

practical Wireless

JULY 1992 £1.75

MORSE SPECIAL

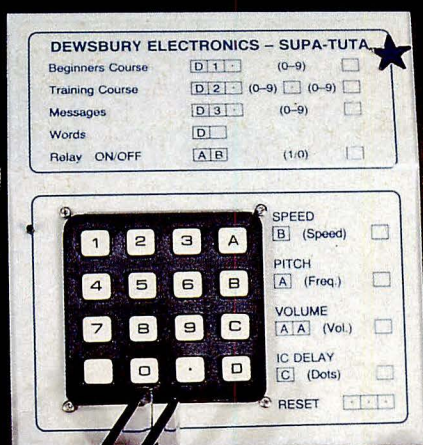
**Read About Selwood's Success In
The Morse Test, Build A Morse
Mobile Transmitter, CW Equipment
Showcase Guide**

SPECIAL COMPETITION!

Win A Datong Morse Tutor



**Reviewed
The MFJ-9020 QRP CW
Transceiver For 14MHz**



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MARCO
TRADING

32 Page Catalogue

**Find The Components And The
Equipment You Need In Their Summer
1992 Issue**

**Plus Getting
Started The
Practical Way,
CB High & Low,
Bargain
Basement And
Lot's More!**

ISSN 0141-0857



YAESU

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FT-650

With 6, 10 and 12m frequencies you can avoid the crowds

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- Semi Break-In CW Keying and Side Tone.

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Performance without compromise

practical Wireless

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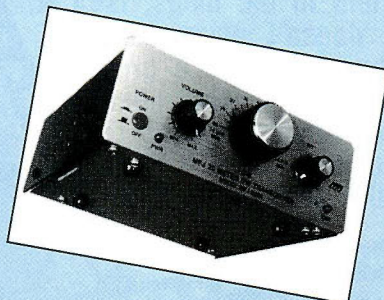
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Listen on the short wave broadcast bands with the PW Subscribers' Club
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Front cover: Our thanks go to Datong Electronics Ltd., Dewsbury Electronics,
G4ZPY Paddle Keys International, Kent Keys, and Waters & Stanton for the
equipment loaned for photographic and review purposes.

Packet Panorama has been held over this month.

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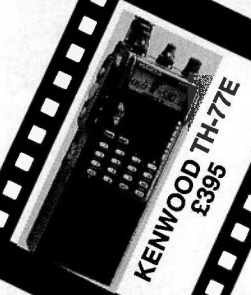


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ALINCO DJ-590E
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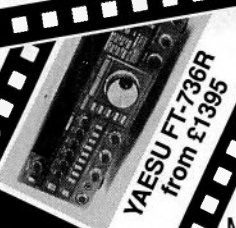
KENWOOD TS-950
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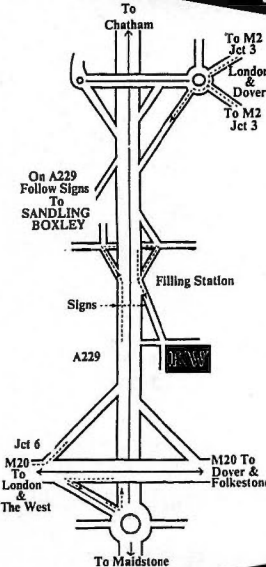
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Don't forget – we stock a wide range of accessories including antennas, mounting hardware, cables, connectors, mobile mounts, SWR meters, PSU's, morse keys, coax switches, rotators, scanners and receivers, microphones, headphones and much much more!

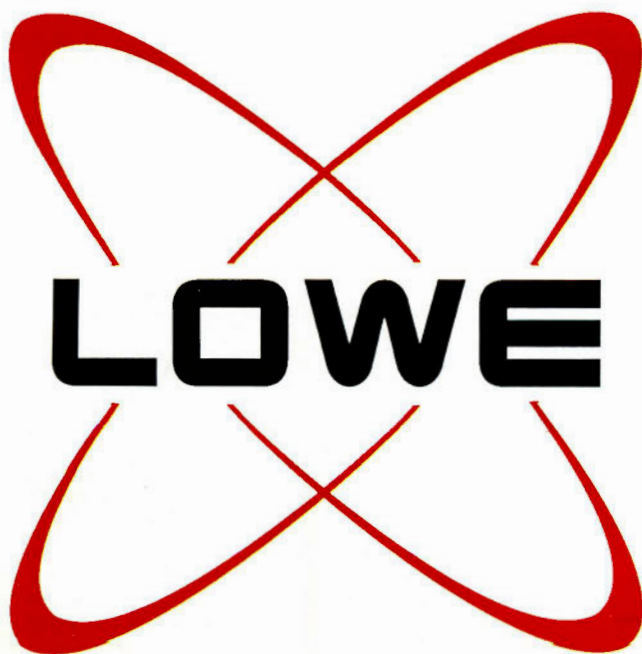


KW has been serving radio amateurs in Kent for many decades – a tradition the new KW will be continuing! Be you man of Kent or Kentish Man, everything for the amateur is right here in the heart of the country. A quick look at a map will also show how easy we are to get to from other areas. Sussex Man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

Our showroom is bright, warm and comfortable, allowing you to relax whilst browsing through our latest books, checking out the latest accessories of trying out a new rig on air before you buy. For those unable to visit we offer a speedy mail order service to get goods to you quickly. Unfortunately you will miss out on the refreshments and the charm, wit and experience of our sales staff! Rest assured we always do our best however you contact us!

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

KENWOOD



INTO ACTION

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HF ATU



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Windom 40/20/17/12/10m	1kW 21m L	£59.00
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Dipole 30/17/12m	200W 11m L	£79.00



2m & 70cms Dual Bander DJ-580E

£369

inc VAT

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

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

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

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



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**Auto repeater mode
AM Airband Reception
Expanded Receive to 995MHz**



Specification

Tx	144-146MHz 430-440MHz
Rx	AM 108-143MHz FM 130-174MHz FM 400-470MHz FM 810-995MHz
Steps	5, 10, 12.5, 20, 25kHz
Memories	42
Power Output	2.5/1.0/0.3 Watts 5 Watts with 12V DC
Scan	8 Modes
Tones	1750Hz plus DTMF Optional CTSS
Sensitivity	12dB SINAD -15dBu
Size	140x58x33mm
Weight	410g
Accessories Supplied	Ni-Cad pack, AC charger, belt clip, carry strap, dual band antenna.

WATERS & STANTON ELECTRONICS

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RAVE REVIEWS



FT990

- * Amateur bands Tx 160-10m
- * General coverage Rx
- * Power output up to 100W P.E.P.
- * Auto ATU and internal P.S.U.
- * 50 memories

Since its arrival in the UK the Yaesu FT990 has been hailed as a resounding success in both performance and ergonomics.

Central to the success of the FT990 is the many hours of extensive development by the engineering team at the Yaesu factory which ensures that all the very latest in circuit techniques are employed to benefit the operator. By the use of more sophisticated designs the actual operation of the transceiver can be made very easy and logical, whilst retaining the superb electronic performance expected from modern transceivers.

Almost all the people who have reviewed the FT990 agree that it is hard to beat at the price and they all suggest you try one.

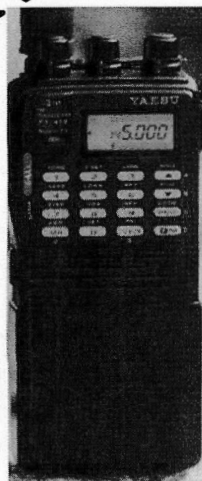
A large number of amateurs are already enjoying the pleasure of operating a transceiver in a class of its own.

So why not join this group of happy people by trying one today at your local dealer!

See December 91 edition of P.W. for Rob Mannion's review
April edition of Radcomm for Peter Harts review

NEW

FT415

2m Hand Portable

The FT415 is the latest in a long line of highly acclaimed hand portable transceivers from Yaesu. Very similar to the FT26, the FT415 is a compact deluxe hand-held with a number of novel features and of course a full numeric keypad.

A whole new range of battery saving features are included to prolong the duration of operation of the transceiver. Amongst these features are the A.B.S. (Automatic Battery Saver) which monitors operating history and optimizes the save duration accordingly. A selectable automatic power off system turns the transceiver off after a period of inactivity.

Supplied with an FNB28 and NC28C charger the FT415 produces 2.5W RF output, this can be increased to 5W by using the optional FNB27 12V ni-cad pack or the EDC5 DC adaptor.

Others options include: CTCSS unit, desk charger, mobile bracket, external speaker, microphones,

vinyl cases and headsets to operate with the internal VOX circuit.

Why not drop into your nearest SMC shop and see one in action!

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FT2400H

2m FM Mobile - Rugged & Reliable

Possibly the roughest, toughest 2m FM mobile transceiver on the market today, the FT2400H has been designed to cope with the rigours of constant day to day operation.

It is probably the only amateur transceiver to be based on a PMR mobile that has passed US military standards for shock and vibration.



The FT2400H is based on a one piece diecast alloy chassis which allows a full 50W RF output without the need for forced air cooling.

Some of the features of the FT2400H include automatic display dim controls with 8 different levels to suit almost all ambient light conditions, a flip-down front panel hides a number of the minor controls allowing trouble free mobile operation - no unexpected channel changes or scanning!

Probably the most useful feature is the ability to programme the memory channels with an alpha-numeric code up to 4 characters long to easily identify certain memories ie. S20, R1 or repeater call signs, 3SN etc. etc.

All these features are packed into an aesthetically pleasing din size package. Try one today we think you'll like it!

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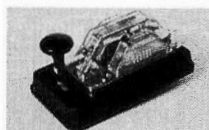
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TNC 24 on Demonstration at SMC HQ

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HK808	Straight Key	2.5Kg deluxe marble plinth.....	68.00	B
HK711	Straight Key	Knee mounting.....	42.65	B
HK802	Deluxe straight key, bearing less solid brass construction.....		99.95	B
HK803	Brass high deluxe telegraph key c/w base plate.....		91.50	B
HK804	Brass high deluxe telegraph key w/o base plate.....		97.00	B
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MK703	Squeeze Key	1.1Kg set in heavy metal base.....	37.80	B
MK704	Squeeze Key	0.15Kg.....	25.50	B
MK706	Squeeze Key	0.7Kg.....	35.75	B

TELEGRAPHIC EQUIPMENT

ELECTRONIC KEYS

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DEWSKEYM	Star Masterkey (Memory).....	95.00	B

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Alternative winches and head units are available at extra cost.

Delivery is by quotation dependent upon distance.

Mobile towers also available to order

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The Daiwa range of power supplies is proving very popular for all types of applications, both for the professional user and the hobbyist alike. From the smallest 9A continuous PS120MKII, via the extremely popular 24A PS304, to the top of the range 32A.

continuous RS40X. All the Daiwa range of PSU's feature variable voltage from at least 3-15V and switchable voltage 1 current metering. Both the PS304 and RS40X have a cigar lighter socket, convenient for powering your handheld.

Also available from Daiwa are some good quality SWR/PWR meters and coax switches.



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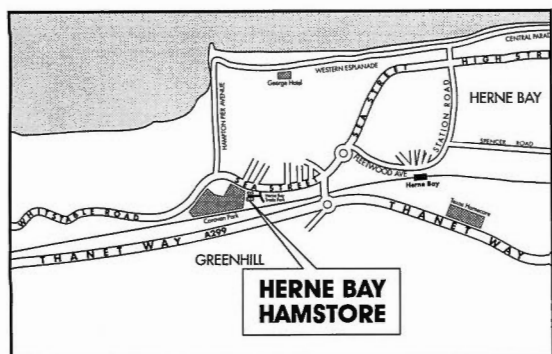
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73's, Chris G8GKC, Gordon G3LEQ and John G8VIQ.

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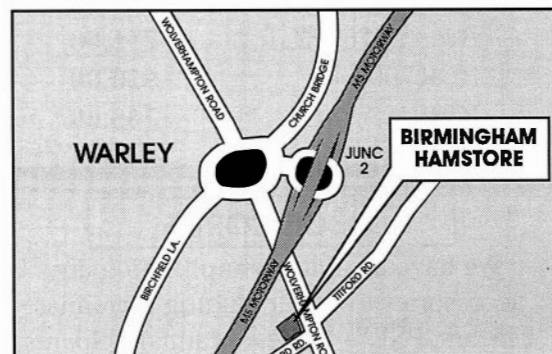
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SG-230

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TRIO TR-2500	2M Hand-held c/w mobile stand/charger	169.00
KENPRO KT-44	70cms Hand-held (comp.)	139.00
YAESU FT-203R	2M Hand-held c/w charger, case, speaker mic, mobile speaker, 12v adapter	169.00
TELERADER CWR-670E	RTTY/CW Decoder	80.00
AR-3000	HF/VHF/UHF scanner covering 100kHz-2036MHz, all modes (as new)	599.99
KENWOOD TH-205E	2M handheld	169.00
KENWOOD TR-9130	25w 2M multimode	340.00
LOWE HF-125	HF receiver c/w keypad, AMS/FM board, active antenna and port. case	315.00

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P.C. BOARD with 2 x MJ10006, 2 x Heat Sinks, 2 x Thyristors (S.C.R.'s), 2 x High Current Diodes @ £1.00 (p&p £1.50).

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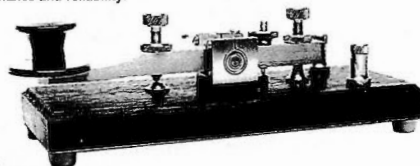
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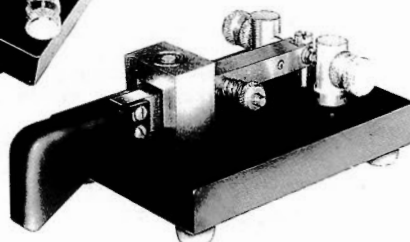
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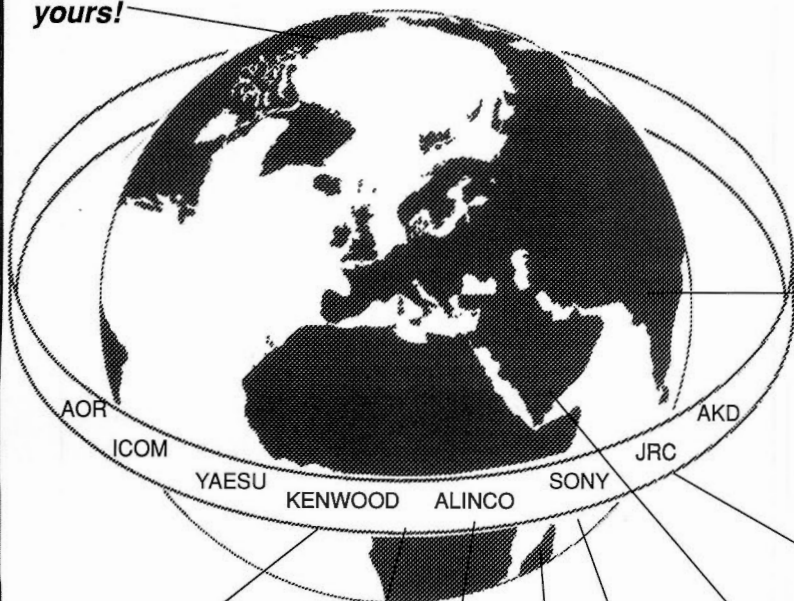
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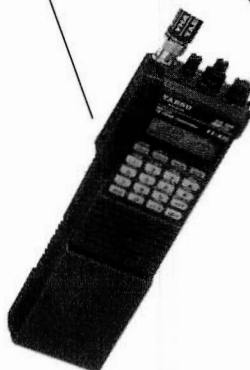


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MARTIN LYNCH..

Who's kidding who

Over the last few months I've been reading with interest my competitors referral to the recession and how they are going to be around in 150 years to serve you for various strange reasons. Another point raised is the question of discounting. Yes, I will agree that it is not possible to offer 'discounted prices' and still maintain a level of back up and after sales service that you deserve. No doubt in some of the most recent events in amateur retailing, those who continued to heavily discount finally screwed themselves so hard it all caught up with them. I don't agree however, that you should be dictated to on price, so much so that



whether you are spending £5 or £5000, you will not get a penny off. I have never thought that way, neither has my mentor (?). I am always prepared to 'talk turkey', provided the deal is sensible and still leaves me enough margin to continue offering you the best possible 'after sales' service in the U.K. If you can get a better offer, phone and tell me. If I can match it and know that I can look after you in the event of something going wrong, we've got a deal.

buying from. The name on the door or indeed the adverts do not always give you the answer. As an independent retailer I will always be able to offer objective advice on all products sold. I won't be biased towards one particular brand, because I don't have to. Thank you for your continuous support. For unbiased and objective advice, call me today!

Why I'll always "Talk Turkey" . .

On the subject of who's kidding who, when you next spend your cash on a new rig, make sure you know who you are

by *Martin Lynch*
73 MARTIN G4HKS

THE LATEST H.F. TOP TEN



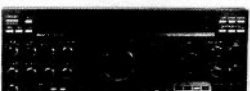
1. ICOM IC728 - Straight in at number 1, ICOM's latest H.F. multimode. All band, general coverage, 100W O/P with P.B. tuning and up-to-date packaging make this a firm favourite! **£825.00**

2. YAESU FT890 - You thought the FT990 reviews were good, wait until you read this one! The world's smallest H.F. all band transceiver with optional auto A.T.U. - built in! **£1075.00**

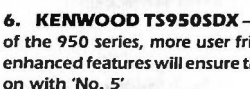


3. KENWOOD TS690S - A first 100W H.F. transceiver with general coverage receive and a full feature 6 metre option, running 50W output thrown in? Price up two separate rigs and see what that comes to! **£1395.00**

4. YAESU FT990 - So I've finally beaten my own U.K. record for sales of FT1000's with the FT990! Rob Mannion and Peter Hart say it's good - so have dozens of Martin Lynch customers. **£1895.00**



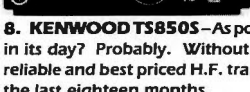
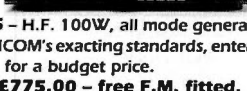
5. YAESU FT1000 - It's confirmed - the ultimate in H.F. base station - £3K is a lot of money, but for a life long investment? I don't think so. If you want the best engineered transceiver and appreciate quality, ring me for a super deal.



6. KENWOOD TS950SDX - The latest version of the 950 series, more user friendly and further enhanced features will ensure this competes head on with 'No. 5' **£2995.00**



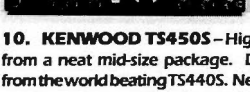
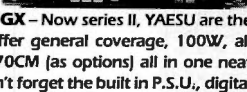
7. ICOM IC725 - H.F. 100W, all mode general coverage, built to ICOM's exacting standards, enter the world of H.F. for a budget price. **£775.00 - free F.M. fitted.**



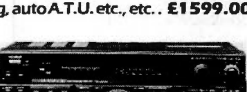
8. KENWOOD TS850S - As popular as the TS830S in its day? Probably. Without question the most reliable and best priced H.F. transceiver I've sold in the last eighteen months. **£1475.00**



9. YAESU FT767GX - Now series II, YAESU are the only company to offer general coverage, 100W, all mode and 2M/6M/70CM (as options) all in one neat package . . . Oh, don't forget the built in P.S.U., digital power/SW/R metering, auto A.T.U. etc., etc. **£1599.00**



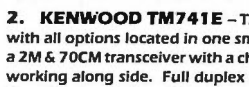
10. KENWOOD TS450S - High performance H.F. from a neat mid-size package. Defiantly takes over from the world beating TS440S. New display, improved receive performance and a sensible price. **£1220.00**



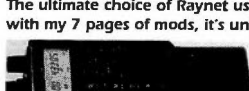
THE LATEST VHF/UHF TOP TEN



1. KENWOOD TM732E - With Kenwood's hi-fi styling influence, their visual appearance and ergonomics are left unchallenged. The TM732E is the latest high power dual band compact transceiver. Remote head, full 50W out on 2 & 35W on 70CM. In stock **£599.00**



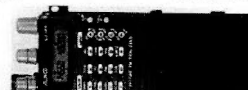
2. KENWOOD TM741E - The only 'triple band' mobile with all options located in one small housing. You can have a 2M & 70CM transceiver with a choice of 6M or 10M or 23CM working along side. Full duplex between any of the bands. The ultimate choice of Raynet users country wide, together with my 7 pages of mods, it's unbeatable! **£759.00**



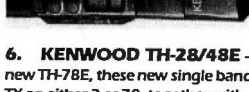
3. ICOM ICW2E - The milestone and bench mark to which other dual band handles are compared - full duplex, dual band 2/70, A.M. RX on airband, 900MHz receive and lots more, together with never ending range of accessories. **£395.00**



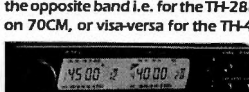
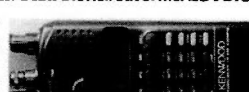
4. ALINCO DJ580E - The latest dual band handle hosts features that others are still catching up on, how many for example can still operate at below 3.8 volts? Patented by ALINCO, this is one of its many outstanding features. All for a very low price of **£369.00**



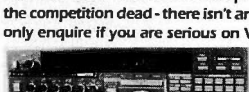
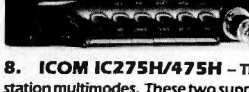
5. KENWOOD TH-78E - Can't keep up with the ever changing range of dual banders? Neither can I! The successor to the TH-77E, this one is splendidous. (Splendid what?). The only handle to offer you dual band RX on both bands, i.e. two frequencies on 2 or 70CM's in addition to its dual band TX capabilities. Beats the hell out of me! **£395.00**



6. KENWOOD TH-28/48E - Along the lines of their new TH-78E, these new single banders offer you single band TX on either 2 or 70, together with dual RX on one band (i.e. two frequencies in-band simultaneously received), plus RX on the opposite band i.e. for the TH-28E transceiver on 2 and RX on 70CM, or visa-versa for the TH-48E. Phone.



7. ALINCO DR-599E - Dual watch, remote head high power mobile 2/70. Special attention to U.K. operation - one of the few to offer tone burst inside the rig, not built into the mic like most. New bright lit display and a host of features. **£539.00**



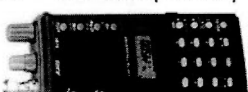
8. ICOM IC275H/475H - The best in high power base station multimodes. These two supremos from ICOM have killed the competition dead - there isn't any! 100W on either 2 or 70, only enquire if you are serious on VHF or UHF operation.



9. YAESU FT736R - Like the FT767GX, YAESU have as yet, no competitor alternative to this one - all mode 2 & 70 with 6M and 23CM all in one box. P.S.U. included. ICOM & KENWOOD wake up! Is there a patent pending on this idea?? **£1395.00 (6/23 extra)**



10. ALINCO DJF1E/S1E - Small, neat, tough, versatile, 2M handles with AM air band. **£239/£179**



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Keylines

Recently, during my trip to the 1992 Dayton HamVention, I met a remarkable young lady radio enthusiast. Although she was both blind and confined to a wheelchair, her interest and enthusiasm for the hobby was infectious.

Despite her visual handicap, she has enjoyed *PW* in the past, thanks to receiving an audio-cassette recorded version of the magazine. Now, because of the security problems and costs, she can no longer get a taped copy of *PW* sent from overseas to the USA.

Dedicated Readers

I've no doubt that the various tape libraries, 'talking newspapers' and dedicated page-to-tape readers in the UK, would be more than willing to help. However, this is an appeal which I'm directing at our readers in the USA.

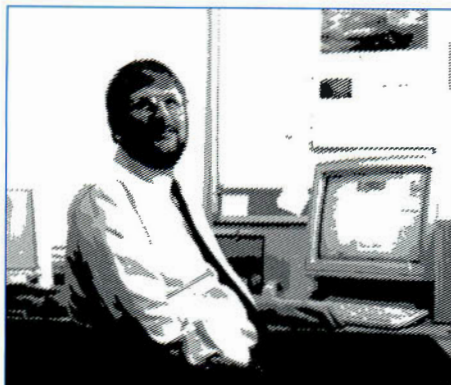
By having the magazine read on to tape in the USA, the problems associated with 'suspicious' little packages in aircraft will be avoided. Wary Customs and Excise officers won't be involved either!

So, if you're an American reader prepared to spend some time to help, let's be hearing from you! Alternatively, you may know another enthusiast who particularly enjoys reading aloud. If so, they may be just the person to record extracts of *PW* on to tape.

I've no doubt whatsoever that there are other enthusiasts in the USA and Canada who'd like *PW* on tape. In fact, I wouldn't be surprised to find out someone is already providing the service in north America. I'd be delighted to pass on the news if this hunch turns out to be accurate.

Newsdesk Appeal

While on the subject of



73 DE Rob Mannion G3XFD

helping visually handicapped radio enthusiasts, I'm reminded of a recent appeal in *PW*'s 'Newsdesk '92'. The request for help, published in the May issue, was asking for volunteers to help the 'Talking Book' service here in the UK.

Along with very many other radio amateurs, I've been a 'Talking Book' servicing volunteer for a long time. In fact, I think it was at one of the old London RSGB shows (held at the Royal Horticultural Hall) that I first signed up to help during the early 1960s.

Thoroughly Enjoyed

Over the years I've thoroughly enjoyed the (infrequent) calls on my services. Sometimes, especially in the mid 1960s, I found myself exploring the depths of Devon and Dorset to service the special cassette players. The welcome I received was always heartwarming.

Eventually, I collected quite a few regular customers. One of these customers was a World War One veteran. He was a marvellous old character and was a keen s.w.l. This particular gentleman was also an avid 'roll

your own' type of smoker, and although he made a mess with the tobacco, still managed the technique fairly well.

Tobacco And Tape

Unfortunately, shredded tobacco and talking book cassette tape don't mix very well. So, about once a month I had to drive out to the beautiful Meon Valley area of eastern Hampshire to sort the machine out for the gentleman concerned!

The servicing of the machine was simplicity itself. All I had to do was to remove all the shredded tobacco pieces from the mechanism, clean around the multi-tracking head system and degrease the heads themselves.

The job only took half an hour or so and I often had a good chat with the old chap. He delighted in telling me about the horse-drawn wireless telegraphy equipment he was involved with in the 'Great War'.

Along with older people like my 'roll your own' gentleman, I met many other delightful talking book users. Naturally, they were just as interested in me and my hobbies, and I didn't waste any

opportunity to tell them about amateur radio and short wave listening.

As a result of my work servicing the machines, I'm pleased to say that several of my 'customers' took up amateur radio. I'd also like to say, without meaning to be patronising to blind or disabled people, that the hobby and friendship that it brings is absolutely ideal for those with limited mobility.

Worthwhile Service

Now you've heard a little more about talking books, why don't you consider offering a little time to help a very worthwhile service? You never know, you may well be able to help someone discover the wonders of radio communications for themselves.

However, I must warn you that if you do volunteer, be aware of the 'not ready yet' trap. This can occur when you're repairing a machine (usually at home on the bench) and you become engrossed in the story on the cassette. It's particularly infuriating when you find that another cassette is needed to complete the story!

You'll end up with having to issue the standard excuse 'it's not ready yet', and (as I often did) buying the book in printed form! Whatever else happens, you'll find you're reading more books, learning more, making new friends and providing a valuable service.

73 DE Rob Mannion

If you are interested in becoming a 'Talking Book' servicing volunteer, please contact **David Finlay-Maxwell on (0484) 450982 (work) or (0484) 604546. Alternatively, you can write to him at the following address. c/o D F Maxwell & Co., Prospect House, Huddersfield, Yorkshire HD1 2NU.**

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 past years are available at £1.80 each including post and packing. Binders, each holding one volume of *PW* are available price £5.50 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.

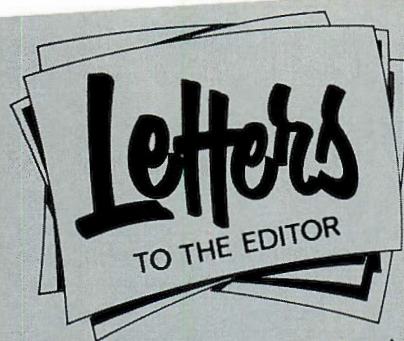
Intermediate: A fair degree of experience in building electronic or radio projects is assumed, but only basic test equipment is needed to complete any tests and adjustments.

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. 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.



Send your letters to the editorial offices in Poole. They must be original, and not duplicated in any other magazine. We reserve the right to edit or shorten any letter. The views expressed in letters are not necessarily those of *Practical Wireless*. The Star Letter will receive a voucher worth £10 to spend on items from our Book, PCB or other services offered by *Practical Wireless*. All other letters will receive a £5 voucher.

THIS MONTH'S STAR LETTER

Lieber Om

Ich habe ihrer artikle in *PW* gelesen und die fremden sprache ist fur mich auch ein hobby und miene sprachkenntnisse ist gut. Ich bin in die abend schule, Deutsch zu lernen daß ich am radio sprechen können.

Auch lerne ich Italienisch und die Italianien sagen. 'Sie sprechen so gut' Complimenti Molli complimenti!

So, now back to English! All this adds a great deal to a QSO and gives me much pleasure. I am 68 years old. First licenced in 1947, US general licence 1991. I hope to meet you on air one day, and we can practice together in foreign languages!

Cyril Malcolm GM3BXW/KB2NFT
Giffnock, Glasgow

Editor's reply: Thanks for your delightful (and very appropriate) reply Cyril. My daughters (who were taught Scottish Gaelic when we lived in the Highlands) will help us out on the air when you use Gaelic I've no doubt! I'm also very pleased to say, that there was a very positive response to the 'Keylines' which covered learning foreign languages. We've had many letters on the subject, and although I can't reply to everyone personally who wrote in, your interest has not been in vain! Watch this space, and I hope you enjoy the practice provided by Cyril Malcolm's letter as you translate it!

Dear Sir

In response to your article, ('Keylines' April 1992) please find enclosed some information on Esperanto.

The International Language is used on the h.f. bands. Skeds and nets arranged by ILERA (International League of Esperanto Radio Amateurs) can be heard most days on 14MHz and 7MHz. The British representative for ILERA is Barry Foreman G0EXS who is QTHR.

Daily broadcasts in Esperanto are made from a number of countries. Good luck, and many thanks for a very fine magazine.

Alan L. Smith
Chelmsford
Essex

Editors comment: Thanks for the information and the Esperanto course Alan, I shall tackle it and hope to join you on the net one day!

Dear Sir

Although only an "ever so 'umble" listener to the short waves, I continue to find much of interest in *Practical Wireless*. The articles by the Rev. George Dobbs G3RJV give me a better understanding of my receiver. Also, the articles by Ray Fautley have helped my daughter in the preparations for her GCSE math's exam. I would certainly buy both should they be produced in booklet form.

However, my main reason for writing to you, is to ask if I might thank a small band of volunteers via 'Receiving You'. I do not know any of them, and have only heard one speak on the air. They are there every week, bang on schedule and have certainly advanced my knowledge of radio communications.

I refer of course to those amateurs who give up their own time to send out the RSGB Slow Morse transmissions.

When I first started listening to the amateur bands, I was shut out of about half of them because I could not understand the Morse code. I set about trying to remedy this, and in the last six months or so, I have progressed from ignorance (not a blissful state) to nearly the test speed. In the greater part this is due to regular practice I get on Monday nights from GB2CW.

In particular I would like to thank John (G3SJE) whose friendly sessions in London have advanced my enjoyment of amateur transmissions. I know he reads your magazine as he used a section from 'Keylines' (April) as a test piece!

Ron Galliers, Islington
London

Editor's comment: Thank you for your letter Ron. The *PW* team are delighted to hear that you find 'Getting Started' so helpful. George G3RJV, has lot's more interesting projects in store. Ray Fautley G3ASG will also be delighted to hear your comments. I agree also that we should all salute the dedicated band of 'Slow Morse' operators around the country. Thank you GB2CW. Finally, I must say that I fell about laughing, when I read that 'Keylines' April had appeared on GB2CW broadcasts. I was surprised, pleased and flattered, and (hand on heart) I honestly didn't notice that comment when your letter was chosen for publication!

Dear Sir

In my own mind there are no doubts at all that many *PW* readers, young and old, and many in the amateur radio fraternity, would thoroughly endorse and support the need for more 'no frills', cheaper, easily-serviced h.f. receivers and transceivers ('Keylines' *PW* April).

Hopefully, the message will get across to manufacturers who will take the initiative in meeting the challenge. There are signs that this may be happening already, but after 30 years there is much leeway to make up. We may have to rely on overseas suppliers in meeting our needs for a few more years yet. What a pity everyone is not cast in the same image as the Rev. George Dobbs G3RJV!

R. Williams, Deddington, Oxon

Editor's reply: Thank you for your support Mr Williams. I'm pleased to say that many readers (judging by the written support I've received) agree that amateur radio needs cheaper commercially made equipment if the hobby is to survive. Although v.h.f. and u.h.f. gear is still fairly reasonably priced, h.f. equipment prices are rising to a level where I realise many people can't possibly afford to buy anything. So, hopefully, the major manufacturers will consider 'budget' lines, to complement their equipment with prices over £1000. You never know, perhaps one or two of our British-based manufacturers (including those who make kits) will be tempted to enter the market for reasonably-priced ready-made h.f. transceivers. I would be very pleased to publish their opinions on the subject in 'Receiving You'.

Dear Sir

The article by Rev. George Dobbs G3RJV on the 'Dip Meter' refers to a variable capacitor in the shopping list. This is listed as Maplin Ref. FT-79L, however the photographs show this as a different type, i.e. Ref FT-78K, and it is easy to confuse these two items.

Would you please confirm which is the correct component.

R. P. Lapham
Huntingdon
Cambridgeshire

Editor's reply: Sorry, it was our mistake Mr Lapham. The variable capacitor used was an FT-78K, and both 'gangs' are paralleled up (the two outer tags are connected together). The centre tag is 'common' earth.

Dear Sir

Considering the number of features manufacturers cram into even the smallest hand-held radio, I have yet to see either a transceiver or scanner which includes a clock in the digital display.

The cost involved would be minimal, as would the power drain. It would seem that only a very small number of the more expensive base-station radios, seem to have this included.

Is there any technical reason why they are not added as a matter of course, or are they thought to be non-important.

