTO address for most TNCs). Here they are CRC checked for validity. Since the proposal is that the packets are broadcast to many users, individual recipients must not acknowledge <ack> the individual datagrams. By definition, <UI> datagrams are un-numbered and have no implicit sequencing. To overcome this, any BDP must have added sequencing information to make proper reassembly of the bulletin possible. In addition, it is necessary to transmit some additional information so that the receiving station knows when the bulletin has been received in entirety.

A Specific Protocol

"In designing 'Bullpro' I had several objectives in mind. The protocol should be simple enough so that a 'minimal' (in equipment terms) user with only a TNC and line printer could make use of it. If the station user has a computer available, then he could use simple utilities he already has. For simplicity, this document assumes an IBM PC-clone running MSDOS with some 'capture-to-disk' terminal program. Utilities that could be used for this are 'Sort' and 'Find' - The 'Bullpro' protocol could easily be expanded so that 'smart' software could handle tasks, such as eliminating duplicates, automatically filing the bulletins and even requesting 'fills' of missing information.

Criteria

"To make 'Bullpro' work, the transmitted bulletins must meet the following criteria:

"A). Bulletins are line-oriented with each line terminated by a carriage return <cr> . The TNC used to send the bulletins is set up with PACLEN at least 20 greater than the longest line. The TNC operates in CONV-erse mode with <cr> used as the SENDPAC trigger to send a frame. Thus each line of text corresponds to a separate <UI> frame.

"B). Bulletins have less than 1000 lines in total. This is to include the header line of text.

"C). Bulletins are identified by a unique character string, assumed to be a standard PBBS BID. This BID is 1-12 alphanumeric characters in upper case only. Blanks and the punctuation characters '@', '<', '$', '>'. and control characters are reserved and should not be used in the BID. The string of characters making up the BID is then preceded by a '$' identifier. Consider the following N=13 line long (blank lines count too) ARRL Bulletin which was distributed with the packet BID $ARLB026 (see **Fig. 1** for the original).

On Transmission

"The bulletin distribution station using 'Bullpro' would send the bulletin by sending a beacon header with the following TNC commands:

MYCALL W3OBS-7 (as appropriate)

UNPROTO BULLTN VIA K9DOG

BEACON EVERY 60,

"Then it would identify the bulletin currently being transmitted by sending an additional line of text (Line#00) which conveys the necessary descriptive material. This is done by setting setting the broadcast bulletin BTEXT to: $ARLB026 L:00/13 SB ALL @ ARRL < W3OBS 900803 220 MHZ BRIEF FILED where at least one blank separates the fields. The L:00/13 identifies this as line zero with 13 more lines to follow (a total of 14 lines). If a bulletin is more than 100 lines long, the L: length field would be like L:000/234. The

```
QST DE W1AW
ARRL BULLETIN 26 ARLB026
FROM ARRL HEADQUARTERS
NEWINGTON CT JULY 30, 1990
TO ALL RADIO AMATEURS

ON JULY 27 THE ARRL FILED ITS LEGAL BRIEF IN THE MATTER OF THE
PROPOSED REALLOCATION OF 220 TO 222 MHZ TO PRIVATE LAND MOBILE
SERVICES, FCC PR DOCKET 89-552, WITH THE UNITED STATES COURT OF
APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT. ORAL ARGUMENTS BEFORE
THE COURT ARE SCHEDULED FOR NOVEMBER 16, 1990. THE CASE IS KNOWN AS
AMERICAN RADIO RELAY LEAGUE VERSUS FEDERAL COMMUNICATIONS COMMISSION
AND THE UNITED STATES OF AMERICA.
```

Fig. 1.

PACKET PANORAMA

additional information in Line#00 gives the user the same information he would have copied from his local PBBS, and this is adequate to re-introduce the bulletin into the packet system. The BEACON EVERY 60 time interval should be chosen so that the Line#00 identification beacon is sent several times while the bulletin is being transmitted by 'Bullpro', and could it be changed as needed.

"The W3OBS-7 bulletin server's software then meters out bulletin text at a rate of one line (one frame) every 10-20 seconds (as appropriate to local conditions) and adds sequencing information at the start of each line. The pattern of blanks in the preceeding information should match that in Line#00 so that the most elementary character-oriented sort utilities (like MSDOS SORT) can reassemble the bulletin of **Fig. 2**.

```
$ARLB026 L:01 QST DE W1AW
$ARLB026 L:02 ARRL BULLETIN 26 ARLB026
$ARLB026 L:03 FROM ARRL HEADQUARTERS
$ARLB026 L:04 NEWINGTON CT JULY 30, 1990
$ARLB026 L:05 TO ALL RADIO AMATEURS
$ARLB026 L:06
$ARLB026 L:07 ON JULY 27 THE ARRL FILED ITS LEGAL BRIEF IN THE MATTER OF THE
$ARLB026 L:08 PROPOSED REALLOCATION (etcetera)
```

Fig. 2.

Implementation

"At the user end, the minimal user can at least read the text and manually re-sequence it without ever logging onto the local PBBS. A user with a more sophisticated set-up, could leave disk capture on overnight and save everything sent by W3OBS-7. An off-the-shelf utility like MSDOS's SORT could then be used to collect all lines with the BID $RLB026 together in order, and the FIND utility could be used to extract each bulletin into a separate file.

Possible Improvements

"Assuming that bulletins are re-transmitted several times, the user would be responsible for handling duplicate lines. The next step in sophistication would be to develop software to automate this. The program should strip off the preceeding sequence information, maintain a list with the status of receipt of different BIDs, and file (under differing filenames) the bulletins based on their BID or other Line#00 criteria. If copying the 'Bullpro' broadcast bulletins proves unreliable, then an additional feature could be added. The bulletin servers could listen for <UI> datagrams which request a specific line to be re-sent. Something like: K9DOG>REQBUL:??? $ARLB026 L:05 for example.

"If a LAN has multiple 'Bullpro' servers, the user has the option of either selecting one with the MTO/MFROM or BUDLIST/LCALLS options in his TNC, or of accepting the multiple inputs and sorting out the duplicates in user's software. The latter option would require that all the servers adhere to a common BID standard. The uniform BID requirement is no more stringent than that imposed by the PBBSes to eliminate duplicates now.

Tom W3IWI.

The above proposal is, as it says only a proposal. Do you have any ideas or thoughts on the matter? The next part of W3IWI h.f. discussion document will follow in a later issue of ***PW***.

To finish this month I would like to say 'Thank you', to all that responded to the write-up in the January issue. Peter and I were inundated with requests for copies of 'Lan-Link'. You can register directly by sending a £24 payment to Terry, POB 75, Chatham, Kent. You could however, if you have a recognised credit card, telephone him on (0634) 687168.

73 and Happy Packetlng de Roger, G3LDI @ GB7LDI, QTHR or (0508) 70278, answering machine on line!

Back-Scatter

HF Bands

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

As I start to write this piece on January 7, the UK is picking up the pieces after a weekend of gales and even storms. The beam here escaped unscathed, as did the 28s.w.g. low-band wire - despite the oft-repeated statement that 'it wouldn't last five minutes' it has now survived two successive halyard failures!

Bureau Closure

I have a letter from **Terry Robinson VK3DWZ**, which states that he has been told by the Secretary of the Victorian Division of WIA that the VK3 incoming QSL Bureau has been closed and cards arriving there are being DESTROYED. Since VK3DWZ hasn't received a batch of incoming cards for some 18 months, there seems to be some case for asking why no-one from WIA had enough decency to tell the rest of the world? Perhaps someone in WIA is overdue for a suitably leaden boot applied to his backside! Or possibly, since the excuse given is that with the Aussie economy so bad, they can't afford an incoming Bureau, perhaps they hadn't the price of a surface mail stamp, or the intelligence to steam one off an envelope. So if you want to QSL a VK3 contact you must spend money on a direct QSL to save them the cost of running the Bureau!

Conditions

Mid-winter doldrums, of course, but not bad for all that - so long as you can keep the antennas up! **G3NOF** notes that he was wakened by the wind and had to get up at 0400 on Christmas Day just to wind the tower down - an omen for 1991 maybe?

The 1.8MHz Band

At the time of writing, a great deal of no-news! **G2HKU** (Minster) mentions his regular s.s.b. with ON7BW and on the key he worked Y34SE.

Our local Powys ARC have a regular evening net on Tuesdays, 1900 clock on 1932kHz±and are always ready to welcome a check-in as long as the activity lasts; usually about an hour.

A most interesting letter from **Roy Merrall** of Dunstable, who indicates that his enthusiasm was fired up by living almost under the antennas of N. Foreland Radio (GNF) for his first 15 years of life - so naturally his interests lie between 1.635 and 2.8MHz! Four one-hour sessions on Top Band produced s.s.b. from G0ICC, G0IKI, G3EES, G4PC, G3JMG, IN3ZDC with RB4ICK, UA6YE, UF6FIM, a couple of OEs whose calls were not completely copied, G3ZWL, G0CMH, G3MJN, GW4OGP, G4XVZ, G4XPO, G3AGN, G8LC, G5KC, plus c.w. from G4ENA, G4VXE, G3KKQ, G0GMS, ON7SM, HB9ZEB, I4EML, OM1DOZ, DJ7WL, DK2MR, and an assortment of other DJs, OZ, UA2, OH, RA1, etc. All were picked out with the aid and help of a good R5000 plus a quarter-wave. Roy comments sadly that his c.w. isn't what it used to be, but he still hasn't had to resort to a Morse reader!

The 3.5MHz Band

A little more here, starting with **ON7PQ** (Kortrijk). Pat has a TH3 beam, a delta loop on 7MHz, an inverted V on 3.5MHz. The latter also serves for the WARC bands, although the 'makings' for a trap dipole for the latter await completion. Pat's 3.5MHz haul included EA9IE, JA3KYC, J8/K3IPK, K6UA, N7RK, W6CCP, OY1CT, 8P9HT, J82A, PJ9A, K7EG, JK6SEW, ZD8Z, TA3D, HC8U, P40GD, J6DX, ZF2PR, VP5VAA, D44BC, HI8A, JW0AFA, 3W4DX, 8Q7AJ, UJ8JI, 4X4YM, 6W1QB, JH1RES, 3W4DZ and JE7RJS, worked at 7.28GMT by long path.

G0HGA (Stevenage) uses the W3EDP arrangement and 20W. On this band she snagged (c.w.) thirteen G3s, six G4s, a couple of G0 and G2BB in UK, plus DL0HO, DF9BC, DL0HSC, DL6TQ, DK6HN, DL1UG, W4QM/MM, PA0RDO, OK1TOP, ON4DS and OT4IM for an ON 'special' prefix.

GW0HWK (Wrexham) mentions Y29DN, SL6FRO, SM6FZD, G0ITA, G0HND, G0LKZ, G3MTQ, GW0LAL and G4XDK.

G3LPS as mentioned elsewhere, has no modern gear in the shack - but he still manages to raise the stuff. On c.w. he worked J6DX, ZD8Z, W9LT/8, EA6/OH2BCI, CN5N, LY3BA, PJ9A, RQ9W, VO1MP, TF3EJ, K7EG, W9ZR, 8P9HT, W0AIH, EA8AGD, K9FN and K0OU.

I have two letters to mention from **G0KRT** (Welling) since Eric just missed the 'bus for the previous issue. That time his QRP DTR3 rig at two watts into an end-fed antenna with counterpoise managed to hook QRP-ers G0FVS, G3INV, G3LGX, G3YHO, G3YLL, G4UNL, G4XVE, G4XUV and F1LAW. Non-QRP stations raised were GM4BAE, DL3BCD, OZ1KVF, PA0AUV, PA0CWF and seven G stations. Second time around he reports QRP-QRP with G0AEO, G0FAH, G0HSW, G3HOH. Non-QRP contacts mustered were G0OHQ, G3AZY, G3BAJ, GM0IGY, PA0BFO, PA0CWF, ON5AG and HB9TK for a new one with QRP. It will be of considerable interest to many that Eric finds that without the counterpoise, contacts are very hard to come by indeed.

Finally we come to G3NOF (Yeovil), who indicates that s.s.b. on 3.795MHz gave him KE1Y, K1JJ, VE3NUM/W3, W2FOE, W2VP, WE2K and VY2EG. All were worked between midnight and 0100Z.

The 7MHz Band

A first letter from G3LPS (Blackburn) who says he has NO modern equipment. For 32 years he has been served by an LG300 transmitter, while on the receive side, an HRO is used. The 'main' one of these is in its third rebuild and is now adorned with many modifications. The receiver is fed from an outboard crystal-controlled converter and there is a three-stage attenuator available up front. For 7MHz, a quarter-wave folded monopole is fed against some 80 radials of various lengths, squeezed into the area, through a tuner at the base of the vertical. In addition a 40m wire, sloping slightly down from 10m maximum, covers all other bands. The score on 7MHz is some 262 countries, and WAZ. All-band gives 306 countries and 5BDXCC with this station which sits in a cedarwood shed in a garden some 25 x 14m. The 'spare' transmitter is an old T1154 which has been persuaded to give a nice clean T9 signal. As to results, he logged YV5AE, TP5HA, TV6AFQ, PP1RR, CN2JL, JA4DND, TA5/HA0LC, 4X/YU3PR, P40J, ZF2PR, NN7L, EA8BWP, W6QUV, C56/G4ODV, JW0GB, SV9ADH, W7ZQ, 4X/YU4OO, 'gotaway' XW3UB and BY5RCS. 4K4QQ on Bear Is, YU3PR/4U, 3W4DK, JH6ZHV, JF1HOH, 4K4QQ a second time, VK3CP, UA0QFC, UJ8KA and Y90ANT. Another 50 stations were worked in the CQ WW CW contest.

G3NOF mentions a single contact, on s.s.b. with VE3YG. On the other hand ON7PQ who is all-c.w. found PJ2/OH6LI, KH0/JG1OUT, 9Y4H, N6TV/KH6, TA2BU, AH0/JO1CRA, PJ2/OH6DO, J8/K3IPK, ZL3GQ, NL7G, 9M6OO, C56/G4ODV, JW0AFA, 3W24DX, ZS9/W6KG, Y90ANT, JX7DFA and 3W4DZ.

GW0HWK offers SP6LBK and LZ1KVZ, while G0HGA mentions her take as being N4AR, K4FU, W3BY, NM3Y, W3UM, KQ3F, WA2SON, FG4SO, 4U1ITU, UZ9XWT and UM8MAA.

WARC

First off, G3NOF (Yeovil) who mentions, on 18MHz, A61AD and Ws, while on 24MHz there were A61AD, A92BE, EA8/DJ3OS, JA2VPO, PJ6/KV4AD, RA2FF, RC2CO, UH3E/UA9TF, UL7TC, VK6AZL, VP2V/WD0ENG, W5SAL (N. Mex), W7ZJ, ZS6AVM and 5N0HBK.

