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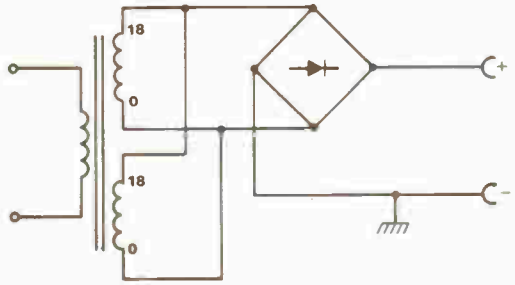

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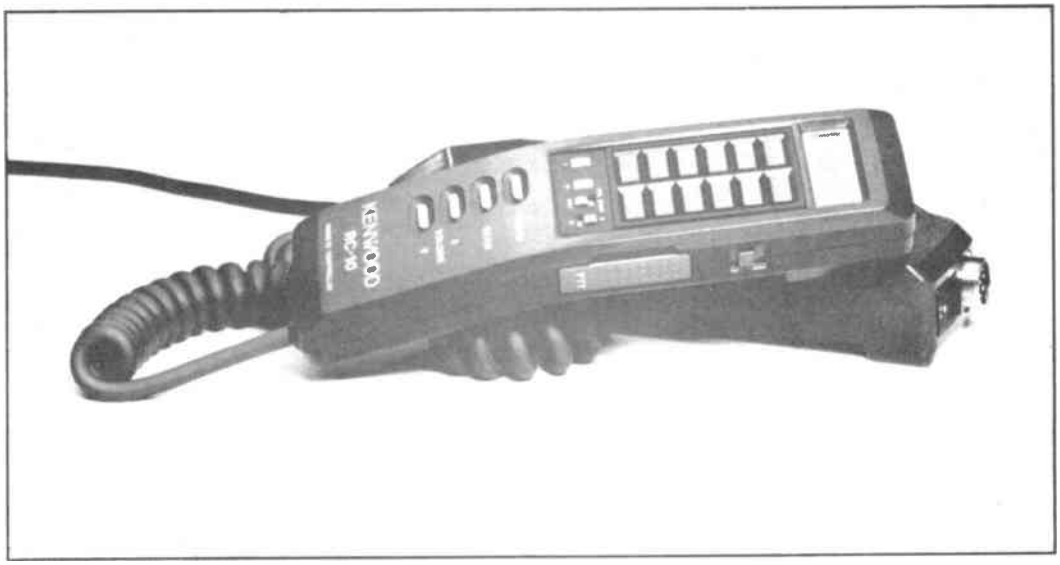


REMOTE CONTROL

Occasionally a piece of equipment comes along which catches the imagination; the RC10 remote controller/handset does just that. Designed to operate with the two new Kenwood FM mobiles, the TM221E for two metres (see G3OSS's review on pg 23) and the seventy centimetre TM421E, the RC10 looks more like a cellular radio car phone than a piece of amateur radio equipment.

In fact the RC10 not only looks like a car phone, but as a speaker and microphone are built-in, operates as a telephone handset would. Easily mounted in any car, dashboard or tunnel, the RC10 controls all transceiver front panel functions, except on/off and high/low power selection. The functions controlled by the RC10 are volume, squelch on/off, frequency readout, keypad frequency entry, memory selection and frequency or memory scanning. Full duplex operation is possible when both transceivers are fitted.

From a security point of view it may even be possible to mount the transceivers out of sight and only have the controller on view. Since most thieves now know that a cellular phone is not a sellable item, owning an RC10 may be a wise investment!

For further information contact: *Lowe Electronics Ltd, Chesterfield Road, Matlock, Derbyshire DE4 5LE. Tel: (0629) 2817.*

SCANNING RECEIVER

Fieldtech Heathrow is pleased to announce the launch of the T1200SR scanning receiver. The T1200 is a microprocessor controlled, digitally synthesized scanning receiver which features direct and remote electronic signal analysis.

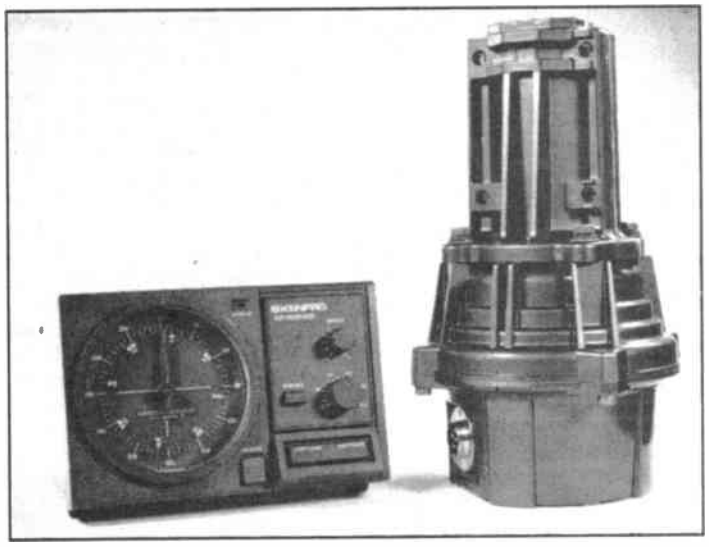
The T1200SR scanning receiver integrates signal analysis function of several instruments into a single compact and portable unit, which is capable of monitoring communication signals within the 100kHz to 999.9999MHz frequency range in 100Hz steps.

For further details please contact: *Graham . Holden, Fieldtech Heathrow Ltd, Huntavia House, 420 Bath Road, Longford, Middlesex UB7 0LL.*

ANTENNA ROTATORS

Two new rotators have been added to the Kenpro Range. Carrying the model numbers KR800SDX and KR1000SDX, these rotators have been designed to turn large VHF arrays and most HF beam antennas, in addition to commercial antennas and structures of similar weights and windloading. However, if in doubt as to the suitability of the proposed installation you are advised to contact head office, one of Kenpro's branches or authorised dealers

All the latest news, views, comment and developments on the amateur radio scene



and agents for advice.

The unique features of these rotators include:

- An extended rotation of 450° which illiminates the null point found on most rotators which generally rotate only 350-360°.
- Variable speed control from the high speed of 43 seconds for a complete rotation to 93 seconds for use with large antennas having large inertia.
- Simplified one touch preset positioning to any desired heading.
- Automatic slowdown before stopping when using the high speed preset positioning ensuring antennas do not whip when stopping, avoiding stresses on antenna elements, rotator and mast.
- Start position of the indication needle in the control unit and the compass heading can both be easily repositioned from the front.
- Quality connectors for control cable.
- Overlap light indicator to show when working near the end strops.

No other rotator incorporates all these modern features.

These quality rotators are designed for either tower mounting or with the use of the optional KCO38 accessory onto a mast 38-63mm diameter. The KR800SDX and KR1000SDX are priced at £325.00 and £368.00 including VAT respectively, and are available immediately.

For further information contact: *South Midlands Communications Ltd, S M House, School Close, Chandlers Ford Ind Est, Eastleigh, Hampshire SO5 3BY. Tel: (0703) 255111.*

PANAVISE RANGE

The versatile Panavise range of bench-top tools and equipment has been enhanced by several recent additions, and Greenwood Electronics, the sole UK distributor, claims that it now caters for virtually any application.

The original 301 Panavise assembly comprises the 300 base which can be attached by screws to a bench-top and the 303 vice head which slots into a universal-type joint on the base. This can be twisted and tilted to any desired position before being locked in position by hand tightening a knob. An alternative vacuum base version (model 380) can be secured to any smooth non-porous surface.

The very latest in new developments include the IDC bench assembly press and accessories designed for low volume, mass termination of various IDC connectors on flat ribbon cable. A broad range of plates accommodate terminations up to 64 conductor cables without wire strippers or soldering.

For further information please contact: *Greenwood Electronics, 28 Portman Road, Reading, Berks RG3 1NE.*

ELECTRONIC TESTER

An electronic tester which works without dials, leads or switches, was launched by The Goport Company Ltd on the eve of this year's 'Exclusively Tools' show. It is designed for use in industry, electronics, appliance maintenance, auto-electronics and in the home.