Alan Radley
Thundersley
Essex

Editor's reply: An interesting question Alan. I don't know the answer, but you may be interested in the useful little digital clocks I use. They're small (a little larger than a 50p coin), cost around £3.50, and are available in a variety of colours from virtually any car accessory shop. I've got one fixed (using 'Araldite') to the left-hand corner of the interior driving mirror in my car. When the battery needs replacing (approximately every two or three years) it's cheaper to buy another clock than a new cell! These clocks also go well with radio equipment.

COMPETITION CORNER

Spot The Difference & Win a Datong Morse Tutor



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

☐ Subscription ☐ Voucher

Circle the 12 differences and send your entry (photocopies acceptable with coupon) to: July Spot The Difference Competition, PW Publishing Ltd., Enefco House, The Quay, Poole, Dorset BH15 1PP. Editor's decision on the winner is final and no correspondence will be entered into.

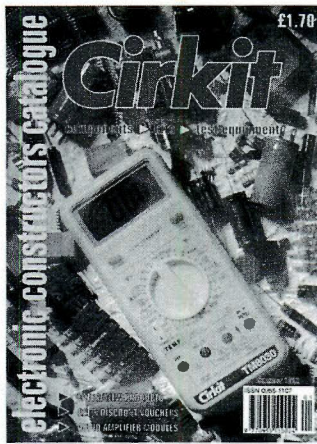
Entries to reach us by Friday 24 July 1992.

First Prize: Datong D70 Morse Tutor (kindly donated by Datong Electronics).

Second Prize: One year subscription or £20 book voucher.

Competition Corner
July '92

Send all your news and new product details to Sharon George at the Editorial Offices in Poole



Cirkit Summer 1992 Catalogue

Cirkit have just published the Summer 1992 edition of the Electronic Constructors' Catalogue.

With 24 product sections, 192 pages, and over 3000 lines, the catalogue includes many new products. Also included are the usual discount vouchers and a new easy-to-follow clear layout. Available from larger newsagents or direct from **Cirkit at Park Lane, Broxbourne, Hertfordshire EN10 7NQ.** Tel: (0992) 441306 enquiries.

Special Event Station GB1MEN/GB0MEN

On 27 June 1992, Malcolm Bidwell G0LDM, will be running a special event station using the callsigns GB1MEN and GB0MEN, at St. Francis Special School, Oldbury Way, Fareham, Hampshire, during the school's summer fete. Any amateurs are welcome, especially Novice licence holders, who will be made most welcome and invited to operate on h.f. and v.h.f.

As a committee member of the Fareham & District ARC, he would like to take this opportunity to invite any radio enthusiast to their club (see 'Club News'). They have a station on-board HMS *Warrior* in Portsmouth Harbour (callsign GB4HMS) and new operators are always welcome, licensed or not!

The GB1MEN/GB0MEN callsign stands for MEN-CAP (Fareham & Gosport Society for mentally handicapped children and adults). They will be issuing special QSL cards.

Further details about the above from **Malcolm on (0705) 528162.**

Kanga Products

Kanga Products latest catalogue is now available, from **Kanga Products, 3 Limes Road, Folkestone, Kent CT19 4AU.** Tel: (0303) 276171.

JAB Electronic Components

The JAB Electronic Components company of Birmingham, have just published their 1992 catalogue for the hobbyist and home constructor. The catalogue comes complete with over £30 worth of special discount vouchers and a special bargain list. Copies of the 1992 catalogue are available, priced at £1.25 each (including p&p) from **JAB Electronic Components, rear of Queslett Motors, 1180 Aldridge Road, Great Barr, Birmingham B44 8PB.**

Is Your Club This Old?

If your club thinks it is old, can you beat the record of the Exeter Amateur Radio Society? This year it celebrates its 72nd birthday. It was inaugurated on 20 September 1920. A number of well-known amateurs of the pre-WWII period came from its ranks, amongst them was 'Herbie' Bartlett G5QA, who later became President of the RSGB. Others were the Rev. A. B. Trewin G2AT, Vicar of Exminster, and F. W. Saunders.

Perhaps the most famous member was Sir J. Ambrose Fleming M.A., D.Sc., FRS, the inventor of the Thermionic Diode, which led to the development of valve technology. After his retirement to Sidmouth in 1926 he became its President.

A number of young lads, influenced by the club members, became amateurs after the war. One of these was Richard Marris G2BZQ, who still contributes to radio magazines. Another is Tom Smith G3EFY, who still operates from the hill above Exeter.

The members met together after the war, in 1947, and re-formed the Society with the new name of Exeter Amateur Radio Society. The list of two letter callsigns was quite impressive.

Exeter ARS is celebrating its 72nd birthday with a special event station on the 20th & 21st June 1992, at the gardens and home of Dr. J. Theobalds GB2EWS (Exeter Wireless Society). Messages on packet radio to the station will be welcomed, and it is hoped the log books will be filled with contacts on 7, 14 and 28MHz.

Former members and visitors will be most welcome to 'sign-in' and re-new acquaintances. Details from:

**W. G. Western G3TDW
Sandye Place
181 Topsham Road
Exeter
Devon EX2 4SQ.**



Drop In By Parachute!

The Milton Keynes & District ARS Car Boot Rally is unique in as much as it is readily accessible by car via the M1 motorway, by bus, by car from Bedford, or, for the more affluent, by aeroplane! However, another option is as the photograph taken last year depicts, with the Boot Rally going on in the top right background - by parachute!

Coming back to earth, whatever your mode of transport, whether it be by car, bus, plane or parachute, this year's event will be held on September 6 at Cranfield Airport, Beds (more details in 'Radio Diary').



Itchen Valley ARC 10th Anniversary

The Itchen Valley ARC, which covers amateur radio enthusiasts in the Southampton, Chandlers Ford and Romsey areas, recently celebrated its 10th anniversary. The photograph shows Chairman Les Kennard G3ABA (left) and retiring President and ex-RLO for Hampshire Trevor Emery G3KWU, both cutting the 'transceiver cake'.

Equipment Stolen

Over the Easter holiday, Waters & Stanton Electronics had a container load of Microset equipment stolen from a car park in the Midlands. If any reader can be of any help, they would be most grateful. Contact them at **22 Main Road, Hockley, Essex SS5 4QS**.

Coastguard Association ARS

The amateur radio callsign G0RCA has been allocated to the Coastguard Association ARS. This callsign was appropriately selected to coincide phonetically for 'R'etired, 'C'oastguards 'A'ssocation.

The Coastguard Association ARS was formed late last year, by Les Gibson G3RCX, to foster relations between serving and retired regular and auxiliary coastguard officers, who hold amateur radio licenses. They hope to encourage contacts with many members of the public through amateur radio links.

This is to help publicise the Association's Registered Charity Fund, founded in the early 1970s, by its present Chairman, Commander John Douglas, ex-Chief Inspector HM Coastguard from 1970 to 1979. He is assisted in the administration by eight other committee officers, most of whom are serving or retired coastguards. He is also ably supported by the many branches of the Association, based at coastguard stations throughout the UK, northern Ireland and the Isle of Man.

Its purpose is to provide financial and practical assistance to serving and retired regular and auxiliary coastguards and their dependants in time of need through disabling accident, illness or other distress. The fund is entirely non-profit making.

The CGA amateur radio net is at present on Sundays at 1000 hours local time on 3.765MHz plus-minus up to 5kHz, and again when possible at 1900 hours.

Les Gibson G3RCX
7 Heycroft Road, Eastwood
Leigh-on-Sea, Essex SS9 5SW.

GB4ATC Air Training Corps Special Event Station

Again this year, the Air Training Corps will be operating an h.f. special event radio station. The station will be on the air between 1100 hours and 2200 hours local time for the duration of the Royal Tournament, July 8 to 25th except Sundays.

Air cadets will be on hand to pass and receive greeting messages. Alongside the station will be a demonstration station operated by air cadets using their own allocated ATC frequencies. Low band v.h.f. and h.f. frequencies will be in use.

Further information from **Malcolm Wood, 12 Lime Tree Walk, Enfield, Middlesex EN2 0TJ. Tel: 071-438 6053.**

Scarborough Special Events Group

The Scarborough Special Events Group commence their summer season on June 27 and 28th, when they will be on the air as GB0YMR. This is during the Silver Jubilee Gala weekend celebrations, to mark the 25th anniversary of the North Yorkshire Moors Railway.

Operation will be around 3.725 and 7.055MHz, in the h.f. bands, plus 144MHz s.s.b. and f.m. The usual full-colour QSL cards will be available to commemorate the occasion and further details can be obtained from **Roy Clayton G4SSH, 9 Green Island, Irton, Scarborough, North Yorkshire YO12 4RN.**

Aerial Techniques

Aerial Techniques have just published their latest catalogue. Copies are available by return of post for £1, a separate price list is included, together with an order form. **Aerial Techniques, 11 Kent Road, Parkstone, Poole, Dorset BH12 2EH.**



Presidential Visit To Poole

There was a 'state' visit to Poole on Thursday 7 May, when Radio Society of Great Britain President Terry Barnes G13USS, was a guest at the Quayside editorial offices of *Practical Wireless* and *Short Wave Magazine*.

Terry, who has been a reader and supporter of *PW* for many years, was delighted to find that the Royal Marines provided a march-past welcome for him outside Enefco House! He wasn't disappointed to find that his visit coincided with the Marines' traditional right of marching through the town with band playing and fixed bayonets!

During his visit, Terry met the staff and publishers and saw the make-up stages of the June issue of *Short Wave Magazine*. Pictured with Terry (centre standing) are Editor of *Short Wave Magazine* Dick Ganderton G8VFH (on Terry's left), and Steve Hunt who is Art Editor of both *SWM* and *PW*. Taking a back-seat for once, is Rob Mannion G3XFD, Editor of *PW*.

Can You Help?

Can you, or any reader or advertiser, tell me of a source of suitable flexible wire that can be made up into replacement headphone leads, or can anybody supply pre-formed leads such as can be soldered into many of the common types of headphone? I find that a reasonable, mid-market priced headphone, only lasts me four to six months when used several hours a day. The leads always

go open circuit (o/c) or short circuit (s/c) due to constant flexing. I think a solution to this problem could interest many of your readers as well as me. **J. Denly, 38 Bushy Mead, Widley, Waterlooville, Hants PO7 5DY.**

**Newsdesk
-92**

Club News

Please send in all of your 'Club News' items to Sharon George at the editorial offices in Poole.

Acton, Brentford & Chiswick ARC meet 3rd Tuesdays, 7.30pm at Chiswick Town Hall, Turnham Green, London W4. Further details from **Paul Truitt G4WQC** on 071-938 2561.

Appledore & District ARC (Devon) meet 3rd Mondays, 7.30pm in Appledore Football Clubroom. For further details, contact **Trevor Brookes G0JRZ** on (0237) 477777.

Axe Vale ARC meet 1st Fridays, 7.30pm in the 'New Commercial', Trinity Square, Axminster, Devon. Further details from **Pat Cross G0GHH** on (0297) 33756.

Aylesbury Vale RS meet 1st & 3rd Wednesdays, 8pm in the Village Hall at Hardwick. Further details about the club from **Martin G4XZJ** on (0296) 81097.

Barr Beacon RC meet 1st Mondays & 3rd Wednesdays, 7.30pm at 112 Walsall Road, Aldridge, West Midlands. For further details, ring (0292) 36162.

Barnsley & District ARC meet Mondays in the radio club room & shack, at the rear of the Darton Hotel, Station Road, Darton, Barnsley. For further information, ring **Ernie G4LUE** on (0226) 716339.

Basingstoke ARC meet 1st Mondays, 7.30pm at the Forest Ring Community Centre, Sycamore Way, Winklebury, Basingstoke. June 28 is 2m Foxhunt, July 4/5th is VHF Field Day & the 6th is a talk on 'Electronic Warfare' by **Peter Chadwick G3RZF**. For further details, phone (0256) 25517.

Bedford & District ARC meet Thursdays, 8pm in the Allen Club, Hurst Road, Bedford. More details from **Gavin Carmichael, 15 Evesham Court, Avon Drive, Bedford MK41 7AJ**. Tel: (0234) 365660.

Blyth ARC meet Wednesdays, 7pm at Newsham Community Centre, Elliott Street, Blyth, Northumberland. All welcome. Details from **Keith Ritson G0PKR** on 091-237 1963.

Bradford ARS meet 2nd & 4th Thursdays, 8pm at the Polish Ex-Service Club, Shearbridge Road, Bradford, West Yorkshire. June 11 is a discussion - 'The Way Forward & the 25th is 'Thermionic Valves' by **G0EQF**. **Charles Bolt G0ACX** on (0247) 494694.

Braintree & District ARS meet 1st & 3rd Mondays, 8pm at the Community Centre, Victoria Street, Braintree. **M. Andrews, 22 Arnham Grove, Braintree, Essex CM7 5UQ**. Tel: (0376) 27431.

Brighton & District ARS meet 1st & 3rd Wednesdays, 7.45pm at the Roast Beef Bar, Brighton Racecourse, Elm Grove, Brighton. More details from **Harold Lunson G3WTR, 17 Tongdean Rise, Brighton, East Sussex BN1 5JG**. Tel: (0273) 501100.

Bromsgrove & District ARC meet Fridays at Avoncroft Arts Centre, South Bromsgrove, Worcester. More details from **Joe Poole G3MRC** on (0562) 710010.

Bromsgrove ARS meet 2nd & 4th Tuesdays, 8pm at Lickey End Social Club, Alcester Road, Burcot, Bromsgrove. June 23 is Dave Gourley RLO, RSGB Topics & the 28th is Lower Wick Country Fair. **Mr D. Edwards G4ZWR, 2 Mason Close, Headless Cross, Redditch, Worcs B97 5DF**. Tel: (0527) 546075.

Bury St. Edmunds ARS meet 3rd Tuesdays, 7.30pm in Room 40-40 of West Suffolk College, Out Risbygate, Bury St. Edmunds. For more details, contact **Ian G0KRL** on (0359) 70527.

Bury RS meet Tuesdays, 8pm in The

Mosses Community Centre, Cecil Street, Bury, Lancashire. 2nd Tuesdays are Lecture/Talk nights & other Tuesdays are general natter nights with the club's 'new' rigs on the air. More details from **Colin Fox G3HII, 'The Lair', 5 Pinewood Crescent, Holcombe Brook, Ramsbottom, Bury BL0 9XE**. Tel: (0204) 883212.

Buxton Radio Amateurs meet at the Lee Wood Hotel, Buxton at 8pm. June 23 is Field Day discussion. For further details, contact **Derek Carson G4IHO** on (0298) 25506.

Charnwood Amateur Radio Contest Club meet Saturday lunch-time at The Priory Hotel, Loughborough. Dedicated to operating & demonstrating the joys of amateur radio & furthering the hobby. Listen on S17 or contact **Phil** on (0509) 232927.

Chelmsford ARS meet 1st Tuesdays, 7.30pm at Marconi College, Arbour Lane, Chelmsford, Essex. More details from **Roy & Ela Martyr G3PMX & G6HKM, 1 High Houses, Mashbury Road, Great Waltham, Essex CM3 1EL**. Tel: (0245) 360545.

Clacton RC meet alternate Wednesdays in The Imperial Public House, Rosemary Road, Clacton-on-Sea. Their next meeting is on June 24. For their membership details, phone (0255) 672606, 436565 or 615207.

Conwy Valley RC meet 1st Thursdays, 7.15pm at The Studio, Penrhos Road, Colwyn Bay, Clwyd. For further details, contact **Merfyn Jones GW4NNL, 72b Princes Drive, Colwyn Bay, Clwyd LL29 8PW**. Tel: (0492) 530725.

Cornish RAC meet at the Memorial Hall, Perranwell Station, Perranwell, nr. Truro, 7.30pm. For further information, please contact **Mr G. Bate, 9 Tresithney Road, Carharack, Redruth, Cornwall TR16 5OZ**. Tel: (0209) 820836.

Coulsdon ATS meet 2nd Mondays, 7.45pm at St. Swithun's Church Hall, Grovelands Road, Purley, Surrey. **Andy Briers G0KZT** on (0737) 557198.

Coventry ARS meet Fridays, 8pm at Baden Powell House, 121 St. Nicholas Street, Radford, Coventry. For further details phone **Jon** on (0203) 610408.

Dacorum AR & TS meet 1st (informal) & 3rd (formal) Tuesdays, 8pm at The Heath Park, Cottesrells, Hemel Hempstead. Further details from **Dennis Boast G1AKX** on (0442) 259620.

Delyn RC meet every other Tuesday, 8pm at the Gwernymyndd Community Centre in Gwernymyndd, near Mold, Clwyd, North Wales. June 16 is Open night & the 30th is BBQ at Steve & Helen's. For more details, contact **Steve Studdart GW7AAV** on (0244) 819618.

Denby Dale & District ARS meet at Pie Hall, Denby Dale, nr. Huddersfield, 8pm. More details from **Ivan Lee, Clayton Lodge, Sunnyside, Edgerton, Huddersfield HD3 3AD**.

Derby & District ARS meet Wednesdays, 7.30pm at 119 Green Lane, Derby. June 17 is an extraordinary general meeting, the 24th is 'The Skerries Expedition' an illustrated talk by **G0PLF**, July 1 is a Junk Sale & the 8th is a BBQ, Drum Hill, Little Eaton. More details from **Richard Buckby G3VGW, 20 Eden Bank, Ambergate, Derby DE5 2GG**. Tel: (0773) 852475.

Dereham ARC meet 2nd Thursdays, 8pm at the St. Johns Ambulance Hall, Yaxham Road, Dereham. June 11 is 'Antennas' **G4LPW** & July 9 is a Problem Solving Night. More details from **Mark Taylor G0LGJ** on (0362) 691099.

Derwentside ARC meet Wednesdays, 7.30pm in the Steel Club, 36 Medomsley Road, Consett, County Durham. Regular talks by amateurs & non-amateurs. Construction work overseen by **Don G4LGA**. Further details from **Geoff Darby G7GJU, 60 Pine Street, Grange Villa, Chester-le-Street, County Durham DH2 3LX**. Tel: 091-370 2032.

Dorking & District RS meet at The Friends Meeting House, South Street, Dorking, 7.45pm. June 23 is Bulletin Boards, Robin Bye **G6XVW/Ian Weller G1GUB**. More details from **John Greenwell G3AEZ** on (0306) 77236.

Dorset Police ARS. A new radio society. Membership open to anyone connected with Dorset police, such as all regular police officers, all special constables, civilian staff employed by Dorset police, immediate families of all the above & retired police officers resident in Dorset. Further details about membership from **Richard Newton G0RSN, Ferndown Police Station, Ringwood Road, Ferndown BH22 9AF**. Tel: (0202) 552099 ext. 3198.

Dragon ARC meet 1st & 3rd Mondays, 7.30pm at the Four Crosses Hotel, Menai Bridge. June 15 is a Quiz night & July 6 is a talk & demonstration on 'RAYNET' by **Dafydd Roberts GW6IWW**. **Tony Rees GW0FMQ** on (0248) 600963.

Dronfield & District ARC meet 1st & 3rd Mondays, 7.30pm in Room 3 of Gladys Buxton School, Oakhill Road, Dronfield. On other Mondays, members meet socially, by arrangement at the Fleur-de-Lys Public House, Main Road, Unstone. More details from **Piers Didham G7HRW, 110 Green Lane, Dronfield, Nr. Sheffield S18 6FU**. Tel: (0246) 290444.

Dundee ARC meet Tuesdays, 7pm in the College of Further Education, Graham Street, Dundee. Further details from **George Millar GM4FSB, 30 Albert Crescent, Newport-on-Tay, Fife DD6 8DT**.

Dunstable Downs RC meet Fridays, 8pm at The Old Mill, West Street, Dunstable, Beds. Further details from **Wendy Jefferson** on (0582) 451057.

Easington ARS (Co. Durham) meet Thursdays, 7.45pm at Southside Social Club, Easington Village. Further details from **Mr H. Walker G3CBW, 20 Birchfield Drive, Eaglescliffe, Stockton-on-Tees, Cleveland TS16 0ER**. Tel: (0642) 788280.

Echford ARS meet in the Community Hall, St. Martin's Court, Kinston Crescent, Ashford, Middlesex, 7.30pm. Further details from **P. Townshend G6PMT** on (0344) 843472.

Edgware & District RS meet at the Watling Community Centre, 145 Orange Hill Road, Burnt Oak, 8pm. June 11 is an informal, **GX3ASR** on air, the 25th is 'Audiometry' by **Rob Mahmud G4GKA**, July 4/5th is VHF Field Day & the 9th is an informal/**GX3ASR** on air. More details from **Howard Drury G4HMD, 11 Batchworth Lane, Northwood**. Tel: (0923) 822776.

Erewash Valley ARG meet Thursdays, 8.30pm at 'The Ancient Druid' public house, Cotmanhay Road, Ilkeston. Further details from **Graham Beech G0KBN, 15 Fisher Court, Cotmanhay, Ilkeston, Derbyshire DE7 8PZ**. Tel: (0682) 327540.

Fareham & District ARC meet Wednesdays, 7.30pm in Portchester Community Centre, Westlands Grove, Portchester, Fareham, Hants. Details from **Red Smith G0ERS** on (0705) 373572.

Farnborough & District RS meet 2nd & 4th Wednesdays, 7.30pm at Farnborough Community Centre, Meudon Avenue, Farnborough, Hants. More details from **Tommy Tomlinson G3UHW** on (0252) 515041.

Fylde ARS meet 2nd & 4th Thursdays, 7.45pm at South Shore Lawn Tennis Club, Midgeland Road, Blackpool. June 11 is Visit to Lancashire County Police HQ Communications Centre at Hutton, the 25th is an informal & July 9 is a talk on 'Radio Controlled Models' by **S. Barlow G4NVF**. **Eric Fielding G4IHF** on (0253) 726685.

Glenrothes & District ARC meet in their clubrooms, Provosts Land, Leslie, Fife, 8pm. Further details from **John Hardwick GM4ALA** on (0592) 742763.

Gloucester ARS meet Wednesdays, 7.30pm at St. John Ambulance HQ, Heathville Road (off London Road), Gloucester at 7.30pm. July 1 is **Cmdr. B. Fairburn** with a talk on 'Policing The Royals' & the 8th is construction group. Further details from **Jenny Beckingham G7JUP** on (0452) 528533 ext. 2734.

Goole R & ES meet most Fridays, 7.30pm at the West Park Pavilion, West Park, Goole, last Fridays at the 'Black Swann Inn', Asselsby. June 12 is NFD Logfill & de-brief, the 19th is the 10th Birthday Party of **GRESI**, the 26th is VHF NFD discussion & July 3/4/5 is VHF NFD. Further details from **Steve Price G8VHL** on (0405) 769130.

Grafton RS meet 2nd & 4th Wednesdays, 8pm in Holy Trinity Church Hall at the rear of Holy Trinity Church, Granville Road, London N4. Further details from **Rod G0JUJ** on 081-368 8154.

Grantham RC meet 1st & 3rd Tuesdays at the Kontak Social Club, Barrowby Road, Grantham. Further details from **John Kirton G8WVJ, 'Treetops', 13 Saltersford Road, Grantham, Lincolnshire NG31 7HH**. Tel: (0476) 65743.

Great Lumley AR&ES meet Wednesdays, 8pm at Great Lumley Community Centre, Great Lumley, Nr. Chester-le-Street, Co. Durham. For more details, contact **Barry G1JDP** on 091-388 5936.

Halifax & District ARS meet 1st & 3rd Tuesdays, 7.30pm at the 'Running Man'

Public House, Pellon Lane, Halifax. June 16 is 'Parachute Mobile' **R. C. Andreang G4CMT**. For further details, contact **David Moss G0DLM, Beechwood Lodge, Leeds Road, Lightcliffe, Halifax, West Yorkshire HX3 8NU**. Tel: (0422) 202306.

Hambleton ARS meet in Room A5 of Northallerton Grammar School at 7.30pm. For more details, contact **Nigel Robertshaw G0NHM** on (0609) 776608.

Hereford ARS meet 1st & 3rd Fridays at the Civil Defence HQ, Magistrates Court, Gaol Street, Hereford. June 19 is an informal. More details from **Errol Robinson G4MET, 29 Folly Lane, Hereford HR1 1LX**. Tel: (0432) 355297.

Hoddesdon RC meet 1st & 3rd Thursdays, 8pm at the Conservative Club, Rye Road, Hoddesdon (side entrance). June 11 is a natter night, the 16th is Visit to **RSGB HQ**, the 25th is a talk on 'Morokullen' by **Peter G0KLU** & July 9 is a natter night. Details from **Roy G4UNI** on 081-804 5643.

Hordean & District ARC meet 1st Thursdays, 7.30pm at Hordean Community School, Barton Cross (off Catherington Lane), Hordean, Hants. June 4 is Brains trust & July 2 is 'Fast Scan TV' by **Mike Sanders**. For more information, contact **Stuart Swain, 35 Mavis Crescent, Havant, Hampshire PO9 2AE**. Tel: (0705) 472846.

Hornsea ARC meet Wednesdays, 8pm at the Mill, Atwick Road, Hornsea. Further information from **Jeff G4IGY** on (0964) 533331.

Horsham ARC meet at the Guide Hall, Denne Road, Horsham, West Sussex, 8pm. Further details from **Peter Stevens G8SUI, 11 Nutwood Avenue, Brockham, Betchworth, Surrey RH3 7LT**. Tel: (0737) 842150.

Ilford Group RSGB meet Fridays at 7pm. For further details, please contact **J. Hooper** on 081-478 3741.

Ipswich RC. Contact **Mrs S. Elden G8HYE, 124 Larchcroft Road, Ipswich IP1 6PD**.

Itchen Valley RC meet 2nd & 4th Fridays, 7.30pm at the Scout Hut, Brickfield Lane, Chandlers Ford. June 12 is Annual Visit from **RSGB Council Member & Zone D representative Peter Chadwick G3RZF** & the 26th is 'Talking Books', a general & technical talk from members of the **RNIB**. Further details from **Maurice Cheeseman G1PQ** on (0703) 736784.

Jersey ARS meet Fridays, 8pm at La Moye Signal Station, St. Brelade. Further details from **Ken** on (0534) 483722.

Keighley ARS meet at The Ingrow Cricket Club, Ingrow, Keighley, 8pm. June 11 is a night on the air **GX0KRS G57KRC**, the 18th is a natter night, the 25th is a Visit to Leeds Weather Centre & July 2/9th are both natter nights. Further details from **Kathy Conlon G1IGH** on (0274) 496222.

Kettering ARS meet Tuesdays, 7.30pm at the Electricity Sports & Social Club, Eksdale Street, Kettering. July 4/5th is VHF Field Day at Loddington Grange Farm, Loddington, nr. Kettering. BBQ on the Saturday evening. Further details from **Len G0RVD (but QTHR as G7EHM)** on (0536) 514544.

Kidderminster & District ARS meet alternate Tuesdays, 8pm at The Queens Head, Wolverley, Worcestershire. For more details contact **Geoff Philpotts G7JIR, 62 Erneley Close, Stourport-on-Severn, Worcs DY13 0AH**. Tel: (0299) 379229.

The Kilo Delta Club for all radio enthusiasts meet in the 'Victoria Inn', Hollins Road, Oldham, Lancashire, at 8pm. All enquiries to the **Secretary, Kilo Delta Club, PO Box 93, Oldham, Lancashire OL8 3XE**.

King's Lynn ARC meet Thursdays, 7.30pm at the 19th King's Lynn Scout HQ, North Runcton. Further details from **Derek Franklin G0MQL** on (0553) 841189.

Lothians RS meet on the 2nd & 4th Wednesdays, 7.30pm in the Orwell Lodge Hotel, Polwarth Terrace, Edinburgh. Further details from **Mel Evans** at 56 Southhouse Road, Edinburgh EH17 8EU or telephone 031-664 5403.

Loughton & District ARS meet in Room 14 of Loughton Hall, 7.45pm. For more details contact **Mike Pilsbury G4KCK** on 081-504 4581.

Louth & District ARC meet 3rd Tuesdays, 7.30pm at the Kings Head, Louth. More details from **Niel Bartholomew G0JXY, The Bungalow, Main Road, Grainthorpe, Lincs LN11 7HX**.

Maidenhead & District ARC meet at The Red Cross Hall, The Crescent, Maidenhead, 7.30pm. June 16 is 'Aerials For Smaller Locations' by **Don G3XTT** & July 2 is 'Radio

Navigation' by Dave G3RZF. Details from **Neil G8KYN** on (0628) 25952.

Manchester & District ARS meet Tuesdays, 7pm at Simpson Memorial Community Association, Moston Lane, Manchester M10 9NB. Further details from **Roger Farnley G0KTR**, 6 Cardigan Road, Hollinwood, Oldham OL8 4SF.

Mansfield ARS meet at the Polish Catholic Club, off Windmill Lane, Woodhouse Road, Mansfield. July 2 is a talk by Dennis G0KIU on 'Radar - The Early Days'. Further information from **Mary G0NZA** on (0623) 755288.

Midland ARS meet in Unit 22, 60 Regent Place, off Caroline Street, Birmingham B1 3NJ. Wednesdays are RAE classes & Thursdays are natter nights. June 16 is a Treasure Hunt, the 26th is an Atari night & the 28th is a Computer night. For further details, contact **John Crane G0LAI** on 021-628 7632 evenings.

Milton Keynes & District ARS meet 2nd Mondays at North Bucks Youth Sports Hall, Haversham Road, Wolverhampton, Milton Keynes. For more information, please contact **Julian Winsor G3FGB** on (0908) 611005.

Morecambe Bay ARS meet every other Tuesday, 7.30pm at the Trimpell Sports & Social Club, with Morse instruction each Tuesday during club meetings. For more details, please contact **J. Burrow G0NYD**, 36 Longfield Drive, Cragbank, Barnforth, Lancashire LA5 9EJ. Tel: (0524) 733212.

Nelson & District ARS meet Wednesdays, 7pm at Llancaich School Nelson. They also run a c.w. class at their meetings. Anyone wishing to find out further information is welcome to call in, or otherwise contact **Leighton Smart G0WLB** at 33 Nant Gwyn, Trelewis, Mid-Glamorgan, Wales CF46 6DB. Tel: (0443) 411736.

Norfolk ARS meet Wednesdays, 7.30pm at 'The Norfolk Dumpling', The Livestock Market, Harford, Norwich. **Jack Simpson G3NJO** on (0603) 747992.

North Bristol ARS meet Fridays, 7pm at Self Help Enterprise, 7 Braemar Crescent, Northville, Bristol. RAE & Morse tuition is available for members. June 12 is 'EMC Problems' by Mark G4KJQ & the 26th is a general knowledge quiz, Charles G0RFB. More details from **Tony G4ROX** on (0272) 513573.

North Ferriby United ARS meet Fridays, 8pm at the North Ferriby Utd. FC Social Club, Church Road, North Ferriby, East Yorkshire. Further details from **Frank Lee G3YCC** on (0482) 650410.

North Wakefield RC meet Thursdays at 'The White Horse' PH, Fall Ings Lane, East Ardsley, Nr. Wakefield. Morse classes start at 7.30pm & all are welcome, with the Novice class on Friday evening. More details from **John Hoban G0EVT** on (0924) 825443.

Nottingham ARS meet Thursdays, 7.30pm at the Sherwood Community Centre, Mansfield Road, Nottingham. June 11 is a Summer Junk Sale, the 18th is Activity/Foxhunt 2, the 25th is a talk on 'Contest Techniques' by Colin G0F0G, July 2 is Forum & the 9th is a talk on 'Foreign Language QSOs' by Walter G00MO. Further details from **Ian Miller G4JAE** on (0602) 232604.

Otley ARS meet Tuesdays, 8pm in the shack at the rear of the RA0B Club, Westgate, Otley, West Yorkshire. Further details from **Jack Worsnop G7DFC** on (0274) 636197.

Oxford & District ARS meet 2nd & 4th Thursdays, 7.45pm at the British Legion Club, Haddow Road, Crotch Crescent, Marston Road, Oxford. June 25 is 'Deep Heat In Nepal': exploration canoeing by Fred Wondre. More details from **Terry Hastings G0CFN** on (0865) 863526.

Pontefract & District ARS have Morse classes on Mondays, Novice classes on Tuesdays & normal meetings on Thursdays, all at the Carleton Community Centre, Carleton, nr. Pontefract, at 8pm. June 16 is 144MHz Open DF Hunt. Details from **Colin Wilkinson** on (0977) 677006.

Poole RAS meet 2nd Fridays, 7pm at Lady Russell-Coates House, Lower Constitution Hill Site, Bournemouth & Poole College of FE. More details from **Vernon Cotton G3BCI**, 45 Branksome Hill Road, Bournemouth, Dorset BH14 9LF. Tel: (0202) 760231.

Preston ARS have an illustrated talk by Mr Ruthven on 'Vanoise National Park' on June 11, an Outing evening to 'Whitebread's Brewery' on the 25th & 'Legging - Locking -

Gongoozling' slides by Mr Astin on July 9. Details of their meeting place & time from **Eric Eastwood G1WCQ**, 56 The Mede, Freckleton, Preston, Lancashire PR4 1JB. Tel: (0772) 686708.

Prudential ARS is open to all employees & ex-employees of the Prudential companies. All those interested in PARS should contact **David Dyer G4DNX** at 'Highbank Cottage', Underhill, Moulsoford, Oxon OX10 9JH.

Reading & District ARC meet 2nd & 4th Thursdays, 8pm at The Woodley Pavilion, Woodford Park, Haddon Drive, Woodley, Reading. June 11 is VHF NFD Planning, the 25th is G5RV & other Antennas, July 4/5 is VHF NFD Contest & the 9th is WAB Organisation. More details from **Nick Challacombe G0LGG** on (0734) 722489.

Rochdale & District ARS meet Mondays at T. S. Frobisher, Greenbank Road, Rochdale. Further details from **Brian** on 061-653 8316 or **Dave** (0706) 32502.

Rhyl & District ARC meet 1st & 3rd Mondays. For more details, contact **Ken Padley GW7IAR**, 67 Rosehill Road, Rhyl, Clwyd LL18 4TS. Tel: (0745) 338276.

Salisbury Radio & Electronics Society meet Tuesdays, 7.30pm at Grosvenor House Centre, Churchfields Road, Salisbury. June 16 is Video Show, the 23rd is a natter night & d.f. events talk, the 28th is Longleat Rally, the 30th is a natter night & committee meeting & July 7 is Guest Speaker. For further details, contact **David Kennedy G7GWF**, 'Celeborn', 11 Silverwood Drive, Laversock, Salisbury, Wiltshire SP1 1SH.