Turning to ON7PQ he logged on 10MHz, HI8A, OX3FV, FS/W2QM. On 18MHz, OY1CT, UH2E/UA9TZ, C6A/KR1S, FG5R, KL7CYL, J6LNJ, ZS9Z/1, OX3FV, VU2BGS, CR7DNP. On 24MHz C56/OH7XI, VP2VCW, C6A/KR1S, FG5R, J6LNJ, VP9MG, ZP6XDW, ZS9Z, KP2A and BY5RA.

At GW0HWK he reported 18MHz with CO2CB, F9DX, KA7AIG, HB9US, G0DYR, plus 24MHz signals to TL8WD, TK/DL7HZ, UM8MTA and EA9TL.

G2HKU only used 10MHz, and here his c.w. got over to N2DHW, K4II, J6LRR, AB4RI, ZP6XDW, W2NS, EA8AB, SM6AOU, YO3CD, W3EER, W1JIY, W1HMD and W2GW.

From M'Scala, Malta, **9H1IP** used s.s.b. to raise OD5QX, A61AD, UA2WJ on 18MHz, while on 24MHz I note that the same mode in use for KB0NL, A61AD, W0CM, W5SAL, KP4LY, K0HA, TK/DL7HZ, GU2FRO, HI8A, V51KC and PJ2MI. On a different tack, Vince notes he now has an Amiga 500 computer and is looking for a logbook programme with a decent search facility. If anyone knows of one, will they please pass the word to Vince 9H1IP, at Tikka, Mintba Street, M'Scala, Malta, as he has so far not been able to find anyone advertising a suitable one.

His old ex-WD roller-coaster from WWII has been pensioned-off in favour of a commercial a.t.u., says **G3VWC** of Bath. Andrew was hoping to expand to all bands by way of a trap dipole, but alas Murphy struck again by way of problems with the feeder! Anyway, on 18MHz, WA7ARU, XM3AT and W7EXR were all raised on the key.

The 28MHz Band

G3NOF found the band open most days from noon to N. America to closure around 1800. The short path to VK and JA has only opened a little from Africa, and only FO0IGS from the Pacific. Contacts all on s.s.b. with A61AD, CO3JA, CT3FT, FO0IGS, J6LQC, KD7MX (Oregon), KA3VJO/HZ, N7PSB, NK7U (Oregon), NT7Y (Utah), TR8GL, TG9AKE, VP5VDH, VU2MYN, W5, W6, WE0D (S. Dakota), ZF2PL/ZF8, ZS9Z (Walvis Bay), and ZS9Z (Penguin Is). Incidentally, G3NDF is now up to 321 countries confirmed after receipt of the Spratly card, leaving him still needing Clipperton for the set.

ON7PQ now; Pat names AH0/JO1CRA, KH0AM, D44BC, CN5N, ZP0Y, N3AD/VP9, FG/F6EPY, FH5EJ, PJ9A, J82A, 8P9HT, HC2G, V51Z, D68GA, 9M2AX, KG4DD, C56/G4ODV, ZS9Z/1, SV5/SM0CMH, 9L/OH7XM, FS/W2QM, XU0AA, 6Y5/W1GHY and 3W4DZ.

Next, GW0HWK; Mike worked K1QKA, N5RCO, KJ3Q, NN6R, OH3NPS, ES5MC, WB7B, KA8SUB, YV5DJP and WB2ZUB.

The key at G2HKU accounted for KY7M, WO0G, K5NA, N6TIB and K5MA on this band.

The 21MHz Band

Conditions on this band have been like those on 28MHz, save that the band has stayed open a little bit later. So G3NOF connected himself with CE2EZE, CT3EU, D44BC, HK0OEP, J39CR, JY3ZH, K5VNJ/AM over the Atlantic off Canada, K3GE/MM in the Straits of Dover, OH9SCL, SV2ASP/A (Mt Athos), UA0ACA, UH8AAQ, VE6ATT, VE4JK, VK2FKH, VK4NPM, VK4UI, VK4VUA, VK6AJW, VK6VB, WA7JZR, WB3KBZ/VP9, XE1CI, 3W4DK, 5T30MTN and 8P9EM who is G3VBL.

Now to ON7PQ who says he raised HC8U (sounds like a crystal holder!), 9M6OO, BW2EX, 6W/JA8RWV, C56/G4ODV, 9X5HG, 3D2AG, 3W4DK and 3W4DZ.

Thanks to XYL pressure in the matter of decorating - we sympathise! - GW0HWK only found time for a singleton on the band by way of 8P9EM.

G3LPS made one of his rare forays onto the band to pick up XE2MX H71A and V51Z and FS/W2QM on c.w.

Now to G3VWC (Bath) who is another key-addict, and he used the method to hook NF0S, VE7CV and W4YSK.

The 14MHz Band

The s.s.b. crop from G3NOF this time includes A41KR, A92C, C53GB, EP2HZ, HB0LL, KL7GU, TA1AR, TA3G, TU2PA, VKs, YB5QZ, YK1AA, Z22JE, 3B8CF, 4K2/UV3CC, 5H3DC, 5V7SA, 7Q7RM and 8P9EM.

It was all c.w. at ON7PQ. Pat managed V51Z, 5W1RA, 6W/JA8RWU, ZS9/W6KG, 3D2WM, Y88POL, ZS9Z/1 and 4K4WS.

At GW0HWK the routine seems to have been: W8JVF, K1YKQ, GI0EZS, K7RMT and EA2CR.

G3LPS tried out his restored T1154N on the band and raised FS/W2QM (QSL to W2QM).

Also on 14MHz, G2HKU used his c.w. to raise EA8QO, while s.s.b. was the mode for ZL3FV.

Finally, G3VWC; Andrew found WD4LGE, PT2DMS, PY2DW, and K6AA.

Contests

The ARRL DX CW is over the weekend February 16/17, and the ARRL DX SSB Contest March 2/3. The Rules were in QST for December, but essentially we should give the W/VEs RS(T) plus a three digit number indicating power input. Three QSO points for each W/VE worked. The W/VE gang use the DXCC list for multipliers, we take the sum of the States worked, plus the District of Columbia plus the VE Districts 1-8, plus VY1 and VO1. Final score is sum of total QSO points times the multiplier.

Looking a little further ahead I note the Bermuda Contest is on March 16/17, and of course the CQ WW WPX Contests. The CQ WW WPX SSB on March 30/31 and the CQ WW WPX CW on May 25/26.

SURELY THERE'S MORE 1.8MHz ACTIVITY THAN WE HEAR ABOUT?
COME ON 'TOP BANDERS', GET WRITING!

Back-Scatter

VHF Up

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

Solar Data for December 1990

The end of November saw the more active side of the sun coming into view. The most significant event was a major class flare which erupted on November 26 causing subsequent auroral storming during a burst of magnetic activity on November 27. The geomagnetic A index levels were very unsettled on November 27/28 with 29 units being recorded but then dropped rapidly, being only 3 units on December 2. Minor flares occurred on December 5 and 9, followed by a major class flare on December 10. The period from December 11 through to the 31st saw little solar activity as the quiet side of the sun was in view. There were a number of mainly insignificant flares between December 22-26. One major energetic event occurred at 2246UTC on December 22, lasting for 59 minutes.

Readers interested in propagation studies may be interested to know that the Radiocommunications Agency has issued the RSGB with a fixed-service broadcasting licence GAM1, to enable hourly transmissions of URSIgram messages to be made in Morse code and RTTY. The broadcasts will be on 3812.3kHz, just h.f. of the 3.5MHz amateur band. Marconi Communications Ltd., have given a 1kW h.f. transmitter, ICS Electronics Ltd., have donated a multi-mode terminal node controller, the Schneider Computer Company have provided a computer and the Rutherford Appleton Laboratory are supplying the URSIgram data.

The 50MHz Band

Although openings were not as prolific as those enjoyed during December 1989, the band was still in good shape allowing contacts to be made into a number of continents. It is interesting to note the seasonal shift in propagation during November, from the far east path to that of the Africa circuit. Openings into this continent during December became more frequent. The east-west path also continued to provide some excellent DX, propagation shifting towards South America by the end of December.

The growth of countries being allowed access to the band continues. The Moroccan authorities have recently approved the use of the 50MHz band by CN stations. Negotiations are still in progress in Cyprus (5B4) and Spain. Despite some rumours seen circulating on the packet network, the UK does not as yet have permission to use vertical polarisation and mobile operation on 50MHz. Do not act on rumour - your licence could be at risk!

DJ3TF sent in a report, via packet radio, of activity during the last quarter of 1990. Using an FT690 Mk2 and 10W into a 4-element Yagi, contacts were made with 3X1SG (IK51) on October 26 and VK6JQ (PH12) on October 27. This latter station completing his WAC. Kosie V51E (JG89) was worked at 1408UTC on November 4, but the best day of the month was on the 11th, with KG6UH/DU1 and KE9A/DU3 being worked around 0945UTC, followed by an opening into the USA from 1200-1400UTC.

The UK-Africa circuit provided some interesting jewels of DX during December. On the 1st, at 1248UTC, **Richard Lax G4AHN** (SRY) worked TU2MA in the Ivory Coast. On the following day, at 0952UTC, **Geoff Brown GJ4ICD** (JER) worked TU2EW (IJ75) and CN2JP. Geoff reports that the contact into Morocco was via some form of scatter propagation. **Chris Tran GM3WOJ** found 6W1QC (IK14), in Senegal, at 1110UTC and heard the 9L1US beacon. Stations on the south coast were working CN2JP, TU2MA, TU2OJ (IJ73) and 6W1QC, from 0950UTC on December 3 with the Sierra Leone beacon heard peaking 579. DJ3TF also managed to work into Africa on this day, contacting TU2OJ and 6W1QC, both on c.w. from 0930UTC. GJ4ICD was the only station to report anything out of Africa on the 4th, with CN2JP being worked via meteor scatter at 1000UTC. At 1153UTC, TR8CA reported hearing the Buxton beacon GB3BUX. The best of the propagation on this day was to central America, but more of that later. Joel CN2JP continued to be heard, in southern England, on the 5th, 6th and 7th. On December 6, he had a good opening into North America, as did many stations in the UK. This was his last major 50MHz opening, as he packed up the station on December 7 for his flight back to the USA. During his stay in Morocco, Joel only managed to work a handful of UK stations but he did leave his TS680S and dipole behind for use by Tarik Skiredj CN2ST. The five active north African stations, TU2EW, TU2OJ, TU2MA, 6W1QC and 9L1US

70MHz BAND PLAN - TO BE IMPLEMENTED ON MARCH 1 1991

70MHz BAND PLAN		USEAGE
70.000	70.000	GB3BUX
BCNS		GB3ANG GB3CTC GB3REB
70.030	70.030	PERSONAL BEACONS
SSB & CW	70.112	5B4CY (KM64PR)
	70.120	ZB2VHF (IM76HE)
	70.130	EI4RF (IO63SN)
	70.150	M.S. CALLING
	70.185	CROSSBAND CALLING
	70.200	SSB & CW CALLING
70.250		
ALL MODES	70.260	AM & FM CALLING
70.300	70.300+/-	RTTY/FAX WORKING
CHANNELISED	70.3125	PACKET RADIO
	70.3250	PACKET RADIO
	70.3375	
	70.3500	
	70.3625	
	70.3750	
	70.3875	
	70.4000	
	70.4125	
	70.4250	
	70.4375	
	70.4500	FM CALLING
	70.4625	
	70.4750	
	70.4875	PACKET LINKING
70.500	70.5000	

NOTES:
[1] 70.350, 70.375 & 70.400MHz are sometimes used by RAYNET

[2] 70.125-70.450MHz is allocated in the Republic of Ireland

Fig. 1. 70MHz Band Plan

Back-Scatter

continued to be worked by UK stations during the month, the best days being the 8th, 16th and 18th. On that latter day, **Paul Simons G4CCZ** (SRY) managed to find 3X1SG, in Guinea, working him on s.s.b. at 1059UTC. CN8ST (IM63) had his first European opening on December 15, working about 30 UK stations, situated mainly on the south coast. By December 21, Tarik had worked 11 countries on 50MHz.

It is worth while looking to the south, during February/March, at the appropriate times, as that path should still be open. Keep an 'ear out' for F1JKK who will be active from Chad (TT8) from February through to May with 70W and a 5-element Yagi. Another station, 6W1BL is active from Senegal, having received his 50MHz permit on November 7. He has already worked a number of stations in Europe. **Hal Lund ZS6WB** has written in with a long letter giving details of 50MHz activity in southern Africa. He reports that propagation will pick up slowly during February and by the end of the month expects daily openings to the Mediterranean plus a few to F, G and PA. March should bring more of these plus a few to LA, OH, OZ and SM. Hal has upgraded his station during the past year and is now using an Icom 575A driving either a TE Systems 0510G, which puts out about 170W, or a Creative Electronics CE-1000-3A, using a 3CX800A7, which produces 400W output for 10W of drive. He recently put up an M2 6M-2.5WL antenna, 11 elements on a 16m boom at 20m above the ground. Hal is very interested in obtaining European awards such as WAB, PACC (100 Dutch QSLs) and WAIP (Worked All Italian Provinces) and encourages UK stations to include information such as locator, WAB square, county, etc., on the QSL card. As openings between South Africa and the UK are short, he will try to work as many stations as possible but does ask those operators that he has worked before to give the weaker stations a chance of a QSO.

Everyone likes to work across the 'pond' and F2 conditions during December allowed many to do just that. December 4 was a good day with G3OIL hearing the FY7THF beacon at 1140UTC. This was followed by an opening into Costa Rica and Ecuador with **Steve Damon G8PYP** (DOR) working, between 1327-1331UTC, TI2HL, TI2KD and TI2NA, all in EJ79, and **Ted Collins G4UPS** (DVN) hearing HC2FG and the Galapagos beacon HC8SIX. He went on to work WA1OUB and, from 1406UTC, K4SC (EL98) and W4OO (EL96). The transatlantic path was also very good during the period December 5-9. Stations worked from the UK included the normally expected VE1, VE2, VE3, VO, W1, W2 and W3 but the skip also allowed contacts to be made with stations located in W4, W5 and W8. **Eric Parvin G2ADR** caught HC5K on the 5th and GJ4ICD managed to work over 60 North American stations on the 7th, including KP2A on the Virgin Islands. He also reports hearing the HC8SIX beacon on 50.082MHz. One of the stations putting in a 'rock crushing' signal during the F2 openings was Mike Dunn VE1XDX. He was only licensed on November 5, but within two weeks had worked 20 DXCC countries with an IC551 giving 10W into a 4-element Yagi at 25m. On December 2, Mike received his TE Systems 170W amplifier and is now using it on the band to great effect. His location in Nova Scotia (FN84) gives him an excellent shot into Europe. **Bob Mobile WA1OUB** (FN43) reports that he worked his 100th country on November 11 when four DL stations went in the logbook. In comparing the November 1989 conditions against November 1990, there has been quite a difference. In 1989, Bob made 460 F2 QSOs in 35 countries whereas in 1990 he only made 145 F2 QSOs in 23 countries. Openings to the North American continent continued to occur on an almost daily basis, although none of them were particularly outstanding. Towards the end of December, the French Guiana beacon FY7THF, on 50.039MHz, became audible on a number of consecutive mornings. It was particularly strong on December 27, peaking 599, at the QTH of G4AHN. Between 1215-1230UTC, a number of UK stations were fortunate to work into Surinam, getting PX1EJ, PZ1AP and PZ1EL in the log. Quite a nice way to finish off the 1990 DX season.