The British made AMBA Multi-Function Electronic Tester is the latest addition to the range of international products marketed by Goport.

Its use in industry is to eliminate the use of bulky calibrated meters, as a voltage present or continuity tester, doing away with restricting leads and affording easy access to machinery.

In electronics work it provides a convenient means for the non-destructive testing of diodes and transistors and for testing printed circuit boards.

In appliance repairs it will locate electrical faults, wiring defects, earth faults and loose connections, and in vehicle maintenance it can be used for tracing faults and testing for polarity.

The AMBA electronic tester is pocket size, operates off a 9V battery and carries a manufacturer's two year warranty. It is covered by British Standard: BF2754: 1976, and the recommended price is £10.96 plus VAT.

For further information contact: *ECL Associates, No 1 The Hollies, Long Lane, Bovingdon, Hemel Hempstead HP3 0ND. Tel: (0442) 832647.*

CIRKIT CATALOGUE

Cirkit Holdings have now produced the Summer 1987 edition of the Cirkit catalogue and, as always, have made improvements to their service and added many new products to the range.

There are probably more new lines in this catalogue than ever before, especially in test equipment with the introduction of a new frequency counter, bench and hand-held digital multimeters, digital thermometer, lab PSUs and a particularly useful hand-held inductance, capacitance and resistance meter. In the kits and modules section there are two brand new designs; a low noise 23cm receiver; a 2-80 metre transverter for class A licensees to operate on 80m from a 2 metre rig, and an updated design of the ever popular FDO kit offering an improved dip and an extended low frequency range. There are also two interesting new software packages for the BBC; 'PCB' for layout and drafting of printed circuit boards; and Satpic, which together with their weather satellite receiver and interface (which will follow shortly) provides a straightforward and inexpensive way of receiving the weather satellite transmissions.

Perhaps the main talking point within the industry over the recent months has been the introduction of surface mount technology with all its far-reaching effect. Cirkit have the first of what, no doubt will become a much larger range of surface mount products. Two ranges of chip inductors are featured in the catalogue, but be warned, you will need a fine tip on your soldering iron and a steady hand for these. In addition to all this, the new summer catalogue includes everyday items such as TNC connectors and adaptors, books, BNC leads and mains distribution blocks.

Cirkit now offer same day despatch on all orders received before 4.00pm, and there are also discount vouchers inside the catalogue which are valid for each order.

The catalogue costs £1.20 and is available from W H Smith and other large newsagents.

For further information contact: *Cirkit Holdings, Park Lane, Broxbourne, Herts EN10 7NQ. Tel: (0992) 444111.*

NEW ANTENNA

Waters and Stanton Electronics are pleased to announce the introduction of a brand new antenna for both listening and transmitting amateurs interested in the VHF/UHF spectrum. Covering 105-1300MHz, it takes the form of a log-aperiodic beam capable of handling up to 500 watts of RF and providing a gain of 11-13dBi.

This is the first time that a wide band antenna covering this frequency range has been offered to the hobby market. It should find particular appeal to the listener who has for a long time sought an antenna for his scanning receiver that is capable of providing gain.

Brief technical specifications are: freq – 105-1300MHz; elements – 19; gain – 11-13dBi; F/B ratio – 15dB; beamwidth – 60; impedance – 50 ohms; VSWR – 2:1; longest el – 1.4m; boom – 1.4m: and weight – 3kg.

Only limited quantities are currently available.

For further information contact: *Waters and Stanton Electronics, 18-20 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835.*

RADIO GUIDE

Geefor Enterprises are pleased to announce a new publication for the radio amateur. *A Guide to Amateur Radio Equipment* by Steve Foster is a handy A5 sized booklet giving details of a wide range of amateur equipment (Rxs, Txs, linears and other communication equipment).

Information on each item includes bands, modes, power source and details of modifications and reviews. Priced at only £2.50, including post and packing, this booklet is a most useful source of reference for the secondhand equipment purchaser.

As a companion to this, Geefor are also producing a secondhand price guide. The information for this is being stored on a micro and is continuously updated to reflect fluctuations in the market. This guide is selling at £2.00 per copy including postage and packing.

When making further enquiries please enclose an SAE.

For further information contact: *Geefor Enterprises, 112 Leeds Road, Mirfield, West Yorkshire WF14 0JE. Tel: (0924) 495916.*

HALF-PRICE STRIPPER?

Electronic and Computer Workshop Ltd (ECW) have announced an extra special offer for the popular Bib No 9 professional-quality wire stripper. At less than half the recommended retail price, this is a unique opportunity to obtain a quality tool at an unrepeatable price, just £1.50 (one-off).

Easy-to-use and with an attractive, sturdy design, the stripper is eminently suitable for all types of applications. Among its impressive features are a convenient fingertip cam adjustment for common wire/cable sizes, comfortable cushion-grip handles, effective return spring and handle lock.

ECW also gives a volume discount for orders of 30 or more, with the price dropping even further to £1.20.

For further information please contact: *Electronic and Computer Workshop Ltd, Unit 1, Cromwell Centre, Stepfield, Witham, Essex CM8 3TH. Tel: (0376) 517413.*

WELLER PRODUCTS

Longs Limited has added a number of Weller products to its extensive range of soldering equipment.

The new range of Weller products includes a number of different soldering stations and the Weller WP series of soldering irons.

New to Longs is the EC2000 soldering station, featuring operator selected, electronically controlled temperature settings and a large LED digital display. Another recent addition is the Weller AG700 pick-a-chip Hot Air Station, used for the desoldering of chip components. This system electronically monitors both the hot air temperature and rate of air flow, allowing the station to be used for other applications such as shrinking and reflowing of micro-components.

Longs will produce full descriptive leaflets and its catalogue, featuring the full Longs range, on request.

For further information contact: *John Boreham, Longs Limited, Hanworth Lane, Chertsey, Surrey. Tel: (09328) 61241.*

CLUB NEWS

The Sussex Mobile Rally

The Sussex Mobile Rally is an annual event for radio amateurs and their families, where the amateur is able to view and purchase the wares of over 50 companies specialising in amateur radio and electronics, all under one roof. Meanwhile the family can enjoy a day by the seaside, and the entertainments specially organised for their pleasure at the Rally.

The 1987 Rally will again be at the Brighton Racecourse, easily found by visitors, and with almost unlimited free car parking (under the control of Rally Marshals), enough even for the 2000 people from all over the South-East who are entertained annually. Always on a Sunday for everyone's convenience, the 1987 Rally will be on the 12th July. Entrance charges have remained unaltered for a number of years at £1 per adult (children under 14 years and disabled visitors are free).

The large Racecourse buildings allow all stands to be under cover in case of adverse British weather, and refreshments, including hot meals, are available in the bars and the cafeteria. For the family a free minibus service runs regularly to and from the seafront throughout the day, and a number of other diversions are available on the rally site.

For the disabled visitors ramps, lifts and wide gangways ensure freedom of wheelchair access. Rally Stewards, Marshals and Committee members wear identifying badges and are on call throughout the day to assist both traders and visitors.

Local Clubs, Societies and specialist groups are all represented, and a special event station, callsign GB2SMR is on air to talk mobile visitors in from far afield.

The Rally is organised by members of six amateur radio societies from throughout Sussex. This is a service to all radio amateurs whose support will ensure success in 1987, and the future of the rally in years to come.

For further details contact the Secretary, Mr Mark Spillett G4UAW, 26 Westlands, Rustington, Sussex BN16 3NW. Tel: (0903) 782594.

III Squadron anniversary

On 1st and 2nd August the Treble One squadron are celebrating the 70th anniversary of their foundation. To add to the events taking place they are hoping to run a small special event station on 144MHz from their current home at RAF Leuchars, Fife.

The squadron was involved with pioneering and the successful use of picking up written messages from the ground by means of a weighted hook on the end of a hanging wire. Perhaps the first ground to air 'amateur communication'.

The squadron hope to operate the station during both the Saturday and Sunday using the callsign GB1CXI. Each contact will receive a QSL either via the bureau or direct from the Squadron address. An HF listening station will also be operating – hopefully a full class 'A' station will be available for the 71st anniversary.