Salop ARS meet Thursdays, 8pm at the 'Old Buck's Head', Frankwell, Shrewsbury. June 25 is a summer social at the Stiperstones and July 2 is NFD preparation. Further details from **Glenda G1YJB** on (0939) 232090.

Sevenoaks & District ARS. June 15 is Rob Mannion G3XFD of *Practical Wireless* to talk about 'Practical Wireless - History & Future'. Details from **The Secretary, c/o Sevenoaks District Council, Council Offices, Argyle Road, Sevenoaks, Kent TN13 1HG**.

Shefford & District ARS meet Thursdays, 8pm at the Church Hall, Amphill Road, Shefford, Bedfordshire. For further information, contact **Nigel G1JKF** on (0908) 274473.

Silverthorn RC meet Fridays, 7.30pm at The Chingford Community & Adult Education Centre, Friday Hill House, Simmons Lane, Chingford, London E4 6JH. June 19 to 22nd is Club Camp & July 3 is a talk by Waters & Stanton. More details from **Andrew Mowbray G0LWS** on 081-529 4489 between 5.30 & 6.30pm weekdays only.

Solihull ARS meet 3rd Thursdays in The Shirley Centre, 274 Stratford Road, Shirley, Solihull, West Midlands. For more details, contact **Colin Taylor G3USA**, 231 Robin Hood Lane, Hall Green, Birmingham B28 0DH. Tel: 021-777 9965 evenings or (0827) 53344 day-time.

South Dartmoor ARC meet Mondays, 8pm at South Dartmoor School, Bailand Lane, Ashburton, Devon. This radio club has a committee of only one adult - the rest being school-age youngsters! Although anyone wishing to join in is welcome. For more details on this Novice-run radio club, contact **Peter Thornhill G6ZKQ**, 21 Elmbank, Buckfastleigh, Devon TQ11 0DX. Tel: (0364) 43433.

South Dorset RS meet 1st Tuesdays, 7.30pm in the Wessex Lounge of Weymouth Football Club. June 28 is the Longleat Rally. **Geoff Gwilliam G4FJO**, 13 Overlands Road, Wyke Regis, Weymouth DT4 9HS. Tel: (0305) 781164.

South Notts ARC meet at Highbank Community Centre, Farnborough Road, Clifton Estate, Nottingham, or Fairham Community College, Farnborough Road, Clifton Estate. June 12 is talk-in S22 & preparation for Elvaston, the 14th is Elvaston Castle Radio Rally, the 19th is construction, the 21st is 2nd Foxhunt, the 26th is on the air, July 3 is Final planning for VHF Field Day & the 4/5th is VHF Field Day. For further details contact **Ray G7ENK** on (0602) 841940.

Southgate ARC meet at Winchmore Hill Cricket Club Pavilion, Firs Lane, Winchmore Hill, London N21. June 11 is a lecture by A. J. Fisher G8TAU on 'Surface Mount Technology', the 25th is Out-door activity & BBQ & July 9 is a lecture by Roger Western G3SXW on 'Contesting & DXpedition'. **Brian Shelton G0MEE**, 22 Berkeley Gardens, Winchmore Hill, London N21 2BA. Tel: 081-360 2453.

Spalding & District ARS meet Fridays,

8pm at The Riverside Centre, The Old Fire Station, Double Street, Spalding, Lincolnshire. June 12 is a test equipment evening, G0CFD, align your radios & home-brew equipment! & July 4/5 is VHF Field Day. Further details from **David Johnson, 65 West Street, Bourne, Lincolnshire PE10 9PA**. Tel: (0778) 425367 (6-7pm).

Spenn Valley ARS meet Thursdays, 8pm in Old Bank Working Men's Club, Mirfield. Alternate Thursdays are 'Noggin & Natter nights'. Further details from **Ian Barraclough G7DWY** on (0484) 716453, early evening.

Stevenage & District ARS meet in Ground Floor Rear Suite, Sitec Building, Ridgeman Road, 7.30pm. More details from **Pete Daly G0GTE**, 48 Lincoln Road, Stevenage, Herts SG1 4PJ. Tel: (0438) 724991.

Stirling ARS meet Thursdays, 7.30pm at premises near Throsk, Stirling. Details from **Brian Mulleady GMOKWL**, QTHR or on (0324) 36235.

Stockport RS meet 2nd & 4th Wednesdays, 7.45pm in Room 14 of the Dialstone Centre, Lisburne Lane, Offerton, Stockport, Cheshire. Further details from **Ray Dawson G3JLX**, 4 Douglas Road, Hazel Grove, Stockport SK7 4JG. Tel: 061-483 0372, or **Andrew Paterson G0HAL** on 061-980 1334.

Stourbridge & District ARS meet 1st & 3rd Mondays, 8pm at Robin Woods Community Centre, Scotts Road, Stourbridge. Details from **Dennis Body G0HTJ** at 53 Grove Road, Wollescote, Stourbridge, West Midlands DY9 9AE.

Stratford-Upon-Avon & District RS meet 2nd & 4th Mondays, 7.30pm at the Home Guard Club, Main Road, Tiddington, Stratford-Upon-Avon, Warwickshire. June 22 is 'Electronic Warfare' by Peter Chadwick G3RZP. Further details from **Alan Beasley G0CXJ**, 2 Ilmington Road, Blackwell, Shipston-on-Stour, Warwickshire CV36 4PE. Tel: (0608) 82495.

Stroud & District ARS meet fortnightly in the Minchinhampton Youth Centre. For more details, please contact **Dave Stallon** on (0453) 886964.

Sudbury & District ARC 'SANDRA' meet 1st Tuesdays, 8pm at the Five Bells Inn, Great Cornard, Sudbury, Suffolk. Further details from **Colin Muddimer G0PAO** on (0787) 77004.

Sutton & Cheam RS meet 3rd Thursdays, 7.30pm at Sutton United Football Club, The Borough Sports Ground, Gander Green Lane, Sutton, Surrey, with natter nights on 1st Thursdays. June 18 is an Inter-Club Quiz, July 2 is a natter night & the 4/5th is VHF National Field Day, Leek, Staffordshire. More details from **John Puttock G0BWW**, 53 Alexandra Avenue, Sutton SM1 2PA.

Taunton & District ARC meet 1st & 3rd Fridays, 7.30pm in 'The Basement', County Hall, The Crescent, Taunton. Other Fridays informally for a natter & station operation, Morse code classes, etc. For further details, contact **Mr W. Lindsay-Smith G3WNI**, Way Close, Madford, Hemycok, Cullompton, Devon EX15 3QY. Tel: (0823) 680778.

The GB3HZ Repeater Group meet at Chiltern Communications, Lincoln Road, Cressux Industrial Estate, High Wycombe, Bucks, 8pm. Details from **Francis Rose G2DRT** on (0494) 814240.

The Submarine ARC submerge on Thursdays, 7pm at HMS Dolphin, Gosport, Hants. For more details contact **K. Fisher G0LXK** on (0329) 281174.

The Three Counties ARC meet every other Wednesday, 8pm at the Railway Hotel, Liphook Hampshire. June 17 is a Construction night & competition & July 1 is 'Novice Licence', how to get one, & what it allows you to do on radio, by Frank G7CND. **Kevin Roche G8GOS** on (0420) 83091.

Thornbury & District ARC meet at the United Reform Church, Chapel Street, Thornbury, 7.30pm, talks start at 8pm. Morse practice sessions are held between 7.30 & 8pm. More details from **H. Cromack G0FGI** at Rose Cottage, The Naite, Dildbury-on-Severn, Bristol, Avon BS12 1RU. Tel: Thornbury 411096.

Tor ARS meet Tuesdays, 7.30pm at the Ernest Bailey Community Centre, New Street, Matlock, Derbyshire. More details from **Vince Shirley G0ORC** on (0773) 826747.

Torbay ARS meet Fridays, 7.30pm at the ECC Social Club, Highweek, Newton Abbot. Club nights are on June 5/12/19/26 & July 3, with a talk on the 'History of Amateur Radio' on June 19. More details from **Andy Stafford G4VPM** on (0803) 329055.

Trowbridge & District ARC meet at 8pm, in the Territorial Army Centre, Bythesea

Road, Trowbridge, Wiltshire, 8pm. More details from **Ian Carter G0GRI** on (0380) 830383.

Vale of Evesham RAC. Further details on the club from **Alasdair** on (0386) 41508.

Verulam ARS meet 2nd & 4th Tuesdays, 7.30pm at the RAF Association Headquarters, New Kent Road (off Malborough Road), St. Albans, Hertfordshire. 2nd Tuesdays are their activity evenings & 4th Tuesdays are their main monthly meetings. June 23 is 'Computerised Logging' by John Linford G3WGV. More details from **Walter Craine G3PMF**, 5 The Crescent, Abbots Langley, Watford, Hertfordshire WD05 0DR.

Wakefield & District RS meet Tuesdays, 8pm in First Floor Rooms, Ossett Community Centre, Prospect Road, Ossett. More details from **Dave Ackrill G0DJA**, 104 Durkar Lane, Crigglestone, Wakefield WF4 3HY. Tel: (0924) 240577.

West of Scotland ARS meet Fridays, 7.30pm at the Scout HQ, 21 Elmbank Street, Glasgow. For further details, please contact **John Power GMOKTO**, PO Box 599, Glasgow G3 6QH.

White Rose ARC meet Wednesdays, 8pm at Moortown RUFC, Moss Valley, King Lane, Leeds LS17 7NT. More details from **Mrs Betty Cappelluto**, 7 Rycroft Place, Leeds LS13 4PF. Tel: (0532) 555488.

Whitton ARG meet Fridays, 8pm at the Whitton Community Centre, Percy Road, Whitton, Twickenham. More details from **Ian G00FN** on 081-894 9131.

Wiesbaden ARC - DA1WA - is a club mainly for US military personnel stationed anywhere near Wiesbaden, Germany. For more details, contact **Robert Kipp DJ0PU**, Hugelstr. 25, D-6070 Langen, Germany.

Wigtownshire ARC have meetings & RAE classes every Thursday, 7.30pm at the Community Education Office, Stranraer Academy. More details from **Ellis Gaston G0MHPK**, 3 Victoria Buildings, Cairnryan, Stranraer, Dumfries & Galloway DG9 8RA. Tel: (0581) 2202.

Wimbleton & District ARS meet 2nd & last Fridays in St. Andrews Church Hall, Herbert Road, Wimbleton SW19. June 12 is a General Activity evening & the 26th is 'DX Chasing On Top Band' by Dave Hayes G4AKY. **Chris Frost G0KEB**, 61 Selbourne Avenue, Tolworth, Surrey KT6 7NR. Tel: 081-397 0427.

Winchester ARC meet 3rd Fridays, 7.30pm at the Red Cross Centre, Durngate House. Further details from **Malcolm Butler G0LMD**, 44 East Stratton, Nr. Winchester, Hants SO21 3DU. Tel: (0962) 89550.

Wirral ARS meet 1st & 3rd Wednesdays, 7.45pm at Ivy Farm, Arrowe Park Road, Birkenhead, Wirral. More details from **Alec Seed G3FOO** on 051-644 6094.

Woodpecker Radio Group meet Mondays, 8.30pm at Richmond Place Club, Edgar Street, Hereford. More details from **Chris** on (0432) 352441.

Wrexham ARS meet at the Maesgwyn Community Centre, Maesgwyn Road, Wrexham. June 16 is a field evening - get the club callsign on the air, v.h.f. & h.f., the 27/28th is the Plassey Steam Rally, nr Wrexham, operation on h.f. & v.h.f. & July 7 is a Junk Sale. More details from **Ian Wright G1WML**, 'Derwydd', 2 Duke Street, Rhos, Wrexham, Clwyd LL14 1SY. Tel: (0978) 845858.

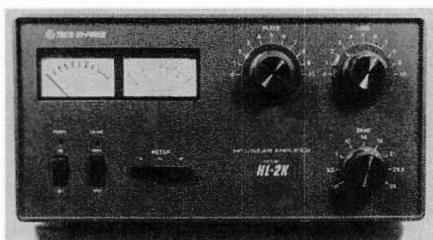
Yeovil ARS meet Thursdays at Red Cross HQ, Grove Avenue, Yeovil, Somerset. June 11 is DXpeditions/RSGB Intruder Watch - G3ZAY, the 18th is 'Spark Transmission' - G5GZ & the 25th is construction & operating (committee meeting). Further details from **Mike Woodford G0JVG**, Holm Wood, 5 Orchard Close, South Petherton, Somerset TA13 5DX.

LINEAR AMPLIFIERS

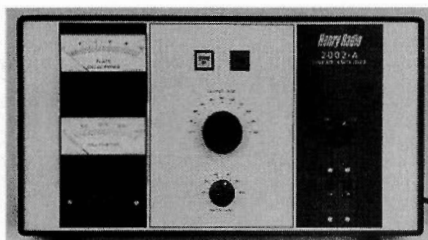
SMC have built up over many years a vast experience of linear amplifiers. We have seen many different models and manufacturers come and go during this time and many inferior products.

We at SMC feel we have possibly the best selection of the most popular high quality linear amplifiers, all available at very reasonable prices.

We are able to service all of these items in-house and have a comprehensive range of spares should anything go wrong. Listed below are details of the linear amplifiers we keep in stock.



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2002A



SAGRA -600

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2002A	2m 3CX800A7 800W out PEP (typical) 13dB gain	£1495.00
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3002A	2m 8877 1600W out PEP (typical) 10dB gain	£2750.00
3K Premier	HF 3CX1200 1800W out PEP (typical) 13dB gain	£3059.00
5K Classic	HF pair 3CX1200 3kW out PEP (typical) 14dB gain	£3950.00

Tokyo Hy-Power HF

HL100B/10	21-28MHz 10W-100W out	£182.00
HL100B/20	14MHz 10W-100W out	£182.00
HL100B/80	3.5MHz 10W-100W out	£182.00
HL1K	160-10m 1kW PEP input 2x4CX250B	£959.00
HL2K	160-10m 2kW PEP input 2x3-500Z	£1450.00

Tokyo Hy-Power VHF

HL37V	2m 3W-32W pre amp	£90.95
HL62VSX	2m 5W/10W/25W in 50W out pre amp	£169.00

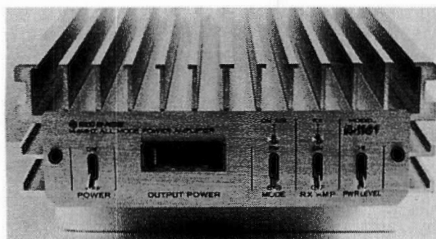
HL110V	2m 2/10W in 100W out pre amp	£220.00	C
HL180V	2m 3/10/25W in 170W out pre amp	£299.00	C
SAGRA600	2m 15-25W in 600-700W PEP output 2x4CX250B	£839.00	E
HL66V	6m 10W in 50-60W out pre amp	£131.75	C
HL166V	6m 3/10W in 80/60W out pre amp	£255.00	C
HL1K/6	6m 10W in 500W PEP output 2x4CX250B	£959.00	D
HL36U	70cm 6/10W in 25-30W out pre amp	£139.00	B
HL63U	70cm 10/25W in 50W out pre amp	£220.00	C
HL130U	70cm 3/10/25W in 120W out pre amp	£397.00	C
HL1240U	23cm 2/10W in 40W out MGF 1202 pre amp	£529.00	C

Daiwa

LA2080H	2m 1.5-5W in 30-80W out pre amp "New - Ideal for dual band handle or mobiles"	£159.95	B
DLA80H	2m/70cm 0.5W-25W in 80W out 2m 60W out 70cms in MGF 1302 pre amp	£339.00	C

Carriage:

B =	£5.00
C =	£7.50
D =	£12.50
E =	£16.50



HL110V



LA2080H

Southampton (0703) 255111
SMC HQ, School Close
Chandlers Ford Ind. Est.
Eastleigh
Hants SO5 3BY
9am-6pm Mon-Fri
9am-1pm Sat

Leeds (0532) 350606
SMC Northern
Nowell Lane Ind. Est.
Nowell Lane
Leeds LS9 6JE
9am-5.30pm Mon-Fri
9am-1pm Sat

Chesterfield (0246) 453340
SMC Midlands
102 High Street
New Whittington
Chesterfield
9.30am-5.30pm
Tues-Sat

Birmingham 021-327 1497
SMC Birmingham
504 Alum Rock Road
Alum Rock
Birmingham B8 3HX
9am-6pm Tues-Fri
9am-4pm Sat

Asxminster (0297) 34918
Reg Ward & Co. Ltd
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West Street
Asxminster
Devon EX13 5NY
9am-5.20pm Tues-Sat

Mobile And Portable Operation - On A Shoestring

Part 2

Although this month's 'Competition Corner', with its cartoon suggests I've been caught doing more than 12w.p.m. while **mobile**, it's not true! Our cartoonist John Worthington GW3COI, (the best!) produced the drawing to warn everyone **not** to try Morse-on-the-move, unless you have a co-pilot!

Although the Morse-mobile may seem to be real joke, (on the operators), it's not such a bad idea. Using valved transmitters of fairly low power, I've been able to penetrate the QRM far better than even an s.s.b. transmitter could.

The whole idea of this simple series of projects, is to get people on the air, with the minimum of fuss. Last month I described the prime mover, the power supply. This time I'm going to start off with the transmitter, which can also be used for a.m.

The Transmitter

As I said last month, the transmitter circuit in **Fig. 1**, is (unashamedly) a design originally published in *PW*, over 30 years ago. It actually appeared in the October 1958 issue. I've built many versions of the rig, and I can vouch for it being a 'sure starter' project.

In fact, this little project, it is a true 'junk box' rig, will work well on all bands from 1.8 to 7MHz. It's also very useful in that it will work with a great number of different valves.

Originally, the project was designed to use the B7G based EL91 valve as the choke modulating stage, and the useful 6CH6 as the Colpitts type crystal oscillator/power amplifier. However, in the many years I've used the circuit, it's proved to work using the 6V6, 6L6, 6BW6 and many other valves.

The diagram, **Fig. 2**, shows the original carbon microphone audio input. Although lacking in quality, the carbon microphone can still help to provide an a.m. facility with the minimum fuss and cash outlay.

I should point out that unless a high output crystal microphone is used for the circuit in **Fig. 1**, the audio on the transmission will be low. However, it should be emphasised that the project is a 'fun' rig, for local 'phone operation. If you're keen, an extra stage of audio would do wonders!

Easy To Find

If you don't have any valves to hand, they're easy to find. However, my recommendation is that whenever possible, you save such useful devices. Even if you don't use 813s, they make a very attractive mantelpiece ornament!

Joking apart though, it is a good idea to hold on to valves if they're okay. Fair enough, even I would hesitate to use a valve rectifier in a modern circuit, but there's still room for the technology in our hobby. And you can save money!

At the end of this article, I've made a list of suitable sources for valves. Two of the suppliers regularly advertise valves and associated hardware in *PW*, while the third is able to supply valveholders and other useful components.

The base diagram and pin connections for the B9A based 6CH6 and 6BW6 valves are provided in **Fig. 3**. The pin numbers are as they're viewed from underneath the valve (pin 1 is on your left as you look at it).

Heater Supply

Another point to remember, especially if you do use the design in conjunction with a 12V d.c. supply, is the valve filament or 'heater' supply. With the original design, I ended up having to play around with resistors, to obtain the correct voltage and current for the valves. But, you can cheat on this if you want!

I found that as this design is so versatile, although I don't make any claims that the efficiency is as good, that (as I've already mentioned) a great variety of valves can be used. This proved very useful in the past. I ended up using two 6CH6 valves in one version of the transmitter. This solved the heater problem at one stroke.

Using two valves with the same heater current and voltage rating, means that all you have to do is join them up in series for 12V d.c. operation. If you decide to build the c.w. version only (leaving out the modulator), a very simple way of finding another accurate series resistor is to use an old valve as 'ballast' in series.

Although the project was originally an a.m. transmitter, unless you want to play around with a.m. (and why shouldn't you?), only the crystal oscillator/p.a. stage need be built. But of course, my recommendation is that you also try the rig as an a.m. job!

Suitable Components

One of the most frequent complaints regarding valved projects, is the difficulty in finding suitable components. I've taken time to think about this problem, and with a little luck, anyone who does build this rig, shouldn't find components that difficult to find.

Bearing in mind that if one of the former p.m.r. inverter supplies is used, one possible problem has been taken care of because it's been built for you. The only other, possibly 'difficult' problems are the valve-holders and the inductors L1, L2 and L3 (L4 is home-wound) and T1 if you use the alternative microphone circuit.

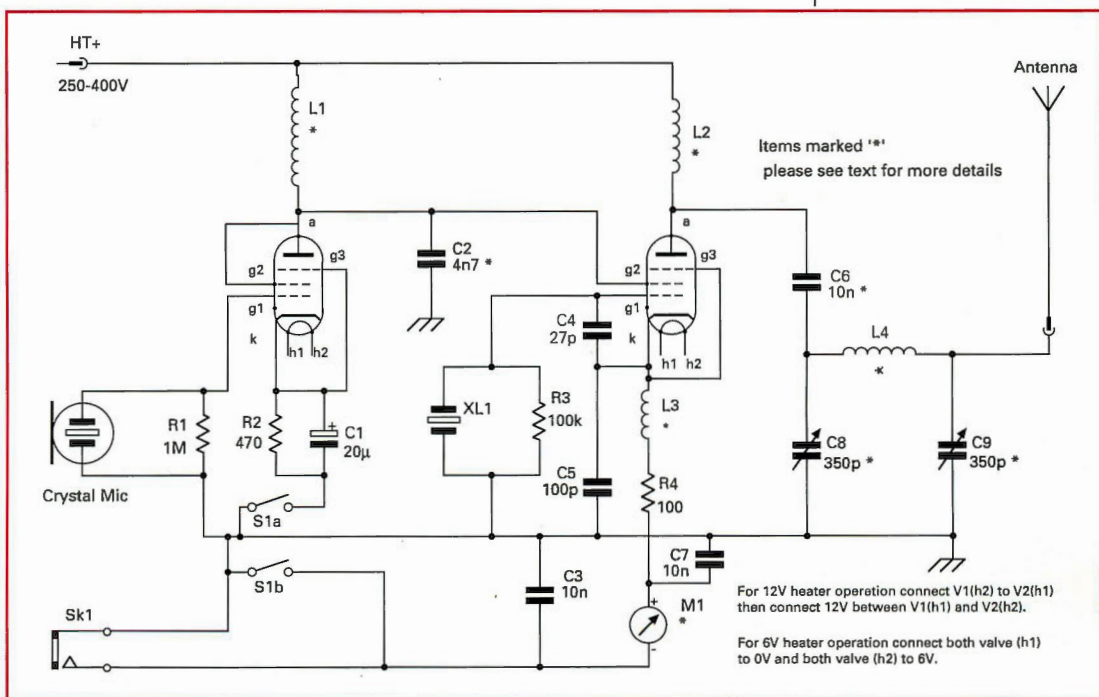
The inductance L1, in the anode circuit of V1, should ideally be a 10H audio frequency choke. However, and unless you have some old a.f. chokes about, a usual alternative is the primary winding of a salvaged valve audio output transformer.

In the past, I've even used a small 240V to 12V step-down transformer for this job. But take care if you use a modern transformer, intended for light duty purposes (battery eliminator purposes) as the 'mains' primary may not be able to take the anode and screen current for V1 and

Construction

This month, Rob Mannion G3XFD introduces 'Morse mobile' operation. Although it's not an original concept, Rob suggests that operating a c.w. rig from a stationary car can be fun. It can add an interesting new dimension to relatively low powered portable equipment, operating in a small space and on a restricted budget.

Fig. 1: The simple crystal-controlled transmitter circuit discussed in the text. The transmitter can be used in conjunction with the inverter supply published in the June issue of *PW*. The inverters are not designed for continuous operation and for c.w. operation, the inverter should be switched in before the transmitter is keyed.



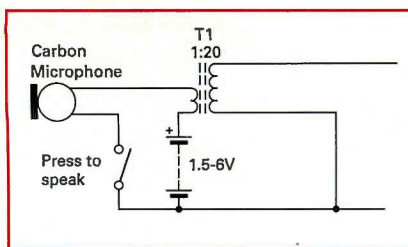


Fig. 2 (above): The alternative carbon microphone circuit (see text).

Fig. 3 (below): Valve base details and pin connections. Some versions of the 6CH6 and 6BW6 appear to have been manufactured with the suppressor grid (grid 3) connected internally to the cathode. Despite this, to ensure the circuit works, it is recommended that the external connection is made.

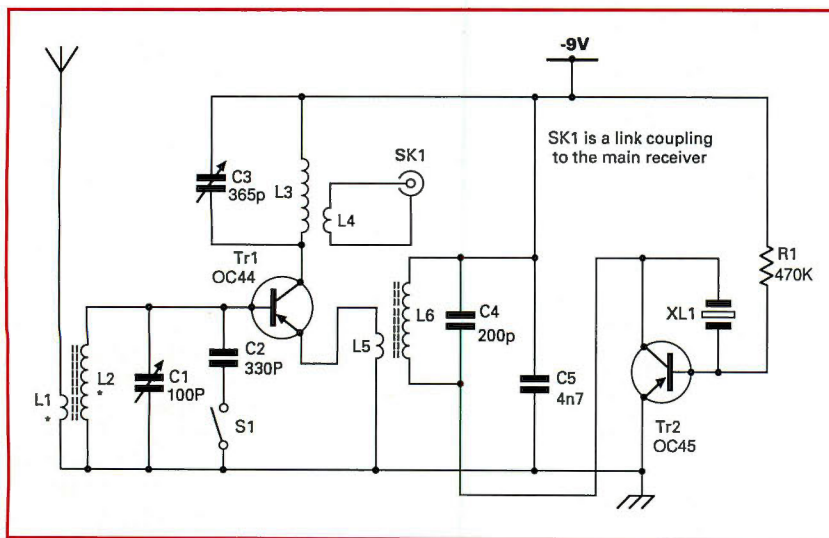
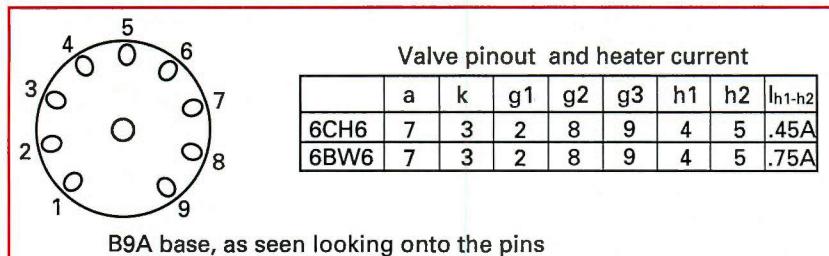


Fig. 4: A simple and efficient crystal-controlled converter, which enables the 1.8MHz band to be received on a car radio. Coil details are provided in Table 1 opposite. As the unit is link-coupled into the receiver, the positive 'chassis' is not a disadvantage.

V2 without overheating.

The other inductors of interest are L2 and 3. Rally-goers shouldn't have any trouble in buying radio frequency chokes capable of carrying up to 200mA. Components such as these are often found in quantity on the 'bargain' stalls.

Borrowed Idea

In my case, as the transmitter (with this particular design anyway) is designed to be remotely sited, I've borrowed an idea used on the Yaesu FT75. I used FT75s for many years as my main s.s.b. mobile rigs, and the r.f. output tuning uses large 'trimmers' for adjustment.

With a rig that's only going to be used over a relatively narrow band of frequencies, large postage-stamp type trimmers are ideal. You can adjust them on to your favourite frequency, and match the rig into the antenna and forget about them.

Fortunately, there's no need to break up an FT-75 for spares. My advice if you do find one, is to hang on to it as they are very handy little rigs for mobile and portable working. Suitable large trimmer-type capacitors for transmitters are available from John Birkett, proprietor of the famous emporium in Lincoln.

Depending on what form your transmitter takes, you can either employ the trimmer type tuning, or go for the same circuit using variable capacitors. It's up to your needs, your pocket and your requirements to decide!

Oscilloscopes For Spares

Many readers have written in to *PW*, advising other constructors to buy up old oscilloscopes for spares. If you can carry home any of the monsters, often on sale at rallies, you'll have enough components to keep you going for a long while.

Another source are the various mail order services. The Maplin Electronics catalogue has a range of r.f.c.s

available, as does the Cirkit catalogue. Although they should be around 5 to 10μH, in practice that I've found that any r.f.c. capable of carrying the current works in the circuit.

Mobile Working

One of the problems for mobile working for my Morris Minor car back in the 1960s, was the lack of space. I'm a big chap in any case, and as I had an old Pye 'Reporter' for 144MHz fitted in the front, there was even less room for anything else.

So, to get over this problem and get on to 1.8MHz mobile, I decided on building a remote-controlled boot-mounting transmitter. This meant, for my purposes and expertise, that it had to be crystal-controlled. I had the ideal circuit, but how could I control it easily?

In the end, as the original *PW* transmitter circuit used a carbon microphone on the modulator, I used the same system. Although the carbon microphone gave poorer quality, it had a great advantage as far as I was concerned!

Great Advantage

The great advantage of the design was the fact that the microphone needed a polarising current. I arranged it so when I squeezed the press-to-talk switch on the microphone, the current passing from the battery, via the mic/control cable, through the input transformer, also passed through a relay coil.

By experimenting, I found a relay that would operate when the p.t.t. switch on the microphone was pressed. This lightweight relay then operated another, which had heavier contacts to start the power supply up. For the c.w. version, I didn't bother with the microphone lead. All that was needed was a 'standby' switch.

The switch, via a relay, changed-over the antenna feed and started the power supply. In those days, I used a small 12V d.c. to 250V d.c. rotary converter for the h.t.

Of course, the project I'm suggesting this time will use the former p.m.r. equipment inverters supplied by Garex (details published last month), unless you want to use that rotary converter in the junk box!

Simple Control

With the simple control system I've described, I only needed the microphone or Morse key at the driving seat. On receive, the 1.8MHz signal from my home-brew, and base-loaded antenna was fed to the receiver.

The receiver side for 1.8MHz was provided by a crystal-controlled converter, which used the car radio as a tuneable i.f. (another *PW* design!). This set-up was more than adequate for a.m. use, and it was also very sensitive.

The converter design in Fig. 4, was originally published in *PW* during December 1965, and used the very cheap (and now obsolete) OC44 and OC45 transistors. Fortunately, transistors of this vintage are plentiful in older car radio and portable receivers.

As the transistors used are *pnp* types, the converter has a positive 'earth'. However, I never found that a problem as the unit is self-contained and runs off its own battery. The i.f. output to the car radio is via a link winding, so that's isolated too.

Any crystal on a frequency between 2.5 and 2.65MHz will provide an i.f. on the medium waveband on a car radio. The original article in *PW* December 1965, provides full information on using the converter on 1.8 and 3.5MHz. Re-prints are available via the *PW* photocopying service.

If you don't want to go to the bother of making a converter from scratch, you can easily modify the *PW* 'Forty-niner' design, published in 1990. This design works very well, as I suggested in Part 1, on 7MHz.

Alternatively, you may like to consider building the receiver section of the *PW* 'Chatterbox'. This delightful little project has proved to be popular in its own right, and I'm very pleased to say that it was a pet project of mine, brought into this world by the skilled hands of the Rev. George Dobbs G3RJV.

Finally, I must emphasise my enthusiasm for using car radio receivers as basic tuneable i.f.s, as they are ideal for the purpose. Although not so suitable for s.s.b. work, with a reflexed i.f. (controlled r.f. feed-back) they can even have a use for simple c.w. working. Many of my school radio club members have started off with receivers based on an old car radio!

I'm not going to dwell on the receiver side too much this time. If there's enough interest from readers, I'll be pleased to reproduce some of the simple ideas published in

my original 'Getting Started - The Practical Way' series in 1986/87.

Building The Transmitter

Some readers who may want to start building the transmitter, won't have any aluminium chassis. Don't worry, you can still build it, by using p.c.b. material. This method can make a handy little 'chassis', as in the photograph, Fig. 5.

With a chassis made from p.c.b. material, you can solder to it, and drill and work it very easily. If you're lucky enough to have a set of old chassis punches, to make standard valve-holder holes, they'll work very well.

If you only have the minimum of metal-working tools, don't worry, because the p.c.b. blank material is exceptionally easy to work with. For one example, you can use a smaller drill to make a hole for a valve-holder, finishing it off with a round file.

The advantages of the p.c.b. 'chassis' method include the cheap off-cuts available at rallies. The advantages also include easy working for making screened compartments, and you only need a soldering iron to do the job.

So, armed with this method of working, you can build what you need, with a great deal of ease. For example, my well-travelled Ford Cortina estate (my family had outgrown Morris Minors by then!) had a centre console for a radio speaker. If I pulled it out, the space could be used for a small transmitter.

As I had the speakers for the car radio mounted in the doors, it was an easy decision when I decided to use the space. Everything was built onto the p.c.b. blank, which made the most of what room I had. So, for very little bother I had an unusual, but very useful little transmitter.

Out And About

What bands you operate on, when you're 'out and about' are up to you. Antennas aren't a problem, and I've used a trapped dipole, centre-supported (two broomsticks

joined together are ideal for the support) in clothes line fashion at about three metres high, for many years.

The 'clothes-line' antenna is lightweight and provides a good portable antenna system. Once you've erected the antenna, it's a simple job to run 10m or so of feeder to the vehicle.

However, don't forget safety! I suggest that you keep equipment (and antennas) with high voltages away from where people and animals can touch them. Believe me, the sight of a cow in full flight, after she's had a shocking experience licking a live antenna wire is quite frightening (especially if you're in her 'flight path').

Secondly, if you're going to try mobile/portable c.w. from a car, I suggest that you use a small electronic keyer. It's much easier.

Perhaps, now you've read my suggestions...you'll have a go too and enjoy amateur radio outdoors this summer. I look forward to working you on either c.w. or a.m. 'phone.