Fig. 2. Steve GW6TGX operating GB0LCS with Zoe Powell, 1st Lairg Guides, logging observed by Clive GW4VVX.

It is still worthwhile beaming westwards for the next few weeks during the midday peak. You may be lucky to hear Bill Wiseman KM1E operating from Green Turtle Cay, one of the Bahama Islands. He will be there until March 8 using the callsign C6A/KM1E from locator FL16. Bill will be using a TS680S, 65W amplifier and a 4-element Yagi.

During December, there was an increase in Sporadic-E activity and a number of meteor showers, the Geminids on the 12th and the Ursids on the 21st, all of which helped to keep interest going on the band. G4UPS worked a number of stations, between 2218-2318UTC on December 13, including DK2PR, I4BXN, LA3EQ, LX1JX, OZ1BCG, OZ1BWZ, OZ1ELF, OZ3ZW and SM7AED. Ted also found an early morning Sp-E opening to Scandinavia on December 15. From 0850UTC he worked 7 OZs and 5 SMs, propagation then swinging around to enable s.s.b. contacts to be made with DF9CY, I2OKW, IK2AEQ, IK2GSO and I4XCC. Steve G8PYP arranged a m.s. schedule, on December 24, with DK1PZ (JO41), completing the QSO in 25 minutes.

Annual c.w. ladder

	Band (MHz)				
Station	50	70	144	430	Points
G4ASR	69	31	257	—	357
GD0ELY	13		237	—	250
G4OUT		48	192	—	240
G4NZU	18	5	159		182
GM4CXP	11	7	89	—	107
G0FYD	31		62	1	94
G0DJA	17		10		27
GW4VVX	3		9	—	12

Number of different stations worked since 1 January 1990

The 70MHz Band

In the September 1990 issue of *PW*, I introduced the proposed 70MHz band plan that was to be implemented on 1 March 1991. Following further feedback, the opportunity was taken to modify the plan to its final version shown in **Fig. 1**. Features of the new plan include a reduction of the beacon zone of 45kHz, an increase in bandwidth of the narrow band section (c.w./s.s.b.) by 35kHz and an increase to the all mode/f.m. simplex section of 10kHz. New calling frequencies for meteor scatter and crossband working have been added, and 12.5kHz channel spacing above 70.300MHz has been introduced. This channelisation is intended for more than just f.m. operation, as there is already a fair amount of a.m. activity in a number of areas. By popular request, 70.260MHz is being retained. During 1991, the UK beacons will move down to their new allocations. Details of this will be discussed at an RSGB VHF Committee meeting in early February, and the new frequencies will be notified in the May issue of *PW*.

From January 29 to February 25, I will be airing the 70MHz promotional callsign GB4MTR. You may be able to hear me using it on any band from 1.8MHz upwards, but I certainly will be active with it during the 70MHz cumulative contest on February 24.

The 144MHz Band

The lack of any decent tropo, the scarcity of auroral propagation and the recent gales, all conspired to make conditions during December abysmally poor. Will it improve? At least we can look forward to the possibility of some auroral openings between February and April, followed by Sporadic-E during the period May to July.

Derrick Dance GM4CXP (BDS) sums up the recent conditions by reporting "nothing to report, still no auroras...It's enough to drive a GM to drink!" He did mention my comments, in the January issue of *PW*, regarding local versus DX c.w. contacts. Derrick confirms that he doesn't have many locals to QSO with, hence the use of c.w. being mainly to work DX. He endorses my view that the number of c.w. contacts is linked directly to the number and intensity of auroral openings, especially if you live in the far flung north.

At my QTH the only period of activity was during the Fixed Station contest on December 2. A painfully slow average of 45 contacts an hour produced a total of 360 QSOs. This may seem quite good to some, but to put it into context, Andy Cook G4PIQ (ESX) had amassed just under 500 QSOs, two hours before the end of the contest! Conditions at my QTH were not spectacular, brief openings, every hour or so, lasting five minutes at a time, gave propagation into central Germany. Despite the conditions, 32 contacts over 500kms were made, including DH1KBB in JO20, DA1UM, DC6SN, DG3KBY, DG3KCL, DK5WO, DL2KBB, DL2OM DL0WAD, all in JO30, DC6LV in JO31, DC6BX in JO32 and DF8AE, DF9YT and DL5BBL, all in JO42, these three being at a distance of just under 800km.

Annual v.h.f./u.h.f. table
January to December 1990

Station	50MHz Counties	70MHz Countries	144MHz Counties	144MHz Countries	430MHz Counties	430MHz Countries	1296MHz Counties	1296MHz Countries	Points
G1SWH	50	34	54	7	88	20	54	11	16	5	339
G6HKM	53	41			65	23	34	13	28	11	268
G0IMG	52	33	44	4	52	13	32	4	—	—	234
G4ASR	27	36	59	8	55	31					216
GD4XTT	36	20			75	20	18	9	1	1	180
G4LDR	27	19			63	14	41	7			171
G8PYP	30	35	2	1	53	19	21	6			167
G6MXL	14	22	26	5	41	9	24	8	13	4	166
G8ESB	9	5	18	3	60	8	37	5	15	4	164
G0NFH	40	20	21	3	48	9	11	2	2	2	158
G0FYD	20	24	1	1	75	20	11	4			156
GW4HBK	2	12	52	7			29	4			106
G0EVT	21	23			36	14	5	1			100
GM4CXP	9	6	7	3	54	13			—	—	92
G4ZTR	—	—	—	—	59	19	—	—	—	—	78
GW1MVL	2	2			43	10	11	2	—	—	70
G7CLY	—	—	—	—	60	9	—	—	—	—	69
G4SEU			62	6	—	—	—	—	—	—	68
GW7EVG			—	—	37	6	—	—	—	—	43
G7CFK	18	12									30
GM1ZVJ	1	9			2	1					13

Back-Scatter

Ralph Sachs G2CZS (ESX) spent a limited time in the contest, working 64 stations but hearing nothing further than GOFOS (YSN), G4ASR (HWR) and G4SSD (DVN). Propagation was better at the end of November with DB8KJ (JO30) being worked on the 25th and GI4SAM (ATM) getting in the log on the 30th. On December 1, Ralph heard another station working EA1DKV (IO53) but could not initially hear the EA station. Suddenly his signal was heard, peaking S7, for about 10 seconds, presumably via meteor reflection, and Ralph was able to copy the EA giving his locator.

Steve Damon G8PYP tried to make the most of the conditions during December, by concentrating on meteor scatter. Two s.s.b. schedules were arranged for the Geminids shower, SP6BTI (JO81) on the 11th and FC1ODA (JN13) on the 12th. Reflections were very short with the occasional good burst but not long enough to complete either QSO. On December 12 and 14, IK1MTZ was heard, but although called and acknowledged, no complete QSO resulted.

Clive O'Hennessy GW4VVX reports on his annual trip to the Highland region of Scotland. Every August, he operates from Lairg (IO78) using the callsign GB2XS and also from the Lairg Crofters Show using the call sign GB0LCS. Normally, Clive is accompanied by Steve Jones GW6TGX, but on this occasion he was unable to go. As the expedition has always coincided with the Perseids meteor shower some operation via m.s. has always taken place. In past years the modus operandi has consisted of listening on the random s.s.b. calling frequency waiting for something to happen. In 1990, Steve decided to take some schedules on the v.h.f. net on 14.345MHz. After the first call he was afraid to use the GB2XS callsign as he had the most horrendous pile ups of DXers wanting the IO78 locator. Unable to say no, he took 30 s.s.b skeds for the period August 12-13. Of these, 26 were complete QSOs, working in the process, 17 countries and 20 locator squares, the best DX being YT2C (JN85). All contacts were worked within the sked period, the longest taking 26 minutes, the shortest three minutes. During one long burst, three stations were worked, one after the other, on the random calling frequency. Not bad for a small portable system consisting of 150W and a 9-element Yagi! Clive was also fortunate to catch a number of auroral openings to give him a total of 50 locator squares. Anyone who still requires IO78, should note that GB2XS will be activated between August 10-24.

In a previous trip to Lairg, a local Girl Guide, Zoe Powell, helped to set up the special event station as part of her Radio Communications badge. As shown in **Fig. 2**. Using the GB licence provisions, Clive was able to get Zoe to exchange greetings with several stations in the UK. She was successful in completing all the requirements for her badge and Charlie GM7ASN, resident in IO78, was later invited down to the 1st Lairg Girl Guide HQ to present Zoe with her badge.

The Microwave Bands

Doug Nasey GW3ATM was out portable on December 2 from the popular microwave location, Mynydd Maen (GWT). On 10GHz wideband he worked G4MAP/P and G8AYY/P, both at around 106km. Using n.b.f.m. Doug also worked G3FYX (AVN) and G3VKV (GLR), the latter station having to 'bounce' his signals off a tower on a local hill to make contact over the 90km path.

The *Microwave Newsletter*, edited by G3PHO and G8AGN, reported on a talk given by Chris Whitmarsh G0FDZ at a recent microwave meeting in Crawley, Sussex. Chris demonstrated his optical wavelength transmitter/receiver system. The transmit side consists of a 2mW Helium Neon laser, obtainable from Maplin Electronics. The beam is tone modulated by a slotted disc, rotated by a small electric motor and keyed by an obstructing flap. The receive side uses an 80cm lens, optical filter and PIN photodiode detector. The good news is that all the main components are readily available in the UK, although some sources are asking very high prices, especially for lenses. The equipment was demonstrated over a 4km path, the laser transmitter producing a 'spot' 8m in diameter. This may sound a lot, but a very substantial tripod and precision pan-and-tilt mechanism is essential. Chris emphasises the importance of not looking into the laser beam, either directly or by reflection from windows, VDU screens, etc.

VHF News

Congratulations to **Dale Harvey G3XBY,** who is getting married on March 23. Looks like Barbi has got the situation well under control, by arranging the happy event to take place on the same weekend as the RSGB VHF Convention!

The West German v.h.f. DX Group have issued a v.h.f. beacon diploma, in order to support the monitoring of the peculiarities of wave propagation. During any one calendar year, a number of 144MHz beacons have to be monitored from one location. Particulars of the reception of the beacon via different propagation modes, such as tropo, aurora, Sp-E, have to be noted. The reception log must contain the following details; date, time, frequency, transmitted text of the beacon and text repeat time. Disturbances to the reception caused by atmospheric interference or other transmitters should be noted. There are three grades of diploma, level 3 for 10 different beacons, level 2 for 15 beacons in 10 countries and level 1 for 20 beacons in 15 countries. The group also provides information on all questions concerning v.h.f. operations. Information leaflets on 144MHz DX operations as well as meteor scatter, aurora, Sporadic-E, expeditions, beacon lists, etc., are available. If you require this information or further details of the diploma award, please send sufficient IRCs for return postage to VHF-DX-Group DL-West, Eckart Moltrecht DJ4UF, Raafstr.36, D-5100, Aachen, Federal Republic of Germany.

Beacon and Repeater News

If you've been wondering why you haven't heard the EI4RF beacon for some time, the answer is that it was struck by lightning late last year and is being rebuilt. It will appear back on 70.130MHz as soon as possible.

The Inverness v.h.f. repeater GB3BI is now on the air again following a system overhaul. Work on the antenna system has been delayed by the bad weather but it is hoped this will take place in the Spring.

The packet radio and voice repeaters in Swindon, GB3TA and GB3TD, are both off the air as the site is no longer available. It is hoped that a new site will be found so that these repeaters will be back on as soon as possible.

The Secretary of the Sussex Repeater Group G0GNV, would appreciate reports of the re-sited u.h.f. repeater GB3HO.

QRZ Contest!

Scandinavian activity contests will be held on the following dates. On the 50MHz band activity will be on February 26 and March 26, 144MHz on March 5, 430MHz on March 12 and Microwaves on February 19 and March 19. Send me a stamped addressed envelope for the full set of rules.

The last of a series of five 70MHz cumulative contests will be held on February 24, March 10 and the 24th, between 0900-1100UTC. Locator, QTH, report and serial number must be exchanged.

A dual band, 144/430MHz contest, will be held between 1400-1400UTC on March 2-3. There are sections for single, multi-operator or listeners, portable or fixed stations and high or low power.

The Derby and District Amateur Radio Society will be holding their annual 144MHz contest on Sunday March 10 from 1300-1700UTC. Details were given in the February issue of *PW*.

The German c.w. contest, AGCW-DL, will be held on 430MHz from 1900-2300UTC on Saturday March 16. The contest exchange consists of the report, serial number, power section and locator. The power sections are; A = less then 3.5W, B = less than 25W, C = more than 25W.

The BATC are holding their Spring Vision ATV contest from 1800UTC on March 9 to 1200UTC on March 10. The event is for fast scan t.v. and will be held on all bands from 430MHz upwards.

The RSGB microwave cumulative contests, for all bands from 3.4GHz upwards, will be held on February 24 and March 31, between 0900-2100UTC. Although the aim is to encourage home station operation, especially on 10GHz narrowband, it does not prevent you from operating from the hills with your wideband gear.

Freddy ON6UG, has provided some details of a microwave activity week being organised by the Danish Society EDR. The event is planned to run between June 15-22 and is intended to promote narrowband activity on the 10GHz band. Further information will appear in this column nearer the date, or if you belong to the EDR, you will find it in the May edition of *OZ*, the Danish Society's magazine.

Tables

You may have noticed the non-appearance of the QTH locator squares table and the 144MHz QRB table in recent issues. The editor has decided that these should only appear in the column twice a year. The advantage is that I get even more space to tell you what really happened on the v.h.f. bands! Those of you that want to see how the competition is shaping up can obtain the latest listing from the *PW* offices by sending an S.A.E. So, please keep those results rolling in. The annual 5 Band table and C.W. Ladder will still be featured each month. To kick these two tables off for 1991, I require details of your scores just after the end of February.

Deadlines

Please send your letters to reach me by the end of the month. I normally write up the column in the first few days of the following month. Don't forget that I can also receive messages via packet radio at my mailbox GB7TCM.

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

QSL Information

C6A/KM1E: P.O.Box120, Woolwich, ME 04579, USA.