Further information can be obtained from Dave Bloomfield GM1RFM QTHR, or via OC, 111 Squadron, RAF Leuchars, Fife.

Car boot sale

The Newbury and District Amateur Radio Society Radio Car boat sale is being held on Sunday 23rd August between 10.00am and 5.00pm.

The event will take place at the Acland Hall and Recreation Ground, Cold Ash, Newbury, Berkshire. Pitches cost £5 (£4 if pre-booked) and inside tables £10 (limited supply).

For bookings please contact Mike Fereday G3VOW, Spindlewood, Stoney Lane, Newbury, Berkshire RG16 9HQ. Tel: (0635) 43048.

10th Telford Rally

The 10th Telford Amateur Radio Rally is being held on Sunday 13th September at the Telford Raquet and Fitness Centre, Telford, Shropshire. Access is available via the M54 (Junction 5) or the A442 from the North or South.

For this special 10th rally there will be feature lectures by MAXPAC on Packet Radio, on Linear Amplifiers by G3RZP/G4FNC and Extra Long Yagi Antennas by G3SEK.

The venue has full catering and bar facilities and Morse tests will be available (prebook with RSGB). One hundred trade stands will be in attendance in addition to a huge flea market.

Doors open at 11.00am (10.30am disabled) and talk-in via GB4TRG on S22 and SU8 will be available.

For further information contact the club secretary, G3UKV on (0952) 55416.

GB2DOG

On Saturday 11th July the Reading Amateur Radio Club is putting on a special event station in support of the guide dogs for the blind. Using the callsign GB2DOG the station will be sponsored to raise money for this worthwhile cause.

In addition to this the club has arranged a Packet radio night on the air on the 21st July. Everyone is invited to come and play with 'the latest thing in amateur radio'.

Further information on these or any other activities run by the club are available from the secretary, Stephen Coleman G4YFB, on Reading 867820.

Mars

The Mansfield Amateur Radio Society meet on the first Friday and the third Thursday of the month at 7.30pm for 8.00pm in the Victoria Social Club, Mansfield.

Events for July include a talk on Raynet by Clive Heaps G4NOR on the 3rd, a club picnic on the 19th and a visit from the RSGB regional representative, Martin Shardlow on the 21st. August is absorbed by HF/VHF operating nights on the 7th and 18th.

Anyone wishing to obtain further information on the club and its activities should contact the hon secretary, Keith Lawson G4AAH, QTHR, or the club chairman JM Coates G4GYU on (0623) 27257.

Verulam ARC

The Verulam Amateur Radio Club meets at the RAF Assocation Headquarters, New Kent Road, off Marlborough Road, St Albans on the second and fourth Tuesdays in each month.

Activities for August include an activity evening on Tuesday 25th August at 7.30pm for 8.00pm, which will be followed by a 'bring and buy' sale.

Visitors are welcome at all club meetings, details on which can be obtained from Hilary G4UKS on St Albans 59318.

Isle of Wight RS

The Isle of Wight Radio Society meet at 8.00pm each Friday at the Unity Hall, Wootton Bridge, Isle of Wight.

The Society has been active and of service to radio enthusiasts for many years, but with the rapidly increasing popularity and scope of the hobby they are putting on a series of talks and practical evenings which will be of interest and use to members. Anybody with an interest in radio communication or its many ramifications is welcome to attend the evenings, as indeed are those who would just like to find out more about amateur radio.

Activities scheduled for July include a talk on modifications to the Storno CQM713 transceiver on the 3rd, a quiz night on the 10th, a constructional projects night when you are invited to take along your home brew for discussion on the 17th, and a CW evening on the 24th.

Further information on membership is available from the secretary, Peter Lovely G4RGE, on 872620.

MARTS

The Medway Amateur Receiving and Transmitting Society meet every Friday at 7.30pm in the Matthew's Riding School, Lower Rainham Road, Gillingham.

Meetings in July feature a talk on the RSGB on the 10th, a talk on long wire antennas by John Heys G3BDQ on the 24th and a natter night on 31st.

Further information on the club can be obtained from the secretary Ian G1MSS on (0474) 814874.

Maidenhead ARC

The Maidenhead and District Amateur Radio Club meet on the first Thursday and third Tuesday of each month for 7.30pm. Meetings are held in The Red Cross Hall, The Crescent, Maidenhead.

The Club runs a full prog-

ramme of lectures, and all interested parties, licensed or not, are most welcome at any meeting.

Activities on the agenda include a visit to the McMichael Rally at the Haymills Centre, Burnham, Nr Slough on the 19th July and a Junk sale on Tuesday 1st October.

Further information on the club is available from the newly appointed secretary, D F Chalmers, at Iona, 25 Willow Close, Flackwell Heath, High Wycombe, Bucks HP10 9LH. Tel: (06285) 22973.

'On the downs'

The Dunstable Downs Radio Club meets every Friday evening for 8.00pm at Chews House, High Street South, Dunstable, Bedfordshire.

Activity for July includes an entry for the NFD Contest 'on the downs' on the 4th/5th and a Junk sale on the 10th.

On September 13th The National Amateur Radio Car Boot sale is being staged at the Shuttleworth Collection, Old Warden Aerodrome, from 10.00am to 5.00pm, and everyone is invited to go along and pick up some bargains.

For further information contact the secretary, Phill G6EES on (0582) 607623.

Datacom

The Spring edition of *Datacom*, BARTG's quarterly journal, features an article about adding an AMTOR facility to the BARTG's very popular ST5 terminal unit. The journal also lists the RTTY software available from the BARTG. To make life even easier, the BARTG even sell the necessary connecting leads for use with the radio, terminal unit and micro.

Datacom is sent to all members of the BARTG, full details of which can be obtained from John GW6MOK and Pat Beedie GW6MOJ, of 'Ffynnonlas', Salem, Llandeilo, Dyfed SA19 7NP.

The BARTG also run an annual rally, which aims to cater for those interested in RTTY and those who like to build their own equipment. The date and venue of the 1987 rally are Sunday, August 30th at Sandown Park.

Further details can be obtained from Peter Nicol G8VXY, 38 Mitten Ave, Rubery, Rednal, Birmingham B45 0JB.

Anti-piracy move

The EEC Commission is to undertake a full scale investigation into music piracy in Indonesia. This week the Commission announced its decision to open an investigation procedure concerning the unauthorised reproduction of sound recordings in Indonesia as a result of a formal complaint by the IFPI. The complaint alleges that Indonesia fails to provide the EEC record industry with effective protection against piracy of sound records, and that it therefore encourages the production of pirate copies on a massive scale for commercial purposes.

In filing its complaint in March 1987 under Regulation 2641/84, IFPI requested the EEC Commission to intervene with the Indonesian Government and asked that if Indonesia is not prepared to curb piracy, then the Commission should deny customs duty preferences to certain Indonesian imports.

The Commission has responded by announcing that it will open an examination procedure which will entail an in-depth study into the legal and factual issues set out in the IFPI complaint. This procedure is likely to last from 5 to 7 months, at the end of which the Commission will decide what action is necessary.

Amateur Radio courses

The Brunel Technical College Bristol run three courses for the radio amateur commencing in September 1987.

The courses are: 1) Radio Amateur Theory – Monday evenings; 2) Radio Amateur Morse – Tuesday evenings; and 3) Radio Amateur – Practical – Thursday evenings.

Enrolment for all the courses is on the 8th and 9th September, and further details are available from Department of Aerospace and Radiocommunications Engineering, tel: (0272) 41241 Ext 2164.

The Sandown College in the City of Liverpool have sent us details of their RAE course commencing on 14th September.

The course is held on two evenings a week between 6.30pm and 9.00pm, at the Mabel Fletcher Centre of Sandown College, Sandown Road, Liverpool L15 4JB. Enrolments commence on Tuesday 8th September.

Further information is available from the course tutor on (051) 733 7211 Extn 37.