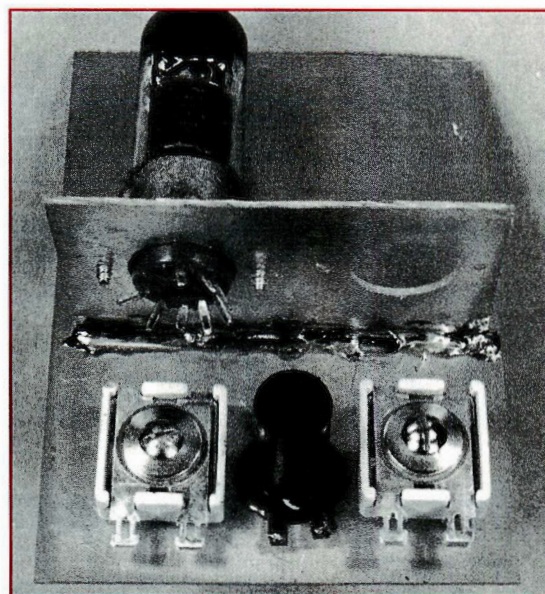


Fig. 5: The transmitter (for c.w. use in this example) under construction, using the p.c.b. material technique. The un-used hole for the modulator valve, clearly demonstrates the neat cut which can be used with a standard chassis punch.

Shopping List

Resistors

Types and power dissipations as stated.

100Ω	1
470Ω	1
100kΩ	1
1MΩ	1

Capacitors

Type and working voltage as stated.

27pF	1
100pF	1
4.7nF	2
10nF	1
10nF	1
20μF	1

Variable capacitors

Trimmer type 2

Inductors

L1, 2, 3 (see text)

L4	1.8MHz 47 turns close-wound 22s.w.g. enamelled on 1in former*
L4	3.5MHz 30 turns close wound 22s.w.g. enamelled on 1in former*
L4	7MHz 16 turns close wound 22s.w.g. enamelled on 1in former*

R4 (8 to 10W, wire-wound or composition)*
R2 (3 to 5W, wire-wound or composition)*
R3, 0.25W 10% carbon film
R1, 0.25W 10% carbon film

C4, silver mica*
C5, silver mica*
C2, at least 250V d.c. working*
C3, 7
C6, 1000V d.c. working (Maplin HV0.1 suitable)
C1, electrolytic 20 to 50V d.c. working.
C8, 9 (see text).

*Above winding details are guidelines, as individual constructors may wish to use smaller or larger formers.

Valves

V1, 2

6CH6/6BW6 (see text)

* Components marked with an asterisk are often available in the 'Bargain Packs' available at mobile rallies for around the £1.50 mark. Alternatively, they can be salvaged from older equipment or made up from combinations of components. (See 'Mathematics for the RAE' March and April issue of PW).

Table 1

Coil winding details for the 1.8MHz Band converter

L1	8 turns 34s.w.g. wound over L2
L2	60 turns 34s.w.g., tap 13 turns from earth on 0.5in former with tuning core
L3	150 turns 42s.w.g. 0.5in former
L4	10 turns 34s.w.g wound over L3
L5	5 turns 34s.w.g. wound over L6
L6	50 turns 34s.w.g. on 0.5in former

Miscellaneous

Crystal (to suit frequency required), crystal holder, moving coil meter (150mA f.s.d.), B9A valve bases and screening cans (if possible use the screened type of holder) to suit (chassis or p.c.b. mounting), audio choke or audio output transformer for L1 (see text), transmitting type trimmers (Birkett's) coil former to suit, switches, jack plug and socket. Carbon microphone (if required) telephone quality works adequately, associated microphone transformer. A valve audio output transformer used back-to-front will work in this job, as will a 240V to 6V step-down transformer. High-output crystal microphone (if required). An old tape recorder microphone will work in the position. Power supply (see June PW for inverter details).

Valve And Associated Specialist Suppliers

Colomor (Electronics) Ltd., 170 Goldhawk Road, London W12 8HJ. Tel: 081-743 0899, FAX 081-749 3934 (valves and valve bases). RST Mail Order Co. Langrex Supplies Ltd., 1 Mayo Road, Croydon, Surrey CRO 2QP. Tel: 081-684 1166, FAX 081-684 3056. (valves and valve bases). J. Birkett, 25 The Strait, Lincoln LN2 1JF. Tel: (0522) 520767. (Valve bases, transmitting type trimmer capacitors, valve equipment type variable capacitors).

Quartz crystal suppliers:

Quartzlab Marketing Ltd., PO Box 19, Erith, Kent DA8 1LM. Tel: (0322) 330830, FAX (0322) 334904.

Golledge Electronics Ltd., Merriot, Somerset TA16 5NS. Tel: (0460) 73718, FAX (0460) 76340.

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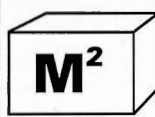
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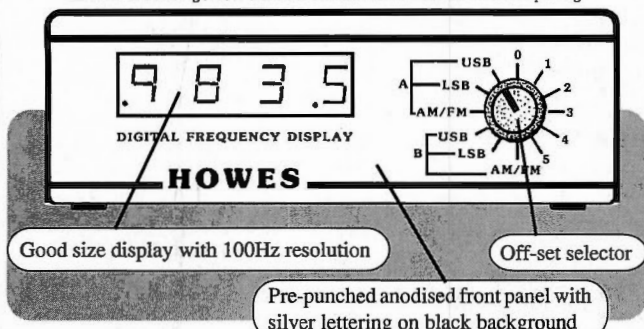


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DCS2 "S Meter" for receiver	£9-20	£13-80

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Basic Synthesisers And How They Work Part 2

Having looked at synthesisers in terms of their overall block diagrams, it's worth taking a closer look at the contents of some of the circuits. One of the most important sections of any synthesiser, is the loop filter.

The loop filter will govern many of the features of the synthesiser, but it need only contain very few components. One of the obvious functions of this filter, is to remove any leakage of the phase detector reference signals on the tune-line. A typical loop filter is shown in the diagram, **Fig. 2.1**.

If these signals appear at the input to the v.c.o., they will give rise to sidebands at the output of the loop. These sidebands will be at an offset from the carrier, equal to the reference frequency as shown in **Fig. 2.2**.

Another important feature of the filter, is that it governs the stability of the whole loop. By proper design of the filter, the loop will remain stable and have a large degree of margin in hand.

However, if the filter components are not chosen correctly, then it's possible for the whole loop to become unstable. If this happens, the tune-line will be seen to have a large oscillation on it, giving rise to a wide band frequency modulated signal. When this occurs, the feed-back path is around the whole loop, and no single stage is oscillating.

Phase Noise

The filter, also contributes to the phase noise characteristic of the synthesiser. The reason for this, is that noise emanating from different parts of the circuit affect the loop differently, depending upon the filter.

From all of this, it can be seen that the choice of the loop filter is very important. As you can imagine with so many features of the synthesiser affected by it, the choice of the filter can be something of a compromise. But this is part of the designer's challenge!

Phase Detector

The phase detector, is another important circuit block within the synthesiser. There are several different types which vary in complexity, as well as performance.

The simplest type is a mixer. The two signals to be compared are fed into it, and the difference signal comes out.

When the loop isn't in lock, and the two signals are on different frequencies, a signal equal to the difference frequency appears on the tune-line. However, when the loop is in lock, the mixer generates a voltage proportional to the phase difference.

Although mixers work well as phase comparators, and are often used at high frequencies where many other types can't work, their operation does have some drawbacks. The main problem is seen when the loop is not in lock, and a difference frequency is being generated.

If the difference frequency is outside the

passband of the loop filter, then no error voltage will be seen on the tune-line to the v.c.o., and the loop will not lock. As a result, the loop will only lock when the frequency difference between the v.c.o. and the frequency it should lock onto, is less than the passband of the loop filter.

In fact, the range over which the loop will come into lock, is known as the capture range. Fortunately, other types of phase detector exist which overcome this problem.

Error Voltage

Essentially, the alternatives generate an error voltage which is proportional to the phase error, when there's no frequency difference. However, when there is a frequency difference they will generate a fixed voltage, as shown in **Fig. 2.3**.

There are many types of circuit which fulfil this requirement, and they use digital techniques. The simplest is an OR gate, but the one which has possibly found the most widespread use is the 'dualD' type phase-detector, as in **Fig. 2.4**.

Voltage Controlled Oscillator

The design of the voltage controlled oscillator (v.c.o.) in any synthesiser, is very important. This is because the circuit will have to meet quite stringent requirements.

Meeting the required frequency range, with the available tuning voltage often presents problems. In addition, the phase noise characteristics are always important.

Unfortunately, there are always other requirements. This means that the design of the

In part 1 of his article on basic synthesisers and how they work, Ian Poole G3YWX guided us through the general theory. Now, Ian takes a closer look at some of the circuit details involved.

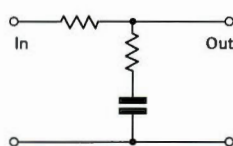


Fig. 2.1: A basic loop filter (see text).

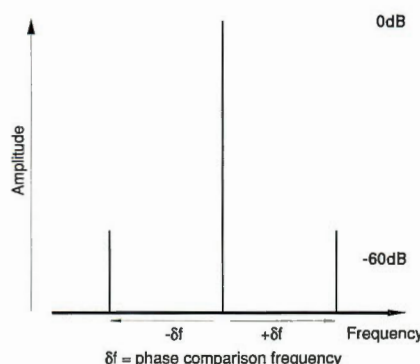


Fig. 2.2: Sidebands at the output of the loop (see text).

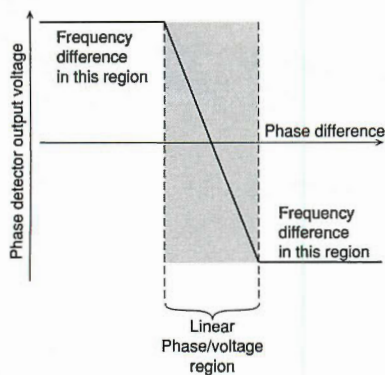


Fig. 2.3: When there is a frequency difference, a fixed voltage is generated (see text).

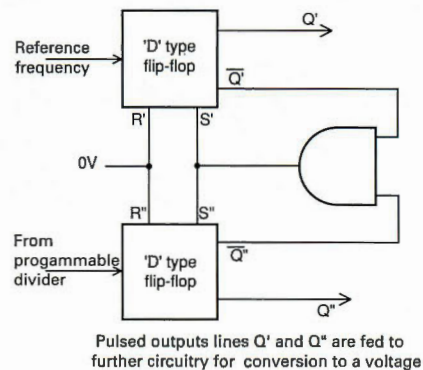


Fig. 2.4: A 'dual-D' type phase-detector.

oscillator is seldom easy!

Although there are many different designs for oscillators, the most commonly used is the standard Colpitts. This is seen whenever a variable frequency oscillator is needed.

In order to make it tune according to the tuning-voltage applied, the standard variable capacitor is replaced by a varactor diode arrangement. Normally, this a couple of diodes, as shown in the back-to-back arrangement as Fig. 2.5.

In this arrangement, the series resistor R1, is to provide radio frequency (r.f.) isolation, so that the oscillator is not affected by the tune-line. Its value can be quite high, possibly 10kΩ or more. This is because the diodes are reverse-biased and they don't draw any current.

Although a choke may seem to be a better solution, here this is not always the case. This is because the choke will be reactive, and it could introduce spurious responses and resonances into the circuit, which are most undesirable!

The Programmable Divider

The programmable divider is an integral and important part of the design of any synthesiser. Essentially, it's a circuit whose division ratio is set by a number of programming lines on the integrated circuit (i.c.).

However, when division ratios become very large, there may not be enough lines available. This can be overcome in a number of ways.

Some synthesiser i.c.s have their programming data entered in a serial fashion. Others can be connected directly to a microprocessor data bus, and have several bytes of data entered one after another.

In fact, this ability for the frequency of a synthesiser to be controlled by a processor, is one of the reasons for their success. Unfortunately, there are a number of problems with the use of programmable dividers.

Too Slow

The main problem is simply that the dividers are too slow. They can't operate fast enough. Although fixed dividers can operate very much faster, the fact that a divider is programmable, means that there's much more circuitry inside and it's slower.

There are a number of ways of overcoming this problem. The first and most obvious, is to place a fixed divider or prescaler in front of the programmable divider.

This is fine up to a point, because the divider increments in multiples equal to the division ratio of the prescaler. In turn, this means that the step size is increased in the same ratio, as the division ratio of the prescaler.

In other words, if a prescaler had a division ratio of four, and the phase detector frequency was 25kHz, then the step size with the prescaler in circuit would be 100kHz. This is obviously not satisfactory in most cases.

Swallow Counter

To overcome the divider difficulty, a more complicated circuit often called 'a swallow counter', employing a dual modulus divider can be used. Essentially, a dual-modulus counter is a prescaler which can switch between two division ratios such as 10 and 11.

Generally speaking, a circuit similar to the block diagram shown in Fig. 2.6 is used. As before, there's a main counter after the prescaler, but there's also an auxiliary counter, which controls the division ratio of the dual modulus counter.

By using this system, it's possible to count in steps equal to the phase-comparison or reference frequency. The auxiliary counter is set to a division ratio less than the main one.

Initially, the dual modulus counter will be set to divide by one of its ratios, and its output will be fed into both of the other counters, which in turn will start to divide. The first counter to have a change in its output state will be the auxiliary counter, and this will change the division ratio of the dual modulus counter.

This alters the rate at which pulses enter the main counter. The overall effect of the three counters is to give a counter which increments in single steps, rather than multiples.

Although the operation of this system may seem a little complicated, it operates very satisfactorily and it's widely used in synthesisers operating over a few megahertz.

Summary

Frequency synthesisers have come to be part of the amateur radio scene. Whether you love or hate them, it can't be disputed that they offer many advantages over other systems for generating stable and controllable frequencies. I hope that now we've taken a closer look, you'll be a bit more familiar with the modern synthesiser.

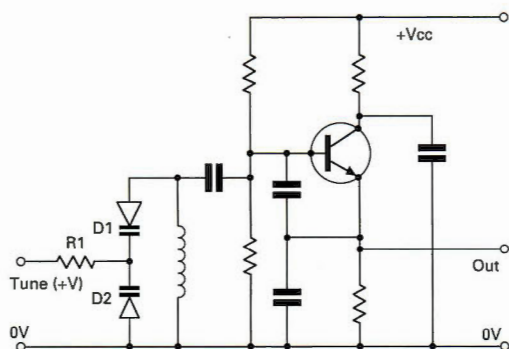


Fig. 2.5: A voltage-controlled oscillator, tuned by a varactor diode.

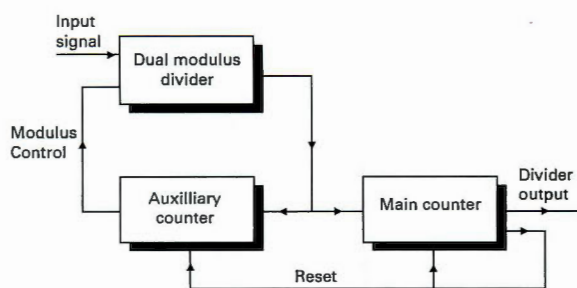


Fig. 2.6: A 'swallow counter' (see text).

Editorial note: If you would like to build on your knowledge, after reading Ian Poole's article, Cirket have a development kit which is an ideal starter point. The MC145151 Development Kit (stock number 40-14151) is based on the Motorola MC145151 frequency synthesis i.c., and needs very few external components to produce crystal-accuracy spot frequencies. The kit costs £28.18, plus £1.40 post and packing from Cirket Distribution Ltd., Park Lane, Broxbourne, Hertfordshire EN10 7NQ. Tel: (0992) 441306 or 440779, FAX (0992) 464457.

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For Sale Lowe HF-150 RX 3 months old still under guarantee, original packing and handbook with portable kit, whip antenna and NiCad batteries, carry strap, £290. Alan, Stoke-on-Trent. Tel: (0782) 410563 evenings.

Wanted Kenwood TS-690S h.f. transceiver, must be in good condition. Any reasonable price paid. Terry G4OXD. Tel: Hitchin (0462) 435248.

Wanted Sony Short Wave receiver or similar multi-band receiver. I have for disposal Commodore 64 enhancer disk drive, floppy discs and manuals - exchange preferable, or cash £170 - with cash difference. Tel: (0492) 514505.

For Sale ERA MkII tutor/decoder for Morse, RTTY, £105. Datong Morse tutor D70, £35. All mint - I passed! Sony 8mm handycam M8EK (simplest) no zoom/monitor, plus v.t.r., snip, £310 o.n.o. Colin GOPDS, Gillingham, Kent. Tel: (0634) 379140.

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Wanted Heil HQ300 or G3WPD parametric equaliser, *Practical Television* magazines January 1956 to February 1957 and collectors Acos Xtal ball microphone, mic 22-2, boxed and working, offers. E. W. McLean, Woodside Cottage, Longmorn, Elgin, Grampian IV30 3SE. Tel: (0343) 86435 evenings.

For Sale Eddystone 640 short wave receiver, very good original condition, £80. HRO50, all original, nine coils, £80. Tektronix 545 'scope, £120. Tektronix 465 100MHz portable 'scope, manuals and probes, very good, calibrated, £295. Alan. Tel: (0344) 27869.

For Sale Sony ICF-6700 f.m., m.w. radio 1.6-30MHz, digital frequency display, like new, £120. HRO50, nine coils, all original, £80. Alan. Tel: (0344) 27869.

For Sale 934MHz cybernet Delta One v.g.c., boxed with standard fist mic, manual and mobile fixing bracket, £235. Tel: Southend, Essex (0702) 512814.

Wanted by F6COT: service manual with circuits and parts list for scanner Black Jaguar BJ200 MkIII; also for Telereader model CWR685E. Douglas GM0AJK. Tel: (0383) 722485.

For Sale Yaesu FT-290, NiCads, case and 20W linear, £250. Tonna 9ele portable antenna, £20. Sota 100W linear (mains), £85. PK232 data terminal, £170. Tel: Bredon (0684) 72061.

For Sale Datong FL2 multi-mode audio filter, excellent, boxed, £40. Tel: Hazlebury Bryan (0258) 817382.

Wanted Control box and cable for 19 set, Jones plugs and sockets, 12V vibrator

units (syncro). Octal-valve cams (service type) 1154 transmitter and J switch for same. Also 1475 RX. Ken Jones G3PSZ, 24 Station Road, Okehampton. Tel: (0837) 53021.

For Sale Kenwood TS430S fitted with f.m. board, c.w. and a.m. filters. Complete with mobile bracket. No p.s.u. or loudspeaker, never used, still as new, boxed, £575 including carriage. G8WYT QTHR, W. Sussex. Tel: (0444) 450265 anytime.

For Sale AOR1000 scanner with charger and mobile connector. Good condition, £150 o.n.o. Kenwood R2000 communications receiver, good condition, £350 o.n.o. Tel: Chattem, Kent (0634) 842005.

For Sale Kenwood TS820 remote VF0820, a.t.u. AT230, and extension speaker SP230. All matching and boxed v.g.c., £600 o.n.o. Buyer collects. Tel: (0524) 859252 after 6pm.

For Sale Sony ICF PR080 hand-held scanner, covers 0.15-230MHz, but with gaps, 40 memories a.m./f.m., £160 o.n.o. GW4VWY Tel: (0443) 772387 anytime.

For Sale Icom IC2SET about three months old, packaged with all accessories and headset/boom microphone, £250 o.n.o. Fairmate HP2000 scanner about 18 months old with packing and two antennas, £195 o.n.o. Chas. Tel: 071-987 2296 after 7pm/weekends or 071-836 4289 days.

Wanted Yaesu FT70G h.f. transceiver. Ian GM00CH. Tel: (0426) 982309 anytime.

For Sale Procomptor AFR2000 RTTY all-mode, in as new condition. Offers over £100, prefer buyer collects. L.V. Wood G4ZSB, Nottingham. Tel: (0602) 256389.

For Sale Panther single band QRP antenna tuners for 7, 10, 14, 18, 22, 24 or 28MHz bands, £24 each. Howes CTX80 kit built and tested, £12. Noise bridge, £10. Includes p&p. Tel: Luton (0582) 454778 after 6pm.



MFJ-9020 14MHz QRP CW Transceiver

As there's a Morse theme to PW this month, Rob Mannion G3XFD has tried out the brand new compact c.w. rig from the MFJ stables in the USA. This small 'all American' transceiver is capable of providing DX, even from a mountain top!

I get a real thrill from obtaining a lot out of a little. In other words, I'm a QRP fan and a committed follower of the 'let's recycle it' brigade. One glance at my shack will tell you that!

It's not often these days, apart from the excellent kits available from British manufacturers, that I get a chance of trying QRP equipment from abroad. So, I was very interested to hear about the MFJ-9020 transceiver and was keen to try it out.

Single Band

The MFJ-9020 is a single band, c.w. only QRP transceiver with a transmitter output of 4W into a 50Ω load. The receiver, is a single conversion superhet with the added refinement of crystal filtering.

Many home-brewed QRP c.w. transceiver designs (including my favourite 14MHz rig) use direct-conversion receivers. This transceiver however, is more refined and includes an 8-pole filter working in conjunction with the 10MHz i.f.

The receiver covers from 14 to 14.075MHz, and utilises single-knob tuning. The tuning scale is very much in the mould of the home-brewer, with a plastics pointer moving above an engraved scale.

In fact, the transceiver although simply and attractively designed, is very straightforward. There's only an on-off switch, an audio volume control, tuning knob and receiver independent tuning control on the front.

The front panel is finished off with two l.e.d.s indicating power-on and the transmit state. In fact, the whole satin-finished front panel and the cabinet is (despite the extreme simplicity) very attractive.

Stable Oscillator

The transmitter frequency is controlled by a very stable v.f.o., linked to the single-knob tuning control. Apart from this control, that's all the operator has to worry about!

The transmitter's output is designed to match into a 50Ω load, and although not fully output protected, can survive momentary shorts on the antenna feeder. The p.a. stage can also tolerate up to 3:1 v.s.w.r.

Semi break-in is fitted, and there's an automatic 700Hz off-set. Because the transmit variable crystal oscillator offsets the b.f.o., the sidetone is also automatically at 700Hz.

There's provision for a keyer to be built-in, along with a 3.35mm jack socket for a standard key.

On The Air

I thought it best to operate the transceiver under portable conditions first, as it will probably appeal

to operators who like the 'great outdoors'. To achieve these conditions, I set up a table in our garden and hooked up to a random length wire fixed to a tree (at about 7m above ground).

The antenna was tuned by my Lake Electronics TU2 Mark 2 QRP a.t.u. The a.t.u. managed to match into the random length wire very well (it was approximately 23m long, and ran straight from the tree to my operating desk).

Once I had adjusted the a.t.u. for an s.w.r. of less than 1.5:1, I was ready to go. My first QSO was with a Swedish station, who gave me an RST of 459 with QRM and QSB.

I spent the rest of the afternoon working steadily down into Europe, with my best DX being into Greece. Altogether that day I had over 30 QSOs.

Next day, a Sunday, conditions were much better on the band, although the weather wasn't so good. So, you can understand why I worked from my study-come-shack! I managed to get several 599 reports from European stations and a 359 from a Canadian (he was running 100W!) and a 459 from a Florida station, when using my end-fed wire.

Particularly Pleasant

I enjoyed using this little rig. It was fun to use, and the sidetone was particularly pleasant and 'soft'. However, although I found that the tone was mellow, I did feel an urge to adjust the frequency just a little higher!

The semi break-in 'delay' type of change-over was sure and very steady, with no peculiar 'hang-ups'. The transmitter also seemed to key very nicely. I consistently received very pleasing comments on the quality of the signal and the receiver coped very well with the heavy QRM met on 14MHz.

Receiver Tuning

The receiver tuning was very accurate at the lower end (measured at 14.0005MHz), but at the upper end (14.075MHz) the actual tuning was low by 3kHz. From our tests (carried out by G1TEX and myself) receiver stability seemed to be good.

The receiver drifted 500Hz high in the first half an hour of the tests. From then on, stability was excellent bearing in mind the simplicity of the rig. When we tested the transmitter, with the key down on transmit, the frequency drifted low by 250Hz, after 15 minutes.

Receiver selectivity seemed to be excellent, and I didn't feel as though the rig was only a single-conversion superhet. I did not feel the need for any audio filtering. However, I would have liked to have had an attenuator control to reduce overloading from some of the stronger signals heard.

Practical Wireless, July 1992

Review

Audio Output

I also had the strong feeling throughout the review period, that the audio output is somewhat lower than it should be on this design. Because of this, I used headphones all the time.

When I first switched the receiver on, I thought the receiver was rather 'deaf'. This is misleading, and I quickly realised that the receiver was fine, all it needed was headphones, and perhaps a little more audio drive into the LM386 a.f. i.c.

Dedicated Operator

The MFJ-9020 will appeal to the dedicated QRP operator. The manufacturers, MFJ Enterprises, say that they also intend to produce versions for other bands.

I was able to talk to the company's representatives, including the president, at the Dayton HamVention in April. During our chat, I learned about the possible plans to produce versions for 7 and 21MHz.

My suggestion that they consider a multi-band version for 7, 14 and 21MHz was received with interest. I'd suggested it because any single-band transceiver is at a disadvantage, particularly if it's not cheap in the first place.

The MFJ-9020 is not considered cheap, even in the USA, although for their money, the American market get a very well-built and designed rig. Unfortunately, by the time the transceiver is imported from America, the import duty, transportation and other considerations all add to the final costs here in the UK.

Despite this, I feel that the transceiver will develop quite a following, and part of the success will be due to MFJ's approach to the customer. The

instruction manual is especially worth a mention, as it provides a great deal of information.

Following a good introduction, the manual contains the full technical specifications, a good block diagram and several pages of advice and information on using the rig. There's also a separate fault-finding section.

The fault-finding section has a component layout guide, an internal adjustment lay-out guide, plus a **full circuit diagram and a d.c. voltage chart!** The manufacturers are to be congratulated for their careful attention to detail, and providing such a user-friendly manual.

Summary

The MFJ-9020 transceiver shows that despite the demise of Heath Company's kits in the USA, we can still expect innovative American manufacturers to come up with interesting designs.

Hopefully, this company will continue its development work on this and other transceivers. The 9020 could become the first of many MFJ products for use on the h.f. bands.

In conclusion, I can honestly say that there is a market for this type of rig. I'm looking forward to seeing the 7MHz and the multi-band versions.

My thanks for the loan of the review transceiver go to Waters & Stanton Electronics at 22 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835 or 204965, who can supply the MFJ-9020 for £179.95 plus £5 carriage.

Optional extras for the MFJ-9020 include the matching a.t.u. for £89.95, p.s.u. £69.95, Curtis Keyer chip £39.95 and the audio filter for £34.95. (all plus postage and packing at £5).

Specifications

Receiver Section

Frequency coverage	14 to 14.075MHz
Receiver type	Single conversion superhet
Local oscillator frequency	4MHz
Intermediate frequency	10MHz
Filtering	8-pole crystal ladder filter
Automatic gain control	Audio derived, instant T/R recovery
Sensitivity	<1µV
Receiver independent tune	1.5kHz range
Audio output	8Ω internal speaker or headphones
Audio filter	Optional extra. 700Hz 4-pole active, unity gain
Receive current consumption	50mA

Transmitter Section

Transmit keying	High impedance, semi break-in
Electronic keyer	(optional) Curtis 8044ABM iambic
Transmitter sidetone	700Hz sinewave
Power output	>4W, (at 13.8V) into 50Ω
Transmitter	
v.s.w.r. tolerance	3:1 v.s.w.r.
Transmit current	1A at 13.8V d.c.
Transmit/receive switching	Semi break-in, adjustable hold.
Transceiver dimensions	60 x 165 x 150mm

MFJ-9020 Modifications

As we were preparing for press, Robert Fox KB5RJE, from MFJ's headquarters in the USA, FAXed a reply, some comments on the *PW* review. Robert has provided details of modifications carried out on later production models of the 9020 transceiver. The *PW* review was carried out on an early production model, collected by me at the Dayton HamVention.

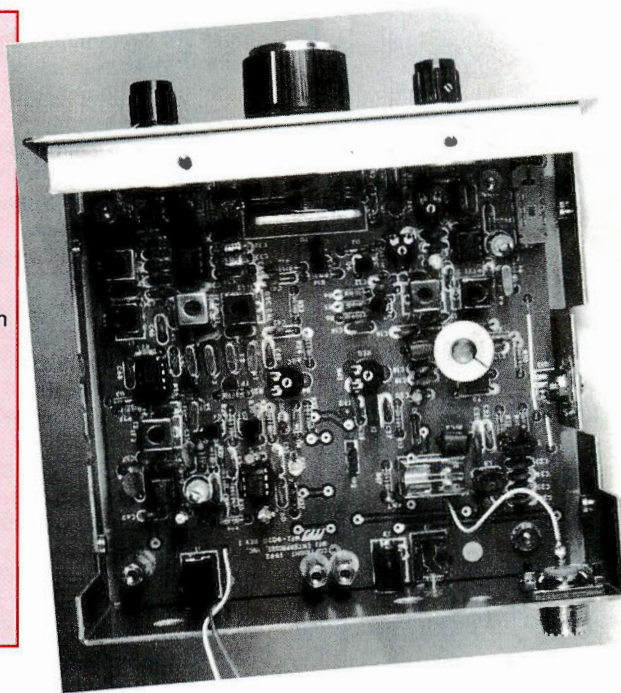
The modifications have been carried out by the rig's designer Rick Littlefield, following the *PW* review and one carried out by an American magazine.

Increased audio output: Early models showed a weak audio output, due to a low power supply level to the audio amplifier (LM386). This has been modified, and the audio output coupling has been increased. These modifications have led to an improvement of 3-6dB in l.f. audio response. The 9020's built-in speaker has been increased in size, and it's now a more robust 75mm unit. The a.g.c. loop has now been adjusted to increase the average power of all signals.

Other production-run modifications include: full reverse-polarity protection, and rear panel silk-screened power connection information. The manufacturers also state they've improved the quality of the main v.f.o. tuning capacitor.

Finally, MFJ will supply owners of early production run 9020s with a modification sheet so they can up-grade their transceivers. Their address in the USA is: **MFJ Enterprises Inc. PO Box 494, Mississippi State, Mississippi 39762 USA. Tel: (601) 323-5869, FAX (601) 323-6551.**

Practical Wireless, July 1992



Review

Morse Equipm

As this issue has a Morse 'theme', the PW team takes the opportunity to present this guide to help you find and choose equipment to learn, practice, read, use and enjoy the c.w. mode to best advantage.

Even though many radio enthusiasts regard Morse as an old-fashioned anachronism, the mode is still very much with us. As a result of the great interest in this most basic of transmission, there's an amazing variety of equipment available to help the operator or potential enthusiast.

The equipment ranges from the basic mechanical to the most sophisticated electronic

transmission and reception aids. Every c.w. fan is catered for, whether they want to just bash away on the hand key or use a keyboard or electronic key.

So, enough of the chatting, let's look at what's on offer in the world of c.w.

Basic Keys And Keyers

To call a Morse key basic, is really like calling a ship's helm a steering wheel, especially as we all know there's much more to it than that! So, we're starting off with a look at hand keys, and keyers.

The choice of basic hand keys on the amateur radio market is enormous. They range from war-surplus military types to antiques (well, almost), to cheap imported types and on to the superbly hand-crafted brass keys which are often made by professional engineers. Then there's the often formidable-looking electronic keyer that looks like it could the job without you!

Coltec Electronics.

Although they may not be very familiar to PW readers, anyone who is a regular rally-goer will have already met this company. Based in Birmingham, Coltec Electronics attend many rallies, and they are yet another British-based organisation producing budget-priced kits for the amateur radio market. Of particular interest for c.w. enthusiasts is their CT122IK iambic keyer, which Coltec claim will key all rigs. They also state they're prepared to do 'one off' projects if you need something special. For further details and prices contact the company at **330 Brays Road, Sheldon, Birmingham B26 2PS. Tel: 021-722 2429.**

G4ZPY Paddle Keys International. Gordon Crowhurst is a familiar figure at most of the shows and big rallies, just look for the well-known moustache under the 'G4ZPY Paddle Keys' sign and you'll find him. Gordon produces a distinctive range of

standard hand and paddle Morse keys, finished to a high standard. One (standard hand type) key is produced in kit form.

All the keys have a good firm action, although Rob Mannion G3XFD says that after evaluation by his 'Monday Morse' regulars, the model with the heavy base made from lakeland stone was the most popular key.

For further details of their full range of products contact **G4ZPY Paddle Keys International, 41 Mill Dam Lane, Burscough, Ormskirk, Lancashire L40 7TG. Tel: (0704) 894299.**

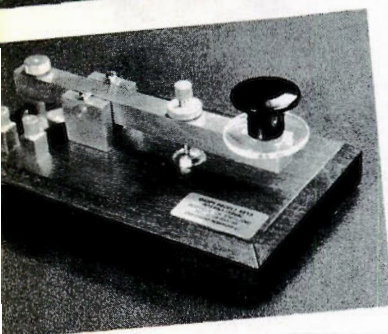
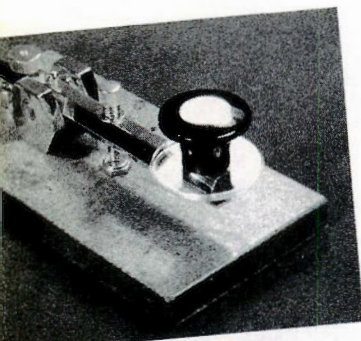
Kanga Products. This company's products are already well-known to members of the G-QRP Club, for their products aimed at the low-power operating fraternity. Based in Kent, Kanga produce a variety of c.w. transmitters, receivers and accessories in kit form. Of particular interest to the c.w. enthusiast is their budget-priced iambic keyer kit. For further details of the keyer kit and the full range of products (free catalogue) contact Kanga Products at **3 Limes Road, Folkestone, Kent CT19 4AU. Tel: (0303) 276171 or (mobile) (0860) 363915.**

Kent Keys. Produced by Bob Kent's company based in Preston, these Morse keys are also hand-made and finished to a high standard. Bob produces a wide variety of keys, with kit options available on various models. For those people who can't get on with iambic paddle keys, this company also produce a neat little single paddle side-to-side key. Rob Mannion has tried this model and he reports that he's "at home with it". (So that's where it went!). For further details and information

on their products, contact **R. A. Kent Engineers at 243 Carr Lane, Tarleton, Preston, Lancashire PR4 6YB. Tel: (0772) 814998, FAX (0772) 815437.**

Samson Keyers have been produced for the last 26 years by Herman Samson DJ2BW from his works in Germany. The product information guide claims that the keyers are in use all over the world and at many coastal stations. There are two models, the Samson ETM-9C Electronic keyer and the Samson ETM-9COG keyer with companion ETM/SQ twin-paddle key. The ETM-9C is claimed to be particularly easy to operate.