CN8ST: 83 Avenue Okbah, Apt 1, Rabat, Agdal, Morocco.

VE1XDX: POB 64, RR #2, Head of Chezzetcook, Canada, B0J 1N0.

VO1NE: POB 1055, Marystown, Newfoundland, Canada, A0E 2M0.

VO1WA: POB 652, Marystown, Newfoundland, Canada, A0E 2M0.

WA1OUB: 33 Kimball Hill Road, Hillsboro, New Hampshire 03244.

6W1BL: P.O. Box 4002, Dakar, Senegal.

6W1QC: QSL via JA8KJH.

Back-Scatter

Broadcast Round-up

Reports to Peter Shore via the *PW* Editorial Office

With the international community in turmoil, the world on the brink of war and civil unrest in the Soviet Union, short wave broadcasting is once again proving invaluable in keeping in touch with what's going on in the world. A new English language service has been started by Latvian Radio's overseas service, called Radio Riga International. This seems to be one way that the beleaguered independence-seeking Baltic state can get news outside the country, without interference from the Kremlin, for the transmitter used is actually in Riga. Full details later in the column.

As would be expected, much rhetoric has been issuing forth from the studios of Radio Baghdad, and the Voice of the Masses from the Iraqi capital is now regularly heard on transmitters in Kuwait. There has been some expansion of the domestic services of neighbouring Saudi Arabia, with the Arabic service now on the air twenty-four hours a day from the early part of January. Radio Kuwait has started transmitting in Arabic from Egypt on transmitters used by Egyptian domestic programmes. The successful *Gulf Link* programme launched by the BBC World Service to keep hostages in Iraq and people in hiding in Kuwait in touch with families and friends in the UK was dropped in December after the last detainees returned. Many of those returning said that it was a great morale booster, and they would even miss meals just to tune in.

In other areas, Radio France has restated its aim to increase the number of transmitters it uses around the world. The ageing 100kW senders in Allouis are to be replaced by 500kW transmitters, and additional airtime is to be bought from Africa Number 1 in Gabon. The relay site in Montsinery is to receive an extra 500kW transmitter, bringing the total to five in French Guiana. In addition, RFI is examining the possibility of constructing new facilities in Thailand and Jibuti in Africa. Financial approval for the expansion has already been granted.

The leading story in this column last month concerned Radio Canada International which was threatened with imminent closure, as a result of budget cuts forced on parent organisation the Canadian Broadcasting Corporation. Unlike the BBC World Service, CBC has not in the past been obliged to operate an overseas service, and funded RCI from its own income. An amendment has been made to the government sponsored Broadcasting Act requiring CBC to have an international service. Sources of funding are still being sought, but speculation includes the Departments of External Affairs, Communications or National Defence as well as, believe it or not, the Canadian Tourist Board.

A relay agreement was signed by perhaps the most unlikely of partners, Radio Moscow and Radio Beijing. There is an exchange of five hours daily between the two stations. This enables Radio Moscow to improve audibility in the Far East, and Radio Beijing to offer better reception in Europe and the Middle East. Meanwhile, Radio Moscow is understood to be offering other broadcasters, including the BBC, surplus hours on its vast transmission network. Some of the surplus arises from the trimming of international services, including the dropping of all regional English programmes. No more are separate transmissions for Great Britain and Ireland, North America and Africa, which in the past ran in parallel with Moscow's 'World Service' in English. Instead, the station incorporates features specifically for the three areas in its mainstream 'World Service'. Since the Spring of 1990, the overall output of Radio Moscow in all its services has been cut by more than one-fifth with a number of language services disbanded or cut back.

Another station changing dramatically is Radio Tirana from Albania. For years the station has been one of the most peculiar in the world, broadcasting an endless stream of Marxist-Leninist ideology, interspersed with some of the most parochial news ever heard. In a New Year message from the station's Director, it was announced that in future the station will try to reflect more closely what is happening in the closed Balkan state - clearly a result of the unrest which affected the country late last year. In addition, some of the output will be cut, although companies interested in advertising on Radio Tirana were encouraged to contact the station.

European Stations
All times UTC(=GMT)

The Voice of Greece has transmissions in the English language included in its schedule:

0000-0350 on 11.645, 9.42 & 9.395MHz [English c 0130 and 0340]

0800-0850 on 17.535 & 15.65MHz [English c 0840]

1000-1050 as 0800 [English c 1040]

1200-1250 on 17.535, 15.65 & 15.625MHz [English c 1235]

1500-1550 on 17.535, 15.65 & 11.645MHz [English c 1530]

1800-1850 on 15.65, 12.105 & 11.645MHz [English c 1840]

1900-1950 on 9.395 & 7.43MHz [English c 1920]

2200-2300 on 12.105 & 9.425MHz [English c 2245]

Some transmitters are not heard on Tuesdays, presumably for maintenance work during the daytime period.

Radio Budapest's English language transmissions to Europe are heard:

1900 on 11.91, 9.835, 9.585, 9.52, 7.22 and 6.11MHz (Tues only)

1930 as for 1900 (daily)

2100 as for 1900 (daily)

The DX programme is transmitted:

0230-0245 on 15.16, 11.91, 9.835, 9.585, 9.52 & 6.11MHz (to Asia on Tuesday, Wednesday, Friday and Saturday only)

1000-1015 on 15.22, 15.16, 11.925, 9.835, 9.585 & 6.11MHz (to Asia on Monday to Friday only)

1030-1045 as for 1000, also to Asia Monday to Friday

1045-1100 as for 1000 (to Europe, Sunday only)

1130-1145 as for 1000 (to Europe, Saturday only)

1615-1630 as for 1000 (to Europe, Monday and Thursday only)

Latvian Radio has introduced an English language service, which has been heard calling itself Radio Riga International. It has been noted on the Riga transmitter which uses 5.935MHz at 1830 on Saturday and 0700 on Sunday.

Radio Romania International has English for a European audience:

1300-1400 on 21.665, 17.72, 15.365 & 11.94MHz

1930-2030 on 9.69, 7.195 & 5.99MHz

2100-2130 on 9.69, 7.195, 7.105, 6.105, 5.99MHz

Following the absorption of Radio Moscow's regional English services into the World Service in English, you may care to try finding out what has happened to the frequencies used until the end of December for the various services. At 2000 the separate service for Great Britain and Ireland had been traced to:

9.72, 9.685, 7.17, 6.175, 6.03 & 1.143MHz

Meanwhile, Moscow to Africa at the same time used:

17.57, 15.47, 12.03, 12.02, 11.775, 11.745, 9.83, 9.82, 9.62, 9.53 & 9.515MHz

The mainstream World Service used:

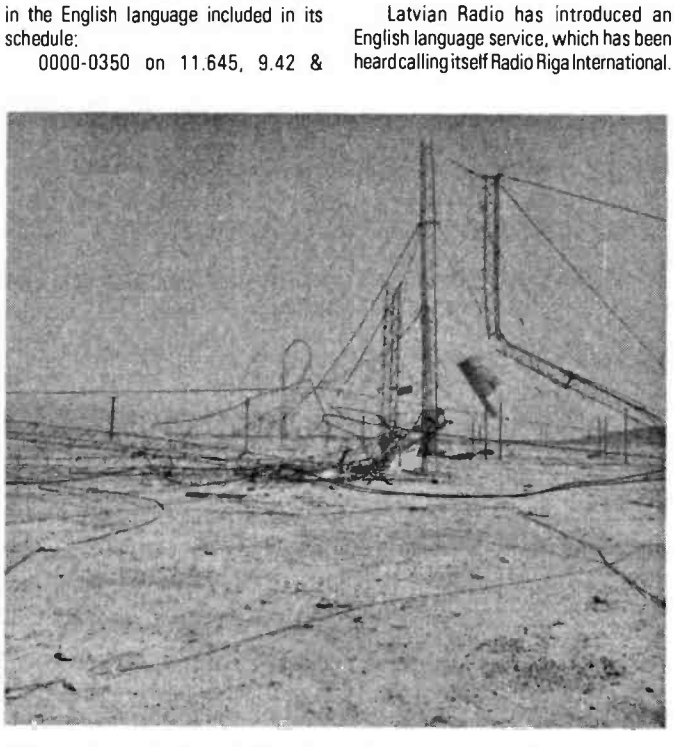
17.605, 15.425, 15.405, 12.05, 11.84, 11.725, 11.685, 9.895, 9.875, 9.86, 9.795, 9.78, 9.765 & 7.105MHz.

That is a total of 31 frequencies beamed around the world for one hour. No wonder that there is overcrowding on the air waves. At the same time, BBC World Service uses 16 (how many listeners is that per frequency for each station...?)

From Roy Merrall in Dunstable, comes news of a strange R. Moscow usage of 3.884MHz at 0345 until 0430. Roy tells me that the announcers appear to operate with mouthfuls of cotton wool and wear buckets on their heads! He has checked all the sub-frequencies and it does not seem to be a harmonic. Any thoughts out there?

Finally in this section, Radio Vilnius appeared on 14 January to have lost its h.f. relays for the international service starting at 2200.

The only traceable channel here in southern England was the medium wave frequency of 666kHz. English was heard signing on at 2230, but reception was extremely poor. The listed 9.675 and 6.10MHz frequencies were unheard, with Radio Yugoslavia's English service on the air from 2200 until 2245. No trace was found of the alternative medium wave channel of 1.557MHz. It is to be presumed that the Soviet authorities had cut off the Lithuanian government's voice to the outside world, since the h.f. senders are located in other parts of the Soviet Union.



Military action, such as in the Gulf conflict, can have a devastating effect on broadcasting installations.

Middle East & African Stations

Voice of Ethiopia has been noted on a new short wave frequency of 9.706MHz (or thereabouts) in parallel with 7.11 and 5.99MHz.

Roy Merrall has continued to monitor Radio RSA with Chi-chewa on 5.96MHz still detectable but generally covered by R. Moscow after 1730. The Lozi service on 7.27MHz is now quite good after 1645 despite the clutter roundabout. Roy says that it is easier to identify than Chi-chewa,

Back-Scatter

with rather more rapid speech and more traditional songs and music. It occasionally rates up to SIO322. The English from Radio RSA at 11.91 (a move from 11.90) can be heard clearly most days up to 0430.

Somalia has been in the news of recent weeks, it has a domestic service which operates in Somali and some Arabic at:

0300-0500 on 7.2MHz (not Friday)
0500-0600 on 7.2MHz (Friday only)
0900-2100 on 7.2MHz (daily)

A regional service from Hargeisa uses 7.12 from 1000 until 1230 and 1500 to 1800. The external service is reported to use 6.095MHz in various languages between 0930 and 1600, including English at 1200.

The Broadcasting Service of the Kingdom of Saudi Arabia transmits English at 1600 until 2100 on the frequencies of 9.72 and 9.705MHz. This service is also carried on BSKSA's domestic service. French can be heard on the same channels at 1400 until 1600 daily.

A programme from the Holy Koran is transmitted to Africa on 7.25MHz daily between 1500 and 1900.

Asian and Pacific Stations

Radio Beijing is now being relayed by Radio Moscow, as described earlier. It can be heard on 7.17MHz from 2200 until 2300 in English, and also has Arabic, Persian, Turkish and French.

English for Europe direct from China can be heard at 2000 for sixty minutes on 11.50, 9.92, 8.26 and 4.13, and at 2100 again for an hour on all but the 8MHz channel, whilst at 2200 for half-an-hour there is a Swiss relay on 3.985MHz.

Radio New Zealand International has dropped 15.485, 9.855 and 9.695MHz and is now using 9.70 for the evening broadcast and 15.13MHz for the morning. Initially neither appears to have performed as well as their predecessors, reports Roy Merrall. He says that 15.13 worked well on Christmas Eve from sign on at 1815 and 1900 with Christmas music and a Breakfast Special programme with a weather forecast for the Cook Islands and all points east (sic!).

Also from Roy comes news that Radio Australia is audible quite often, on both 6.08 and 11.88MHz (in parallel with a sometimes very poor 13.745MHz in English) at around 1930.

A strong language service on 7.24 at 2100 is reasonably good - sometimes to SIO 333, but more usually 332.

A good Chinese/English signal can be heard on 13.605 at 1200 to 1500 although there is intrusion from co-channel Abu Dhabi.

The Americas

It's reported that KUSW in Salt Lake City closed in December, and it appears that the 100kW transmitter is now used by a new station called KTBN. It uses 7.51MHz at 0200 until 1600 and 15.59 from 1600 until 0200.

A list of some of the South American stations caught by Roy Merrall during December:

R.Nacional da AmazonasBrasilia		11.78MHz
R.Guaiba, Porto Alegre		11.785MHz
R.Globo, Rio de Janeiro		11.804MHz (v strong)
R.Universo	initially	11.905MHz
	later	9.565
R.Bandeirante		11.925MHz
R.Nacional Paraguay		9.735MHz
R.Rumbos		9.66MHz (after ABC Brisbane fades)

HCJB is using 15.455MHz regularly for s.s.b. transmissions, although it's only announcing these in the Middle East transmissions. Other s.s.b. transmissions continue on 21.445 at various times and 24 hours a day on 25.95MHz.

Radio Marti, the US anti-Castro propaganda station is on the air:

0400-1200 on 6.03MHz
1200-1400 on 9.59MHz
1400-2300 on 11.93MHz
2300-0400 on 9.525MHz

6.03 can be heard poorly, as a result of co-channel QRM from SDR between 0700 and 1000; 9.59 is usually reasonable throughout its span; 11.93 offers best reception 1800 until 2100 whilst 9.525 suffers deep fading although is quite usable. All transmissions are in Spanish.

'RADCOM' for the Radio Amateur

'Radio Communication' is internationally recognised as one of the world's leading journals for the radio amateur and short-wave listener. Published monthly by the Radio Society of Great Britain, it is circulated exclusively to members of the Society and carries wide ranging and authoritative articles, technical reviews and data essential to those seeking to keep themselves briefed on the most up to date developments in the hobby. Regular columns cater for HF, VHF/UHF, microwave, satellite, data transmission and QRP enthusiasts. Regular constructional articles are supported by a PCB service.

JOIN THE RSGB TODAY

Membership services include a QSL Bureau, advice on planning permission for aerials plus technical and EMC problems, specialised contests and much, much more!

FOR YOUR FREE 'RADCOM'
and a membership pack, post the coupon today, or
CALL 0707 59015

PLEASE SEND YOUR PACK

NAME .....

CALL SIGN .....

ADDRESS .....

.....

..... PW

To **RADIO SOCIETY OF GREAT BRITAIN**
Lambda House, Cranborne Road,
Potters Bar, Herts, EN6 3JE.