Contest results

The Derby and District Amateur Radio Soceity ran a 144-145MHz contest on Sunday 15th March 1987, which was a tremendous success. Certificates were awarded to G4CRA/P, G6HKM, G4RLF/P and GW6TGX/P. The full results are included in the table below.

The DADARS contest subcommittee would like to thank all those who took part, congratulate the winners and runners up, commend those stations whose entries were particularly neatly presented and those who submitted station and county multiplier check lists, and show appreciation for the many comments and suggestions received. Next year there will be a much stronger G3ERD on the band and separate subsections for single and multi-operator entries.

Position	Callsign	County	Valid contacts	Worked G3ERD	Valid Multipliers	Penalty for adjudicated unmarked duplicators	Score
Section 1 – Full legal power limit							
1	G4CRA/P	ESX	117	NO	47	-	10998
2	G6HKM	ESX	102	NO	39	-	7956
3	G8WYR	YSW	90	NO	28	20	5020
4	G10VK	HWR	70	NO	33	-	4620
5	G8IUB	WMD	56	YES	26	-	3120
6	G4SSD	DVN	55	NO	27	-	2970
7	G4WUS/P	CVE	56	NO	26	-	2912
8	G2CVV	DYS	50	YES	19	-	2052
9	G4YIR	ESX	27	NO	12	-	648
Section 2 – Low Power – 25 Watts maximum output							
1	G4RLF/P	WLT	160	NO	52	-	16640
2	GW6TGX/P	GWT	154	NO	46	-	14168
3	G6XVV	YSS	129	YES	50	-	13300
4	G0FEH/P	DYS	128	YES	39	20	10276
5	G6ZZZ/P	NHM	120	NO	38	20	9100
6	G1VEN/P	HWR	101	NO	29	-	5858
7	G4PRT/P	DYS	79	YES	27	-	4482
8	G0EVD	HFD	59	NO	25	-	2950
9	G4DFI	LDN	53	NO	22	-	2332
10	G1LPB	SFD	41	YES	20	-	1800
11	G1RPA	SXE	28	NO	21	-	1176
12	G0EVT	YSW	35	NO	16	-	1120
13	G1DCH	DYS	30	YES	11	-	748
14	G1VKT	MCH	14	NO	9	-	252
15	G1XEO	HFD	18	NO	7	-	252
16	G6MXL	DOR	12	NO	9	-	216

Section 3 – SWL
Only one entry was received for this section and this was disqualified as it did not show the callsign of the station being worked (Rule 6).

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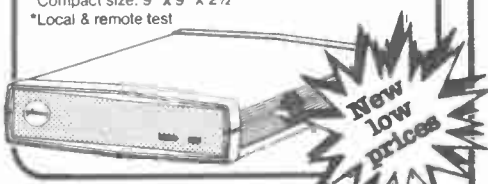

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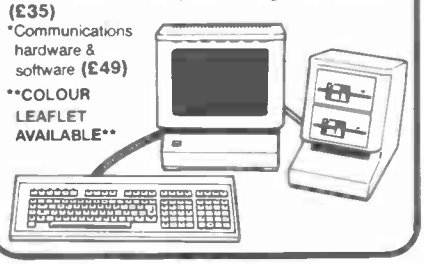

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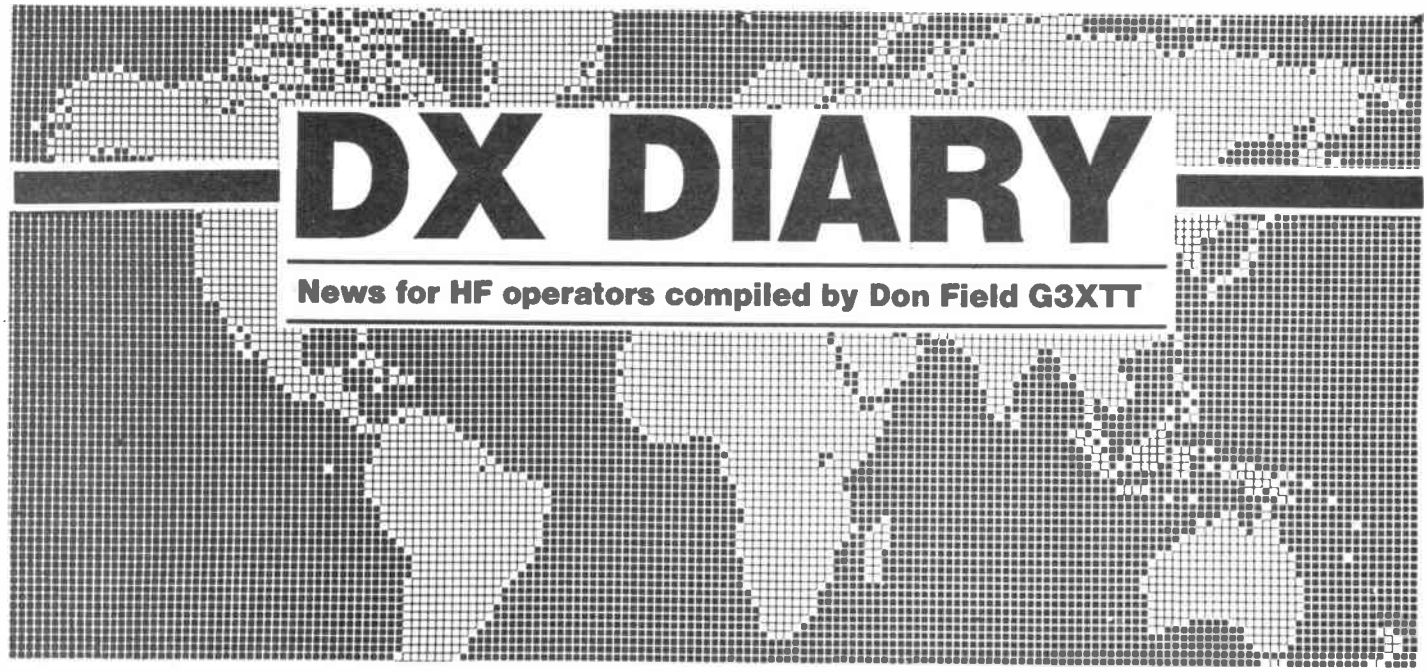


DX DIARY

News for HF operators compiled by Don Field G3XTT

HF conditions have continued to improve as the year wears on. During May 20 metres was wide open to the Pacific almost every morning, with S9+ signals from FO5JP, KL7LF/KH3, KH6IJ, ZK1DD, ZK2EKY and many others. There were also some excellent openings to Asia on 15 metres, and to Africa and South America on ten. While there were no major DXpeditions during the month, there were plenty of rare stations on the bands. For example, 5A0A remains very active. One evening I heard him working dozens of UK stations on ten metres CW, and later turning up with an equally good signal at the low end of 80.

Take advantage

In fact, one of the heartening things as far as I was concerned was to hear so many UK stations taking advantage of the good conditions. Tuning across 20 in the mornings I can frequently hear many UK stations working into VK and ZL, and in the evening there are many more working into the USA and Canada. Whether these folk are all DXers in terms of chasing rare countries and the like I don't know, but they have certainly made the effort to put out a decent signal which will reach around the World. As an example of sheer tenacity, G3LQP has recently completed his 1000th regular sked contact with a friend in New Zealand, which of course means that he has managed to keep this up through all manner of propagation conditions.

How long to DXCC?

For those who do aspire to DXCC, the question 'How long will it take me?' often arises. Now, I have known top UK DXers work as many as 280 countries in a single year, but these are experienced operators with top notch stations. Realistically, a newcomer can expect to work his first 100 countries in anything from a few weeks to a few months, though it can be done in a contest weekend given some determined effort.

The 200 country mark takes longer, anything from two to five years according to the potency of your signal and, probably more importantly, how much time you can spare for DXing. Of course, it helps to know what is in the offing in the way of DX, which is where columns like this and the various DX newsletters come in.

300 countries is rather more of an uphill battle. Probably five to ten years is realistic for all but the dedicated few. In my case, it took me about 7 years from coming back on to the HF bands in a serious way after some years away.

The impossible dream?