Full product details, information and prices, etc., are available from the sole UK Agent, **F. H. Watts G5BM, Woodland View, Birches Lane, Newent, Gloucester GL18 1DN. Tel: (0531) 820960.**



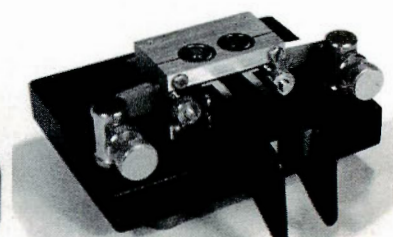
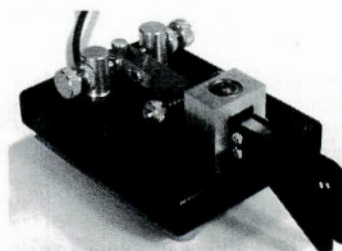
G4ZPY Paddle Keys



Samson Keyers



Kent Keys



Recent Showcase

S.E.M. Based in the Isle of Man, this manufacturer, along with other amateur radio equipment, produces several items of particular interest to the c.w. enthusiast. Their range includes a twin-paddle key and their established iambic keyer (which for versatility uses a reed relay for switching) plus the latest addition to the range, the Cosmic Keyer. For further information and product details contact **Mr G. P. Crapper, S.E.M., Union Mills, Isle of Man. Tel: (0624) 851277.**

Morse Aids

As the equipment on offer here is so varied, we've grouped everything together under

has (so Rob Mannion G3XFD reports) "got a class of youngsters between the ages of 12 and 15 years-old, up to seven words a minute in one evening, because they immediately relate the sounds to the letters"! Once the student has the basics, the D70 can then be used for private practice (it's self-contained and very portable).

The D70 will run an efficient loudspeaker at a volume level suitable for a classroom, when the speaker is plugged into the earphone socket at the rear. A standard modification for this popular unit, is to remove the piezo-type audio transducer, and to replace it with a single dynamic earpiece (as used in telephones, and as fitted in the D70 when it was first introduced). This modification, provides a far greater audio output for personal and

includes a Supa-Tuta 'Plus' with a comprehensive keyer facility added to the teaching aids of the basic Supa-Tuta. Their range is comprehensive and it has recently been extended. For the latest details contact Dewsbury Electronics at **176 Lower High Street, Stourbridge, West Midlands DY8 1TG. Tel: (0384) 390063/371228, FAX (0384) 371228.**

Enterprise Radio Applications. Better known by their company's initials, ERA, this manufacturer has made its name by the well-established ERA 'Microreader' which has been reviewed in *PW*. This well-known unit, is designed as a 'stand alone' addition to decode (and display) Morse signals and RTTY. All that the operator has to do is to connect the audio output from the receiver to the unit. Incoming signals are decoded and displayed on the built-in l.c.d. screen. The 'Microreader' also includes a Morse tutoring facility so you can check your sending and receiving performance. The company also produce a separate RS232 display unit, so you don't have to tie up your computer while receiving. For full details on this and other products, contact ERA at **5 Clarendon Court, Winwick Quay, Warrington WA2 8QP. Tel: (0925) 573118.**

ICS Electronics. This company, based in West Sussex, has tended to specialise in computer-based amateur radio and data receiving equipment for some time. Of the many products that ICS stock there are several to interest the Morse enthusiast. One of their well-established products is the AEA 'Morse Machine'. This electronic memory keyer features a multi-

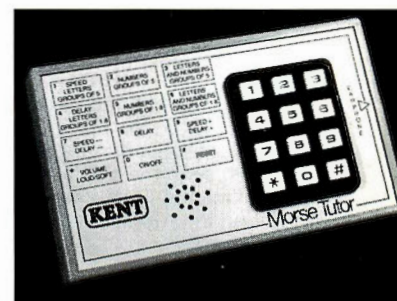
SEM Cosmic Keyer



function electronic keyer, plus a comprehensive training mode

(reviewed in *PW*). The machine also has a simulated QSO program, which is designed to help you practice a under 'real' QSO conditions. If you're really keen, you can even use the built-in simulated DX Contest program and join in or just listen in for practice! The AEA 'Morse Machine' is fully computer compatible, and it offers a host of features. For full details, prices and information on this and other products contact **ICS Electronics Ltd., Unit V, Rudford Industrial Estate, Ford, Arundel, West Sussex BN18 0BD. Tel: (0903) 731101, FAX (0903) 731105.**

Kent Keys. Along with their full range of hand-made Morse keys (address and details, provided above) Kent's



produce a completely self-contained Morse receiving practice unit. The Kent Morse Tutor is a hand-sized unit, housed in a plastics case, providing a range of sending speeds, spacing, delays and volume settings. As the tutor has a built-in battery power supply and internal speaker



the one title. After all, they are made to help you get the best out of using the Morse model!

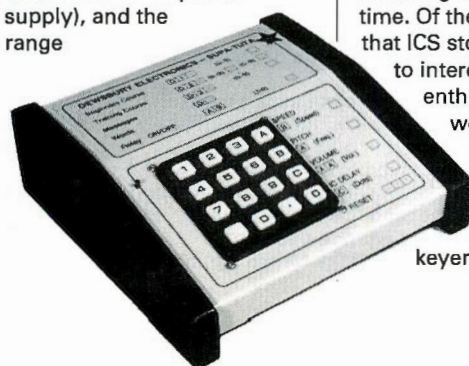
Datong D70 Morse Tutor. This famous product has been on the market for many years and is deservedly well-known. Rob Mannion thinks the unit is at its very best in the Morse classroom environment where its character-delay control proves to be so useful.

The D70 generates random groups of five letters, comprising of numbers or mixed letters and numbers. The D70's speed is adjustable from 6.5 to 37w.p.m. with variable delays adjustable from 0.5 to three seconds. The battery-powered unit has a built-in transducer acting as a small speaker, and there's also an earphone socket.

For the beginner, Rob Mannion has found that the variable delay helps. Immediately after the character is sent, the instructor tells the class what the Morse character was. This method

teaching use. Further details on this and other products are available from **Datong Electronics Ltd., Clayton Wood Close, West Park, Leeds LS16 6QE. Tel: (0532) 744822, FAX (0532) 742872.**

Dewsbury Electronics. Based in the West Midlands, Dewsbury Electronics produce an interesting range of Morse-related equipment. The Dewsbury Supa-Tuta has been reviewed in *PW*, and it's now well-established. The Supa-Tuta range is, as the name suggests, a teaching device. It comes with handbook showing you what the lessons are, making the unit suitable for private self-tutoring. The units are portable (requiring an external 12V d.c. power supply), and the range



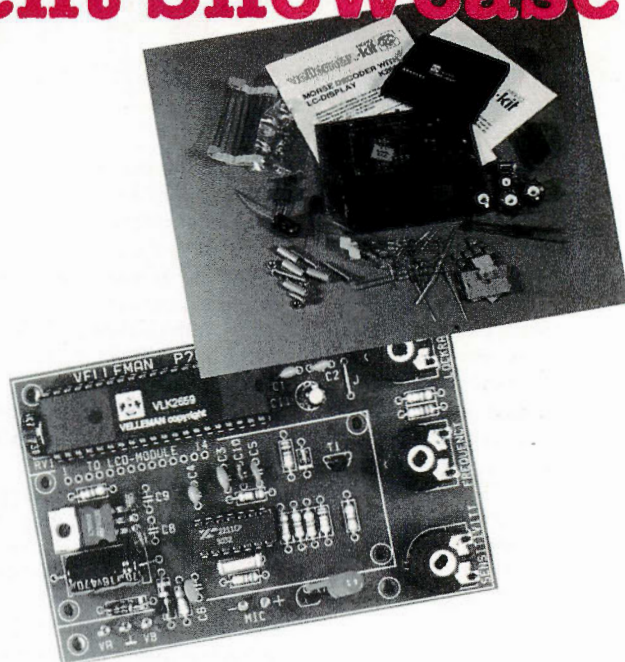
Morse Equipment Showcase

and earphone socket, it can be used for personal practice anywhere. All controls and commands are entered in via the key-pad on the front panel. Further details from their address on page 34

Velleman Morse Decoder Kit. An extensive range of Velleman kits, originating from Holland and Belgium, is now stocked and distributed by Maplin Electronics. Of special interest to the c.w. enthusiast, or someone who would like to learn or read Morse, is the Velleman K2659 Morse Decoder with display. This unit is self-contained and when built does not require any connection to the radio, as the

received Morse is picked up by the K2659's built-in microphone. All the operator has to do is place the decoder near the radio, switch it on and watch the decoded Morse as it's displayed on the l.c.d. screen. The l.c.d. screen displays 16 characters and the manufacturers claim it will decode Morse at almost all speeds. For further details, see the Maplin Electronics catalogue (page 591) which is available from W H Smith and other large newsagents, or direct from

**Maplin Electronics,
PO Box 3, Rayleigh,
Essex SS6 8LR.
Tel: (0702) 554161,
FAX (0702) 553935.**



Well, the PW team hope that this 'showcase' will help you choose the equipment you need to enjoy c.w. mode on the bands. If nothing, it will surely show that you're not alone in wanting to enjoy and make the most of the Morse mode on the bands!

The Velleman K2659 Morse Decoder Kit

Review

As Tex Swann G1TEX doesn't 'speak' Morse, he thought the Velleman Morse decoder kit would be an easy way of cheating. So, he volunteered to build and use it and share his experience!

Anyone like myself, who doesn't 'speak' Morse, has to resort to a Morse reader to make sense of the dits and dahs. So, that's how I found myself volunteering to build the kit in the first place!

The Velleman K2659 kit is marketed in the UK by Maplin Electronics and I felt that it was a project that I could enjoy building and using.

So, after a bit of unnecessary arm-bending by the editor, I duly contacted Maplin Electronics and they kindly arranged to send me a kit to build and review. It was then just a case of sitting and waiting for it to arrive!

All Components

When the parcel arrived, I saw that the kit comes packed securely in a clear plastics box. Velleman supply all components and an excellent p.c.b.

The instruction booklet is rather small, despite the fact that it has instructions in four languages including Dutch, French, German and English. In spite of the instruction booklet being small, it's more than adequate for the job.

In my opinion, the booklet can lead even a relative novice through the many steps putting the kit together. All I had to do was to get on with it!

Novice Builder

I approached the kit's assembly as if I were a novice builder, and everything turned out well. Building the kit presented no 'funnies' that I felt might cause problems.

Despite the lack of problems, I noted that the component numbers were not in any logical order that I could see. Perhaps this was an advantage, as it made me take more care with each component than I might have done normally.

Having assembled the unit, I'm sure that it is a good project for the average constructor. In my opinion, this kit is one that could be completed in one longish evening, or maybe in two shorter sessions.

When finished, the kit works from either a centre-tapped (8-0-8V) transformer or a 12V d.c. supply. The current drain, about 100mA, makes it possible to use batteries as a standby power supply.

Morse Messages

After I had finished the assembly, I searched for some Morse messages to listen into. To this end, I looked in on the amateur bands first.

Following the instructions given, I found that a fairly accurate readout of the characters was easy to achieve. I was able to prove this by tuning into some plain language c.w.

The completed project uses a small microphone to 'receive' the Morse. The sensitivity from this built-in electret microphone proved to be good.

After a little 'twiddling' with the various controls, 'tone' and 'lockrange', the decoder's l.e.d. began to flash, in synchronisation with the Morse signal.

This audio-visual feed-back would be an aid to anyone suffering from impaired hearing, as it would allow the radio to be turned down after setting-up is completed.

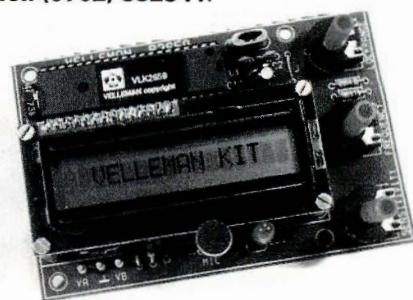
In use, I found that as long as the received Morse was being sent at a regular rate, the Velleman kit read the signals with no problems, whatever the speed.

As well as reading c.w. from the radio, I found that the decoder could easily read Morse generated by various other methods. This included the rather disgusting sounding Morse that I could generate using a key and a buzzer.

Despite the decoder's skill, I caused it a few problems with my sending. It became baffled quite often, when it would decode several of my 'e' characters or just a few '*****'!

My conclusions are that the kit is very good value for money. It also has an added plus point, as I can now prove that my Morse keying is as bad as my receiving!

My thanks for the loan of the review kit (who can supply the kit, ref: VE89, @ £59.95 inc. VAT) go to Maplin Electronics at PO Box 3, Rayleigh, Essex SS6 8LR. Tel: (0702) 552941.



Selwood's Success



Phil Selwood G0RKF, has recently scored a success with his Morse Test. So, with his own triumph fresh in mind, Phil tells his story to encourage others to have a go and prove that they too can be successful!

Phil Selwood G0RKF is pleased at his double success. He's not only passed his Morse Test, he has also proved that the RAF were wrong, when they regarded him as having "no aptitude for Morse". Photo courtesy of Gavin Selwood.

This article started out as a letter for PWs 'Receiving You' letters page, in answer to some of the negative comments regarding the Morse test. However, the Editor thought it deserved a page of its own. So, I'd like to tell the following story.

Bullying Neighbour

The story starts way back in November of last year (it seems ages anyway) and I had then held my G7 call for a whole four months. Despite this, I decided to 'go for the Morse', after much bullying from my neighbour Geoff G0PIZ!

Once Geoff had got me to somewhere around eight words per minute, he handed me over to Stuart G0GOF for further training. So, for the whole of December and January I drove the 16 miles to Stuart's house, each evening, for his unique mixture of Morse, good coffee, epic yarns and cringe inducing jokes.

I should also mention that I saw his 'rhubarb stick'. This was Stuart's nickname for a lump of solid ebony, used to encourage pupils to do better!

A Week To Go

With just a week to go before the test, I was going to pieces! My sending was awful and my receiving not much better. Amongst other worries, I did not want to spoil Stuart's 100% record for getting students through the test.

Only four days before the test ordeal, George who was a fellow student, counselled me with some good home-spun psychiatry: "It's only a hobby, you can have another go in April, just relax"! With all this sound advice, my nervous apprehension duly subsided, my sending improved dramatically and my receiving came on in leaps and bounds.

On the night the test, held at the Tiffield Centre in Northampton, I arrived with the kind of calm resignation that's probably experienced by condemned men on seeing the gallows!

Pleasant Banter

After much pleasant banter had been exchanged with the other candidates, some of whom were physically shaking, it was then our turn for the receiving test!

The examiners welcomed us into the room and made sure we filled in the necessary paperwork correctly. They also took the trouble to check that the tone of the oscillator was to our liking, and generally did their utmost to make sure we started in as relaxed a state as possible.

Then we were off, after a short practice piece had been keyed, to get us used to the examiners 'fist'. I was so relieved, because the characters and numbers went down on the paper like a dream and I had solid copy in both parts.

Nervous Hand

We were then sent outside the room, and were called individually for the sending test. Despite a fairly nervous hand, I managed to send the characters with no errors though I made and corrected two mistakes in the figures. It was only then that I started to suffer from post traumatic stress disorder!

A week later the pass slip was in my hand. This wasn't so bad for a fellow who had failed once before. On that occasion I had my RAF Telegraphy Course failure sheet endorsed with "No aptitude for Morse code, also lacks the manipulative skills required". I've proved how wrong they were!

Thanks To All

I must say many thanks to all the previously mentioned amateurs, especially G0GOF, for helping to get me through the Morse Test. And guess what? I'm actually enjoying c.w. operating, just for the fun of it! The only problem is that I haven't made my first entry in the log yet - all I have to do is get my Drake TR3 working and on the air!

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Getting Started - The Practical Way

The gates are mine to open, as the gates are mine to close.....

Rudyard Kipling in *Our Lady of the Snows*

So far in this series, we have been dealing with **analogue electronics**. Analogue circuits are where the input and output voltages can be varied over a range of values.

Nowadays, a lot of the electronics world concerns itself with **digital electronics**. Digital circuits are those where there are only two states for input and output values: they are either 'on' or 'off'.

The terms on or off may not sound very complex or inspiring, and of course isn't that just what a switch does? Indeed it is: the switch is the simplest type of digital circuit!

But digital electronics are a vast and complex subject into which we are going to dip a fraction of a toe. For those wishing to explore the subject further, there are many text books on digital electronics.

Integrated Circuits

We're going to build a couple of simple circuits which make use of digital integrated circuits (i.c.s). Digital i.c.s are two-state devices.

One state is near zero volts or ground (**low** or **off**). The other state is near the supply voltage level of the i.c. (**high** or **on**). Uninspiring as it seems, these two states enable us to use a method of counting, known as the binary system, to great advantage.

The binary counting system only uses two numbers and they are 0 and 1. This is sometimes called binary logic, and follows the system of 'Boolean Algebra' invented by George Boole, who like me, is a son of the Lincolnshire fens.

Basic Gates

Enough of the theory! All we need to know is that digital i.c.s use basic circuit elements called **gates**.

Gates have two or more inputs and a single output. Their function is fixed by how high and low inputs produce a high or low output.

The three basic types of gates are called the **AND**, **OR** and **NOT** gates. In the **AND** gate a signal (a **high**) must be present at all input gates to produce an output signal.

The **OR** gate must have an input signal at one input or the other (or both) to produce an output signal.

The **NOT** gates are often called **inverters**. This is because they reverse the signal: a **high** produces a **low** and a **low** produces a **high**.

And, just to make life complex, the first digital i.c. we'll use contains four **NAND** gates. The **NAND** is a gate which will only produce an output signal if there are signals on **all** of the input gates.

Several Families

There are several families of digital i.c.s, and the one we we'll use here is called transistor-transistor

Practical Wireless, July 1992

logic (t.t.l.). It's a fairly old family, and it has the merits of being cheap and cheerful.

The disadvantage of using this family, is that it requires a 5V supply and a lot of current. The diagram, **Fig. 1**, shows the 7400, which is the basic building block of the t.t.l. family.

It's a **quad** (four in a package) **NAND** gate. The drawing shows the symbol for a **NAND** gate, with four of them in the 14-pin dual-in-line package.

The diagram **Fig. 1**, also shows (symbol below i.c. diagram) that if the inputs are joined together, the **NAND** gate becomes a **NOT** gate, or an inverter. That is, a **high** input produces a **low** output or a **low** input produces a **high** output.

Combined Principles

In the last part of this series, we built a crystal controlled oscillator circuit. In previous articles we have looked at the multivibrator circuit. The circuit in **Fig. 2**, combines both of these principles and uses the 7400 i.c.

The multivibrator is a good choice for low frequency crystal oscillators. They are sometimes a little sluggish to start oscillating. The multivibrator, which works on a simple on-off principle, usually gets the most sluggish crystals to oscillate.

Two gates **a** and **b** are coupled to switch each other on and off alternately. They are coupled via **XL1** and **C2** which control the frequency of the oscillations.

The crystal **XL1** is a 1MHz type. The series capacitor, **C2**, is a trimmer capacitor used to fine tune the frequency of the oscillator. This means that

Theory

This month, the Rev. George Dobbs G3RJV delves into the extremely important world of digital electronics. Appropriately enough, George has called this month's offering 'Opening And Closing The Gates' and of course he starts off with a quotation!

Fig. 1: Outline and pin connection for the 14-pin dual-in-line (d.i.l.) transistor-transistor-logic i.c. The i.c. is a quad (four in a package) device. Directly below the outline, is the symbol used for NAND gates, (see text for explanation of logic states).

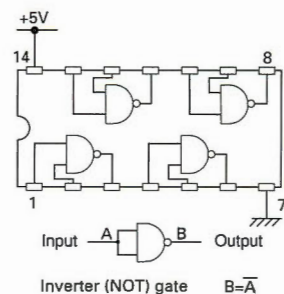
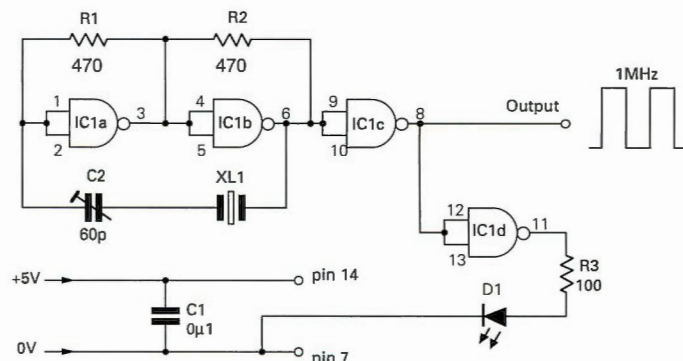


Fig. 2: The circuit diagram of this month's project, a transistor-transistor-logic (t.t.l.) oscillator using the 7400 i.c. (see text).



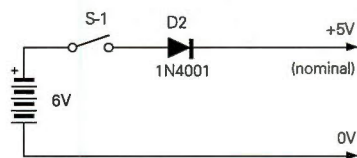
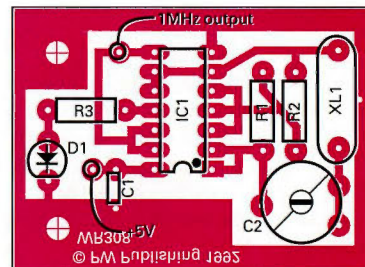
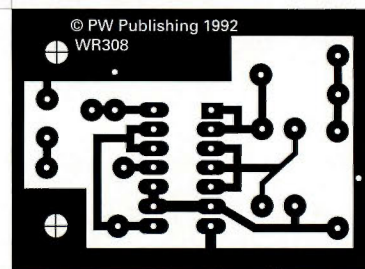


Fig. 3: To overcome the disadvantages of using 5V, this simple circuit proves useful. The circuit uses the voltage drop across the diode, D2, to provide a (nominal) 5V supply from a standard 6V source.

Fig. 4 (top right): The copper-track side of the t.t.l. oscillator p.c.b.

Fig. 5: View of p.c.b. (component side) looking down onto the board, showing component placing guide.



it is possible to accurately set up the frequency.

Our multivibrator oscillator produces a square-wave because of its on-off action. This, through its very nature is rich in harmonics. The harmonics are extra products at multiples of the oscillator frequency.

Because of the harmonics, the oscillator will be heard on a short wave receiver at 1MHz and multiples of 1MHz: 2MHz, 3MHz, 4MHz, etc.

Two Extra Gates

The 7400* (See note below) has two extra gates, c and d. The gate c is used as a simple buffer, between the oscillator and the output. The fourth gate, d, is used to drive an l.e.d., which serves as an indicator that the circuit is working.

The pins of the 7400 gates are marked on Fig. 2. The diagram also shows that the supply (which must be between 4.75 and 5.25V) is connected between pins 14 and the ground, which is pin 7.

Because of the exacting voltage requirements, this supply can be a problem. The diagram, Fig. 3, shows how a 6V battery can be used to power a t.t.l. circuit.

A suitable battery would be the PJ996 lantern battery (the type with a top positive connector in the form of a coiled spring) or the cheaper PP1 battery.

A series diode, D2, reduces the voltage to a suitable level. If you remember the action of the diode, it is easy to see how current will pass through D2 but there will be a drop of some 0.6V.

Naturally, for this to work, D2 must be connected the right way round or no current will pass! In the next part of this series I will describe a suitable power supply.

Suitable Layout

A suitable p.c.b. track layout for the t.t.l. oscillator is shown in Fig. 4. The layout is viewed from below (copper track side).

As with all dual-in-line (d.i.l.) i.c. packages, all pins are counted in an **anti-clockwise** fashion. If you look at Fig. 1, you'll see that the outline package illustrated, has the pin numbers marked.

To identify the pins, the indentation on the casing (shown in the diagram between pins 1 and 14) **must be on the left**, when you're looking down at the top of the i.c. (the top is of course where the identifying numbers and letters are printed). With the i.c. in this position, the numbers are read from left to right for pins 1 to 7, and from right to left for pins 8 to 14.

Some i.c.s also have a small indentation, or pip, marking pin 1. If you make your own p.c.b., you can make pin 1's p.c.b. pad square-shaped, to assist correct placement (the PCB Service board will have the i.c. orientation silk-screened on, **Editor**).

Printed Circuit Layout

The component side of the p.c.b. layout is shown in Fig. 5. The wider spaced holes to accept the crystal and the trimmer capacitor, C2, are on the right in the diagram.

The 5V, l.e.d. and output pads can be made larger if you're making the board yourself (it's not essential, but can be useful). The pads can be fitted with Veropins which provide soldering points for the connections to the board.

Naturally, this layout could be used with perfboard as in previous projects. With this approach, the copper tracks are replaced by interconnecting wires.

Chip Holder

When the board is completed, check that the 7400 i.c. or 'chip' is wired in the correct way round. For the less experienced constructor, I would advise the use of an i.c. holder. A chip holder is a good idea, as it's difficult to desolder 14 small pins if the i.c. is in the wrong way around!

Check also that the l.e.d. is connected the right

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way round. The shorter of the two leads should go to ground, and the longer lead to the resistor.

It's now possible to test the circuit, but **do not connect more than 5.25V**. Please use a proper 5V supply or the battery arrangement described above. If you're in difficulty regarding a suitable supply, I've succeeded in getting t.t.l. circuits to work with a 4.5V cycle lamp battery, but this voltage is a little low.

Supply Connected

When the supply is connected, if all is well, the l.e.d. will glow. This is not just a power on indicator, as it shows that a signal is being produced by the oscillator.

When the board is placed close to a short wave receiver, it should be possible to detect a signal at 1MHz intervals. The signal will not be modulated, so ideally a receiver with a b.f.o. ought to be used.

Your receiver may have a b.f.o. control, alternatively it may have a switched position marked s.s.b. (single sideband) or c.w. (continuous wave for Morse reception), which will select a beat frequency oscillator.

The beat frequency oscillator (b.f.o.), mixes or 'beats' with the incoming signal, and the product is an audible tone. This will appear as a tuneable, heterodyne or 'whistle'.

Why Use It?

What is the use of an oscillator which just gives a whistle every 1MHz on a receiver? Why use it?

Well, one obvious job is to use the signal that it generates, and which appears so conveniently at regular intervals. In this way, it can be used as a calibration oscillator to indicate the MegaHertz points on your receiver.

This little project could prove to be very useful. The prototype t.t.l. oscillator I built, could be heard beyond 30MHz, and I suspect the harmonics can be heard even higher than this.

To be used to best advantage, the frequency of the oscillator needs to be as near to 1MHz as possible. The easiest way to set the frequency is to use a receiver which has an accurate digital readout.

Plenty About

If you don't have a receiver with a digital readout, you'll find there are plenty about. Perhaps a friend or the local radio club can help. Don't check it at 1MHz, but go to a higher frequency.

Any difference between the signal and 1MHz will be multiplied as the frequency is multiplied. In

other words, any error in your calibration is multiplied too, and it's easier to spot at higher frequencies.

Although 1MHz marker points are useful, smaller divisions of frequency would be even more valuable. Next time, we'll fill in the gaps with extra markers between the 1MHz points and I'll show you how t.t.l. can be used on conventional voltage power supplies. Until then, get those digits busy (your fingers!) and keep busy!

*** Note:** If you've not worked with i.c.s before, you may find that it's rather difficult to sort out the chip identifying number from all the other information on the device. Don't worry, it's quite simple really. When you handle the i.c., you'll see a series of letters, with the numbers you require 'buried' amongst them. But once you know how to separate them, it's not a problem!

Here's an example, using the i.c. from this month's project: On the top of the chip, you'll probably see: **xx74yy00zz**. The first two letters (represented by 'xx') are the manufacturer's 'house' letters (e.g. the letters SN are the Texas Instruments Co's identification. This company originated the whole series by the way). The letters represented by 'yy' indicate the speed and power rating of the device. (You may see 'AS', 'LS', 'HC', 'S', or 'L' in this position).

Finally, the letters represented by 'zz' are used to define the encapsulation. For normal encapsulation 'N' is used to represent 'normal' epoxy material. So, now you should be able to easily identify an SN74AS00N from other chips!

Shopping List

Resistors 0.25W 5% carbon film		
100Ω	1	R3
470Ω	2	R1, 2
Capacitors		
Ceramic		
100nF	1	C1
Trimmer capacitor	1	C2 (miniature foil type) Maplin
3-60pF	1	
Semiconductors		
7400	IC1	(Maplin QX37S or similar)
Miscellaneous		
Crystal 1MHz freq.	(Maplin FY79L or similar), red l.e.d., Veropins,	
connecting wire, solder.		

*** June 14:** The Royal Naval ARS have their Annual Mobile Rally at HMS Mercury, nr. Petersfield, Hants. There will be dozens of trade stands; a Bring & Buy; flea market; radio-controlled power boats & trains; local radio clubs & repeater groups; children's rides & amusements; vintage fire engine; TV detector van; ices & refreshments; arts & crafts exhibition; two Grand raffles; spectacular arena displays & other attractions, making this a great day out for all the family. Talk-in on 144 & 430MHz, free parking & picnicking, free admission for children, adults £1.50, no dogs except guide dogs. For full details, contact Cliff Harper GA4JR, 31 Neva Road, Bitterne Park, Southampton SO2 4FJ. Tel: (0703) 557469.

June 14: The 23rd Elvaston Castle Mobile Radio Rally will be held at the Elvaston Castle Country Park, located on the B5010 which runs between the A6 & the A52, five miles south-east of Derby. Bring the family, they have something for everyone. Radio, electronics, computers, crafts, children's entertainments, refreshments. The reception marquee, together with a very welcome 'rest area'. A huge Flea market (for private vendors). Use the Great Bring & Buy marquee if you don't want to do the selling yourself! Talk-in on 144MHz (S22) & 432MHz (SU22). Parking £2 for cars & £10 for coaches. Adjacent caravan/camping site, for bookings telephone (0332) 751936. Further information from John Robson GA7FZ on (0332) 767994. **June 20/21:** Preston 'Guild' Hobbies Fayre is to be held in & around the grounds of Tulketh High

School, off Tag Lane, Preston. One of the largest local exhibitions of crafts, hobbies, pastimes & sports, staged in the north-west. The fayre runs for two days, with the Preston ARS flying the flag for 'amateur radio' & 'amateur electronics'. Any profits from this event will be split between local charities & Tulketh High School. Trade stands & activities cover everything from armchair hobbies to the super-adventurous, with something for everyone, whatever age group. **Eric Eastwood GW1CQ, 56 The Mede, Frackleton, Preston, Lancashire PR4 1JB. Tel: (0772) 686708.**

June 21: Denby Dale & District ARS will be holding their Rally at Salendine Nook High School, Huddersfield. Easy access from M62, junction 23 eastbound, junction 24 westbound. Doors open 11am. Traders, craft stalls, etc. Bar, catering, car boot sale. Bring & Buy, ample parking. Talk-in S22 & SU22. Details from Philip GAFSQ on (0494) 648827.

June 21: The Newbury & District ARS will be holding their Fifth Annual Car Boot Sale at Achland Hall & Recreation Fields, Cold Ash, Newbury, Berkshire. From 10am until 3pm. Free admission & parking. RSGB Morse tests - contact RSGB for bookings. Children's play area & refreshments. Site open to traders from 8am, £7 per pitch, payable on the day. Further information from Norman on (0635) 863310 or Richard on (0635) 46241.

June 27: The Brentwood International Amateur

Radio & Computer Rally will be held at Brentwood International Centre, Duddinghurst Road, Brentwood, Essex. Major suppliers & manufacturers of radio equipment, computers, accessories, antennas, computer software & second-hand gear. Easy access from M25 motorway junction 28, & A12 trunk road. Fully signposted by the AA. Bar & cafe serving hot meals & drinks all day. Bring & Buy area. Massive car park, easy access for the disabled. Rally information centre on site. Talk-in on S22 & SU22. Doors open 10.30am to 6pm. Details from CLPK, 18 Litchfield Close, Clacton-on-Sea, Essex CO15 3SZ.

June 28: The 35th Longleat Amateur Radio Rally (follow the brown signs for 'Longleat House' from Warminster, Wiltshire). There's an extensive trade exhibition, featuring over 140 companies, a large craft fair, RSGB bookstall & membership services stand. Over 20 national & local amateur radio clubs are attending. Bring & Buy. Beer tent & plenty of on-site catering. Free parking right by the rally. Camping & caravanning facilities by the lake all weekend. All the attractions of the Longleat Estate available. Details from Shaun GBVPG on (0225) 873098.

June 28: The Bromsgrove ARS will be holding their second Mobile Radio Ham Rally & Car Boot Sale at the Lower Wick Country Fair, the location being on the Worcester to Malvern Road, rear of Bennetts Dairy. Doors open 9am to 6pm. Tables for Boot Sale are £4. Entry to fair

& rally is £1 per person. Details from Dave Edwards G4ZWR on (0527) 546075.

July 5: King's Lynn ARC will be holding their Rally at The Corn Exchange, King's Lynn, Tuesday Market Place. Doors open 10am. Further details from Derek Franklin GOMQL on (0553) 841189.

July 5: The York Radio Rally will be held in the Tattersall Building, York Race-course, Knavesmire, York. Doors open 11am (10.30am for disabled visitors). Entrance fee £1. Ample free parking. Amateur radio, electronics & computers, arts & crafts. Morse tests. Licensed bar & cafe. Talk-in on S22. Further details from Dave Moreland G7FGA on (0904) 790079.

July 5: The 1992 Newport ARS Junk & Boot Sale will take place at the usual venue - Brynglwyd House in Newport. Opening time is 10.30am (10am for disabled), & there will be a talk-in on S22 by GC1NRS. Light refreshments will be available. There will also be a raffle, with various prizes. Entry is by ticket, cost 25p. Further information, & applications for pitches from Kevin Snelling GW7BSC, OTTH on (0633) 262488, please phone between 6 & 7pm weekdays only.