RSGB

NEW! 40M QRP TX/RX KIT

COMPLETE TO THE LAST NUT!
★ 2W CW OUTPUT
★ 7.0–7.1MHz
★ STABLE VFO
★ SIDETONE
★ RIT
★ AUDIO FILTER
★ CASE AND ALL HARDWARE INCLUDED ★

DTR7 — KIT **£84.50** READY BUILT **£135.00**
Send SAE for Brochure or call Alan, G4DVW on 0602 382509

LAKE ELECTRONICS
7 MIDDLETON CLOSE, NUTHALL, NOTTINGHAM NG16 1BX
(callers by appointment only)

VISA

Books for radio amateurs
NAVICO
YAESU
AERIAL ACCESSORIES AND MASTS

ELLIOTT ELECTRONICS
for the Radio Enthusiast
MICROWAVE MODULES
APPOINTED DISTRIBUTOR
JAYBEAM AMATEUR ANTENNAS

INSTANT HP AVAILABLE
WRITTEN DETAILS ON REQUEST

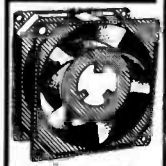
RIGS, ANTENNAS, SWR BRIDGES, POWER SUPPLIES, TEST GEAR, COMPONENTS, MORSE KEYS, COAXIAL CABLES, ROTATORS, MICS, PLUGS AND SOCKETS, SWITCHES

QSY OLD MAN TO
Call us on (0533) 553293
OR COME AND LOOK AROUND AT
26/28 Braunstone Gate, Leicester

HENRY'S
ELECTRONICS DISTRIBUTORS

ALL PRICES INCLUDE VAT
QUANTITIES FROM STOCK
ASK ABOUT OUR LOW LOW QUANTITY PRICES!

FANS



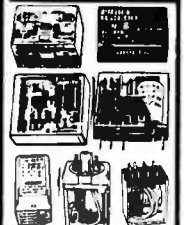
Axial Fans in stock 220/240V A/C. 110/120V A/C, 12 volt and 24 volt. Various sizes.

SWITCH MODE POWER SUPPLIES

TWO MODELS AVAILABLE IN QUANTITY - FROM STOCK

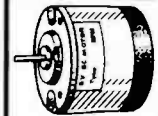
◀ **TYPE 1**
OPEN CHASSIS TYPE
Output + 5 volt 8 amp, + 12 volt 0.5 amp, - 12 volt 0.3 amp. 230-250 V A/C Input Size 7.7 x 4.2 x 1.9 ins
Post, Packing and Insurance £2.05 for 1 or 2
BRAND NEW **£5.95** EX-UNITS **£2.95**

TIMERS & RELAYS



All types of Relays, Low Voltage, 110/240 V A/C DIL, OCTAL, PLUGIN, PCB Ecc Also 110 and 240 V A/C timers.

MOTORS



Low voltage DC. 3 volt, 6 volt, 9 volt and 12 volt stocked.

TYPE 2 ▶
ASTEC ENCLOSED METAL BOX

Three pin mains socket input, on/off switch. Output + 5 volt 3.75 amp, + 12 volt 1.5 amp, - 12 volt 0.4 amp. 115-230 V A/C Input Size 7.0 x 5.3 x 2.5 ins
BRAND NEW £12.95
Post, Packing and Insurance £2.05 for 1 or 2

TEST INSTRUMENTS
UK' largest in-stock range. Also components and Semi-conductors. Security and Audio/PA

HENRY'S AUDIO ELECTRONICS
404 Edgware Road, London W2 1ED. Tel: 071-723 1008
- Open 6 days a week for callers and Telephone orders
- Trade/Export supplied
- Quantity Enquiries Tel: 071-258 1831
- FAX: 071-724 0322

VISA

CALL IN OR SEND FOR CATALOGUES
Send A4 SAE (UK Stamp £1.10) Mark Ref. SWP FREE to callers. Trade/Industry and Education

PW BOOK SERVICE

VISA 0202 665524

The books listed have been selected as being of special interest to our readers. They are supplied from our editorial address direct to your door. Some titles are overseas in origin.

HOW TO ORDER

POST AND PACKING: add 85p for one book, £1.20 for two or more books, orders over £30 post and packing free, (overseas readers add £1.50 for one book, £3.00 for two or more for surface mail postage) and send a postal order, cheque or international money with your order (quoting book titles and quantities) to **PW Publishing Limited, FREEPOST, Enefco House, The Quay, Poole, Dorset BH15 1PP.** Please make your cheques payable to Practical Wireless, payment by Access, Mastercard, Eurocard or Visa also accepted on telephone orders to Poole **(0202) 665524.** Books are normally despatched by return of post but please allow 28 days for delivery. Prices correct at time of going to press. Please note: all payments must be made in Sterling.

* A recent addition to our Book Service. O/P = Out of print, O/S = Out of stock.

RADIO

AIR & METEO CODE MANUAL
10th Edition. Joerg Klingenfuss
Detailed descriptions of the World Meteorological Organisation Global Telecommunication System operating FAX and RTTY meteo stations, and its message format with decoding examples. Also detailed description of the Aeronautical Fixed Telecommunication Network amongst others. *289 pages* **£15.00**

PASSPORT TO WORLD BAND RADIO 1991
This book gives you the information to explore and enjoy the world of broadcast band listening. It includes features on different international radio stations, receiver reviews and advice as well as the hours and languages of broadcast stations by frequency. *398 pages.* **£13.95**

SCANNERS (Third Edition)
Peter Rouse GU1DKD
A guide for users of scanning receivers, covering hardware, antennas, accessories, frequency allocations and operating prodedures. *245 pages.* **£8.95**

SCANNERS 2
Peter Rouse GU1DKD
The companion to Scanners, this provides even more information on the use of the v.h.f. and u.h.f. communications band and gives constructional details for accessories to improve the performance of scanning equipment.
216 pages. **£9.95**

SHORT WAVE RADIO LISTENERS' HANDBOOK
Arthur Miller
In easy-to-read and non-technical language, the author guides the reader through the mysteries of amateur, broadcast and CB transmissions. *207 pages.* **£7.50**

RADIOTELETYPE CODE MANUAL
10th Edition. Joerg Klingenfuss
This book gives detailed descriptions of the characteristics of telegraph transmission on short waves, with all commercial modulation types including voice frequency telegraphy and comprehensive information on all RTTY systems and c.w. alphabets. *96 pages.* **£8.00**

THE SATELLITE EXPERIMENTER'S HANDBOOK (USA)
A guide to understanding and using amateur radio, weather and TV broadcast satellites. *207 pages.* **£7.50**

1934 OFFICIAL SHORT WAVE RADIO MANUAL
Edited by Hugo Gernsback
A fascinating reprint from a bygone age with a directory of all 1934 s.w. receivers, servicing information, constructional projects, circuits and ideas on building vintage sets with modern parts. *260 pages.* **£10.15**

HIGH POWER WIRELESS EQUIPMENT
Articles from *Practical Electricity* 1910-11
Edited by Henry Walter Young
A reprint of interesting practical articles from the early days of radio.
99 pages. **£6.05**

BEGINNERS

AN INTRODUCTION TO RADIO DXING (BP91)
R. A. Penfold
How to find a particular station, country or type of broadcast and to receive it as clearly as possible.
112 pages. **£1.95**

BEGINNER'S GUIDE TO RADIO
9th Edition. Gordon J. King
Radio signals, transmitters, receivers, antennas, components, valves and semiconductors, CB and amateur radio are all dealt with here. *266 pages.* **£9.95**

ELECTRONICS SIMPLIFIED - CRYSTAL SET CONSTRUCTION (BP92). F. A. Wilson
Especially written for those who wish to take part in basic radio building. All the sets in the book are old designs updated with modern components.
72 pages. **£1.75**

THE SIMPLE ELECTRONICS CIRCUIT AND COMPONENTS Book One (BP62)
The aim of this book is to provide an in-expensive but comprehensive introduction to modern electronics.
209 pages. **£3.50**

TELEVISION

THE ATV COMPENDIUM
Mike Wooding G8IQM
This book is for those interested in amateur television, particularly the home construction aspect. There is not a 70cm section as the author felt this is covered in other books. Other fields, such as 3cm TV, are covered in depth. A must for the practical ATV enthusiast. *104 pages.* **£3.00**

AN INTRODUCTION TO SATELLITE TELEVISION (BP195)
F. A. Wilson
Answers all kinds of questions about satellite television. For the beginner thinking about hiring or purchasing a satellite TV system there are details to help you along. For the engineer there are technical details including calculations, formulae and tables. *104 pages.* **£5.95**

A TV-DXERS HANDBOOK (BP176)
R. Bunney
Information on transmission standards, propagation, receivers including multi-standard, colour, satellites, antennas, photography, station identification, interference etc. Revised and updated 1986. *87 pages.* **£5.95**

GUIDE TO WORLD-WIDE TELEVISION TEST CARDS
Edition 3. Keith Hamer & Garry Smith
Completely revised and expanded, this is a handy reference book for the DXTV enthusiast. Over 200 photographs of Test Cards, logos, etc., world wide. *60pages.* **£4.95**

SATELLITE TELEVISION INSTALLATION GUIDE
2nd Edition. John Breeds
A practical guide to satellite television. Detailed guidlines on installing and aligning dishes based on practical experience. *56pages.* **£11.95**

THEORY

COMMUNICATION (BP85)
Elements of Electronics Book 5
F. A. Wilson
Fundamentals of line, microwave, submarine, satellite, digital multiplex, radio and telegraphy systems are covered, without the more complicated theory or mathematics. *256 pages.* **£2.95**

FILTER HANDBOOK A practical design guide
by Stefan Niewiedomski
A practical book, describing the design process as applied to filters of all types. Includes practical examples and BASIC programs. *195 pages.* **£25.00**

FROM ATOMS TO AMPERES
F.A.Wilson
Explains in simple terms the absolute fundamentals behind electricity and electronics. *244pages.* **£3.50**

AUDIO (Elements of electronics - book 6)
F. A. Wilson
This book studies sound and hearing, and examines the operation of microphones, loudspeakers, amplifiers, oscillators, and both disk and magnetic recording. Intended to give the reader a good understanding of the subject without getting involved in the more complicated theory and mathmatics. *320 pages.* **£3.95**

PRACTICAL ELECTRONICS CALCULATIONS AND FORMULAE (BP53)
F. A. Wilson
This has been written as a workshop manual for the electronics enthusiast. There is a strong practical bias and higher mathematics have been avoided where possible. *249 pages.* **£3.95**

SOLID STATE DESIGN FOR THE RADIO AMATEUR
Wes Hayward W7ZOI and Doug DeMaw W1FB
Back in print by popular demand! A revised and corrected edition of this useful reference book covering all aspects of solid-state design. *256 pages.* **£10.95**

The ARRL ELECTRONICS DATA BOOK
Doug DeMaw W1FB
Back by popular demand, completely revised and expanded, this is a handy reference book for the r.f. designer, technician, amateur and experimenter.
260 pages. **£8.95**

A BEGINNERS GUIDE TO MODERN ELECTRONIC COMPONENTS (BP285)
R.A. Penfold
This book covers a wide range of modern components. The basic functions of the components are described, but this is not a book on electronic theory and does not assume the reader has an in-depth knowledge of electronics. It is concerned with practical aspects such as colour codes, deciphering code numbers and the suitability.
164 pages. **£3.95**

EVERYDAY ELECTRONICS DATA BOOK
Mike Tooley BA
This book is an invaluable source of information of everyday relevance in the world of electronics. It contains not only sections which deal with the essential theory of electronic circuits, but it also deal with a wide range of practical electronic applications. *250 pages.* **£8.95**

LISTENING GUIDES

AIR BAND RADIO HANDBOOK (3rd Edition)
David J. Smith
Listen to conversations between aircraft and ground control. The author, an air traffic controller, explains more about this listening hobby. *174 pages.* **£8.99**

AIR TRAFFIC CONTROL
David Adair
A guide to air traffic control with maps, drawings and photographs explaining how aircraft are guided through crowded airspace. *176 pages.* **O/P**

DIAL SEARCH
6th Edition (With Updates). George Wilcox
The listener's check list and guide to European broadcasting. Covers m.w., l.w., v.h.f. and s.w., including two special maps. *54 pages.* **£3.95**

FLIGHT ROUTINGS 1990
T.T.Williams
Identifies the flights of airlines, schedule, charter, cargo and mail, to and from the UK and Eire and overflights between Europe and America. *104 pages.* **£4.95**

GUIDE TO BROADCASTING STATIONS
20th Edition 1989/90. Philip Darrington
Frequency and station data, receivers, antennas, Latin American DXing, reporting, computers in radio, etc.
240 pages. **£9.95**

GUIDE TO FACSIMILE STATIONS 10th Edition
Joerg Klingenfuss
This manual is the basic reference book for everyone interested in FAX. Frequency, callsign, name of the station, ITU country/geographical symbol, technical parameters of the emission are all listed. All frequencies have been measured to the nearest 100Hz. *318 pages* **£14.00**

GUIDE TO FORMER UTILITY TRANSMISSIONS
3rd Edition. Joerg Klingenfuss
Built on continuous monitoring of the radio spectrum from the sixties until the recent past. A useful summary of former activities of utility stations providing information in the classification and identification of radio signals. *126 pages.* **£8.00**

GUIDE TO UTILITY STATIONS
9th Edition. Joerg Klingenfuss
This book covers the complete short wave range from 3 to 30MHz plus the adjacent frequency bands from 0 to 150kHz and from 1.6 to 3MHz. It includes details on all types of utility stations including FAX and RTTY. There are 15802 entries in the frequency list and 3123 in the alphabetical callsign list plus press services and meteorological stations. *502 pages.* **£19.00**

HF OCEANIC AIRBAND COMMUNICATIONS
3rd Edition. Bill Laver
Aircraft channels by frequency and band, main ground radio stations, European R/T networks, North Atlantic control frequencies. *29 pages.* **£3.50**

INTERNATIONAL RADIO STATIONS GUIDE (BP255)
Revised and updated in 1988, this book shows the site, country, frequency/wavelength and power of stations in Europe, the Near East and N. Africa, North and Latin America and the Caribbean, plus short wave stations worldwide.
128 pages. **O/P**

MARINE UK RADIO FREQUENCY GUIDE
Bill Laver
A complete guide to the UK s.w. and v.h.f. marine radio networks. Useful information, frequency listings and the World Marine Coastal Phone Stations.
62 pages. **£4.95**

NEWNES SHORT WAVE LISTENING HAND BOOK
Joe Pritchard G1UQW
A technical guide for all short wave listeners. Covers construction and use of sets for the s.w.l. who wants to explore the bands up to 30MHz. *288pages.* **£12.95**

THE COMPLETE VHF/UHF FREQUENCY GUIDE
1990 - 1991
This book gives details of frequencies from 26-2250MHz with no gaps and who uses what. Recently updatad, there are chapters on equipment requirements as well as antennas, etc. *88 pages.* **£5.95**