The DXCC Honour Roll is another matter again. This requires working and confirming all but 9 of the countries on the list. Given that several are well nigh impossible at any given time (currently Burma, North and South Yemen, Albania, Bangladesh, Vietnam Laos, Mozambique, Afghanistan, Angola and Ethiopia all fall into this category), any newcomers might begin to think that Honour Roll is an impossible dream. In practice, nothing stays the same for ever. Just a few years ago many DXers thought they would never see China back on the air, and now there is regular activity from there. So take heart. More than 2500 callsigns appeared in the latest Honour Roll listings in *QST Magazine*, representing almost 10% of holders of DXCC. Admittedly, some of these guys go back a long way, but the listing includes several G4 stations, so perhaps it won't be too many years before the first G0s start to appear.

50 years of DXing

George W1GKK currently heads the Honour Roll listing, with 368 countries confirmed, ie all the current ones plus all 52 deleted countries. George has fifty years of DXing behind him, but I was surprised to learn from *CQ Magazine* that, until about a year ago, George had never operated on any band other than twenty metres. His secret was to concentrate on this one band, using a succession of home-brew monoband beams, and to make sure that nothing slipped through his fingers.

For those new to DXing, you may wonder how 52 countries can have vanished from the face of the Earth. Well, the 'deleted' list makes fascinating reading, with such names from the past as Tibet and Manchuria (now parts of China), Eritrea, French Indo-China, the Karelo-Finnish Republic (now part of European Russia), Zanzibar, Palestine, the Saar, and so the list goes on. Truly a page from the history books.

While on the topic of DXCC, I note from *DX News Sheet* that G4NXG worked his 100th country for the Jubilee DXCC award by mid-May. So what? Well, this was as G4NXG/M. Alan's all-time mobile score includes 204 countries and all US states, an achievement which many would be pleased with from their home stations.

RTTY

More and more UK amateurs are taking an interest in modes such as RTTY, Amtor and Packet, and finding that there is interesting DX to be worked without the QRM often experienced on SSB and CW. About a year ago I mentioned that I would be interested in hearing from any readers active on these modes in this column and, lo and behold, I have had a letter this month from Jeff G0GGR, who actually remembered my remark and writes to say that he is now active on RTTY.

Jeff reports that most Western countries are well represented on RTTY, with rather less activity from the USSR due to the scarcity of personal computers. John included a long list of rare stations he had worked on 20 metre RTTY in the previous 6 weeks. I won't mention them all here for resons of space, but they include such interesting ones as A61XL, D44BC, OD5NG, TL8KH, UO5OK, XX9DN, 9M2MW, as well as several VU, TA, YB, PY and YV stations and numerous Central and North Americans.

Jeff mentions that RTTY contests are a good

opportunity to catch new ones. In particular he mentions the upcoming Danish (SARTG) World-Wide RTTY Contest on 15/16th August. In fact, in recognition of growing popularity of the mode, *CQ Magazine*, sponsors of the CQ World-wide and CQ WPX Contest, are sponsoring for the first time this year a World-Wide RTTY DX Contest. This will take place over the last full weekend in September; a maximum of 30 hours operating being allowed for single opeator stations during the 49 hour contest period. Permitted modes are Baudot, Amtor, ASCII and AX25, on the 160, 80, 40, 20, 15 and 10 metre bands. The contest exchange will consist of RST and CQ zone and, in the case of US and Canadian stations, state or province. There are the usual multipliers, etc, in terms of scoring. I will be happy to send a photocopy of the full rules to any reader who wants them, in exchange for an SAE. Unfortunately, the date coincides with the RSGB's HF Convention (27th September), otherwise I might just be tempted to take up RTTY myself and have a go.

Finally, while on the subject of RTTY, KL7LF/KH3, who has been a regular on 20 metres SSB of late, hopes to be active on RTTY as soon as his new TS940 arrives.

Contests

While we are on the subject of contests, let's see what July and August have in store. Apart from those I mentioned last month, there is the SEAnet (South East Asia Net) DX CW Contest on 18/19th July (a chance to work 9M, 9V, DU, etc), and the Worked All Europe CW event on 8/9th August. The latter, sponsored by the German DARC, has complex rules if you intend to participate fully, but is a popular event and a good opportunity to work lots of non-European stations. The All Asia CW Contest is on 29/30th August, so it looks as though the summer period is a chance to get some CW practice.

Angela Sitton, who wrote to me once or twice in her SWL days, is now licensed as G0HGA, and writes in agreement with what I said recently about signal reports. Angela has already found on several occasions that she has been given R5 reports on CW, only to be asked to repeat name, report, etc. Angela also regrets that some DX stations will not slow down for newcomers. I sympathise with this, but the only answer, I guess, is to build up speed by working more common stations before tackling the DX. To use the analogy I used last month, it is best to practice on ordinary roads after passing your driving test before going on the M25 in rush hour! DXpedition operators often want to give out as many contacts as possible in the limited time they have available, and a slow operator will deprive two or three others of a contact.

Forthcoming DX

Island chasers will want to note that I4ALU/IF9 will operate from Favignana Island from 9th-22nd August, and Carlo hopes to use the same callsign from other islands in the group around the same period. Carlo is a keen DX operator, having operated in the past from 8Q7, 9Y4, etc. The only thing is that he also loves skin diving, so you won't catch him on the air when the sea is calling. Carlo hopes to be back in the Maldives as 8Q7BX in December of this year, and this time plans to take a lightweight 3 element yagi with him.

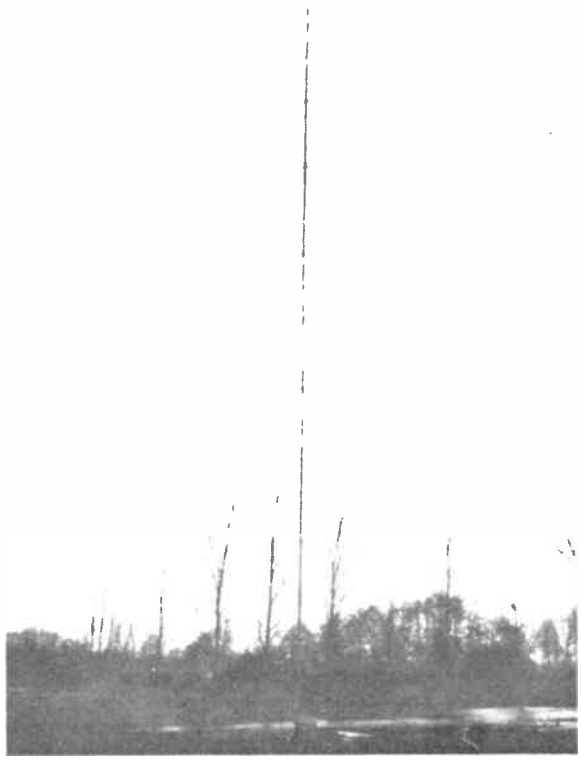
The Cambridge University Wireless Society are also planning an island hopping expedition for the summer. Listen for them as GM6UW/P from the Summer Islands from 1-3rd August and from the Monach Islands from 7-9th August.

These dates are provisional. G3ZAY will have the full details nearer the time.

And from 1700GMT on 24th July to 0500MT on 26th July the Nanticoke ARC will operate KW3Z from Smith Island off the coast of Maryland. This one counts as NA83 for the Islands on the Air Award.

The special callsigns ZZ8ADV (on SSB) and ZZ8VMC (on CW) were due to be activated from 29th June to 5th July to commemorate Brazil's annual 'Fire Prevention Week'. QSLs go to PW8DP.

Also, by way of unusual prefixes, look out for YB19AR and YB42RI from Indonesia.



SP3BQD's 90ft Top Band vertical antenna

Jerry SP3BQD, well-known Top Band operator

The first will be active from 23-25th July to celebrate the 19th anniversary of ORARI (the Indonesian equivalent of the RSGB), and the second from 16-18th August to celebrate the 42nd anniversary of Indonesia's independence.