July 11: The Cornish Rally will be held at Penar School, St. Clement Hill, Truro. Usual amateur radio/electronic/computer traders, Bring & Buy, ample free parking, refreshments, vintage wireless display, RNARS, RAFARS, repeater

groups, etc. Doors open 10.30am, disabled visitors 10am. Admission is £1, accompanied children under 16 free, otherwise 50p. Talk-in on S22, GX4CRC. Further details from Mr Barrie Thomas G6NMR, 'Creekside', Greenbank Road, Devoran, Nr. Truro, Cornwall. Tel: (0872) 862046.

July 12: The Homcastle Amateur Radio, Electronics & Computer Fair will be held in the Sports Hall of Queen Elizabeth's Grammar School, as last year. There will be facilities for a flea market outside, a talk-in station on 144MHz & there is lots of free parking. If anyone would like to bring things to sell from the boot of your car (electronics/radio only please), you will be able to, for a small fee. Any information can be obtained from Tony Nightingale on (0507) 522482, or send an s.a.s. to The Area Youth Office, Homcastle Youth Centre, Cagthorpe Building, Cagthorpe, Homcastle, Lincs LN9 6HW.

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

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

Reflections

Ron Ham takes a look at the long history of short wave broadcasting, and its role in times of war. Ron then discusses 'clandestine' equipment, before ending up with solar and propagation reports.

Ever since short-wave broadcasting began, people around the globe have enjoyed listening to programmes from foreign stations. By doing this they learnt a great deal about other countries and ex-patriots loved to know what was happening at home.

Can you imagine what it was like to have your set confiscated and told that it was illegal to listen to 'outside' broadcasts, and if you did, there was a risk of being shot? This was the case in many parts of the world, during WWII, that were under German or Japanese occupation.

In some parts of Europe, the confiscated sets were replaced by a special limited range receiver called the 'volksempfänger'. Broadcast stations not only provided entertainment and news in their respective countries, but, while on air, the signals were like beacons which helped enemy aircraft to find their targets.

The transmitters were often closed down because of the 'beacon' effect when an air raid was expected. Furthermore, broadcasters often transmitted propaganda. Their regular programmes, like plays or talks, also sometimes concealed important messages for agents and sympathisers listening inside enemy territory.

Equipment And Reading

This month, I wish to discuss an item of clandestine equipment and not the politics

of those dark days, 50 years ago, when wireless was also a weapon of war. However, to find out more about the BBC's contribution to the war effort, I recommend that you read *The War of Words* by Asa Briggs.

This book is volume III of *The History of Broadcasting in the United Kingdom* published in 1970 by the Oxford University Press. There are two other books that will add to your better understanding of the times. Firstly, *The Secret War of Charles Fraser-Smith* (ISBN 0-7181-2035-3) with Gerald McKnight and Sandy Lesberg and secondly, *Secret Warfare* (ISBN 0-85613-586-0) by Pierre Lorain.

Briefly, the first book deals with the ideas and design of agents' needs, and the second describes in great detail the weapons, communications, codes and supply lines used by the Special Operations Executive and the French resistance.

Secret Warfare is well illustrated, and many of its 185 pages are devoted to radio. There are also descriptions and some circuits of the various clandestine sets.

In addition, several pages are devoted to the sophisticated direction-finding network, which was used by the German counter intelligence to find the undercover operators and their sets. The English-language version of *Secret Warfare* was edited by David Kahn, author of another fine work, *The Codebreakers*.

Editorial note: Readers may also like to know that the fascinating book *BBC Engineering History 1922-1972* (Pawley, 1972) contains a great deal of information on broadcasting during the 1939-45 war. Although out of print, your library will obtain a copy for you. It's compulsive reading! G3XFD.

Theatres Of War

We mustn't forget that agents, in all theatres of war had to conceal their sets. Therefore, these had to be as small as technically possible, and be robust, reliable and easy to use.

A specification like this, was not easy to achieve using the thermionic valve with its glass envelope and component technology of the late 1930s. However, great advances were made in design and manufacture of sets and components between the outbreak of war in September 1939 and the end in July 1945.

One such set was the MCR1 (Miniature Communications Receiver 1), in the centre of Fig. 1. This set measured 220mm x 83mm x 58mm, which is about the size of a standard building brick.

The receiver worked from a dry battery, or from a mains power unit. This is shown in the lower part of Fig. 1. It accepted the same 4-pin plug, left in Fig. 1, and centre in Fig. 4, as the battery.

An adjustment screw, under the end cover in the bottom right

of Fig. 1 and on the panel in Fig. 3, enabled the mains unit to work on 107, 127, 205 and 235V.

Another name for the MCR1 was the 'biscuit tin receiver'. This was because the set and three of the four tuning coils, (above the set in Fig. 1), the power unit, light-weight headphones, (top in Fig. 1) and hank of antenna wire was often delivered in a 2lb (0.9kg) biscuit tin.

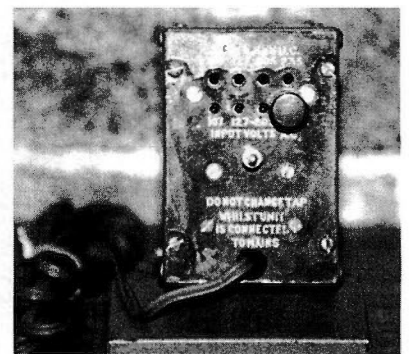
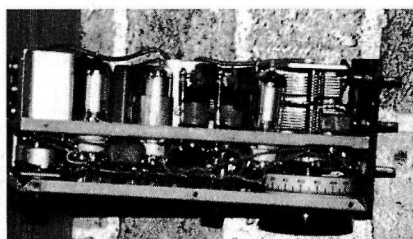
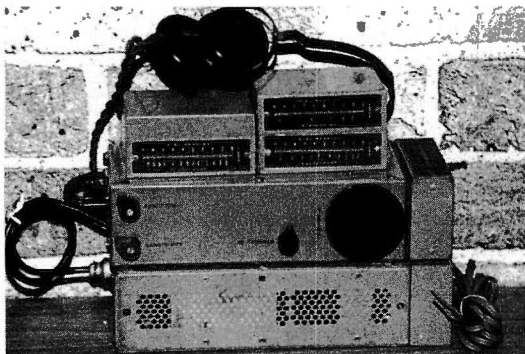
The full frequency coverage of this sensitive receiver is from 150kHz to 15MHz. This coverage was provided by four 'plug-in' coil units, on the right in the centre of Fig. 1.

Each coil-pack has its own calibration scale. This shows the relationship between the 0 to 180 markings on the main tuning dial, and its particular frequency range.

For example, Ranges 1: 150kHz - 1.6MHz (20 = 200kHz and 160 = 1.5MHz); 2, 2.5 - 4.5MHz (10 = 2.5 and 140 = 4MHz); 3, 4.5 - 8MHz (10 = 4.5 and 140 = 7MHz) and 4, 8 - 15MHz (10 = 8 and 170 = 15MHz).

The coil fixing points are immediately adjacent to the tuning capacitor, on the right in Fig. 2. The designer's idea of changing coils by hand, saved the space required for a wave-change switch assembly and the associated wiring, coil mounts and components.

The dial is read through a tiny opening, just above the large knob, in Fig. 1. The whole tuning unit can be seen on the



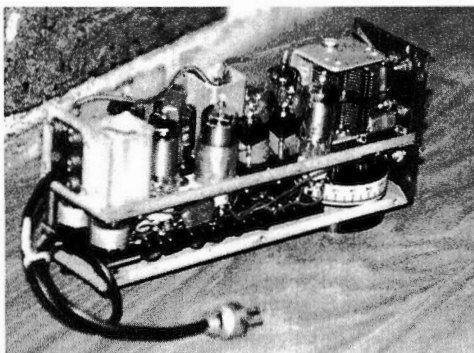


Fig. 4.

right of Figs. 2 and 4.

All five valves, four of type 1T4 and one of type 1R5, using ceramic B7G holders, can be seen in Fig. 4. Additionally, some of the under-chassis components are visible at the bottom of both Figs. 2 and 4.

The valves are directly-heated miniature glass types. Each requires 1.4V at 0.05A low-tension, to heat their filaments and between 60 and 90V high-tension supply on their anodes.

Two of the four single sockets on the end panel, left in Figs. 2 and 4, are for the headphones. The others accept the antenna and earth leads.

For simplicity, the receiver has four controls, Fig. 1. The 'reaction' control, (top left) adjusts the 'feedback' oscillation used for c.w. reception; 'sensitivity' (bottom left) is a gain control. The others, 'AE trimmer' and 'tuning' are self-explanatory.

This British-made receiver was widely used in clandestine circles. It was useful for monitoring the transmissions by colleagues to London, and for listening to overseas broadcast stations operating in the free world.

Not Much Point

In my opinion, there's not much point in making one of these sets work. I feel it's better for students in the future to see how it was made in 1942, than how it was serviced in 1992.

However, if one of these historic sets comes your way, don't attempt any work on the receiver or its mains power unit unless you really know what you are doing. Ask a qualified and experienced radio engineer first.

Secret Observations

The secret wireless operators of World War II I've met, knew very well that changes in the ionosphere, local interference

and static discharges could spoil the transmission and reception of their vital signals.

However, unlike today, these secret observers could not write to *Practical Wireless* and/or *Short Wave Magazine* to tell their columnists all about it!

Spring 1992 Reports

Let's look at the spring reports. Throughout March, Ron Livesey (Edinburgh), with a 2.5in refractor telescope and a 4.0in projection screen, kept watch on the sun's disc for active areas. Ron identified three active areas on days 3, 13, 16, 22, 23, 25, 26 and 30, and four on days 8, 11, 14, 21 and 25.

Although his observations were sometimes hampered by cloud, Cmdr. Henry Hatfield (Sevenoaks), using his spectrohelioscope, located one sunspot group, 14 filaments, nine quiescent prominences and an active plage, close to the East-limb, at 1220 on March 6.

Henry also noted one grp, 15fs and six very small qps at 1420 on the 18th; two grps, both slightly active, 16fs and five qps at 1237 on the 19th and four grps, one very active, 17fs and two minute prominences at 1448 on the 31st.

From their respective observatories, Ted Waring (Bristol) counted 10 sunspots on the 23rd and Patrick Moore (Selsey) kindly sent a drawing

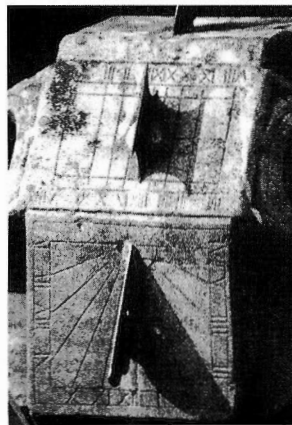


Fig. 6.

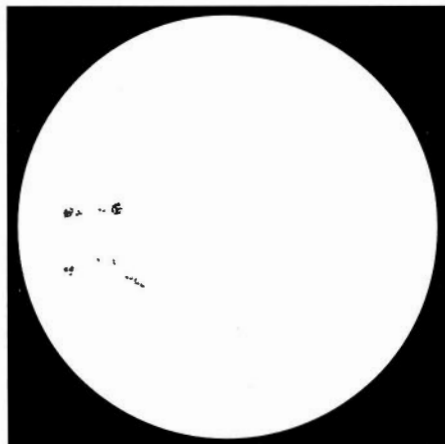


Fig. 5.

of the prevailing groups, Fig. 5, that he projected at 0750 on the 31st.

The groups Patrick noted, nearing the west limb, were visible from about March 24 to April 1. They were no doubt responsible for the individual bursts of solar noise, on 136MHz, recorded by Henry Hatfield on the 26th and April 1. Also the continuous noise all day on the 31st.

As I write this, there's a good picture of Patrick Moore and a write up about him on pages 26/27 of the April 25 - May 1 (South) edition of the *Radio Times*!

Auroral Reports

My thanks for the aurora reports are due to Ron Livesey, who is the auroral co-ordinator for the British Astronomical Association, for his part in our regular exchange of information.

Ron's team of observers, who watch for aurora borealis from the British Isles, reported, seeing 'glows' overnight on March 7, 8, 9, 19, 21, 22, 25, 29, 30 and 31. They reported 'rays' on the 8th and 'active aurora' on the 21st.

Astronomers in New Zealand, watching for aurora australis, reported 'glows' on March 2, 7, 25, 29 and 31, and 'rayed arc' on the 1st, 11th and 27th. Auroral reflected (tone-A) radio signals on the 50 and 144MHz bands were detected

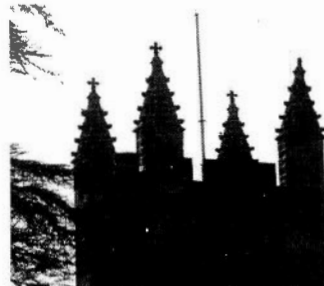


Fig. 7.

by Doug Smillie (Wishaw) on days 17, 21 and 26.

Magnetic Reports

Now it's time for magnetic reports. Referring to March, Tony Hopwood (Upton-on-Severn) says, "A peculiar month with no real magnetic storm," although he found the field disturbed on days 1, 4, 5, 23, 29, 30 and 31.

Tony added, "the outstanding magnetic feature was the predominant westerly deviation throughout the month, especially the last 'e' days when diurnal deviation reached about 30min. W about 1400 on the 30th and 31st." (Those groups again, Fig. 5.).

The magnetometers used by Karl Lewis (Saltash), David Pettitt (Carlisle) and Doug Smillie recorded most activity on the 11th, 17th, 21st and 26th.

Penshurst Place

On April 8, Joan and I visited Penshurst Place, near Tonbridge, Kent, and had tea in the National Trust village of Chiddingstone on the way home. Believe me, both places are well worth a visit, especially the house, grounds and toy museum at Penshurst.

Of particular interest to me were the clocks in the house, a WWII pill-box in the grounds and one of the sundials, Fig. 6, in the garden. I also found the four lightning arrester 'spikes', one on each pinnacle, Fig. 7, on Chiddingstone church interesting.

Coronation Day Television

My recent reference to watching the Queen's coronation on a 9in television receiver, prompted John Woodcock (Basingstoke) to write, "We well remember watching with relations on a 12in television, about 10 of us, in a semi-darkened room!"

Poulsen Arc

I have a request from Brian Head, a researcher for The Royal Navy Submarine Museum, at Gosport, for a photograph of a Poulsen Arc unit and/or a transmitter using that type of signal generator. Any help that you can give readers will be much appreciated by Brian at 2 Winchester Drive, Pinner, Middlesex HA5 1DB.

So, that's the lot for this time. Keep writing, and I'll see you next time.

Reflections

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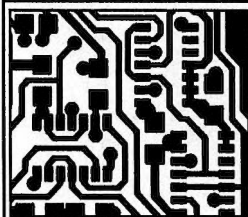
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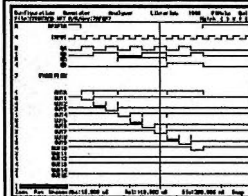
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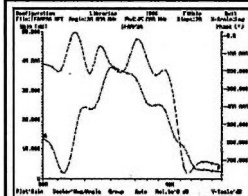
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The CB radio service is a boon to many. For example, it can be very helpful to the elderly who can't get about easily. With the help of CB radio they can have a quiet chat with friends in the same situation, they could also find it handy in case of emergency.

Another age group are the young people who may one day join the ranks of the more 'mature' users. Many of these regard CB as a hobby, and some regard the service to be a useful introduction point to the world of amateur radio.

Then there are the drivers of large lorries and others, who despite the often very 'down to earth' repartee you can hear, regard CB as a mobile telephone. The service is often used to get help for themselves or others, who are broken down, or taken ill on lonely highways.

Radio Hooligans

As in amateur radio, there are (unfortunately) 'radio hooligans', although I could think of other ways of describing them! In amateur radio they can cause havoc on the 144MHz repeaters. On CB however, these people often take the view, 'We're alright Jack, we have multi-mode rigs, kilowatt afterburners and whopping great antennas. So get off the channel!'

Just as bad are the sick minded types who think that obscene talk is an alternative to normal language. They object to a quiet chat among friends on the technicalities of CB, events of the day, or some favourite TV programme!

What can be done about these nuisances? They have of course been the subject of many letters to 'CB High & Low' since the column got underway, although the problem has been with us since CB first became legal in the UK during 1981.

Press Notice

Going through my files on CB radio, I found an interesting Department of Trade & Industry press notice. It was dated August 1984 with the heading, "DTI Takes Over Radio Investigation Service".

The notice further stated: "The



By 'Quaynotes'

This month, 'Quaynotes' talks about interference from stations using the CB bands illegally with s.s.b. and a.m. transmissions, and the so-called high power 'afterburners'. To round off, he looks at r.f. power loss at 934MHz.

Radio Investigation Service will investigate interference to authorised radio and television broadcasts, land mobile and emergency radio services, trace illicit transmissions and will prosecute offenders. For example, operators of 'pirate' radio transmitters and (take note of this!) **illegal Citizens Band Radio users**".

While the RIS is still under the banner of the DTI, licensed radio amateurs and CB radio operators are no longer 'protected services' (if they ever were). In other words, if your reception is spoiled by other inconsiderate users, legal or illegal, don't expect to get special consideration!

To Complain

You are of course at liberty to make a complaint to your district RIS office. The addresses are available from: **The Radiocommunications Agency, Room 613, Waterloo Bridge House, Waterloo Road, London SE1 8UA. Tel: 071-215 2217.**

You might get help if there's a station close to you, operating

illegally in some way. If adequate proof of this can be provided, as well as the fact that the station is causing interference to your reception, then action by the RIS 'might' be taken.

Unfortunately, there's no longer a 'national' society for CB Radio to speak on your behalf. Also, it's not known how many individual CB Radio Clubs there are.

For example, does each individual club (and I can't find out how many there are!) have enough members to collectively petition the DTI for a better and more active interference investigation service?

In all fairness however, a service of this nature requires considerable time and manpower. And of course, it's easy to forget that the trouble-makers operate at all hours during the day and night.

Early Tracking

In the early days, friends and I used to do our own tracking to get the location, as in Fig. 1, along with other useful evidence. Anyone who has taken part in a 'foxhunt' (that's radio direction-finding for fun) will

tell you what's involved.

Of course there's always the possibility of getting extra help, by writing to your local MP, provided you have enough support. There's also a very good chance that CB stations illegally using high-powered linear amplifiers (often referred to by the misleading name of 'afterburners') are causing television interference.

You can be sure that neighbours will be pleased to have any CBER causing TVI shut down. It doesn't take a lot to find them out, as their linear amplifiers (the 'afterburners') can easily cause interference in the wrong hands!

Power Loss And Coaxial Cable

I recently dealt with the subject of r.f. power loss at 27MHz due to high s.w.r. The same applies to 934MHz, but remember quite considerable power loss at these frequencies can also be attributed to **coaxial cable attenuation** unless the cable itself is rated as **very low loss** for u.h.f. working.

For example, RG-213 (BICC) or its equivalent, is rated as **low loss** at v.h.f., but using 10 to 12m of this cable at 934MHz would result in only about **half of the power** from your transceiver reaching its antenna.

However, coaxial cable type 10D-FB (available from Nevada Communications in Portsmouth) has a loss factor of 0.105dB per metre at 1000MHz. At 934MHz this loss becomes:

$$0.105 \times \sqrt{(934/1000)} = 0.101\text{dB/metre.}$$

Even so, a cable length of only 10m, as per Table 1, and based on a nominal loss factor as above, will bring your 8W down to a little under 6.5W at the antenna. These figures only apply when the s.w.r. is 1 to 1 or unity, and you are also using very low loss cable connecting plugs and sockets. **Remember:** The longer the cable, the greater the loss as the table shows.

Cheerio for now, and enjoy your CB.

Quaynotes

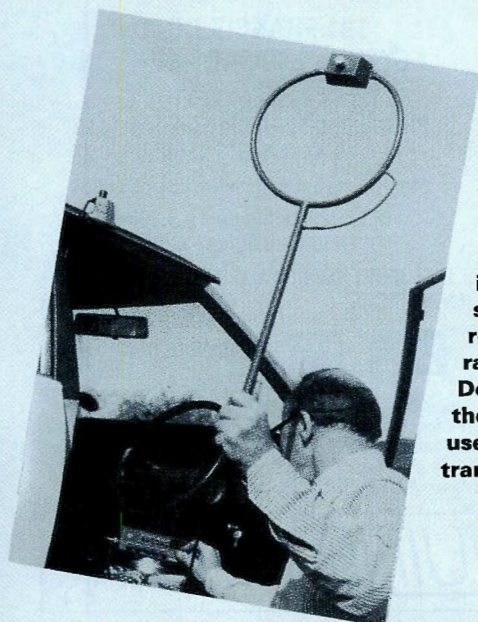


Fig. 1. Using a direction finding loop at 27MHz for locating transmitting stations. A loop like the one shown is effective but suitable only for relatively short range operation. Don't forget that (in the UK) it's illegal to use loop antennas for transmission.

Table 1. This shows r.f. power loss at 934MHz with different lengths of the coaxial cable type 10D-FB. The attenuation at 934MHz is 0.101dB per metre.

**Transmitter output 8W at 934MHz
Low loss coaxial cable 10D-FB
Attenuation -0.101dB/Metre at 934MHz.**

Cable Length in metres	Cable length in feet	Total Cable Loss dBs	RF power at antenna in Watts
10	32.81	-1.01	6.34
11	36.09	-1.11	6.19
12	39.37	-1.21	6.05
13	42.65	-1.31	5.91
14	45.93	-1.41	5.78
15	49.22	-1.52	5.64
16	52.5	-1.62	5.51
17	55.78	-1.72	5.39
18	59.06	-1.82	5.26
19	62.34	-1.92	5.14
20	65.62	-2.02	5.02

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Mathematics For The RAE

We'll start this month with the easiest part, calculating the effective inductance value of coils connected in series. The drawing of Fig. 1, shows three series connected inductors L_1 , L_2 and L_3 . The problem is to determine the effective inductance which appears between terminals A and B.

It's very simple! All you have to do, is to add the three separate inductance values together like this:

$$L_{a-b} = L_1 + L_2 + L_3$$

As an example, let $L_1 = 50\mu\text{H}$, $L_2 = 35\mu\text{H}$ and $L_3 = 100\mu\text{H}$.

All three values are in μH (the same sub-multiple of the basic unit). So all we need to do now is to add the inductance figures together like this:

$$L_{a-b} = 50 + 35 + 100 = 185\mu\text{H}$$

What could be easier? No matter how many inductors are connected in series, the effective inductance value of the network is the addition of all the separate values of inductance.

In this example all three values are in the same sub-multiple of the basic units, which is μH (microHenries).

Different Units

If the three values are in different units, such as one in mH (milliHenries) and two in μH , then all would have to be converted to either basic units or into a common multiple or sub-multiple before starting any calculations. This is to avoid the possibility of decimal point errors.

For example: What is the effective inductance of 2.3mH, 1.7mH and 750 μH , connected in series?

In this case we have two values expressed in mH and one in μH . The arithmetic for this example (found during a few years doing it!) is easier if the values are all converted to a common sub-multiple. Either mH or μH will do. Say we decide to convert to mH, then the values are stated as 2.3, 1.7 and 0.75.

$$L(\text{effective}) = 2.3 + 1.7 + 0.75 = 4.75\text{mH}$$

If we change all the values to μH they are 2300, 1700 and 750, giving:

$$L(\text{effective}) = 2300 + 1700 + 750 = 4750\mu\text{H} \text{ which is the same as } 4.75\text{mH}.$$

In Parallel

Connecting inductors in parallel is not quite so simple, and the process needs a little bit more maths. The diagram, Fig. 2, shows the circuit of three inductors connected in parallel. The effective value of the inductance between terminals a and b, L_{a-b} , is given by:

$$\frac{1}{L_{a-b}} = \frac{1}{L_1} + \frac{1}{L_2} + \frac{1}{L_3}$$

As an example, let $L_1 = 2.5\text{H}$, $L_2 = 5.0\text{H}$, and $L_3 = 10.0\text{H}$.

In this case all of the three given values are already in the same units - basic units, so no conversions are necessary.

$$\frac{1}{L_{a-b}} = \frac{1}{2.5} + \frac{1}{5.0} + \frac{1}{10.0}$$

Just in case you're not familiar with the use of a calculator, this is how to do it. To show the keys to be pressed I'm going to put square brackets [] around each keystroke. So [6] means press the six key.

Switch the calculator On, then press [1] [/] [2] [=] [5] [=]

The answer, of 0.4, should appear on the display, which is the answer to the first part of the right hand side of the equation.

Find the other two values, using the calculator in a similar way, then add them together. This then becomes:

$$\frac{1}{L_{a-b}} = 0.4 + 0.2 + 0.1$$

Finally, inverting both sides of the equation:

$$L_{a-b} = \frac{1}{0.7} = 1.43\text{H}$$

The answer is actually 1.42857142, but to be practical you should round it to the nearest practical value.

Calculations Simplified

When there are only two inductances connected in parallel, the calculations can be simplified somewhat.

$$L(\text{effective}) = \frac{L_1 * L_2}{L_1 + L_2}$$

Let's suppose an inductor L_1 having an inductance value of 12.57mH, is in parallel with an inductor (L_2) of 8.5mH. Now let's find the effective inductance.

Again, as both values are in the same sub-multiple of the unit, we can do the calculation without any changes.

$$L(\text{effective}) = \frac{L_1 * L_2}{L_1 + L_2} = \frac{12.57 * 8.5}{12.57 + 8.5}$$

$$= \frac{106.845}{21.07} = 5.071\text{mH}$$

Final Example

Here's a final example where different sub-multiples of the unit are given: what's the effective inductance of 1.8mH in parallel with 900 μH ?

Don't forget to get all the values into the same multiple or sub-multiple before any calculations. This way you will be less likely to make errors. So, in this case use either 1800 μH and 900 μH , or 1.8mH and 0.9mH.

$$L(\text{effective}) = \frac{L_1 * L_2}{L_1 + L_2} = \frac{1.8 * 0.9}{1.8 + 0.9}$$

$$= \frac{1.62}{2.7} = 0.6\mu\text{H}$$

What about a combination of series and parallel connected inductors as in Fig. 3? It's no more difficult, just a bit more complicated. First determine the effective inductance of L_2 and L_3 in parallel, then add the result to L_1 - that's all!

Suppose $L_1 = 10\text{H}$, $L_2 = 10\text{H}$ and $L_3 = 10\text{H}$. They're easy values to handle, as they are all in basic units.

$$L(\text{effective}) = L_1 + \frac{L_2 * L_3}{L_2 + L_3} = 10 + \frac{10 * 10}{10 + 10}$$

$$= 10 + \frac{100}{20} = 10 + 5 = 15\text{H}$$

Here's a more difficult example. Let $L_1 = 220\mu\text{H}$, $L_2 = 5.6\text{mH}$ and $L_3 = 1.8\text{mH}$.

$$L(\text{effective}) = L_1 + \frac{L_2 * L_3}{L_2 + L_3}$$

$$= 0.22 + \left(\frac{5.6 * 1.8}{5.6 + 1.8} \right) = (0.22 + 1.362)\text{mH}$$

Following my own rule with the common sub-multiples, the 200 μH is taken to be 0.22mH. Then $L(\text{effective}) = 1.362\text{mH} + 0.22\text{mH}$, giving 1.582mH as the answer.

That's all for this month. Next time, I'll be dealing with capacitor combinations. So don't forget, keep practicing!

Theory

This month, Ray Fautley G3ASG gets to grips with inductors connected in series and parallel, and then reminds everyone of a very simple rule to remember!

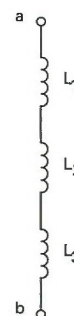


Fig. 1: Inductances in series (see text).

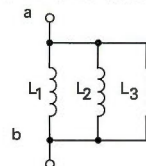


Fig. 2: Inductances in parallel (see text).

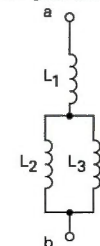


Fig. 3: A circuit using a combination of inductances in series and parallel

Ray's Rule:

Remember to get all the values into the same multiple or sub-multiple before making any calculations, and you'll be less likely to make errors.

Readers' Letters

I regularly receive letters from readers asking "... what do you recommend by way of equipment and antennas to be able to use the various amateur satellites? ..."

The answer isn't simple! With enough equipment, time and know-how it is possible to fully exploit any, or all of the currently operational spacecraft.

What does need to be emphasised, is that you don't need infinite resources. The chances are that the average amateur or s.w.l. already has enough equipment to be able to enjoy at least some of the satellites.

Basic List

John Branegan GM4IHJ is active on almost every satellite. From his wide experience, John has made a list of the basic antennas and equipment needed for each currently active amateur satellite.

I've complemented his list with what I use and found most effective. The following listing for each satellite gives the antenna(s) recommended, the transmitter minimum power needed, the receiver required, and any modems, t.n.c.s or software that may be required.

Starting Off

I'm starting off with RS-10/11. For the 'A' mode 145MHz transmitter uplink, use 10W of c.w. or u.s.b. via a 5-element azimuth trainable Yagi, which does not have to be circularly polarised.

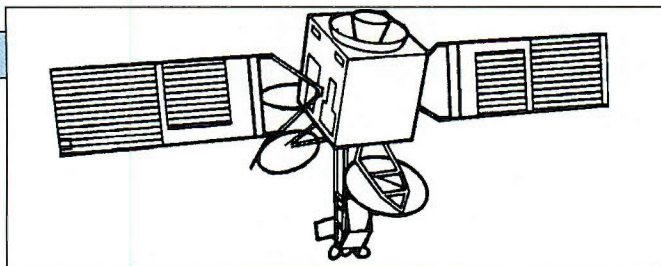
For the 29MHz downlink, use a sloped dipole to any receiver with a s.s.b. detector. A pre-amplifier may assist some of the older valved receivers.

I use 50W to a ground-plane antenna for the uplink, and a 3-element Yagi antenna feeding to my IC-720-A transceiver for the downlink. If RS-10/11 comes onto Mode K, then use as for the following RS-12/13.

Quite Sufficient

The second on the list is RS-12/13. For the Mode K 21MHz uplink, 50W of c.w. or u.s.b. to a dipole or whip is quite sufficient.

The 29MHz downlink can be



Satellite Scene

by Pat Gowen G3IOR

This month Pat Gowen G3IOR, responds to the many requests received from readers asking about the type of equipment needed to 'get aboard' the amateur-radio satellites now in orbit. Pat then features the personalities and callsigns of two well-known amateur satellite operators.

heard well using a sloping dipole to any conventional 29MHz s.s.b. receiver. For sub-horizon work, I use my IC-720-A transceiver and a 3-element tri-band beam.

If either RS-10/11 or 12/13 appear active on their 21MHz uplink and 145MHz downlink 'T' mode, then, keeping the uplink needs the same approach. Use any conventional 145MHz c.w./s.s.b. receiver, or transceiver. A 145/28MHz converter can also be used with a general coverage receiver for reception.

Performs Well

With OSCAR-10, 25W of uplink power from any 435MHz transmitter, running c.w. or l.s.b. to a azimuth and elevation controlled 12-XY or multi-beam 430MHz antenna, performs well, even at the furthest apogee.

Use a 9-XY with a low-noise pre-amplifier for the 145MHz downlink, also with azimuth and elevation rotation. You don't have to have circular polarisation, but it helps stop spin fading QSB.

A suitable antenna with minimum side lobes, and maximum back-to-front ratio is to be preferred. This is because industrial and domestic noise can otherwise degrade the signal readability.

Any 144MHz s.s.b. receiver is acceptable when used with a pre-amplifier. This technique helps

overcome sensitivity and signal-to-noise limitations.

The OSCAR-10 satellite is only on 'B' 435MHz to 145MHz mode now. It may be used at any time, with the proviso that no f.m. is indicated on the 145.810MHz plain carrier beacon.

Downlink Only

The OSCAR-11 satellite, also known as UOSAT-2, has a downlink only. Any 145MHz f.m. receiver using a 5-XY trainable antenna, or even a simple crossed-dipole 'turnstile', will work with any suitable telemetry decoder, direct or as a computer program.

To help, AMSAT-UK has such programs and decoders available. The organisation will send you a list of all satellite equipment and aids available, on receipt of your request and s.a.s.e. This should be sent to: **The Secretary, Ron Broadbent G3AAJ, 94 Herongate Road, Wanstead Park London E12 5EQ.**

Same Equipment

For 'B' mode, 435MHz up and 145MHz down, the same equipment may be used as for OSCAR-10. For 'J' mode, you can use the same antennas, and the same transmitter and receiver, as suggested for OSCAR-10. However, the frequencies are reversed, as this

mode has its uplink on 144MHz and its downlink on 435MHz.

For the 'L' mode, 1269MHz up and 435MHz down, the uplink needs a pair of 23cm 20-element loop Yagis. It also needs at least 100W of s.s.b. or c.w.

The downlink requires a 435MHz 12-XY or multi-beam, and both antennas need to have AZ and EL rotation. Any s.s.b. receiver covering the 435MHz section will be suitable, if a pre-amplifier is added.

Mode S needs around 50W of 435MHz c.w. or s.s.b. uplink from a 12-XY or multi-beam. The 2400MHz downlink needs a 20-turn helix antenna, and both antennas need to have AZ-EL rotation.

For the 'S' mode downlink reception, a 2.4GHz to 144MHz or 2.4GHz to 28MHz receive converter may be used. This will feed the main station 28-30MHz s.s.b. receiver.

Two Satellites

I'm going to look at two satellites now. For the uplink on UO-14 or UO-22, use a 145MHz 5-XY, for the downlink a 435MHz 12-XY or multi-beam, both with AZ-EL rotation.

The 145MHz f.m. transmitter needs 25W with direct modulation of the varactor. The 435MHz f.m. receiver must have a 20kHz bandwidth, with its output taken direct from the discriminator.

A G3RUH 9600 modem and modified t.n.c. will be required. (The TNC320 and PK232 are not recommended). An IBM micro with PG software or an Atari with PE1CHL.net software running completes the needs for 9600baud operation.

Three Satellites

Now it's time to look at the three satellites, AO-16, AO-18 and AO-19. For these microsats, antennas as used for UO-14 are recommended.

The 145MHz f.m. transmitter is as for UO-14, with varactor drive desirable. The 435MHz s.s.b. receiver needs to be equipped with a.f.c.

Use a G3RUH FUJI b.p.s.k. modem and a modified t.n.c., with the original modem disconnected. The software and micro may be as



Fig. 1: Ron Pearson G3CAG and his OSCAR equipment.