THE INTERNATIONAL VHF FM GUIDE
7th Edition. Julian Baldwin G3JNK and Kris Partridge G8AUU
The latest edition of this useful book gives concise details of repeaters and beacons worldwide plus coverage maps and further information on UK repeaters.
70 pages. **£2.85**

THE POCKET GUIDE TO RTTY AND FAX STATIONS
Bill Laver
A handy reference book listing RTTY and FAX stations, together with modes and other essential information. The listing is in ascending frequency order, from 1.6 to 27.1MHz. *46 pages* **£2.95**

SHORT WAVE LISTENERS CONFIDENTIAL FREQUENCY LIST
Bill Laver
Covering the services and transmission modes that can be heard on the bands between 1.635 and 29.7MHz. **£8.95**

VHF/UHF AIRBAND FREQUENCY GUIDE (Updated)
A complete guide to the airband frequencies including how to receive the signals, the frequencies and services, VOLMET and much more about the interesting subject of airband radio. *74 pages* **O/P**

WORLD RADIO TV HANDBOOK 1991
Country-by-country listings of long, medium and short wave broadcast and TV stations. Receiver test reports. English language broadcasts. The s.w.l.'s "bible".
£17.99

INTERFERENCE

INTERFERENCE HANDBOOK (USA)
William R. Nelson WA6FOG
How to locate and cure r.f.i. for radio amateurs, CBers and TV and stereo owners.
253 pages. **£8.75**

RADIO FREQUENCY INTERFERENCE (USA)
What causes r.f.i? Are all r.f.i. problems difficult, expensive and time-consuming to cure? These questions and many more are answered in this book.
84 pages. **£4.30**

AMATEUR RADIO

The ARRL UHF/Microwave Experimenter's Manual
Various Authors
A truly excellent manual for the keen microwave enthusiast and for the budding 'microwaver'. With contributions from over 20 specialist authors. Chapters covering techniques, theory, projects, methods and mathematics. A must for your bookshelf!
446 pages **£13.50**

AMATEUR RADIO CALL BOOK (RSGB)
Spring Edition
Now incorporates a 48-page section of useful information for amateur radio enthusiasts. *310 pages.* **£7.70**

AMATEUR RADIO SATELLITES the first 25 years
Arthur C. Gee G2UK
This souvenir publication mainly a pictorial account of the pattern of developments which have occurred over the last 25 years. *34 pages.* **£2.25**

AN INTRODUCTION TO AMATEUR COMMUNICATIONS SATELLITES BP290
A. Pickard
This book describes several currently available systems, their connection to an appropriate computer and how they can be operated with suitable software
102 pages. **£3.95**

AN INTRODUCTION TO AMATEUR RADIO (BP257)
I. D. Poole
This book gives the newcomer a comprehensive and easy to understand guide through amateur radio. Topics include operating procedures, jargon, propagation and setting up a station. *150 pages* **£3.50**

HINTS AND KINKS FOR THE RADIO AMATEUR
Edited by Charles L. Hutchinson and David Newkirk
A collection of practical ideas gleaned from the pages of *QST* magazine.
152 pages. **£4.95**

HOW TO PASS THE RADIO AMATEURS' EXAMINATION (RSGB)
Clive Smith G4FZH and George Benbow G3HB
The background to multiple choice exams and how to study for them with sample RAE papers for practice plus maths revision. *88 pages.* **£8.20**

PASSPORT TO AMATEUR RADIO
Reprinted from *PW* 1981-1982
The famous series by GW3JGA, used by thousands of successful RAE candidates in their studies. Plus other useful articles for RAE students.
96 pages. **£1.50**

PRACTICAL IDEAS FOR RADIO AMATEURS
Ian Poole G3YWX
Offers a wealth of hints, tips and general practical advice for all transmitting amateurs and short wave listeners. *128 pages* **£5.95**

PRACTICAL GUIDE TO PACKET OPERATION IN THE UK
Mike Mansfield G6AWD
Aimed at all user of packet mode being an excellent introduction and reference manual. Spiral bound to lay flat 70 pages A4 sized. **£5.95**

RADIO AMATEUR'S GUIDE TO RADIO WAVE PROPAGATION (HF Bands). F. C. Judd G2BCX
The how and why of the mechanism and variations of propagation in the h.f. bands. *144 pages.* **£8.95**

THE 1991 ARRL HANDBOOK FOR THE RADIO AMATEUR
This is the 66th edition of this very useful hardback reference book. Updated throughout it has several new sections covering oscilloscopes, spectrum analysers, digital frequency synthesis, phase-noise measurement and new constructional projects. *1200 pages.* **£16.95**

***THE ARRL OPERATING MANUAL**
Another very useful book from the ARRL. Although writen for the American radio amateur, this book will also be of use and interest to the UK amateur.
684 pages **£12.95**

THE ARRL SATELLITE ANTHOLOGY
The best from the Amateur Satellite News column and articles out of 31 issues of QST have been gathered together in this book. The latest information on OSCARs 9 through 13 as well asd the RS satellites is included. Operation on Phase 3 satellites (OSCAR 10 and 13) is covered in detail. *97 pages* **£4.95**

THE COMPLETE OX'ER
Bob Locher W9KNI
Now back in print, this book covers equipment and operating techniques for the OX chaser, from beginner to advanced. *187 pages* **£7.95**

THE RAE MANUAL (RSGB)
G.L.Benbow G3HB
The latest edition of the standard aid to studying for the Radio Amateurs' Examination. Updated to cover the latest revisions to the syllabus.
132 pages **£6.20**

RADIO AMATEUR CALLBOOK INTERNATIONAL LISTINGS 1991
69th Edition
The only publication listing licenced radio amateurs throughout the world. Also includes DXCC Countries list, standard time chart, beacon lists and much more.
Over 1500 pages. **£19.50**

RADIO AMATEUR CALLBOOK NORTH AMERICAN LISTINGS 1991
69th Edition
Listings of US amateurs (including Hawaii). Also contains standard time chart, census of amateur licences of th world, world-wide QSL bureau and much more.
Over 1400 pages. **£19.50**

THE RADIO AMATEUR'S OX GUIDE (USA)
15th Edition
The guide contains information not easily obtained elsewhere and is intended as an aid and quick reference for all radio amateurs interested in DX.
38 pages. **£2.95**

THE RADIO AMATEUR'S QUESTIONS & ANSWER REFERENCE MANUAL
4th Edition. R. E. G. Petri G8CCJ
This book has been compiled especially for students of the City and Guilds of London Institute RAE. It is structured with carefully selected multiple choice questions, to progress with any recognised course of instruction, although is is not intended as a text book. *280 pages.* **£7.95**

ALL ABOUT VHF AMATEUR RADIO (USA)
W. I. Orr W6SAI
VHF/UHF propagation, including moonbounce and satellites, equipment and antennas. *172 pages.* **£7.95.**

YOUR GATEWAY TO PACKET RADIO
Stan Horzepa WA1LOU
What is packet radio good for and what uses does it have for the 'average' amateur? What are protocols? whre, why, when? Lots of the most asked questions are answered in this useful book. It included details of networking and space comunications using packet. *278 pages* **£7.95**

MAPS

RADIO AMATEUR'S MAP OF NORTH AMERICA(USA)
Shows radio amateur prefix boundaries, continental and zonal boundaries.
760 x 636mm **£2.95**

IARU LOCATOR MAP OF EUROPE DARC
This multi-coloured, plastics laminated, map of Europe shows the AIRU ("Maidenhead") Locator System. Indispensible for the v.h.f. and u.h.f. DXer.
692 x 872mm. **£5.25**

NORTH ATLANTIC ROUTE CHART
TThis is a five-colour chart designed for the use of ATC in monitoring transatlantic flights. Supplied folded.. *740 x 520mm.* **£5.00**

RADIO AMATEUR'S PREFIX MAP OF THE WORLD (USA)
Showing prefixes and countries, plus listings by order of country and of prefix.
1014 x 711mm **£2.95**

RADIO AMATEUR'S WORLD ATLAS (USA)
Seventeen pages of maps, including the world-polar projection. Also includes the table of allocation of international callsign series. **£3.50**

DATA REFERENCE

DIGITAL IC EQUIVALENTS AND PIN CONNECTIONS (BP148)
A. Michaels
Equivalents and pin connections of a popular selection of European, American and Japanese digital i.c.s. *256 pages.* **O/P**

INTERNATIONAL DIODE EQUIVALENTS GUIDE (BP198)
A. Michaels
Possible substitutes for a large selection of many different types of semiconductor diodes. *144 pages.* **O/P.**

INTERNATIONAL TRANSISTOR EQUIVALENTS GUIDE (BP85)
A. Michaels
Possible substitutes for a popular selection of European, American and Japanese transistors. *320 pages* **£3.50**

LINEAR IC EQUIVALENTS AND PIN CONNECTIONS (BP141)
A. Michaels
Equivalents and pin connections of a popular selection of European, American and Japanese linear i c.s.
320 pages. **O/P**

NEWNES AUDIO & HI-FI ENGINEER'S POCKET BOOK
Vivian Capel
This is a concise collection of practical and relevant data for anyone working on sound systems. The topics covered include microphones, gramaphones, CDs to name a few. *190 pages. Hardback* **£9.95**

NEWNES COMPUTER ENGINEER'S POCKET BOOK
This is an invaluable compendium of facts, figures, circuits and data and is indispensable to the designer, student, service engineer and all those interested in computer and microprocessor systems. *203 pages. Hardback* **£9.95**

NEWNES ELECTRONICS POCKET BOOK
5th Edition
Presenting all aspects of electronics in a readable and largely non-mathematical form for both the enthusiast and the professional engineer.
315 pages. Hardback **£10.95**

NEWNES RADIO AND ELECTRONICS ENGINEER'S POCKET BOOK
18th Edition. Keith Brindley
Useful data covering math, abbreviations, codes, symbols, frequency bands/ allocations, UK broadcasting stations, semi-conductors, components, etc.
325 pages. Hardback **£9.95**

NEWNES TELEVISION AND VIDEO ENGINEER'S POCKET BOOK
Eugene Trundle
This is a valuable reference source for practitioners in "entertainment" electronic equipment. It covers TV reception from v.h.f. to s.h.f. display tubes, colour camera technology, video recorder and video disc equipment, video text and hi-fi sound.
323 pages. Hardback **O/P**

POWER SELECTOR GUIDE (BP235)
J. C. J. Van de Ven
This guide has the information on all kinds of power devices in useful categories (other than the usual alpha numeric sort) such as voltage and power properties making selection of replacements easier. *160 pages.* **£4.95**

FAULT FINDING

ARE THE VOLTAGES CORRECT?
Reprinted from PW 1982-1983
How to use a multimeter to fault-find on electronic and radio equipment, from simple resistive dividers through circuits using diodes, transistors, i.c.s and valves.
44 pages. **£1.50**

GETTING THE MOST FROM YOUR MULTIMETER (BP239)
R. A. Penfold
This book is primarily aimed at beginners. It covers both analogue and digital multimeters and their respective limitations. All kinds of testing is expleined too. No previous knowledge is required or assumed. *102 pages.* **£2.95**

MORE ADVANCED USES OF THE MULTIMETER BP265
R.A. Penfold
This book is primarily intended as a follow-up to BP239, Getting the most from your Multimeter. By using the techniques described in this book you can test and analyse the performance of a range of components with just a multimeter (plus a very few inexpensive components in some cases). The simple add-ons described extend the capabilites of a multimeter to make it even more useful.
85 pages. **£2.95.**

OSCILLOSCOPES, HOW TO USE THEM, HOW THEY WORK 3rd Edition
Ian Hickman
This book describes oscilloscopes ranging from basic to advanced models and the accessories to go with them. **£14.95**

TRANSISTOR RADIO FAULT FINDING CHART (BP70)
C. E. Miller
Used properly, should enable most common faults to be traced reasonably quickly. Selecting the appropriate fault description at the head of the chart, the reader is led through a sequence of suggested checks until the fault is cleared.
635 x 455mm (approx). **£0.95**

CONSTRUCTION

COIL DESIGN AND CONSTRUCTION MANUAL (BP 160)
B.B. Banbani
Covering h.f. coils to power transformers this 100 page pocket sized book is crammed full of information and tables for the constructor. *110 x 175mm 100 pages* **£2.50**

FURTHER PRACTICAL ELECTRONICS CALCULATIONS AND FORMULAE (BP144)
F. A. Wilson
Covering Maths, digital maths, electrostatics, electromagnetics and all forms of electronic calculations, with many worked examples, of amplifiers, noise, feedback etc. *450 pages, 110 x 175mm* **£4.95**

HOW TO DESIGN AND MAKE YOUR OWN P.C.B.s (BP121)
R. A. Penfold
Designing or copying printed circuit board designs from magazines, including photographic methods. *80 peges.* **£2.50**

INTRODUCING QRP
Collected articles from PW 1983-1985
An introduction to low-power transmission, including constructional details of designs by Rev. George Dobbs G3RJV for transmitters and transceivers from Top Band to 14MHz, and test equipment by Tony Smith G4FAI. *64 pages.* **£1.50**

MORE ADVANCED POWER SUPPLY PROJECTS (BP192)
R. A. Penfold
The practical and theoretical aspects of the circuits are covered in some detail. Topics include switched mode power supplies, precision regulators, dual tracking regulators and computer controlled power supplies, etc. *92 pages.* **£2.95**

POWER SUPPLY PROJECTS (BP76)
R. A. Penfold
This book gives a number of power supply designs including simple unstabilised types, fixed voltage regulated types and variable voltage stabilised designs.
91 pages. **£2.50**

PRACTICAL POWER SUPPLIES
Collected articles from PW 1978-1985
Characteristics of batteries, transformers, rectifiers, fuses and heatsinks, plus designs fc a variety of mainsdriven power supplies, including the *PW* "Marchwood" giving a fully stabilised and protected 12V 30A d.c. *48 pages.* **£1.25**

QRP NOTEBOOK
Doug DeMaw W1FB
This book deals with the building and operating of a successful QRP station. Lots of advice is given by the author who hes spent years as an ardent QRPer. All the text is easy-to-read and the drawings large and clear. *77 pages.* **£4.95**

TEST EQUIPMENT CONSTRUCTION
R.A.Penfold
Describes, in detail, how to construct some simple and inexpensive, but extremely useful, pieces of test equipment. *104 pages.* **£2.95**

50 (FET) FIELD EFFECT TRANSISTOR PROJECTS
F.G.Rayer
50 circuits for the s w l., radio amateur, experimenter or audio enthusiast using f e t s. *104 pages.* **£2.95**

ANTENNAS (AERIALS)

AERIAL PROJECTS (BP105)
Practical designs including active, loop and ferrite antennas plus accessory units.
96 pages. **£2.50**