Cocos Island

The delayed operation from Cocos Island by TI8CBT should have started in early June, and was timed to last for a month. Carlos was expecting to operate as TI9M. The TI9M opeation earlier this year by TI2KD and his wife Sophie TI2IY, was the subject of one of the talks at this year's Visalia DX Convention in California. Carlos described how their operating position was tucked into a deep bay on the north west of the island, with the path to Europe obscured by high cliffs. They hope to return in the not too distant future and would like to be able to haul their gear to the top of the island, some 1500ft about sea level. However, given that they had to take rigs, generator, batteries, fuel, etc, this could be easier said than done!

Buried treasure

With his QSLs, Carlos sent out a leaflet about the Cocos Islands National Park which makes interesting reading. The leaflet describes a tropical paradise, with many unique species of wildlife and a history laced with tales of pirates and buried treasure. However, this paradise is threatened by both animal and plant species which have been introduced by man during several attempts to colonise the island earlier this century. Costa Rica's poor economy prevents it from providing the men and resources needed to maintain and protect the island. Obviously a fascinating place in many more ways than simply as a DXCC country.

The bad news this month is that the Mellish Reef operation planned for August has been cancelled due to several of the operators pulling out. Another attempt will be made next year.

And pirates

YA0DX, claiming to be located in Afghanistan, turns out to have been a pirate operating from within the USSR close to the Afghanistan border. However, the latest rumour is that UA3DKH and UA3AKV have permission to operate /YA sometime in June or July. Once again, it's time to cross fingers . . .

A major operation from Equatorial Guinea is due to take place from 10-19th July. The group consists of F6GXB who will operate as 3C1CW, TR8CR (3C3CR) and TR8JLD (3C2A). QSL 3C2A to AK1E (who has now taken over as manager for TR8JLD's operations under his own call and as TR1G and TR8WCY, as well as any future operations). QSLs for the others go to their home calls. The group will concentrate on CW operation, though there will be some operation on SSB and other modes.

Major DXpedition

In *DX News Sheet* K6KH was reported to be organising a major DXpedition/wildlife safari to Kenya from 29th June to 14th July. FB1LDX is going to Tchad for 3 months, but has been told that amateur radio operations there are suspended until further notice.

Bing VK2BCH flew to the South Cook Islands in mid-May for a 2 month spell during which he hopes to get to North Cook. His South Cook callsign is ZK1XV, but he anticipates that he might be required to use a different call from North Cook. If you do work him, note that he does not answer bureau cards, but will only respond to direct cards to his home address with return postage. This seems to me to be regrettable, but is becoming all too common nowadays.

GB2SMC will be operated from 8-23rd August in connection with the 850th anniversary of St Magnus' Cathedral, Kirkwall. And, to round off this section, OD5SM has apparently been talking about a possible operation from North Yemen. I would be surprised if anything comes of this. Jerry N5GJL who recently appeared on the bands as 4W1AA, claims to have been given verbal permission to operate, but no callsign was issued and no paperwork exists. So don't hold your breath waiting for DXCC accreditation.

DXCC

Cards for DL7FT's operations in 1985 and 1986 from Mt Athos are now acceptable for DXCC credit. This decision is bound to fuel the recent controversy, and certainly won't please the Greek amateurs who claimed that Frank's operation was unathorised. However, the DXCC desk is a very conservative institution, so Frank must have been able to provide some pretty convincing evidence for this decision to be made. Other operations which are now admissable for DXCC include 5A0A, A61AA, A61AB, T50DX, VU4APR, VU4NRO and XF4DX. Decisions are still awaited on I2VA/5U7 (documents being translated) and T52JL (no documentation yet received). Ones which are definitely not acceptable include: A51PN (recent activities), A6XB, A6XL, 5U7LD, and any recent Ethiopian operation.

Chiltern DX club

The Annual Review Meeting of the Chiltern DX Club (CDXC) was held at the end of May, and it was clear that the group is going from strength to strength and can reasonably claim to be the premier HF DX group in the UK. Readers who are in receipt of QSLs from the recent Peter 1st Island operation will see that the CDXC was given credit for its donation to the operation, alongside such prestigious organisations as the Northern California DX Foundation. The new secretary of CDXC is Ian G4LJF, a well-known DXpeditioner in his own right, and the newly elected Chairman is Henry G3GIQ. Either of these would be happy to provide more information about CDXC.

Finally

Finally, some information is beginning to trickle through about the recent VU4APR and VU4NRO operations from the Andaman and Nicobar Islands. Bharati VU2RBI, the most prolific of the operators, made some 14,450 QSOs with 182 countries, including just 4 contacts on Top Band (two with Japan and two with Europe). The group hoped to return to the Nicobar Islands later in the year, but look like being thwarted due to lack of funds.

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QRP FOR FUN

QRP operation is one field of amateur radio which has aroused a lot of interest in recent years. This can be seen by the growing band of amateurs who find their enjoyment from talking to the world on just a few watts.

When the advertisements in the magazines seem to show more complicated equipment each month, and when the powers which are being used seem to be rising it is refreshing to take a new look at everything and see what QRP has to offer.

What is QRP?

As everybody knows, the letters 'QRP' stand for low power. But QRP operation has come to mean far more than just operating with a low power transmitter. It opens a whole new realm of challenges and enjoyment. Not only does it cover operating with low power equipment, but also building some of it and discussing the whys and wherefores with fellow enthusiasts.

Being lower power, and often lacking many of the frills of the commercially made equipment, it brings back the possibility of the average radio amateur being able to build his own equipment. Transmitters using just two or three transistors, built in an evening, are making contacts over many thousands of miles. Receivers can also be suitable projects if they are kept simple by using a direct conversion design. Even though they will not have all the refinements of double superhet, they are still able to keep their heads above water in today's band conditions and give a good account of themselves.

So what about the power limitations? As 'low power' is only a relative term, different people will class different power levels as actually being QRP. However, it has almost become internationally agreed that the limits for QRP operation should be 5 watts of RF output or 10 watts dc input. This can be seen by the limits set on the QRP sections in some of the big contests, such as the CQ World-wide Contest or the ARRL DX Contest. However, some groups have their own limits. One of these is the G-QRP Club which limits the maximum power for its awards and events to 5 watts dc input or 3 watts RF output.

Even though these limits may seem rather low it is surprising how much can be done with these limited power levels. Some people have made contacts across the Atlantic on less than a watt, whilst others have even contacted Australia and New Zealand. Some people can even boast that they have made contacts over distances corresponding to more than 1000 miles per watt.

From this it may seem that changing to a low power transmitter may not reduce the signal strength as much as one might think. In fact reducing one's power from the full legal 100 watts output on CW to 1 watt will only reduce the signal strength by 20dB, or about 5 S points. This means that using just one watt it should be quite possible to make a good number of contacts.

The transmitter

There are a large number of circuits around for QRP transmitters of various descriptions. Despite the number of designs, they all tend to have one thing in common – simplicity. However, this apparent simplicity often hides the fact that a lot of careful thought and time has been put into optimising the design. As a result many of these little transmitters can be put together in just an evening if the right components are to hand.

Many of the transmitter circuits use just two or three transistors. One is used for the crystal oscillator, a second as the PA and a third is sometimes used to key the PA.

Limited range

The heart of the transmitter is the oscillator. By using a crystal it is possible to generate a stable signal with sufficient level to drive the PA without the need for any further amplification. However, the use of crystals does mean that the frequency range is limited. Fortunately, not all is lost, because it is possible to pull the oscillator frequency. This can be done by placing a capacitor in series with the crystal, as shown in *Figure 1*, and it can give around 5kHz frequency change is some cases. If more range is required a coil can be placed in series with C1. The value of this is best determined by experiment, but beware of trying to get too much swing by making the coil inductance too large, as the circuit may become unstable. The other point to watch is that if the value of C_1 falls too low, then the output from the oscillator drop or the circuit may stop oscillating altogether. In order to stop this a small capacitortor C_2 can be introduced accross C_1 and its value determined by experiment.

Similarities

Often the oscillator directly drives the PA without any further amplification. The circuits for the PAs are often similar but give a wide choice of usable transistors. When selecting a transistor it is worth keeping clear of the VHF or UHF types, like the 2N3866 etc. Whilst they may appear to work perfectly well, they will be more prone to spurious oscillations at VHF and above, which may give problems to other users of the radio spectrum.