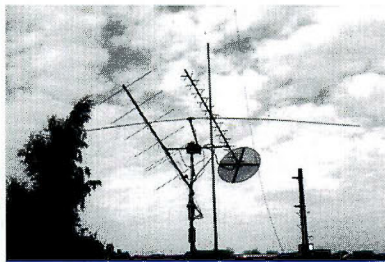


Fig. 2: The satellite antennas at G3CAG.

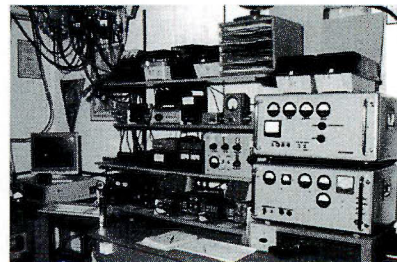


Fig. 3: DL6KG's satellite, v.h.f., u.h.f. and h.f. station.

for UO-14.

For the AO-16 2.4GHz downlink only, a simple helix can be used going to a 2.4GHz/144MHz or 28MHz converter, with the same modem and t.n.c. as used for 435MHz reception.

Strong Packet Downlink

The Dove, DO-17, satellite has no transponder and no uplink. However, it has a strong 145.825MHz 1200baud packet downlink that can be read on any standard packet station.

You can use a 5-element Yagi 145MHz antenna, or even a turnstile or vertical feeding any 145MHz f.m. receiver with this satellite. In conjunction with any v.h.f. t.n.c. (unmodified) and standard YAPP, PACKCOM or similar software, any suitable micro computer will read the AX.25 packets well.

For the 2.4GHz downlink, the needs are as for AO-16. But **please note** that this DOVE downlink is a very weakly modulated signal. The G3ZCZ 'WHATS UP' telemetry decoding software program, works well for this satellite. The speaking f.m. when available, should be audible on any conventional 145MHz f.m. receiver with no need for a pre-amplifier.

Simple Software

Now it's time to look at FUJI-AO-20. For the digital mode JD, see the requirements set out for AO-16, but use with simple software such as YAPP or PACKCOM.

For the analogue Mode JA (s.s.b., c.w., etc.), antennas as for AO-14 are ideal. For the uplink a 145MHz s.s.b. transmitter with some 25W of output power will be needed, with a 435MHz s.s.b. receiver for the downlink.

You may find that you need a front-end, high Q band-pass filter such as a cavity if you have high harmonic content from your 144MHz transmitter. This will help overcome any blocking of the 435MHz downlink satellite signals.

Analogue Transponder

For the RM-1 analogue (s.s.b. and c.w.) transponder of RS-14, use the antennas and the transmitter and receiver set-up as for AO-10. Please note that only 100W absolute maximum e.r.p. is required, as the satellite is much nearer earth and the transponder is extremely sensitive.

Signals of less than 5W e.r.p. (5W to a dipole, 1W to a 3-element beam) can produce good readable downlinks. This is still so, even if simple turnstile and vertical receive antennas are used.

A pre-amplifier is not essential,

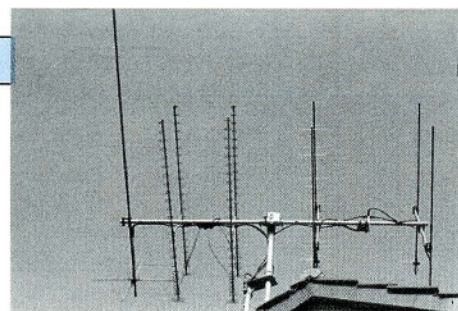


Fig. 4: AZ-EL satellite antennas used at DL6KG.

as the downlink signals are very strong. For the digital mode use a 144MHz 5-XY Yagi to your 144MHz f.m. receiver feeding any 300baud UOSAT-1 modem, with GM4IHJ tracking and Jupiter eclipse software.

Latest Amateur Satellite

The very latest amateur satellite, SARA - OSCAR-23, has no transponder, and only a single channel downlink. Any f.m. receiver covering 144-146MHz band will do.

However, using a low noise pre-amplifier and 5-XY cross-polarised Yagi with AZ-EL pointing will help resolution. This will also decrease Faraday fading, as the downlink is not that strong, often being close to inaudible with simple antennas. To decode the telemetry, see *Practical Wireless* April 1992 'Satellite Scene' pages 44 and 45.

Manned Missions

On the MIR and Shuttle manned missions, both the 145.550MHz speech and packet downlinks are very strong. They are easily read on any f.m. receiver using simple turnstile or vertical antennas. Despite this, beam antennas with AZ-EL tracking will help in the QRM caused by any local callers.

A simple hand-held transceiver would give a five and nine signal on board the spacecraft. But in practice, 100W into a well-trained 10-XY AZ-EL beam is needed to obtain the f.m. capture advantage effect. This is needed to overcome the QRM of the many callers present in the MIR and Shuttle 'footprint'.

Short List

I've only had space for a short list. Several pages could have been devoted to each satellite! But unless they're interested in specialised modes, most readers will have enough equipment to use some of the many operational amateur satellites.

Despite what many think, with few exceptions, high transmitter powers, huge beams, and ultra-low noise receivers are not required. For more details see the *RSGB Space Radio Handbook* and the *UO-3 and UO-5 Manuals* written by John Branegan GM4IHJ.

A manual on *MIR* is also

available. A s.a.s.e. and request for details of the specific manuals may be sent to John GM4IHJ at: **8 Whitehills, Saline, Fife, Scotland KY12 9UJ.**

Further Information

For further information, and details of the exact uplink and downlink frequencies, the beacons and modes of each amateur satellite, send a large s.a.s.e. to Donna Vincent at the address given for *Practical Wireless* on page 2 of this issue, and request your free copy of 'Satellite Frequencies'.

While on the subject of books, particularly recommended to the newcomer is *The Guide to OSCAR Operating*. Available from AMSAT-UK (address given earlier), cheques made out to AMSAT-UK for £3.25 post paid. Note that this omits details of the more recent RS-14, OSCAR-22 and SARA satellites.

If you have further questions or need specific help, don't hesitate to call in on one of the many AMSAT nets. There are always amateurs with expertise on the various satellites and modes who will help you.

The nets are on: Sundays at 1015 local time on 3.780MHz and at 1800UTC on 14.282MHz. On Mondays and Wednesdays there's a net on 3.780MHz at 7pm local time, and on Saturdays at 1000UTC there's a further net on 14.280MHz.

With Great Pleasure

It's with great pleasure I'm able to introduce two respected and highly effective satellite users, who have both worked much DX on many different satellites.

Ron Pearson G3CAG, of Milton Keynes, is shown in his operating position in Fig. 1, with his h.f. TS-520, 145MHz FT-290 and 20W linear, 435MHz FT-790 and MM-432-30 linear.

The equipment mentioned, in different configurations, allows Ron to enjoy RS-10/11, RS-12/13, RS-14, FO-20 and OSCARs 10 and 13, and provide the odd QSO with the

operators on the MIR space station.

Ron's antennas include a 29MHz dipole, a 145MHz crossed Yagi and a home-brew 435MHz helix. The antennas, all seen in Fig. 2, are all azimuth and elevation controlled. They send their signals via pre-amplifiers and 30m of coaxial cable (!) to the shack.

Dr. Hans L-Rath DL6KG of Ulm, Bavaria enjoys DX, and is on the Honour Roll of DXCC. He started on satellites in July 1975, and is active on almost every OSCAR with his very well set-up station.

Hans' shack equipment, shown in Fig. 3, consists of a 144MHz 25W Kenwood TS-711E, a 25W 435MHz TS-811E, a Yaesu FT-726R giving 10W on both 144MHz and 435MHz, and 29MHz downlink receiver for the RS series.

Also present is a 1269MHz transverter and the telemetry decoding equipment for OSCAR-11, FO-12 and OSCAR-13. In the picture is his Yaesu FRG-9600, Datong r.f. speech processor, 144 and 435MHz watt meters, rotor-controller, FO-12 modem/t.n.c. Kenwood TM-421-E and t.n.c. for packet.

The antenna and transmit and receiving switching box, is seen in the extreme right-hand bottom corner. Above this is his transverter and 2 x 2C39 100W 1269MHz 'L' mode uplink linear.

Above the uplink linear, is his 144MHz 4X250A PA, which is not used for satellite work as it's far too powerful. On the left is the PC/XT and the panel housing all the antenna cables, relays and rotors. (Out of shot is Hans's formidable terrestrial h.f. station).

Hans's antennas, seen in Fig. 4, consist of 2 x 9-element Tonna 145MHz Yagis connected for circular polarisation and his 4 x 12-element horizontally polarised 435MHz 'Flexa' Yagis.

The bay of four 1269MHz G3JVL type quad loop Yagis, built by DJ5BV, and provide 25dB gain are also visible. The higher 144MHz 11-element, and his 432MHz 19-element 'Flexa' Yagis used for terrestrial work, are 18m high and out of the picture, as is his Telex high-gain 4-element tri-band h.f. beam. If that's not enough, Hans has a cubical quad and a vertical dipole as well!

The azimuth and elevation control of the satellite antennas is performed by auto-tracking with a Mirage/KLM interface and GrafTrak software using an AT-PC clone, and both the 435 and 145MHz antennas have GaAsf.e.t. pre-amplifiers mounted at the antennas themselves.

Do you have a photograph of your satellite station that we could use in 'Satellite Scene'? If you have, I'd be pleased to publish it, together with an explanation of its function in a future edition of this column.

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Back-Scatter

HF Bands

Reports to
Paul Essery GW3KFE

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At the time of writing, the sun seems to be in a funny mood. However, the fall in sunspot numbers has coincided with a period of low A-index, so overall perhaps, not too many problems!

One of the joys of writing this column is receiving the 'Contest Calendar' galleys from *CQ Magazine*; previously by W1WY Frank Anzalone, and more recently by John Dorr K1AR.

For the current issue, John seems to have written to the wives of several prominent contesters for their views on this aspect of the hobby. Of the seven letters of reply he printed, there wasn't one which could really be called in favour. Indeed I suspect that the seven ladies had laboured long and hard to express such moderation and yet register their 'anti' views!

Silent Keys

I've got news of several silent keys this month. Janos Bolyoczi HA0NNN was killed in a car crash on March 16; he was just 26, and will be recalled as operator at ZA1QA and deeply involved in getting amateur radio back into that country.

Father Moran 9N1MM, passed away on April 14, in New Delhi. He would have been 86 on May 29, and had been an amateur for forty-odd years. Marshall Moran was born in Chicago, and ran a school in Kathmandu; I would think the majority of applications for DXCC would have contained a 9N1MM QSL card. He will be much missed.

News

From my news, it sounds as though the SMOM station 1A0KM has been pirated, and rumour has it that as a result of problems encountered it will disappear for the foreseeable future.

Regarding the information on the HA5BUS/S2 crew, they were operating with official permission I understand, if without a licence in the usually accepted meaning of the word. The latest news I have is that they are the only ones and only allowed to operate from the bus. All others are held for 'security' reasons. Thus, other stations signing S2 would appear to be invalid.

The VP8SSI operation from South Sandwich was a fine effort in highly adverse conditions. They got back to the Falklands on April 12 after a rough trip, putting 39400 contacts in the log and stopping over

at South Georgia on the return as VP8CBA, having had to leave some of the equipment at South Sandwich. Any QSLs go via KA6V.

The story on the proposed Laccadives expedition seems to be shrouded in an impenetrable mist. The only suggestion I have is keeping an ear to the ground.

It is understood that the last USSR award has been issued - to G3TQQ - and it is therefore suggested you don't waste time sending for these, at least until the dust settles! There will no doubt be some new awards thought up in due course.

The callsign XQ0YAF is the new call of CE0FFD on Easter Island; the QSL goes to Box 4 Isla de Pasqua, Chile.

I've heard that cards sent to Venezuela, for the YX0AI operation are being damaged before arrival. Try going via Pablo Alonso PO Box 68353, Caracas, 1062-A, Bolivia. Identify either 'c.w.' or 's.s.b.' in the lower left corner of the envelope....which seems a good way of ensuring the envelope is 'filleted' in transit.

Party Time

Between 0001UTC on September 5, and 2359 on September 20, you'll find the Annual FOC Late-Summer QSO Party. The idea is to chat on the key, so there's no specific information exchange. Look for members at about 25kHz up from the band-edges. There will be a plaque for the member and the non-member who appears most in the logs from the other class, while the non-competitive group can also take part and there are plaques for some of them too. Logs and reports to Peter Miles G3KDB, 151 Leomansley View, Lichfield, Staffs WS13 8AU, by the end of October please. In conclusion, I note there might even be a prize for someone who can think up a snappier name for the event!

The 28MHz Band

On the 28MHz band, we'll kick off with Don G3NOF in Yeovil, whose month was made by a QSO with FO0CI, to complete the full set of current DXCC countries on sideband. Other contacts included AP2AF, F5ZU/T, G4IRS/MM in the Persian Gulf, HD0T, HL2KAT, HL9HH, HU1FT (=YS), HZ1AB, J8/W8KKE, JAs, KA5FSB (New Mexico), P49V, RE9C, RY0U, S2/HA5BUS, 5V8/SM0TXM, T11C, TL8NG, VKs, VP5/KB4IRS,

VP8CBG VP8CEH, VP8SSI (S. Shetlands), VP9GE, VP9MN, VS6CM, VQ9IO, VU2WAP, various Ws including W7ITN in Idaho, W7LOW in Montana, WA7PEE, XT2BW, XX9AW, ZF2RW/ZF8, ZS6AMP, 3B8FU, 8P6CK and 8P9CW.

The letter from Pat ON7PQ (Kortrijk) mentions VK9CL, VP8SSI, VP8CBA, S92AA, VP8BZL, HF0POL, XQ0YAF, OD5/LA4GHA, JW0E, PJ2AM, S2/HA5BUS, HS1CDX, BY4STV, VP5/WB9HRO, WL7E, 7P8SR, 5N0ZKJ and JY2FR; all Pat's contacts, whatever band, are on c.w.

John G3BDQ in Guestling has sideband entries against DU1PX, AP2JZB and VP8SSI, while the keyer accounted for VP5/KD6WW, 3B8FG, TX4B, HL2KAJ, FR5GG, ZD8LII, C56/GM3YOR, PY0FZ, ZF2NE, VP8SSI and PJ5/N4XO.

The sideband contacts made by QRP enthusiast Leighton GW0LBI in Trelewis, included K3TUP, K1TO, KA4RRU, 6D2X, T11C, SV1DT, CP6RP, VP9MM, ZP5JEA, VP2EC, 5N0RJM, 4X1NM and D44BC; powers used varying from 100mW for the K3 up to 10W.

Turning to Ted G2HKU at Minster, he seems to be on the mend; he complains he can't hear telephony for the rattle of the pills he's had to take! The s.s.b. did for 7Q7XX, ZW5B, 9K2WR, PZ1DY and VP5P, while keying was preferred for VP5P, PZ1DY, C56/GM3YOR, DJ0AF/5N0, ZA1TAJ, VP8SSI, UL7TX, OK1IAI/YA, HF0POL, VU2KQJ, K5XK, LU6HGC, ZA1FD, K6QVB and 3B8FQ.

The 28MHz band can't be flavour of the month for Don GM3JDR up in Aukengill, as he only mentions a single contact, namely HL2KHE.

The 1.8MHz Band

Now onto the 1.8MHz band. Firstly we may all note that the OZs have Top Band from April 1 - which presumably means OX and OY also. John G3BDQ mentions this as he had sideband contacts with OZ1DPR and SP9GDB; OK1BVO, OK1FDW, UA3OE, UA6LOZ, UB4NWW, UB5NB, EA3NI and U3UW.

As his wife has added to their family - congratulations - poor Leighton GW0LBI has had his amateur radio activity sharply reduced. However, he did manage c.w. with EA1EVM and LA4RJ, while on sideband OY9JD, OT2A and OZ3SK.

For Ted G2HKU, 1.8MHz showed a sidebander with ON7BW as usual, plus c.w. to ES1RSZ.

The WARC Bands

On the WARC bands, we'll let Don GM3JDR have first try, c.w. first. 10MHz for P49V, W6s, JAs, VK2BKH, AP2UR, KL7UPS. On 18MHz, PW8QN, UW0LO, UA0JH, UA9CM, PJ4/DK9FM, UZ0AXX, HL1LUX, NL7VJ, ZS6QU, ZL1MH, VK6HG, U18AG, UW0FP, UA0JU, UZ0AWK, Ws and JAs; and on 24MHz 9M2AX, J37M, ZS6QU, C06CG, 4K2CC, V2/VE5RA, 8Q7CW, VK4AYX, 9K2MU, N6AV/VP9, YN/SM00IG, VK1FT, VU2MIR, UM8MBA, PJ5/N4XO, KL7AF, UL8PA, RV0AM, VQ9RS, W1XP/VP9, FY5YE, ZF2NM, UJ8JMM, Ws and JAs. The sole sideband contact was FO8PT on 18MHz.

Don G3NOF in Yeovil tried 18MHz for A92BE, NL7WH, VE7IM and Ws; on 24MHz he scored D44BC, EX0FWR, FO0CI, K0DK (Colorado), JP1KDC/JD1 (Minami Tori-shima), JAs, NH6C, PY0FZ, PZ1EL, RA0AL, RJ8JMM, UA9OCP/R10, UL0A, Ws, XE1L, XX9AW, YA5MM, ZB2AZ, 3B8AD, 4S7NE, 7Q7XX, 9M2AX. All s.s.b. of course.

Turning to Pat ON7PQ, he notes on 24MHz KH6SB, KP2J, VP8BZL, FO0CI, KP5/N1DX, OX3XR, PY0FZ, PJ4/DK9FN, VK9CL, VP8SSI, N6AV/VP9, 9V1OK, VP8BZL, 7Q7XX, Z21HS, S92AA, VQ9RS, 9V1YW, 3B8CF, EA9/DK9ZB, HU1FT, V85KX, 9K2MU; over to 18MHz where V85KX, VP8BZL, EA9/DK9ZB, FO0CI, KP5/K0BJ, BV2FA, VK9CL, 8Q7CW, YA5MM, FO0PT, FJ/N0IMH, PJ2/OH6XY, 7Z2AB, N6AV/VP9, VU2PT7, 9V1OK, 3D2QB, YV5/K3UDC, VP8SSI, S9AGD, KH4/N7TNL, S92AA, FY5FP, OK1IAI/YA and VK9NS. As for 10MHz here we find OY7ML, 9Y4KB, 3C1EA, TA2AO, EA9/DK9ZB, 9K2MU, Z21HS, 7Q7XX, C06CG, KH6AFS, HL1UA, WP4IIV, VE8DR, XE1/JA1QXY, KP5/K0BJ, FO0CI, FO0PT, VK9CL, JW0GB, PJ2/OH6XY, P49V and HU1FT. Pat is all-c.w.

On to John G3BDQ; who has a sloping 7m centre-fed with the 450Ω slotted feeder for the bands 18MHz upwards. On 18MHz C06CG was booked in on sideband, while on 24MHz the same mode went to A61AD, FY4FT, PY0FZ, YA5MM, BZ4RBX, 8R1UN, HL1UA, plus key contacts to HL2KAJ, Z21HS, VK9CL, YN/SM00IG, OK1IAI/YA, RM8MA and C06CG.

Vince 9H1IP next; Vince mentions 18MHz with KG4DD in Guantanamo Bay, 6Y5EW, FO0CI, VK9CL, HKJ/HK5JPS, 8P9RE, K0TVJ and VE7IM; 24MHz accounting for KG4DD, KC7BL, K6VX, NH6C, FO0CI, J77DX, FY4FT, PY0FZ, YA5MM,

VK9CL, OX3CS, plus a lone key contact to hook VP8SSI.

At least one 10MHz report this time, by way of **Mike GOKDZ** near Thirsk, who tangled with FO0CI, FO0PT, 5T5CJ, 6W6JX, SU1HV, PJ2LC, PJ4/DK9FM, YV6AZC/3, JW0E, CO2VG, ZP6CW, JJ1VKL/4S7, VK2BCC, VK2VA, VK3MJ, VK3MR, VK3XU, VK3AUC, VK3ELX, VK3BXN, VK4ATS, VK7TS, ZL1BM, ZL4HB, JA0AWF, JH2CLV, JH2QM, NN6R, K6YJO, W6AQF, N6AW, K6UA, W6DU, W6TH, W6TSQ, N6FX, KT6V, K6ITZ, K6RM, W7EC, W7NEJ, AA7DW, KG7EN, AA7CQ, AA7KF, KE7GG, K7UM and VE7BLF. Antenna, inverted-v erected at precisely a half-wavelength high, fed with a ferrite choke balun and carefully pruned to give minimum s.w.r.

Leighton GW0LBI notes 7X2VXK on 24MHz, plus KA1PE and C31HK on 18MHz.

Turning now to the Sage of Sheppey, Ted G2HKU says he raised (18MHz) W2JB, Z21HS, ZD8OK and OX3XR on c.w., while on s.s.b. he worked EA6ZY who is of course ex-G3ZY. On 24MHz c.w. went to W7ZQ, VE7BLC, UC2WAZ, UA9QCP/R10, 9M2AX, ZS6BI, KX6M, ZD8OK, ZS6CEV, VU2MIR, K5FJ, UA0KZ, N6AV/VP9, Z21HS, VU2TRZ, W1HMD and 3B8FG, plus sideband with 6Y5/K6JAH, ZS1ACY, K6VX, YB0WWL and YB0MWA.

Back-Scatter

3.5 And 7MHz Bands

Eric GOKRT has an end-fed 28m top, fed via a quarter-wave counterpoise, buckled to a Lake DTR7; two-way 7MHz QRP contacts ensued with GW4CFS, F6ACD, HB9HVE, ON5UP, SM5DQ, and a couple of Gs. QRO stations raised included F6IGE, HA5BBM, HB9JNU, OZ5AAH, ON4GU, ON7EZ, PA3EAD, PA0DJC, TK4ML for a new country, SP3MEP, UA3AEX, UB5VCM, YL2UZ, G10PML, GM0LIR and GW0FJT.

A try at 7MHz by Don GM3JDR netted (c.w.) PY7SA, LW1EXU, YX0AI, VU2KSE, UA9AFS, UA9LAK, ZL1ST, ZL2UV, JW0E, VK3RP, VK9NS, KP4YD, 4K2CC, KC6/W6SS, KP5/N1DX, AP/WA2WYR, AJ6T, CM3RA and PP7IU.

Activity on 3.5MHz for Pat ON7PQ meant KP5/N1DX, PY6MT, PY0FZ, JW0D, YA5MM, JA6BJT, PJ4/DK9FN, TU4SR, ZL1AXQ, S9AGD, 1A0KM, PY5XH, Z21HS, JW0E, VP8BZL, OA4JR, FY5FY, FG5BG, HF0POL, 9Y4KB and XE2CQ; on 7MHz

he netted 8Q7CW, VK9CL, HL2IVL, EP2EU, PY0FZ, VP8SSI, VK9NS, VP5/WB9HRO, HK7DSZ, CX4SB, JW0E, OX3GL, VK6HD, FY5EW, CN8ST, 5N0ZKJ, 6W6JX, FM5BH, G4SMC/8R1, YN/SM00IG and KP4YD.

John G3BDQ showed all c.w. on 7MHz by way of 4X1NM, JW0GB, JW0E, 6W6JX, PY1AM, PJ4/DK9FN, JG1XDL, SV0IG/9, VK2ARK, W1GFH, KT3FT and VP8SSI.

Again on 7MHz we find Ted G2HKU employing his wiles on OX3GL, ZD8OK and C56/GM3YOR.

14 And 21MHz Bands

First it's John G3BDQ, on the 14 and 21MHz bands, with c.w. on 21MHz to Y77UN, KP5/K0BJ (Desecheo), FO0CI, ZF2NE, HL2KHE and HL9AA.

Ted G2HKU keyed on 14MHz with ZD8LII and SV0IG/9, plus sideband to VU2AU; on 21MHz I note c.w. to ZD8OK, YC6JRV, PJ4DK9FN, PP7CW, PS7EJ and sideband to PJ8DFS (St Eustace Is), PJ7/K2TW, UZ9MWD for a YL and 9H1DE.

It's all sideband for Don G3NOF; who notes (14MHz) C53GB, CU2YA, CT3FF, EA8BYR, FO0CI, I10NU/IT9ESZ, JAs, KL7XD, S92AA, TI2MEN, UA0QFC, UL7OB, VKs, VK9CL (Cocos-Keeling), VP5/KN4UG, VQ8CFM, VU2JJQ, XE2FU, XX9TQL, YA5MM, WZ6C/S2, ZL2AAV, ZS1DZ, 5H3DC, 7X2WCK, 9L1MR; (21MHz) AA6DB, AL7CQ, D44BS, CE6DFY, JAs, JH1MAO/JD1 (Minami Tori-shima), KB7MJ, N16H, NL7DU, P29DX, RU6B/RZ4HXX, S2/HA5BUS, UU6U, VKs, VP8SSI, WL7E, XB9Z, XX9TQL and ZF2NE/ZF8.

Pat ON7PQ was keying on 14MHz with T17/T14SU, 8P6AU, 7Q7XX, A61AC, BV4CT, HS1CDX, VP8BZL, YA5MM, 1A0KM, BY8AC, VP8SSI, KH4/N7TNL, XU1RA, S9AGD, S2/HA5BUS, FM5BH, HZ1AB, FO5FQ, plus on 21MHz VP8SSI, S2/HA5BUS, HH3HK, VP8CBA, 1A0KM, 9V1YW, 9X5HG, BV4HB, AH6JF, Z21HS, VP5/WB9HRO, A22GH, ZS9/DL3ECK, A71/NX7K, TR8LVP, PZ1EA and A61AC.

Finally, Don GM3JDR and 14MHz; 4K2OLQ, JW0E, UA0IDW on 21MHz ZL1AOD, UA0JU, 3D2AG, U18AG, Ws and JAs.

We're out of space again! Deadline for next time will be June 19, July 17, and August 21, to arrive here - the address is at the head of the column.

Solar Data for April 1992

During March there was a major decline in solar activity and this continued well into April with the solar flux hovering around the 150-190 mark for more than four weeks. The 27 day pattern for solar activity almost disappeared making propagation predictions very difficult.

On April 1, peaking around 0100UTC, there was an M5.6/1B class flare but it was not particularly outstanding being small in size and not all that intense in x-rays but it was probably the mechanism that caused an auroral opening on April 3. Solar activity remained low during April with the flux staying at the 140 to 150 level. Slight flare activity produced no disturbances and the A and K indices stayed quite low.

On April 14 at 2025UTC there was a sudden magnetic impulse of unknown origin. It was detected briefly and caused the planetary K index to rise only to three units. It is hard to recall any recent period with so many WWW K index reports of one or zero units and it now looks likely that Solar Cycle 22 is going to have a long period of low activity until the minimum is reached, probably around 1996. With Solar Cycle 22 on the down-hill slope, the best years for 50MHz work are probably behind us until well into the 21st century!

Back-Scatter

VHF Up

Reports to
David Butler G4ASR
Yew Tree Cottage

Lower Maescoed, Herefordshire HR2 0HP

Sporadic-E

As the days get longer the lower v.h.f. bands will progressively be influenced by Sp-E propagation and the chances are that by the time you read this you may have already participated in a 144MHz Sp-E opening. It might even be happening right now. I suggest you read the rest of this column with the receiver tuned to 144.300MHz just in case!

Although openings on the 144MHz band may be elusive to many operators those on the 50MHz band are very common and you can expect to find stations, up to 2000km away, nearly every day during June and July. It should also be remembered that on this band a multi-hop path will occasionally exist which spans the Atlantic Ocean to North America. Signals arriving via this mode can be very strong indeed and it is not impossible for stations running 5W and a halo to work some very good DX.

Transatlantic Openings

Regarding transatlantic openings, in my experience, the following indicators should be looked for if you want to catch a 50MHz opening to North America via Sp-E. First, you should note that statistically these openings, lasting between two to three hours duration, are more likely to occur during the first and third weeks of July between 2100-0000UTC. This may not be strictly true but it is a slight refinement to saying, put your beam at 290° and listen to the 50MHz band for 24-hours a day during June and July. (Although I do know one station that does this!)

Sporadic-E propagation is less likely to occur during periods of high geomagnetic activity, so you may find it useful to know what the latest 'numbers' are by logging into your local DX Cluster or telephoning research centres such as Boulder

(0101 303 497 3235) or GEC-Marconi (0245 73331 extension 3152). If the geomagnetic conditions are similar to those that existed during March and April of this year (quiet to unsettled) then the possibility of transatlantic Es during June-July will be very good.

It is unusual for an opening to occur if there has been no Sp-E activity during the day and a useful indicator is to note the days when single-hop Sp-E propagation has lasted for hours (possibly all day) and has been particularly intense. After a while you get to know which days are good and which days are REALLY good!

It is on these really good days that openings also occur on the 144MHz band. If this should happen during the evening, say around 1900-2100UTC, it would be unwise not to monitor the 50MHz band for North American DX later in the evening. Sometimes it can occur almost immediately so you should have laid plans to pacify the YL/OM beforehand! It is also useful to know if Sp-E ionisation is being formed to the west of the UK and the easiest way to detect this is to beam between 260-300° and listen for back-scatter signals from European stations or the GB3SIX beacon on 50.020MHz.

Incidentally, if you don't like working aurora, the back-scatter mode is a very useful way of contacting locator squares or

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EB91	1.50	EY50DA	3.00	QOV02-6	19.50	6B7	5.00	6X4	3.00
EBF80	1.50	EZ80	1.50	QOV03-10	5.00	6B8	1.50	6X5GT	2.50
EBF80	1.50	EZ81	1.50	QOV03-10 Multi	15.00	6B8	2.50	12A7	2.25
EL31	12.50	G1501	3.00	QOV03-20A	25.00	6B8	2.25	12A7	2.25
EL31	6.50	G222	6.50	QOV03-40A Multi	40.00	6B8	2.25	12A7	2.25
EC333	7.50	G233	4.00	QOV3-12	10.00	6B7A	3.50	12A7A GE	7.00
EC335	7.50	G234 GE	7.50	R18	4.00	6B7	6.00	12B6	2.50
EC381	2.25	G237	4.50	R19	3.00	6B8A	4.00	12B8	2.50
EC382	2.25	K161	7.50	SP41	8.00	6B7	6.00	12B7A GE	6.50
EC383 Siemens	2.25	K168	20.00	SP61	4.00	6B8	4.50	12B7A GE	7.00
EC385	3.50	K169 GEC	35.00	U19	10.00	6B7	1.50	12E1	20.00
EC388	4.75	K177 Gold Lion	P.O.A.	U25	2.50	6B7	2.50	12HGT 12GN7	6.50
EC391	2.00	K168	15.00	U26	2.50	6C4	1.95	30P1/2	1.50
EC398	1.50	W16	9.00	U27	7.50	6C5	3.00	30P4	2.50
EC435	3.50	O42	2.70	UBR20	1.50	6C6A	3.00	30P19	2.50
EC442	3.50	O82	2.70	UBR9	1.50	6C6A	5.00	30P13	1.50
EC481	3.00	OC3	2.50	UCH42	4.00	6CL	3.75	30P14	1.50
EC482	1.50	OC3	2.50	UCH81	2.50	6C7 GE	5.25	30B8(PFR)	120.00
EC482	1.50	PC28	2.50	UC122	2.00	6CH	6.00	5729	70.00
EC483	3.00	PC28	2.50	UC183	3.00	6C4	8.00	605	60.00
EC486	1.75	PC32	2.50	UF89	2.00	6D6	3.50	807	5.00
EF37A	3.50	PC37	2.00	UL41	10.00	6D5 GE	12.00	811A	18.50
EF38	2.75	PC390	2.00	UL84	2.00	6D6B	9.50	812A	52.50
EF40	5.00	PCF80	2.00	UY41	4.00	6E8	3.50	813	27.50
EF41	3.50	PCF82	1.50	UY85	2.25	6E5	1.85	866A	25.00
EF42	4.50	PCF86	2.50	VR105/30	2.50	6F6	3.50	872A	20.00
EF46	2.50	PCF801	2.50	VR150/30	2.50	6G6	4.00	931A	25.00
EF54	4.50	PCF802	2.50	Z759	35.00	6H6	6.00	2050A GE	10.00
EF55	3.50	PCF805	1.70	Z803U	25.00	6H8	4.95	5763	10.00
EF90	1.50	PCF808	1.70	Z021	3.50	6J5	3.00	5814A	4.00
EF95	1.50	PCF808	3.00	3829	20.00	6J6	3.00	5842	12.00
EF98	5.00	PCF82	2.00	4C250B EIMAC	62.00	6J7	4.00	5860	9.50
EF99	1.95	PCF83	3.00	5RAGY	5.00	6J8A GE	15.00	6148B GE	15.00
EF99	2.15	PCF84	2.00	5U4G	5.25	6J8C	12.50	6550A GE	15.00
EF183	2.00	PCF85	2.50	5V4G	4.00	6J8C GE	11.25	6883B GE	18.00
EF184	2.00	PCF86	2.00	5Y3GT	2.50	6KGT	3.00	6973	11.00
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EL33	7.50	PL200	2.50	6Z0L2	1.75	6K8 GE	11.95	7199	10.00
EL34 Philips	16.00	PL35	2.50	6A07	3.00	6L8	8.50	7581A	12.00
EL34 Siemens	16.00	PL81	1.75	6A18	4.00	6L8C SYL	9.50	7588	15.00
EL36	4.00	PL82	1.50	6A25	4.50	6L8C Siemens	4.50	7587	23.00
EL180	25.00	PL83	2.50	6A25	1.00	6L8C GE	9.50	7591A	10.00
EL81	5.00	PL84	2.00	6A26	1.95	6L7	3.50	7668	10.00
EL84	2.25	PL504	2.50	6A26	5.00	6L8	12.50	8668	15.00
EL88	2.75	PL506	6.50	6A26A	4.50	6D7	4.00	8417GE	11.50
EL91	4.00	PL506	6.00	6A26S	3.25	6R4H8/6K8	12.00		
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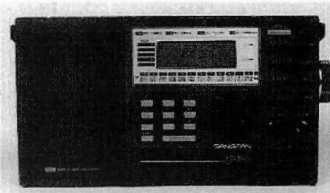
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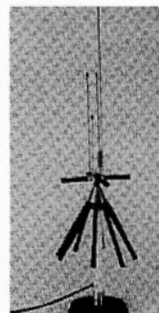
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countries up to a 1000km from your QTH. Monitoring the 28MHz band during the evening for strong east coast stations (W1, W2 and W3) is another good sign of an impending opening although it should be noted that 50MHz propagation may occur without anything unusual being heard on the 28MHz band.