ALL ABOUT CUBICAL QUAD ANTENNAS (USA)
W. I. Orr W6SAI & S. O. Cowan W2LX
Theory, design, construction, adjustment and operation of quads. Quads vs. Yagis. Gain figures. *109 pages.* **£5.50**

ALL ABOUT VERTICAL ANTENNAS (USA)
W. I. Orr W6SAI & S. O. Cowan W2LX
Theory, design, construction, operation, the secrets of making vertical work.
191 pages. **£7.50**

AN INTRODUCTION TO ANTENNA THEORY (BP198)
H. C. Wright
This book deals with the basic concepts relevant to receiving and transmitting antennas. Lots of diagrams reduce the amount of mathematics involved.
86 pages. **£2.95**

ANTENNA IMPEDANCE MATCHING
Wilfred N. Caron
Proper impedance matching of an antenna to a transmission line is of concern to antenna engineers and to every radio amateur. a properly matched antenna as the termination for a line minimises feed-line losses. Power can be fed to such a line without the need for a matching network at the line input. There is no mystique involved in designing even the most complex multi-element metworks for broadband coverage. Logical step-by-step procedure is followed in this book to help the radio amateur with this task. *192 pages.* **£11.95**

BEAM ANTENNA HANDBOOK (USA)
W. I . Orr W6SAI & S. O. Cowan W2LX
Design, construction, adjustment and installation of h.f. beam antennas.
198 pages. **£6.75**

***NOVICE ANTENNA NOTEBOOK**
Doug DeMaw W1FB
Another book from the pen of W1FB, this time offering "new ideas for beginning hams". All the drawings are large and clear and each chapter ends with a glossary of terms. *130 pages.* **£5.95**

OUT OF THIN AIR
Collected Antenna Articles from PW 1977-1980
Including such favourites as the ZL Special and 'ZBCX 16-element beams for 2m, and the famous "SlimJim", designed by Fred Judd G2BCX. Also features systems for Top Band, medium wave/long wave loop designs and a v.h.f. direction finding loop. Plus items on propagation, accessories and antenna design.
80 pages. **£1.80**

SIMPLE, LOW-COST WIRE ANTENNAS FOR RADIO AMATEURS (USA)
W. I. Orr W6SAI & S. O. Cowan W2LX
Efficient antennas for Top Band to 2m, including "invisible" antennas for difficult station locations. *191 pages.* **£6.75**

THE ARRL ANTENNA BOOK (USA) 15th Edition
A station is only as effective as its antenna system. This book covers propagation, practical constructional details of almost every type of antenna, test equipment and formulas and programs for beam heading calculations. **£12.95**

THE ARRL ANTENNA COMPENDIUM (USA)
Volume One
Fascinating and hitherto unpublished material. Among the topics discussed are quads and loops, log periodic arrays, beam and multi-band antennas, verticals and reduced size antennas. *175 pages.* **£7.50**

WIRES & WAVES
Collected Antenna Articles from PW 1980-1984
Antenna and propagation theory, including NBS Yagi design data. Practical designs for antennas from medium waves to microwaves, plus accessories such as a.t.u.s, s.w.r. and power meters and a noise bridge. Dealing with TVI.
160 pages. **£3.00**

W1FB'S ANTENNA NOTEBOOK
Doug DeMaw W1FB
This book provides lots of designs, in simple and easy to read terms, for simple wire and tubing antennas. All drawings are large and clear making construction much easier. *124 pages.* **£5.95**

25 SIMPLE AMATEUR BAND AERIALS (BP125)
E. M. Noll
How to build 25 simple and inexpensive aerials, from a simple dipole through beam and triangle designs to a mini-rhombic. Dimensions for specific spot frequencies including the WARC bands. *80 pages.* **£1.95**

25 SIMPLE INDOOR AND WINDOW AERIALS (BP136)
E. M. Noll
Designs for people who live in flats or have no gardens, etc., giving surprisingly good results considering their limited dimensions. *64 pages.* **£1.75**

25 SIMPLE SHORT WAVE BROADCAST BAND AERIALS (BP132)
E. M. Noll
Designs for 25 different aerials, from a simple dipole through helical designs to a multi-band umbrella. *80 pages.* **£1.95**

25 SIMPLE TROPICAL AND MW BAND AERIALS (BP145)
E. M. Noll
Simple and inexpensive aerials for the broadcast bands from medium wave to 49m. *64 pages.* **£1.75**

THE RADIO AMATEUR ANTENNA HANDBOOK
William I. Orr W6SAI & Stuart. O. Cowan W2LX
Yagi, quad, quagi, l-p, vertical, horizontal and "sloper" antennas are all covered. Also towers, grounds and rotators. *190 pages.* **£6.75**

COMPUTING

AN INTRODUCTION TO COMPUTER COMMUNICATIONS (BP177)
R. A. Penfold
Details of various types of modem and their applications, plus how to interconnect computers, modems and the telephone system. Also networking systems and RTTY. *96 pages.* **£2.95**

AN INTRODUCTION TO COMPUTER PERIPHERALS (BP170)
J. W. Penfold
Covers a wide range of computer peripherals such as monitors, printers, disk drives, cassette recorders, modems, etc., explaining what they are, how to use them and the various types of standards. *80 pages* **O/P**

NEWNES AMATEUR RADIO COMPUTING HANDBOOK
Joe Pritchard G1UQW
Shows how radio amateurs and short wave listeners can 'listen' to signals by reading text on a computer screen. This book also covers the aplication of computers to radio 'housekeeping' jobs such as log-keeping, QSL cards, satellite predictions and antenna design as well as showing how to control a radio with the computer. *368pages.* **£14.95**

MORSE

INTRODUCING MORSE
Collected Articles from PW 1982-1985
Ways of learning the Morse Code, followed by constructional details of a variety of keys including Iambic, Triambic, and an Electronic Bug with a 528-bit memory.
48 pages. **£1.25**

THE SECRET OF LEARNING MORSE CODE
Mark Francis
Designed to make you proficient in Morse code in the shortest possible time, this book points out many of the pitfalls that beset the student.
87 pages. **£4.95**

The prepaid rate for classified advertisements is 42 pence per word (minimum 12 words), box number 60p extra. Semi-display setting £13.90 per single column centimetre (minimum 2.5cm). Please add 15% VAT to the total. All cheques, postal orders, etc., to be made payable to Practical Wireless. Treasury notes should always be sent by registered post. Advertisements, together with remittance should be sent to the Classified Advertisement Dept., Practical Wireless, Enefco House, The Quay, Poole, Dorset BH15 1PP. Telephone (0202) 676033.

Classified Ads

Whilst prices of goods shown in advertisements are correct at the time of going to press, readers are advised to check both prices and availability of goods with the advertiser before ordering from non-current issues of the magazine

Receivers

B.F.O. KITS, resolves single side-band on almost any radio, £14.95. Also Steepletone FM/AIR/MW £9.95. CORRIGAN RADIOWATCH, 7 York Street, Ayr KA8 8AR.

G3LLL for ICOM & YAESU - BUT Holidays? Phone first! Also CW Filters FT101ZD, 902, 707 & 102 £40 P.P. - Valves & Mod kits 101E, etc. - P.X. Commission sales. HOLDINGS AMATEUR ELECTRONICS, 45 Johnson Street, Blackburn BB2 1EF. Tel: (0254) 59595.

EDDYSTONE 40A Noise Measuring Test Sets. Instrument grade HF receive 130kHz-32MHz AM/SSB/CW solid state, batt/mains, internal loop, whip or external antenna. Superb calibrated front end attenuator, built-in noise calibrator, usable for DF. Ideal for EMC tests, also general purpose HF Rx, Good condition, with full manuals: £150. GAREX ELECTRONICS, STATION YARD, SOUTH BRENT, SOUTH DEVON, TQ10 9AL Tel: (0364) 72770 Fax: (0364) 72007.

OSCILLOSCOPE EX-MOD Double Beam with lead and manual £60.00, new Larkspur Morse keys £12.00. A range of Amstrad and Spectrum Computers. New ex-MOD whip antennas will tune to 2M £5.50, large selection of war and post-war manuals. Ex-Mod VHF SWR Bridge 45-160MHz £27.00. All prices include P&P. Tel: Wolverhampton 20315.

YAESU FL101TX, FR101D, SHURE 444, SP102 Manuals, boxed. All leads for full transceive. 6 metre 2 metre FM boards fitted in RX. £400. Nigel G0DTQ (0488) 39544.

Wanted

TEST GEAR, Computers, Computer Surplus, Amateur. Bought for cash. (0425) 274274

MOST VALVES WANTED: for cash. Large or small quantites must be unused and boxed. CBS, 157 Dickson Road, Blackpool FY1 2EU (0253) 751858.

SUITCASE I.E. CLANDESTINE RADIO STATION such as a Mk III, Berit "2" Mk 15, wanted for Museum purpose. Lennart Larsson SM0ZT, Vulcanusgatan 8:1, S-11321 Stockholm, Sweden.

Service Sheets and Servicing

TECHNICAL INFORMATION SERVICES (PW)
76 ,CHURCH STREET, LARKHALL, LANARKSHIRE ML9 1HE
Phone: (0698) 884585, Mon-Fri, 9am-5pm. OR. Phone: (0898) 883334 any other time.
IMMEDIATE dispatch on all ***ACCESS & VISA*** orders
PHONE OR WRITE NOW FOR FREE QUOTE & FREE CATALOGUE with every S.A.E.

SERVICE MANUALS & SERVICE SHEETS
Remember, not only do we have EVERY Service Sheet ever made, but we also have
ONE OF THE WORLDS LARGEST SELECTION OF SERVICE MANUALS
NOTE:- Over 200 seperate Titles of Technical books are always in stock, over 1/2 are exclusive to TIS! CTV SERVICING by KING - £14.95, VCR SERVICING by BEECHINGS - £25.00, Ku-BAND SATELLITE TV - £25.00

SERVICE MANUALS
Available for most Video Recorders, Colour & Mono Televisions, Cameras, Test Equipment, Amateur Radio, Vintage Valve Wireless, Any Audio, Music Systems, Computers, Kitchen Appliances, etc.
Equipment from the 1930s to the present and beyond.
Over 100 000 models stocked, orignals and photostats.
FREE catalogue Repair and Data Guides with all orders.
MAURITRON TECHNICAL SERVICES (PW),
8 CHERRY TREE ROAD, CHINNOR, OXON, OX9 4QY
Tel: (0844) 51694 Fax: (0844) 52554

TEST EQUIPMENT MAINTENANCE
Spare Parts, Service Manuals and a comprehensive repair service now available for all makes of Test Equipment (Scopes, Generators, PSUs, AVOs, Counters, DMMs, etc. etc.).
We support equipment manufactured by over 100 different companies.
New secondhand Test Equipment also supplied.
Valves & Misc Components also supplied.
Trade Enquiries welcome. No minimum order charge.
HESING TECHNOLOGY
41 Bushmead Road, Eaton Socon, St Neots, Cambs PE19 3BT
Tel: (0480) 214488 (anytime) 216870 (eves).

Educational

FULL-TIME COURSES FOR RAE & NOVICE LICENCE at Radio School Ltd, Hayling Island. Tel: (0705) 466450, 24 hrs.

RAE COURSE ON VIDEO contains nearly all you need for the Radio Amateurs Exam £25.00 including Post & Packing. **VHS only.** For those of you with Math difficulties I have produced a 3 hour video on "RAE Maths Only" to help with the RAE Exam. Also at £25.00 including Post & Packing. PWT ELECTRONICS, 21 Elmbank, Buckfastleigh, Devon TQ11 0DN.

COURSE FOR CITY & GUILDS, Radio Amateurs Examination. Pass this important examination and obtain your licence, with an RRC Home Study Course. For details of this and other courses (GCSE, Career and professional examinations, etc) write or phone - THE RAPID RESULTS COLLEGE, DEPT JX101, Tutition House, London SW19 4DS. Tel: 081-947 7272 (9am-5pm) or use our 24hr Record-a-call service 081-946 1102 Quoting JX101.

Antennas

DESKTOP TUNABLE ACTIVE ANTENNA 150kHz to 30MHz. Details SAE: Perins 76c Whitehall Road, Gravesend, Kent DA12 5PH.

NOTICE TO ADVERTISERS

Would intending and existing advertisers please note that *Practical Wireless* has an editorial policy not to accept advertising for surveillance and 'bugging' transmitting and receiving equipment.

ORDER FORM PLEASE WRITE IN BLOCK CAPITALS

Please insert this advertisement in the next available issue of Practical Wireless for.....insertion/s.
I enclose Cheque/P.O. for £.....(42p per word, please add 15% VAT to total). Rates and Postal Address at top of page.
(Cheques and Postal Orders should be made payable to Practical Wireless).

CATEGORY HEADING .....

Name .....

Address .....

.....

.....

.....

.....

For Sale

250MHz SPECTRUM ANALYSERS
Connect this unit to convert almost any oscilloscope into RF Spectrum Analyser, 400kHz to 250MHz. 70dB range. £195 SAE for details.
WATERBEACH ELECTRONICS
34 Providence Way, Waterbeach, Cambridge CB5 9QJ.

USED SCOPES various types from £10-£50 each. ITT Star phones UHF single channel with CCT. £10 each. (0684) 560991.

MAINS FILTERS specifically for Amateur and commercial radio, reduce T.V.I. and lower the noise threshold of reception significantly. Full details: Rello Electronics, 16 Stirling Road, St Leonards-on-Sea TN38 9NP. (0424) 852440.

COMPUTER - Sharp 4502 Lap-top 640k -2 Floppy disks - ideal for packet - or Business use. Unwanted gift. Bargain £495. Phone (0923) 678770.

TEKTRONIX 7704 OSCILLOSCOPE 150MHz, Dual Trace, delayed timebase, space plug-ins, current PRD13E, 12Kv Probe, camera, trolley, £250 ono (0342) 824501 (Sussex).

Miscellaneous

GZVF LOOP ANTENNAS COMPLETE WITH ATU FOR H.F. HAM RADIO BAND TRANSMISSION (SWR One to One 40, 15 and 10 and One Point Five to One 80 and 20) **AND SWLs, AND LONG AND MEDIUM WAVE BANDS FOR BCLs.** Loops 21 inches square or triangle. No special skills required. Circuits, Parts Lists with sources of supply assembly/data. **HIGH FREQUENCY LOOP** 80 to 10 Metres **£5. LONG AND MEDIUM WAVE LOOP** for BCLs **£3. LONG WAVE MEDIUM WAVE AND SHORT WAVE LOOP** 1500 to 10 Metres **FOR THE BCL AND SWL£8. SHORT WAVE ATU FOR LOOP OR LONG WIRE ANTENNA £4. SHORT WAVE ATU BUILT IN PRE AMP FOR LOOP OR LONG WIRE £7.** Pre-amp LW, MW and SWave £2. **MW LOOP** with pre amp ATU £3. **PRE AMP FOR GZVF HF** Loop or ATU **£4.** SAE details. All projects DIY. Metal Detector £2. PhotoCopy HRO manual **£4. F.G. Rylands**, 39 Parkside Avenue, Millbrook, Southampton SO1 9AF Tel. (0703) 775064.