The PA can be keyed directly, or

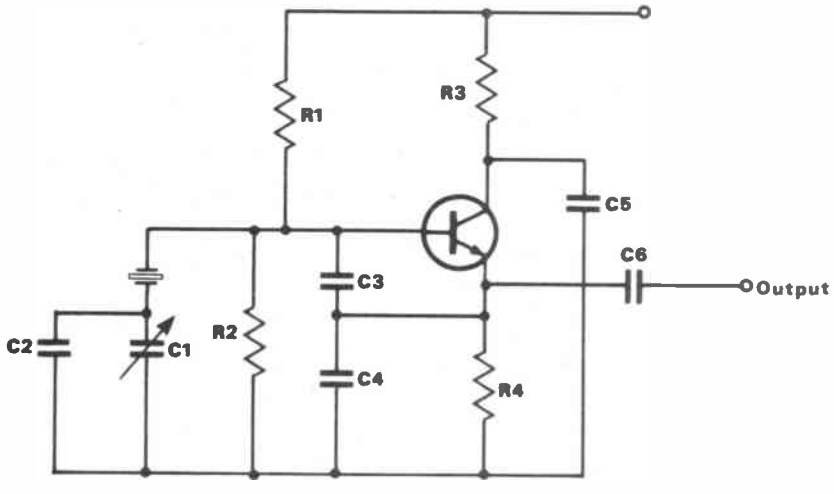


Fig 1 *A crystal oscillator with a variable capacitor to pull the oscillator frequency*

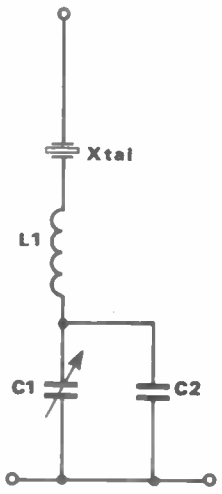


Fig 2 *Showing the introduction of a coil to give increased frequency coverage*

sometimes a third transistor is used. The reason for including this is that the circuit may be drawing a few hundred milliamps and some keyers (especially the semi-automatic mechanical keyers) may not like it. By including this third transistor the current which the keyer has to handle is reduced to a maximum of a milliamp or so.

The final block on the transmitter is the output filter. This may include some form of network to match the PA output to 50 ohms. Often this is not necessary because the output impedance of the PA will be fairly close to 50 ohms. The filter itself is required to eliminate any harmonics produced by the transmitter. As this will have to give a high degree of attenuation, even at twice the operating frequency, it is quite common to see five, or even seven element filters. Using these it is possible to ensure that all the harmonics are better than 50dB below the carrier.

The receiver

Whilst many stations use their normal station receiver, some people prefer to build their own. It is quite an awesome task to build a full superhet with all the required extras, but a direct conversion receiver can be made far more easily and as a result this type of receiver has become very popular with home constructors.

Essentially a direct conversion receiver operates by mixing the incoming RF signal with a local oscillator to directly produce the wanted audio signal. The basic block diagram of such a receiver is shown in *Figure 4*. From this it can be seen that the incoming signal first enters an RF filter. This serves two functions: to prevent strong off-channel signals from reaching the mixer and causing it to overload; and to prevent any signals reaching the mixer which might mix with the harmonics of the local oscillator to give an unwanted audio output.

Once through the RF filter, the signals are mixed directly down to audio. Here they are filtered, using a low pass filter, to remove any frequencies above about 3kHz, and then they are amplified.

Although very much simpler than the more conventional superhet, these receivers can perform well. However, they do have a problem in that they exhibit an 'audio image', which comes about because a beat note is heard at both sides of the signal. In spite of this, direct conversion receivers are still a very popular choice for home constructors, because they are fairly simple – a typical receiver can be made from three or four transistors and a couple of ICs.

What about the aerial?

The aerial is a very important element in any radio station, its effectiveness determining the efficiency of the whole station. When QRP is being used the aerial becomes even more important, as it must not put the station at even more of a disadvantage.

In spite of this, very few QRP stations use large yagi arrays. Instead they tend to use home-brewed wire aerials. However, it is necessary to make sure that they are operating as best they can. One way of doing this is obviously to put the aerial up as high as possible and ensure there are no nearby objects which may impair the performance of the aerial.

Another way is to use an ATU and ensure it is set up correctly. This will enable every last millwatt to be transferred from the transmitter to the aerial. Every QRP operator is all too aware of the advantages which an ATU gives, and often they will try several designs before settling on the correct one.

Fortunately ATUs for QRP are not as expensive as those used for high power, and this makes experimentation a lot cheaper.

Making contacts

Using low power brings out the operating skill in anyone. Listen first is always the golden rule, only calling CQ as a last resort. Judge the state of the

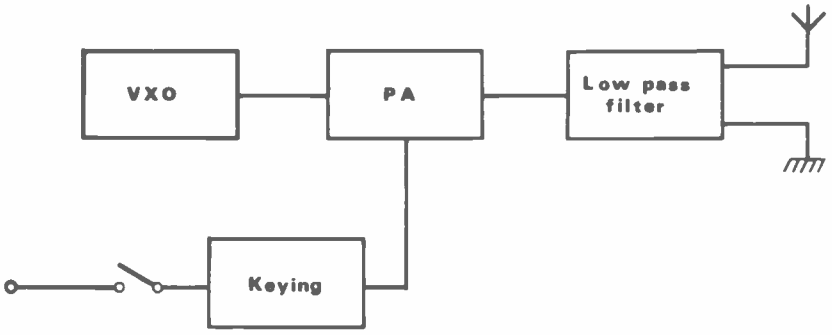


Fig 3 *Block diagram of typical QRP transmitter*

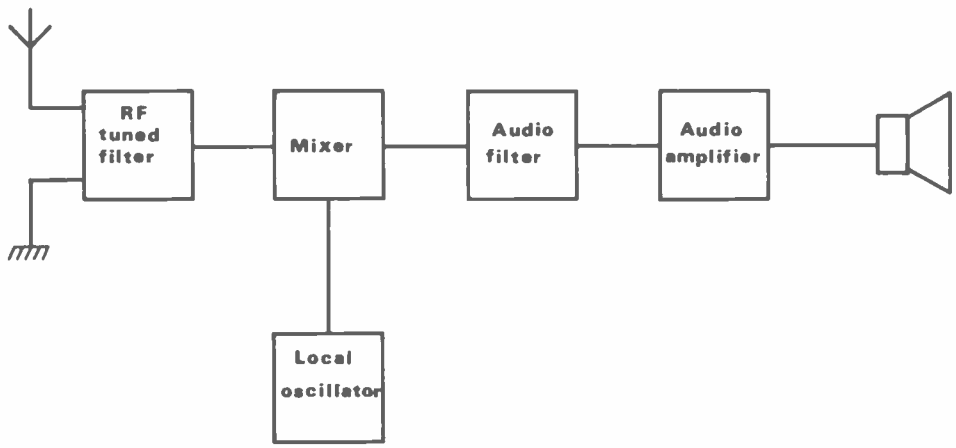


Fig 4 *Block diagram of typical direct conversion receiver*

band and get to know how strong a signal has got to be to give you a chance of a contact. Factors like these and many more become second nature to skilled operators, and they pay dividends. They enable QRP operators to make more contacts, or to have contacts over greater distances. So what factors should the QRP operator take into consideration?

Firstly the choice of frequency is very important. In fact on most of the HF bands there are designated QRP calling frequencies. Usually they are 60kHz from the bottom of the band eg, 3560kHz for 80 metres. However, 40 metres is an exception where the total width of the band is only 100kHz. As a result the QRP calling frequency is 7030kHz.

These frequencies are used almost exclusively by QRP operators, and usually the big boys with their kilowatts and triband yagis tend to stay clear. This gives the QRP station a much better chance of slipping through the interference and making a contact. The other advantage of using these frequencies is, of course, that it makes contacts with fellow QRP operators more likely, and with it the possibility of comparing notes.