If you have the time to sit in front of the rig for hours at a time these techniques will enable you to build up a good mental picture of how the band is developing but if, like me, you have commitments to your family or elsewhere you will have to resort to help from other DXers either by using the spotting announcement facility of a DX Cluster or by forming a telephone warning chain.

Aurora Activity

The month of April was virtually devoid of any auroral activity with the exception of a small opening which I detected at my QTH (IO81) on April 3 between 1555-1746UTC. At the commencement of the event, all I could hear was the GB3RMK (50.060MHz) and GB3LER (50.064MHz) beacons but 15 minutes later the first signals were heard on the 144MHz band.

I went on to make c.w. contacts with DL2EAA (JO31), DL3LBK (JO54), DJ6LV (JO31), EI5FK (IO51), F6FLV (JN18), G6FDI (IO83), GM0GMD (IO86), GM0ICF (IO75), OZ1FGP (JO56) and at 1726UTC, SP5EFO (KO02) 53A 53A on a beam-heading of 40 degrees. Around the same time GW3YDX reported hearing UZ2FWA (KO04) on 144.046MHz peaking 53A.

After my contact with SP5EFO had been completed the band noticeably faded, and so a quick QSY was made to 70MHz to work GM4DIJ (IO85) before the band collapsed abruptly at 1746UTC. During auroral openings I always ignore the 50MHz band in preference to the higher frequencies (and better DX!) but I did notice 'spot' announcements from my local packet radio cluster GB7DXC indicating 50MHz activity, between 1620-1749UTC, with stations in DL, EI, GD, GM, ON, OZ, PA and SM.

One station that prefers to operate on the 50MHz band is **Graham Atkinson GD7HEJ** (IO74). He made a number of s.s.b. contacts during the opening on April 3 including DF7VO (JO32), OZ9AFA, PE1GNP (JO31), PA3EON (JO21), PA3FBM (JO33), PA3FXV (JO23), PA0BM, PA00QS (JO33), SM7CAD, SM7NNJ (JO86) and 29 G stations.

Tropospheric Openings

Conditions during March and April were fairly uninspiring and apart from some extended tropospheric openings to Spain during March there has been very little else reported.

Richard Girling G4FCD (IO91) mentions a good opening into western France and Spain during the evening of March 19 in which he worked F6HRE (IN93) on the 144MHz

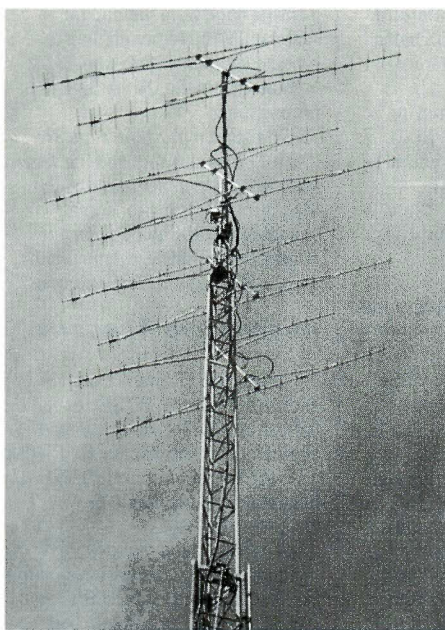


Fig. 1: The 8-Yagi 430MHz e.m.e. array at G4GCM.

band, F6CCH (IN96) on the 430MHz band and FC1ANH (IN98), FC1BJD (JN08) and F6CCH (IN96) on the 1296MHz band. Graham also worked EA2AGZ (IN91) on 144 and 430MHz but failed to work him on 1296MHz which is unfortunate as EA2AGZ was the first Spaniard QRV on that band which G4FCD has found. Does anyone know of other north coast EAs QRV on 1296MHz?

The only DX recently worked by **Neil Underwood G4LDR** (IO91) was EA1TA on March 19 but **Steve Damon G8PYP** (IO90), located on the south coast and better placed for this particular tropo opening worked, on the 144MHz band, EA1DDU (IN73), EA1KI (IN73), EA1TA (IN53), EA1TJ (IN83), EB1DSD (IN63), EA2AGZ, FC1CYB (JN17), F1FHI (IN97) and FC1GHV (JN06). The report from Steve is probably his last for some time as two days later his wife gave birth to a baby girl, Jade Naomi. Congratulations!

Ela Martyr G6HKM (JO01) couldn't find much in the way of DX but did make 144MHz contacts with EI2WRC/P (IO62) and EI4DQ (IO51) on March 17 and EA2AGZ and FC1CDS (IN77) on the 19th. During the same opening she worked EA1TA, EA2AGZ and FC1CDS on the 430MHz band.

Keith Killigrew G6DZH (IO82) made his best ever 430MHz DX by working OE5XBL (JN68) earlier in the year. Keith uses an Icom IC-451 giving 12W into an 18-element Yagi. He mentions that signals on the 430MHz band can often be stronger than those on 144MHz, and on many occasions openings will occur on u.h.f. which are totally inaudible on the v.h.f. bands.

Meteor Scatter

Results of the Bavarian Contest Club meteor scatter contest, held during the Geminids shower 1991,

have just been received from DL5MAE. In first place was UB5EWA (KN58), who ran 1kW into a 17-element Yagi to make 56 contacts.

Second place was taken by YU7MS (KN05) running 300W into four 11-element Yagis and third place went to RB5AL (KO61) who used 700W into two 20-element Yagis. A total of 26 entrants from 13 countries entered the contest. The 1992 event will be held during the Perseids shower in August.

Ari Kekki OH9NYW (KP25) is looking for c.w. schedules on both the 50MHz and 144MHz bands. He is also interested in trying some e.m.e. tests with well equipped stations. Contact Ari by telephoning 010 358 698 16952 or writing to Koulukato 6, SF-94100 Kemi, Finland.

The following data, concerning meteor showers occurring during June-July will help you determine in which direction to beam at specific times and when the shower is below the horizon.

The June Lyrids meteor shower is usable between June 10-21, with the main peak occurring around

June 17. It is a complex stream with multiple peaks and is circumpolar, meaning that it does not set or go below the horizon. This shower is generally found to give its best results on the north-south path between 1900-2300UTC and 0300-0700UTC.

The June Perseids, alternatively called the 54 Perseids, are encountered between June 22-30, with a probable peak on Saturday June 27. Between 0700 to 0900UTC beam north-east or south-west, 0900 to 1200UTC beam east or west, 1200 to 1500UTC beam south-east or north-west, 1500 to 1600UTC beam south or north. The radiant is below the horizon from 1700 to 0300UTC.

The Beta Taurids shower lasts for over one month, from June 5 to July 17, maximum activity occurring on Sunday June 28. This shower has the same beam-heading characteristics as the June Perseids, the only minor difference being that the shower is below the horizon from 1700 to 0500UTC.

The L. Geminids shower can be worked between July 4-29, but the best day will be Saturday July 11. Between 0700 to 0900UTC beam north-east or south-west, 0900 to 1400UTC beam east or west, 1400 to 1600UTC beam south-east or north-west. The north-south path is not usable with this shower. It is below the horizon from 1800 to 0400UTC.

The Alpha Orionids occur between July 9-15, with best activity being on Sunday July 12. Between 0600 to 0800UTC beam north-east or south-west, 0800 to 1200UTC beam east or west, 1200 to 1400UTC beam south-east or north-west. This shower does not favour the north-south path and is below the horizon from 1600 to 0500UTC.

The Nu Geminids stream is encountered between July 9-18, also peaking on Sunday July 12. Between 0600 to 0900UTC beam north-east or south-west, 0900 to 1200UTC beam east or west, 1200 to 1400UTC beam south-east or north-west, 1400 to 1500UTC beam south or north. The radiant is below the horizon between 1700 to 0300UTC.

Moonbounce

Conrad Farlow G6ZTU has recently changed his modest 144MHz moonbounce antenna



A trio of contesters spotted at the RSGB v.h.f. convention. In the foreground, left to right, G4UJS (Northern Lights), G4PIQ (Martlesham) and G0OFE (Flight Refuelling). Photo G4VXE.

system of four 9-element Yagis to that of four 17-element 9FT Yagis. This is elevated by a 60cm satellite antenna screw-jack and mounted on a 13m tower.

The difference, about 2dB, is very noticeable especially on echoes. Despite the small size of the original set-up a total of 60 e.m.e. stations were worked with it. Whilst it was still up in February, contacts were made with CX9BT (for the first ever CX-G QSO on the 144MHz band), DK1KO, LA8YB, OE3JPC, PA2CHR, RA6HHT, VE5RF, VK3AMZ, WA1JXN, K3HZO, AA4FQ, WB5IGF, KB8ZW, W0RWH and ZS6ALE. The larger antennas were erected in March and during that month c.w. contacts were made with DK9ZY, DL3SAS, EA2LU, I5JUX, OZ1HNE (a 2-Yagi station), SM4IVE, K1NMS, N4GJV, WA6MGZ, N6OC, N8AM, W8VWN and Y23RD.

Contacts made during April were even more impressive with G6ZTU working C53GS (a very loud signal), DL5MAE, IK4PLU, LA8KV, LA0BY, LU7DZ (for the first G-LU contact on 144MHz), RB5LGX, SM3LBN, SM0PYP, UG6AD (to complete W.A.C.), UL7TQ, K1GVM, WA6PEV, W7FN, W7VXW, KD8SI, WG8Q, W90EH, W0WHS, Y28WH, and ZL1BVU (the ZL's first G contact).

John Regnault G4SWX, is another 4-Yagi station achieving great results on the 144MHz band and between April 4-13 he worked C53GS (fantastic signal), DL5MAE, I1KTC, I2FAK, IK4DCX, JA4KLX, LA8KV (4-Yagi, 1kW station), SM5MIX, VE6TA, VE7BOH, VK3AMZ (a good signal), K1GVM, W5UN, WB5LBT, W90EH and 4N2EZA. Stations heard during this period included DL7YW, DL8DAT, W6JKV/HK0 (with a very large pile-up), IK2EAD/IA2, LA9NEA, OE5EYM, RA6FMT, SM3LBN, SM5DCX, UG6AD, K1WHS and N6OC. It certainly is becoming a very interesting band!

Bob Henshaw G4GCM, is running an 8-Yagi system on the 430MHz band as the photograph in Fig.1 shows. The antennas are the 21-element F9FT design, 168-elements in total, and this combination has resulted in over 30 stations being worked off the moon all of them without a sked. Bob uses a TS700 transceiver with a re-built front-end, a home-made audio filter and K2RIW amplifier (2 x 4CX250B). A low noise amplifier (l.n.a.) which uses an ATF10135 f.e.t. followed by an MRF571 bipolar device is mounted in a watertight box at the top of the tower.

Pagliarini Ermes IK4PLU, is now active on 144MHz e.m.e. using an 8877 high power amplifier, four 11-element 2.2 w.l. Yagis and an MGF1502 low noise amplifier. Unfortunately, he has t.v.i. and can only be QRV between 0000-0730UTC. Anyone interested in making a sked can write to IK4PLU, Via A.Manzoni, 9 - C.A.P. - 47030, S.Mauro, Pascoli, Italy.

The 50MHz Band

Conditions were relatively quiet

on the 50MHz band during March and April with most of the DX being over the African circuit, via trans-equatorial propagation (t.e.p.). Among the call signs reported in openings on March 8, 9, 16, 20, 21, 22, 23, 28 and April 3, 4, 5, 9 and 11 were A22BW, TU4DH, V51AT, V51/DL3ECK, ZS1, ZS2, ZS4, ZS5, ZS6, ZS9A 7Q7CM, 7Q7RM and the 7Q7XX beacon on 50.090MHz.

A special event call sign ZS70SAN celebrating 70 years of the South African Navy was heard working a tremendous pile-up around midday on April 5. Any QSL cards for this 50MHz operation go via Etienne Swart ZS6YA, P.O.Box 14, Honeydew 2040, South Africa.

Openings to South America were reported on March 22 with LU3EX and LU7DZ being worked around 1350UTC and on April 24 when PY5CC and ZP6CW were worked between 1300-1400UTC. This path opened up during the middle of a big European Sp-E opening and it was interesting to note many UK stations working the S9+ stations in I, OE and YU and totally missing the real DX!

Eric FC1JKK, better known as TL8MB is now QRV from Turkey using the callsign TA/FC1JKK. You should be able to work him via multi-hop Sp-E this summer.

The 70MHz Band

As I have already mentioned, packet radio can be a very useful tool for the DX chaser. I was therefore interested to read a bulletin on my BBS GB7TCM that GD7HEJ had just obtained a transverter for the 70MHz band, and would be operating portable during the evening of Saturday April 4.

A special watch was therefore kept on 70.200MHz and at 1835UTC, up popped GD7HEJ/P and a quick contact was made with the Isle of Man. A few days later, I received a message from Graham mentioning that the portable system consisted of an FT757, a Microwave Modules transverter and a 5-element Yagi and that a total of 6 stations had been worked that evening, G3APY, G3UKV, G4ASR, G4SEU, G8APB and GW4BZD.

By the time you read this, GD7HEJ should be QRV from his home QTH in Douglas. If you want to make a sked you can contact him via his BBS @ GB7MAN or talk to him on the local cluster GB7MDX.

Mark ZB0T has re-erected his 70MHz antenna and will be looking for UK stations around 70.200MHz during this summer's Sp-E season. He is also QRV on f.m. and may very well break in to your simplex QSO. Be warned!

The 144MHz Band

Two Algerian stations, 7X2AJ and 7X2DS, are now active on the

144MHz band from the capital Algiers (JM16). Although they're running low power they should be workable from the UK via Sp-E propagation.

The station of 7X2AJ runs 3W into a 12-element Yagi and has been making s.s.b. contacts around the Mediterranean area for some months. At 7X2DS the equipment consists of a TR9000, running both s.s.b. and f.m. into a Yagi antenna.

Microwave Beacons

On March 25, a new Dutch microwave beacon PI7SHF became QRV on 3400.020MHz. It's running 1W output into an antenna located 140M a.s.l. at Schiphol Airport (J022). Reception reports would be welcomed by PA0EZ.

A narrow-band microwave beacon, GB3SCX, is now operational from the south coast (IO90BR) on 10368.250MHz. The beacon, built by G0API and G4JNT of the Dorset 144MHz Repeater Group, runs 275mW output into a slotted waveguide antenna.

Expedition Updates

Now it's time for an expedition update. The Fontainebleau Radio Club are mounting an expedition to the Balearic Islands (EA6) between June 25 to July 6. They will operate from JM19 on 144MHz with 500W and two 17-element Yagis, 430MHz with four 21-element Yagis, 1296MHz with four 55-element Yagis, 2.3GHz, 5.7GHz and 10GHz bands. The group will mainly be active via tropo, Sp-E and e.m.e. Skeds will be taken on the v.h.f. net 14.345MHz.

Here's another for the diary, as a 50MHz expedition to Kaliningrad (UA2F) during the Sp-E season in July, is planned by UL7GCC, UL8GDD and PA3EUI.

Uffe TA2/OZ1DOQ and Soren TA2/OZ1FTU, will be active on the 144 and 430MHz bands between July 13-31 from various squares (KN40, 41, 50, 51, 61, 62, 71, 72) on the Black Sea coast of Turkey.

On the 144MHz band they will be running a 4CX250B amplifier and a 15-element Yagi. Although primarily an m.s. expedition they will also be QRV for tropo and Sp-E contacts, monitoring 144.300MHz and 432.200MHz when propagation looks likely.

When operating on meteor scatter, Uffe will use the call sign TA0Z1DOQ on 144.136MHz for random contacts and 144.146MHz for schedules. He will transmit during the first 2.5 minute period at a speed of 1200 i.p.m. No skeds will be taken in advance but can be arranged on the v.h.f. net (14.345MHz) from 1500UTC daily.

Incidentally OZ1DOQ sent me this information via packet radio! If you want further information you

could send him a message @ OZ6BBS.

Contest News

The RSGB are holding a 430MHz f.m. contest on June 20 between 1300-1700UTC. It has sections for the single operator fixed station, all others and listeners. The contest exchange consists of call signs, report, serial number and locator. Later in the evening, between 1800-2200UTC, a 430MHz c.w. event is being held with sections and rules identical to the f.m. contest.

Sunday June 21 is the day when everyone heads for the hills to participate in the PW 144MHz QRP contest. It's being run between 0900-1700UTC and a full set of rules can be found on page 24 of the June issue. Don't forget to look out for the Sp-E opening!

A German 144MHz c.w. contest, organised by the AGCW-DL group, will be held between 1900-2300UTC on Saturday June 27. The contest exchange consists of the report, serial number, power section and locator. The power sections are; A = less than 3.5W, B = less than 25W, C = more than 25W. An example would be 599012/C/O81MX. I can supply the rules for this contest plus other information sheets on receipt of an s.a.e.

A QRP 144MHz telephony contest has been organised by the WAB group to run between 0900-1700UTC on Sunday June 28. All licenced amateurs and short wave listeners are eligible to enter. The contest exchange is RST, serial number, WAB area and county. Further details of all WAB contests can be obtained from G4SKQ QTHR. Don't forget to send an A4 size s.a.s.e.

The very popular RSGB v.h.f. field day is being held on July 4-5 between 1400-1400UTC. Although only portable stations are allowed to enter, fixed stations will find this event an invaluable source of new counties on the 70, 144, 430, 1296 and 2320MHz bands.

The 70MHz band is split into two separate operating periods with a c.w. section taking place between 1400-2200UTC on Saturday 4th, and an s.s.b. section running between 0600-1400UTC on Sunday 5th.

On the 1296MHz and 2320MHz bands the operating periods are between 1400-2300UTC on the 4th and 0500-1200UTC (two hours before the rest of the contest finishes) on the 5th.

Summer microwave contests have been scheduled by the RSGB microwave committee. They are to take place between 0900-2100UTC on the following Sundays: June 14, July 19, August 16, September 13 and October 4, the latter to coincide with the IARU contest arranged for the same weekend.

Scandinavian activity contests will be held between 1800-2200UTC on the following dates, 50MHz on June 23 and July 28, 144MHz on July 7 and August 4, 430MHz on July 14 and August 11, microwaves on June 16 and July 21. A full set of rules can

be obtained from me on receipt of an s.a.e.

Diamond Jubilee

Don't forget *PW's* diamond jubilee! I am still looking for information and examples of v.h.f. work in the early 1930's to assist me in the preparation of a very special 60th anniversary issue of *PW* later in the year. Any details of bands, contacts, equipment, in fact anything that reflects the history of v.h.f. will be very much appreciated. If you don't go back that far, you may still be able to help by digging out any old photographs or logs for the period 1940-1970.

Deadlines

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

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

Back-Scatter

Annual v.h.f./u.h.f. table January to December 1992

Station	50MHz Countries		70MHz Countries		144MHz Countries		430MHz Countries		1296MHz Countries		Total points
G4FCD	16	12	—	—	72	20	46	17	18	9	210
G6HKM	38	26	—	—	39	16	20	12	3	6	160
G1SWH	8	20	18	5	37	10	21	9	2	1	131
G4ASR	6	18	38	5	41	19	—	—	—	—	127
G8ESB	7	3	15	2	37	9	14	3	7	2	99
G4LDR	2	4	22	2	10	9	23	9	—	—	81
G7CLY	—	—	—	—	11	6	2	1	—	—	20
G1THG	4	3	—	—	2	2	—	—	—	—	11

Annual c.w. ladder

Band (MHz)	50	70	144	Points
Station	11	6	139	156
G4ASR	—	5	53	58
G4OUT	—	—	27	27
G0DJA	—	—	—	—

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

144MHz QRB Table

Top distances (km)		
Tropo	3160	GM4YXI
Aurora	2143	G4YTL
Sp-E	3080	G0EVT
Meteor	3100	GW4CQT

Back-Scatter

Broadcast Round-up

Reports to Peter Shore via the *PW* Editorial Office

The BBC launched World Service Television to Africa on April 15. Transmitted over Intelsat VI at 27.5 West on Transponder 20, the service is available to viewers between 0000 and 0900 and 1700-2100. The signal will be encrypted from early June. The South African pay-television operator M-Net is establishing marketing outlets around Africa.

Meanwhile in Australia, the ABC is looking at how a television service could be started with news, current affairs and entertainment for the Pacific region.

The CNN service is now available on Astra for European viewers and in the Middle East, it can now be seen on Arabsat 1C.

Albania is reported to be seeking other international radio stations who might be interested in hiring its medium wave transmission facilities. According to a report broadcast recently on Radio Netherlands *Media Network* programme, discussions are under way between the Albanian authorities and a number of stations including the BBC and Trans World Radio. The Albanian broadcasting company is desperately short of funds and thinks that revenue from hiring the transmitter on 1.395MHz would help reduce some of the funding problems.

If you are interested in new radio receivers, there is a very interesting new set now available in the UK. The

Grundig Satellit 700 is the latest semi-portable receiver from the German manufacturer and it replaces the Satellit 500.

The new receiver offers many new facilities, from stereo f.m. reception (through headphones) to Radio Data System (RDS) and a staggering memory capacity of up to 2048 frequencies! Short wave is covered continuously from 1.6 to 30MHz, and there is f.m., m.w. and l.w. as well.

Many international broadcast frequencies have been pre-programmed in the factory and it is easy to page through the memory files. Station names are displayed in the comprehensive liquid crystal data panel together with operating data.

The receiver may also be used as an RDS test set and many radio broadcasters throughout Europe have bought the Satellit 700 for this purpose. The set performs well on short wave and a full test report will appear soon in *PW's* sister magazine, *Short Wave Magazine*. The new Grundig costs around £350 in the UK.

European Stations All times GMT (=UTC)

The present schedule for Iceland's relays of its domestic service is:

1215-1300 on 13.83MHz
1215-1245 on 15.79MHz
1855-1930 on 11.402 and 13.855MHz.

These transmissions are in addition to the constant relay on 3.295MHz.

Radio Vilnius from transmitters in the former Soviet Union changed frequencies on 4 May. English is heard at 2130 on 9.71 and 9.675 and at 2300 on 15.58, 13.645 and 11.78MHz.

No sooner had last month's edition of *Practical Wireless* gone to press than a reprieve was granted to European listeners to Radio Netherlands. The daytime transmission at 1230 has a European frequency of 9.855MHz.

Radio Norway's weekend English transmissions during the summer are heard at:

1200-1230 on 213.705 and 17.86MHz

1300-1330 on 15.27 and 9.59MHz
1600-1630 on 17.72 and 15.23MHz
1700-1730 on 9.655MHz
1900-1930 on 21.705 and 17.86MHz

In Moscow, Radio Galaxy which broadcasts in English and Russian is heard daily at 1900 until 2200 on 9.88MHz. The station's address is PO Box 7, Moscow 117418 and the telephone number is 211 5475 - but only on Wednesdays between 1800 and 2100! Radio Moscow's Russian language World Service is now called 'Golos Rossii' which translates to the Voice of Russia.

Roy Merrill says that Radio Ala has changed frequency from 7.40 to 7.37MHz for most of its 24 hour-a-day transmission period. Parallel frequencies include 5.04, 6.015 and 11.965MHz. Medium wave channels of 1.386MHz and 684kHz also carry the station.

Radio Pamyat is heard weakly 1600-1900 on 11.65 under KTWV and Radio Beijing. The station is also scheduled for 1430-1600 on 12.04MHz.

Radio Polis in St Petersburg is scheduled 0300-1300, but it was previously noted around 1030 with straightforward identification 'Radiostantsa Polis' on a very cluttered 6.045MHz and later at 1350.

Radio Radonezh was briefly

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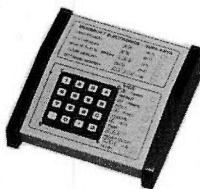
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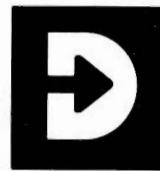
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4.433619	HC-49/U	20pF	2.55	21.400000	HC-49/U Series		2.55
6.000000	HC-49/U	30pF	2.55	32.000000	HC-49/U Series		2.55
6.144000	HC-49/U	30pF	2.55	60.000000	HC-49/U Series		3.55
10.000000	HC-49/U	30pF	2.55	100.000000	HC-49/U Series		3.55
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Radio Exterior de Espana has English at 1900-2000 on 9.875 and 9.685 and at 2100 on 9.875MHz. These frequencies are beamed to Europe.

Radio Sweden's summer English schedule:

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The satellite service on Astra 11.597GHz audio subcarrier 7.74MHz carries the 2030 transmission and the Australasian service at 1230GMT. Tele-X also has Radio Sweden on 12.207GHz audio subcarrier at 7.38MHz.

The latest edition of Radio Sweden's *Mediascan* publication *Communications in Space* is now available. In 29 pages of information it covers the whole field of satellite communications from broadcasting through weather and navigational spacecraft to monitoring the space shuttle and Mir. Write to Mediascan, Radio Sweden, S-105 10, Stockholm, Sweden for your free copy.

Radio Kiev is no more. Long live Radio Ukraine! The change in name occurred in late March and seems to affect all the station's language services. A telephone number has been announced in Kiev - 229 1757 - for anyone wanting to contact the English service of the station. English to Europe is transmitted at 2100 for an hour on 9.785, 9.64, 7.34, 7.25, 7.24 and 6.01MHz and at 0000 on 17.69, 11.77, 10.344-u.s.b., 9.87, 9.785, 9.685, 9.64, 7.24, 7.195 and 6.145MHz.

From what's left of Yugoslavia, Radio Yugoslavia in Belgrade has English to Europe at 1830 on 15.14 and 6.10 and later at 2100 on 11.735 and 6.10MHz.

African And Middle Eastern Stations

Roy Merrill reports strong reception of Radio Algiers English on 11.715 at 2000-2100 but he says the

presentation lacks a certain 'je ne sais quoi'!

A very weak RDT de Djibouti has been noted on very cluttered 4.78MHz from around 1730 with barely discernable id in French. Roy Merrill reports the station is often covered by female 'numbers' operator.

The Voice of Ethiopia can be heard, with some difficulty, on 9.56 at 1740 up to close at 1800 with French. The station suffers from an unattributable jammer at times and also some adjacent channel QRM from RSA which signs off on 9.555MHz.

Israel Radio continues to use some odd frequencies which presumably hark back to the days of jamming. English transmissions are at:

0400-0415 on 11.588MHz
1000-1030 on 17.545MHz
1300-1325 on 17.59, 17.575, 15.65, 15.64, 11.605 and 11.587MHz
1700-1715 on 15.64, 15.59, 11.675 and 11.587MHz
1900-1930 on 17.63, 17.575, 15.64, 11.675, 11.605 and 11.587MHz
2130-2200 on 17.575, 15.64, 15.59, 15.10, 11.603 and 11.587MHz

Radio Kuwait's English service is back on the air. It's heard each day at 1800 until 2100 with news at 1830. There's just one short wave frequency traced so far: 13.62MHz. Roy Merrill reports this rates SIO554 and better on most days although QSB increases after 2000.

Could there be a new Radio Riyadh on 4.8525MHz, from fade-in around 1730? Roy Merrill reports hearing this station with English news at 1830-1855 and sometimes at around 2050, too. The station gives clear identifications in English at those times but also carries Arabic.

Some reports suggest that this is Radio Sa'ana in Yemen, but Roy thinks these are mis-identifications as Sa'ana is not on the air at the same time. Has anyone else noted

this?

The FEBA Radio service in the Seychelles has a new Azeri transmission on 15.12MHz at 1735 followed by Farsi at 1800. Very strong signals reported by Roy Merrill from sign-on. This channel used to be occupied by Radio New Zealand International, but it now uses 9.675 from 1650-1850.

Radio RSA increased its English language transmissions to Africa on 3 May. There are new transmissions at 0200 until 0400 on 7.27, 0300-0500 on 5.96, 0400-0600 on 9.695, 0600-0700 on 15.22MHz. The evening transmission now runs from 1600 until 1800 on 11.885 and 9.565MHz.

Radio Tanzania is reactivated and has been heard consistently by Roy Merrill on 5.0501 from fade-in around 1745 in Swahili. There is some adjacent channel QRM from Lome on 5.047MHz but it's otherwise quite audible to close at 2100.

Asian And Pacific Stations

Radio New Zealand International was logged with a number of test transmissions during February and March, on 9.645, 9.67 and 15.305MHz at weekends between 1700 and 1900.

The AWR-Russia station has been briefly noted on a partially blocked 9.835MHz with Russian around 1830 with several co-channel stations. The station's English transmission at 1300-1400, is more clearly heard on 11.855MHz. The station identifies as AWR-Russia and asks for comments and letters to be sent to PO Box 310, Hong Kong. Hindi follows with strong signals at 1400-1500. English is also scheduled at 0100-0200, 0700-0800 and 1300-1400 on 11.855 and at 1900-2000 on 9.835MHz.

The Americas

Roy Merrill unexpectedly logged Radio Relogio Federal in Rio de Janeiro, using 4.9042MHz at 0200

with a clear Portuguese language identification at 0030. The signal rated up to SIO242 with heavy QRN. The programming appeared to be news with short musical intervals; items seemed to be preceded by a brief announcement and three pips. The signal had faded out by 0100.

Radio Canada International broadcasts to Europe in English with a mixture of its own programmes and relays of CBC domestic output.

0400-0430 on 9.65, 11.905MHz
0515-0600 on 6.06, 6.15, 7.295 and 9.75MHz (Mon-Fri)
1415-1430 on 11.935, 15.305#, 15.315, 15.325, 17.795#, 17.82 and 21.545MHz
1600-1630 on 11.935, 15.305, 15.325, 17.82 and 21.545MHz
1900-1930 on 5.995, 7.235, 13.65, 15.325, 17.875 and 21.675MHz
2100-2130 on 5.995, 7.235 and 13.65MHz
2100-2200 on 15.325 and 17.875MHz

indicates Monday-Saturday only

Radio Havana Cuba has been noted with very strong English signals to North America on 11.97MHz at 0140 up to SIO443 on a schedule 0000-0200.

English to Europe is best heard on 11.93MHz via Russia at 2200-2300. The *DXers Unlimited* programme airs from 2230 on Saturday. English is also heard at 2000-2100 on 15.33 via Russia and on 17.705MHz.

The KGEI service, 'La Voz de la Amistad', has been a very strong signal in Spanish on 9.615 from before 0430 to at least 0930 on a number of occasions, generally rating a best SIO of 333.

The KNLS service in Alaska has a new English schedule:

0800-0900 on 7.365MHz
0900-1000 on 11.82MHz
1300-1400 on 9.66MHz

Roy Merrill suggests that the best channel of all three very weak signals is on 7.365MHz.

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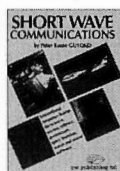
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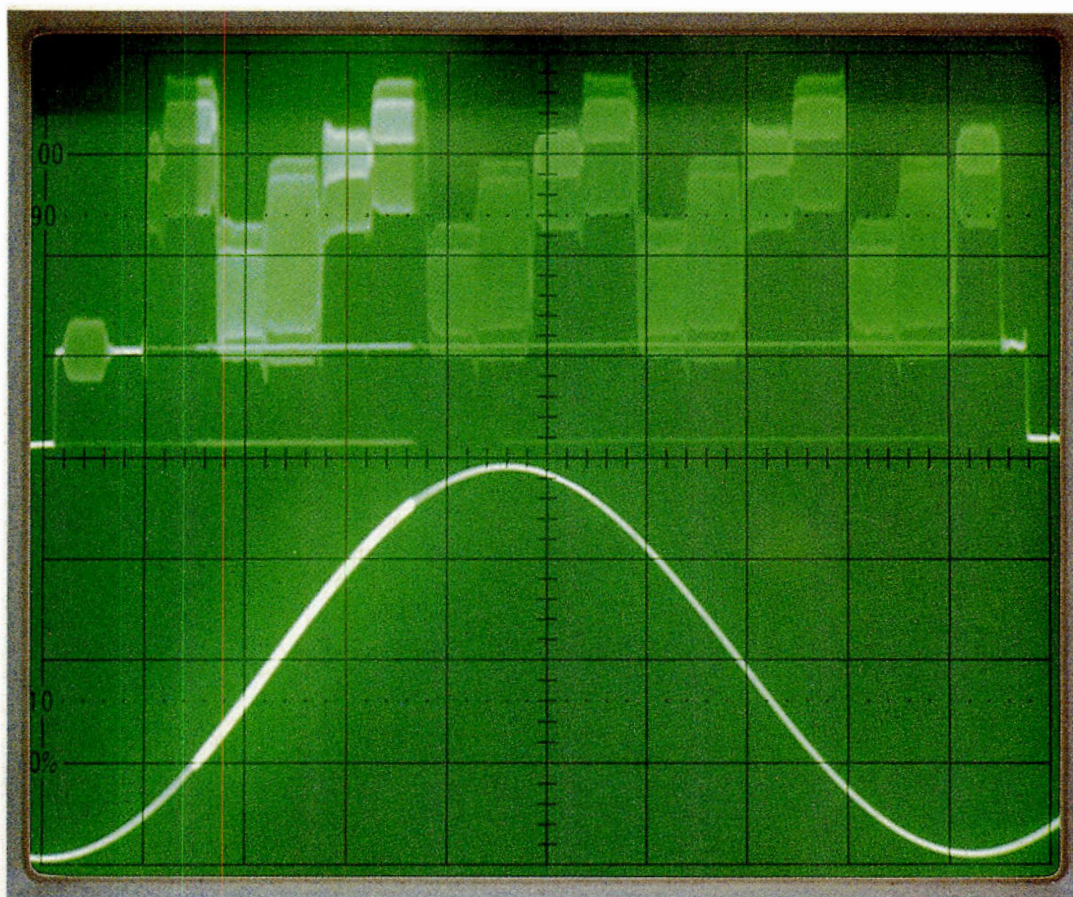
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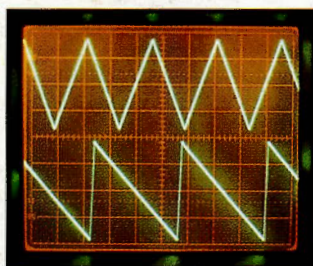


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