HEATHKIT U.K. Spares and Service Centre. Cedar Electronics. 12 Isbourne Way, Broadway Road, Winchcombe, Cheltenham. Glos. GL54 5NS. Tel: 0242 602402.

VHF COMMUNICATIONS The worlds foremost VHF/UHF microwave magazine £12.00 per year for four issues. VHF COMMUNICATIONS, 5 Ware Orchard, Barby, RUGBY CV23 8UF

RCS VARIABLE VOLTAGE D.C. BENCH POWER SUPPLY
1 to 24 volts up to 0.5 amp. 1 to 20 volts up to 1 amp. 1 to 16 volts up to 1.5 amps. D.C. Fully stabilised. Twin panel meters for instant voltage and current readings. Overload protection. Fully variable. Operates from 240V A.C. Compact Unit: size 9 x 5.5 x 3ins.
£42 Incl. VAT + Post £2.

NEW MODEL. Up to 38 volts DC at 6amp. 10 amp peak. Fully variable. Twin Panel Meters. Size 14.5 x 11 x 4.5in. £96 inc **VAT.** Carr £6
RADIO COMPONENT SPECIALISTS
337 Whitehorse Road, Croydon SURREY, U.K. Tel: 081-684 1665
List. Large S.A.E. Delivery 7 days. Callers Welcome. Closed Wednesday

MVT5000 JUPITER II Hand-held scanner Nicads charger. Boxed. £250.00. Plymouth 766946.

144MHz to 2500MHz Cavity Wavemeter.
One Wavemeter to cover the VHF/UHF Bands 144MHz to over 2500MHz. Don't get caught without one.
Write to: P. Sergent G4ONF, 6 Gurney Close, Costessey, Norwich. Tel: (0603) 747782
(HIGH) WAVEMETER KIT
144-2500MHz WAVEMETER

LIGHT WEIGHT ANTENNA MASTS 5 metre extended height, aluminium telescopic, manual extension. Full accessories available. Price £239.00 including carriage UK & VAT. Phone CMTS (0983) 67090.

Components

QUARTZ CRYSTALS and FILTERS
Large numbers of standard frequencies in stock for amateur, CB, professional and industrial applications.
Stock crystals **£5.50** each (inc. VAT and UK post).
Any frequency or type made-to-order from **£6.50.**
Phone or SAE for lists.
GOLLEDGE ELECTRONICS
Merriott, Somerset, TA16 5NS
Tel: (0460) 73718

J. A. B. Electronic and R.F. Components. (Toko now available). Callers:- 1180 Aldridge Road, Rear of Queslett Motors, Great Barr, Birmingham. Tel: 021-366-6928 For opening times. MAIL ORDER Catalogue & Discount Vouchers send 75p.

TOROIDAL CORES, FERRITE BEADS, send 50p for catalogue to: FERROMAGNETICS, PO Box 577, Mold, Clwyd, N. Wales CH7 1AH.

Veteran & Vintage

THE VINTAGE WIRELESS BOOK LISTING. Published regularly containing 100s of out of print, old and collectable wireless and TV books, magazines, etc. Send three first class stams for next copy or £1.75 for next 4 issues. **WANTED,** Pre-1960 wireless books, magazines, catalogues, any printed material or Ephemra relating to wireless. CHEVET BOOKS, 157 Dickson Road, Blackpool, Lancashire FY1 2EU. Tel: (0253) 751858.

VINTAGE RADIO & AUDIO ENTHUSIASTS:- Contact us for components, valves, service sheets, radios & amplifiers. Mail order to anywhere - over the counter retails Saturday only. Send 46p stamp for FREE catalogues & newsheet. THE VINTAGE WIRELESS COMPANY, Tudor House, Cossham Street, Mangotsfield, Bristol BS17 3EN. Tel: (0272) 565472 or Fax: (0272) 575442. All major credit cards accepted by letter, PHONE OR FAX.

WANTED: PYE MOZART Hi-Fi SYSTEM, recognised by its copper front panel and horizontal EL34's. Also wanted associated AM/FM Tuner - looks similar to above (0875) 33291.

Computer Soft/w & Hard/w

THE ULTIMATE MORSE TUTORIAL Curriculum coveted "A" Licence. Atari 520/1040/ste. Colour monitor/TV. Unique phases learning practice testing. Two disks fully documented. £14.95 inclusive cable for Morse key. wallet. p/p. SAE. info. LUCID PUBLICATIONS 18 Hobard Road, Ramsgate, Kent.

COMMODORE COMPUTERS (+4, C16, 64, 128). "MICROCOM" CW/RTTY TX/RX with superb Morse tutor. "TURBO LOG" ultimate high speed station log. "MICROCOM INTERFACE" ready built. S.A.E. to:- Moray Micro Computing, Enzie Slackhead, Buckie, Moray AB5 2BR. (Tel: 0542 7384).

IBM/COMPATIBLE SHAREWARE 10,000 + FILES. Send £1.50 for comprehensive catalogue on disk. Cheapest prices! AK SHAREWARE, 54 Sheldrake Road, Mudeford, Dorset BH23 4BP.

ATARI 520/1040/STE MORSE MASTER Complete CW tutor for novices and professionals. Send/receive under realistic on air conditions. Complete with cable. £29.99 from **BOSCAD LTD,** 16 Aytoun Grove, Baldridgeburn, Dunfermline, FIFE KY12 9TA. For info Tel: (0383) 729584, evenings.

Situations Vacant

BBC MONITORING

Receiving the World Loud and Clear

BBC Monitoring, part of BBC World Service, is a 24 hour news gathering service listening to radio and viewing television broadcasts from around the world. The very latest information is gathered using our satellite dishes and aerials. We are seeking to recruit enthusiastic and bright staff as Operators to join us.

As an Operator you will be responsible for the research and reception of all radio voice, telegraphy and satellite transmissions of interest to BBC Monitoring. This will include technical measurements and signal strength reports for the BBC and other broadcasters. You will also be responsible for the distribution of the received programmes.

Applicants should have:

* Knowledge of radio and satellite signals sufficient to identify different signals and operate receiving equipment.
* Demonstrate a knowledge of radio reception and propagation techniques.
* Have an ability to recognise foreign languages and an interest in current affairs.

Shift/weekend work involved.
Salary range £10,320 to £14,222 plus 10% shift allowance.
Based Caversham Park and Crowsley Park, Reading.
For further details and application form, please contact (quote ref. 6696/PT) **Personnel Officer, BBC Monitoring, Caversham Park, Reading, Berkshire RG4 8TZ. Tel: 0734 472742 ext. 332.**

WE ARE AN EQUAL OPPORTUNITIES EMPLOYER

YOUR LOCAL DEALERS

INDEX TO ADVERTISERS

ICOM

Count on us!

IC-725 Budget HF

- **General Coverage Receiver**
- **105dB Dynamic Range**
- **100W Output**
- **DDS System**
- **26 Memories**
- **Scanning**
- **CI-V Computer Control**
- **Semi Break-in**

The new ICOM IC-725 budget H.F has been produced due to the demand for a simple, high specification transceiver. Despite the limited features, compared to more expensive equipment this set retains a superior level of technical performance necessary to operate on the H.F. bands today.

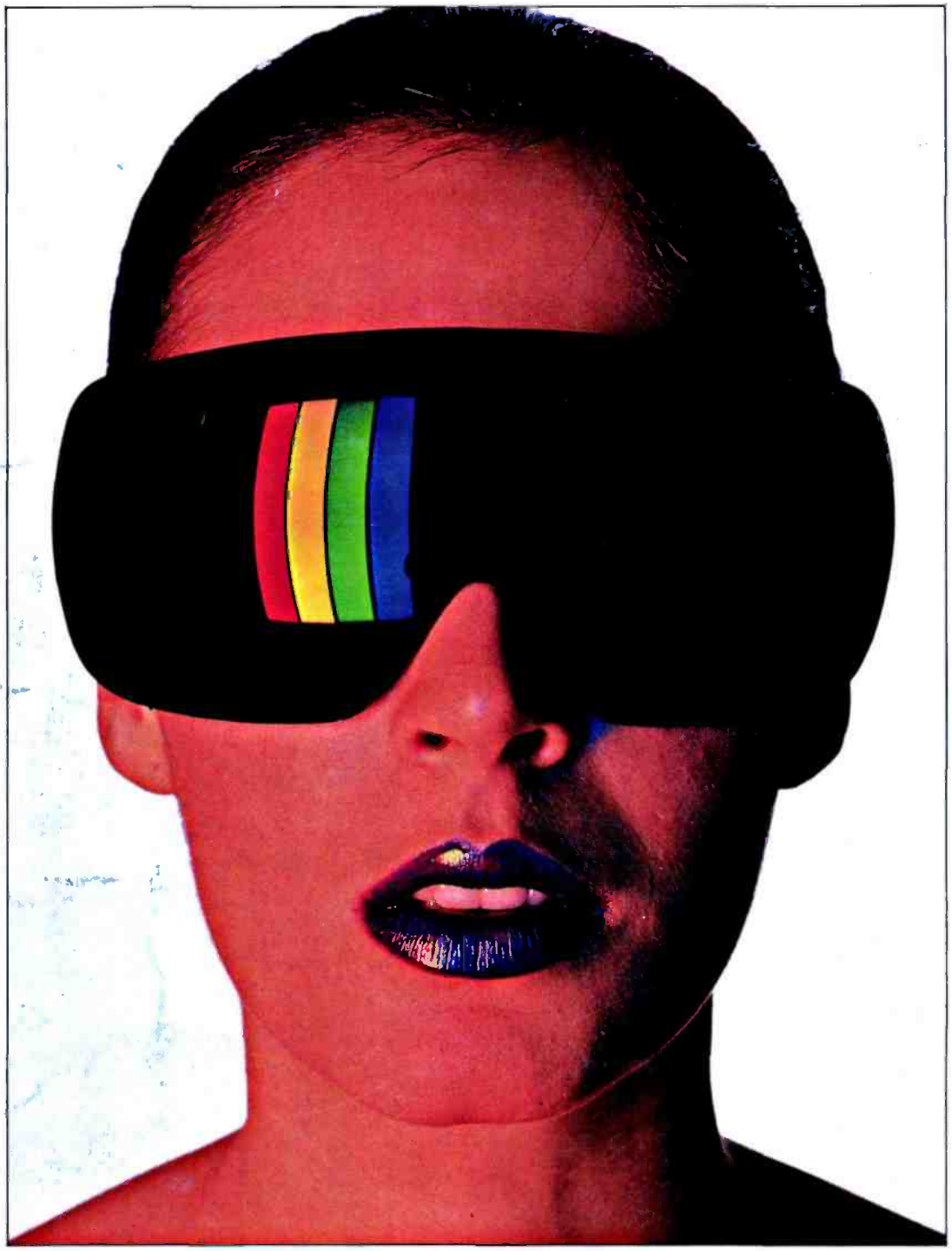
Additional features include Noise Blanker, Pre-amp, Attenuator, AGC and RIT. The DDS Sytem (Direct Digital Synthesizer) ensures fast Tx/Rx switching times, ideal for Data Communications. An A.T.U. controller is built into the IC-725 for use with the AH-3 H.F. Automatic Antenna Tuner for mobile or base station operation.

Accessory options available are the PS-55 20A P.S.U., AH-3 Auto Antenna Tuner, UI-7 AM Tx. FM Tx/Rx Unit, FL-100 500Hz CW Filter, FL-101 250Hz CW Narrow Filter and SP-7 External Loudspeaker.

For more information on the IC-725 budget H.F. and other ICOM amateur equipment contact your nearest authorised ICOM dealer or phone us direct.

Icom (UK) Ltd.
Dept PW, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 0227 741741 24 Hour. Fax: 0227 360155
Datapost: Despatch on same day whenever possible.
Visa & Mastercards: Telephone orders taken by our mail order department.
Instant credit & interest free H.P. available.

MasterCard VISA



NICAM

...set your sights on a better sound!

Experience a new sensation. An experience that opens up a whole new spectrum of sound.

Put yourself on stage at the Albert Hall, surrounded by a great orchestra. Imagine the sound you will hear, every nuance, every note; or travel up the Nile with an intrepid explorer, a journey not only full of breathtaking beauty and colour, but rich in the sounds of another continent; or capture the hidden gasps of 100,000 hardened fans at Wembly for the F.A. Cup Final, when the ball skims the crossbar with the last kick of the match; follow with your ears as well as your eyes, dodging the bullets, as your favourite hero battles out of yet another tight corner, it's just like being in a cinema!

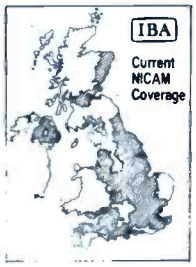
Nicam hi-fi stereo will turn your living-room into a living room of sound! You don't settle for second best with television picture quality, why settle for second best in television sound quality? Nicam sound is the new high quality digital stereo sound system, pioneered by BBC, ITV and TV/video manufacturers. In fact so good is Nicam it is comparable to the superb sound reproduction of the compact disc, when played through your existing hi-fi arrangement. If your television hasn't got a built-in Nicam decoder, you will need the Maplin Nicam Tuner System. Ultimately almost all of your favourite programmes will be broadcast in superb hi-fi quality stereo-sound. Without a Maplin Nicam Tuner you won't be able to capture every sound to its full.

Nicam hi-fi stereo. Catch your breath, open your eyes, and pin back your ears! It's what your hi-fi system was made for . . . It's what your ears are made for!

DIGITAL STEREO TV SOUND FROM YOUR HI-FI

The complete kit contains all the components required to build the unit. However you will also need: a power supply, 12V at 600mA regulated e.g. YZ21X at £8.95; a co-ax Y adaptor e.g. FS23A at £1.20; a co-ax lead to connect to your TV or video; RW36P 2m long at £1.28, JW39N 5m long at £1.98, or JW40T 10m long at £2.95; a phono lead to connect to your hi-fi e.g. RW50E at 98p or a SCART Peritel lead JW36P at £4.95. An infra-red remote control kit is also available LP20W at £29.95.

Complete kit LP19V only £139.95 incl. VAT + £1 mail-order handling charge.



Maplin ELECTRONICS

CREDIT CARD HOTLINE

0702 554161

For a friendly welcome and the very best of service why not visit our shops in Birmingham, Brighton, Bristol, Leeds, London (Edgware and Hammersmith), Manchester, Newcastle-upon-Tyne, Nottingham, Reading, Southampton and Southend-on-Sea.

Subject to availability. Prices subject to change.

Digital stereo sound companion for your TV set.