Even though most of the QRP operation takes place on or around the calling frequencies, this does not mean to say that other frequencies cannot be used. On the contrary, it is often very rewarding to listen around the band for a strong station and give him a surprise when he hears what power is being used!

When making forays out into the wilds of the rest of the band a little extra help may be needed. The first requirement is probably a VFO, as this will give a far bigger choice of frequencies and stations than that offered even by two or three extra crystals. It always seems that the station you want to call is on a frequency the VXO cannot quite reach!

The next requirement is a good dose of patience. QRP operating is not always easy and one will have to be prepared for several disappointments. However, when the DX station replies to you it makes it all worthwhile.

Help and advice

When embarking in a field such as QRP it is always helpful to have some advice from other enthusiasts smitten by the same bug. Amateur radio in general has its own societies and clubs, and in addition to these there are also groups for the minority interests. QRP is no exception, having the G-QRP Club which is based in the UK, and other similar societies for other countries. These societies have grown rapidly, for example the G-QRP Club was founded in 1975 and now boasts over 4000 members. It publishes its own quarterly magazine called *Sprat*, which devotes much of its space to circuits and other practical ideas useful to QRP operators.

Apart from the magazine the club enables its members to obtain some components at special rates and also sponsors several awards. In addition to all of this the club has produced the *G-QRP Club Circuit Book*. As one may imagine this is a very useful source book for QRP circuits and it is effectively a compilation of many of the designs which have appeared in *Sprat* over the years. The book is available either from the club itself or via the RSGB.

For anyone interested in joining the G-QRP Club, the address to write to is: Rev G Dobbs, St Aidens Vicarage, 498 Manchester Road, Rochdale, Lancs.

Finale

So what about QRP, is it for you? It must be said that it is harder to make contacts with less power. There will also be less DX contacts than if a kilowatt and a 3 element beam are used. Against this there is far more of a sense of achievement. Each contact represents a challenge, and every time a station answers a call there is a feeling of excitement. This is not only because of the power involved, but also because it is usually possible to say that you built some of the equipment.

So, how about it then? Give it a try.

ANGUS McKENZIE TESTS

ICOM IC475E

432MHz multimode transceiver

This transceiver follows on from its predecessor, the IC471E, in exactly the same way as its 144MHz counterpart, the IC275E, followed on from the IC271 series. It is identically styled to the 275E, which I reviewed in the March 1987 issue, very favourably indeed. The IC475E offers the same facilities as the 275E, and of particular interest is the provision of an optional narrow CW filter, a notch filter, passband tuning and computer interfacing.

The rig incorporates FM, upper and lower sideband and CW, with an extra facility for RTTY and data transmission and reception. Most usefully, there is an RF pre-amp switch which can provide 13V dc on the inner of the antenna N type socket, in order to power a masthead preamplifier if required. The dc switches off at the instant that PTT or Tx is achieved. If the data facility is switched on, eg for Packet radio, the RF pre-amp facility is inoperative, so that the changeover between Tx and Rx can be almost instantaneous.

The rig tunes from 430 to 440MHz in 1 and 5kHz steps on FM, and in either 10Hz or 1kHz steps on SSB and CW. This gives tuning rates of 500kHz per revolution on FM, and 2.6kHz per revolution on SSB when the normal tuning step position is chosen; the tuning rate on SSB/CW speeding up to around 7.5kHz per revolution if you rotate the knob quite quickly.

Although the rig is primarily intended for home base station operation off ac mains, it can also be used off 13.8V dc, and thus is an ideal rig for portable contest operation, especially as it can give up to 30W PEP output.

Front panel facilities

Most of the rig's functions are microprocessor controlled, and these include: mode selection (FM, USB, LSB and CW with normal or narrow filter); normal memory scan; mode scan; scan with preselected channel skip; programmable scan; data input/output; and duplex/simplex switching with a button for 1750kHz tone for repeater access. Other buttons select: audio speech compression on/off; external pre-amp on/off; AGC slow/fast; noise blanker on/off; and speech frequency readout enable when an optional board is fitted. Further buttons allow control of the microprocessor to vary the built-in repeater shifts and optional tone squelch frequencies. A 'check' button allows you to listen on repeater input. As despatched, a 7.6MHz shift is incorporated, but it does not take long to reprogram this for 1.6MHz.

Along the bottom of the left side of the front panel are additional switches and tiny pre-set pots. These have to be clicked out to allow them to be turned, after which they can be pushed home, and thus they recess almost completely into the front panel. The buttons select: Tx MOX: front panel metering S units on Rx and power out on Tx; or centre tuning on FM Rx and Tx ALC.

The miniature pre-sets are used to adjust: Tx output power from 1.5 to 25W nominal (all modes); Rx RF gain; Rx audio tone; Tx mic gain; and Tx/Rx switching delay for semi break-in operation. Note that on the back panel there is an additional meter switch which allows the meter to read SWR, and a three-position switch for selecting MOX, semi break-in or full break-in keying.

Buttons to the right of the tuning knob select: tuning step rate; MHz steps; VFO A or B; split VFO Tx/Rx; and lock frequency. Further buttons select: 'call' frequency; memory to VFO; VFO A = B; notch filter enable; RIT on/off and clear; and memory access, write or clear. A rotary click step control selects the required memory, of which there are 99 main ones storing frequency, mode and duplex info, and two additional positions called P1 and P2, provided for setting the limits of the programmable scan. Rotary pots provide filter notch frequency adjustment and passband tuning, the latter having a centre indent. The RIT control can adjust the Rx offset by up to ±9.9kHz.

The Rx audio gain control is concentrically mounted with the squelch control which operates on all modes. A quarter inch stereo type jack socket is provided for headphone connection, with the tip and ring shorted together so that both left and right ear pieces are fed with a mono signal.

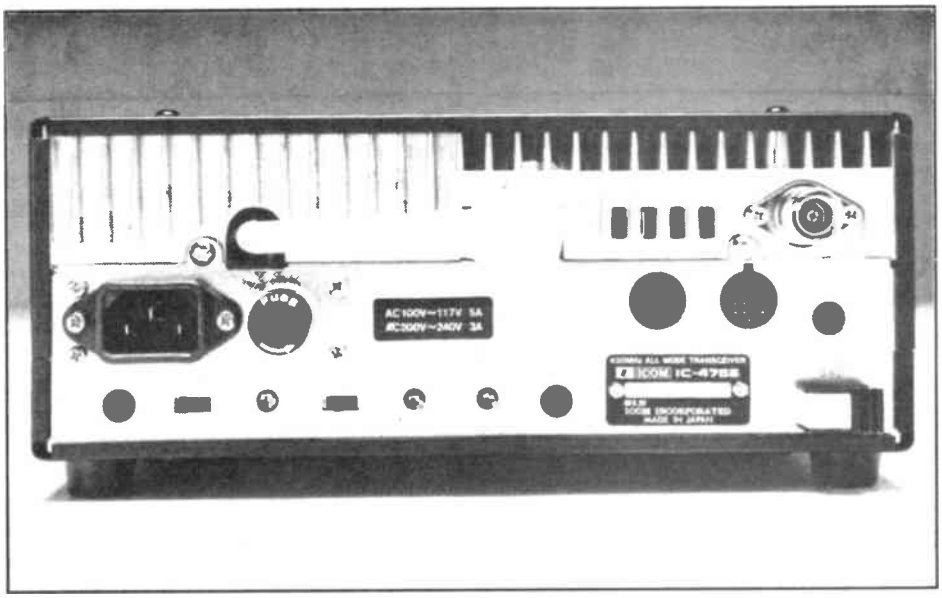
Note that a mono jack plug on a headphone lead will not be satisfactory. The microphone socket is a conventional eight pin type to standard Icom convention; the microphone supplied being an HM12, fitted with PTT and up and down buttons.

Frequency display

The liquid crystal display on the front panel indicates to 100Hz resolution, and also provides RIT offset frequency readout. Various basic status indications are provided, including memory channel, duplex shift and facilities in use. The display is in the form of black characters on a bright orange background, and is easy to see.

The tuning knob rotates very freely, and is a little smaller than those of some earlier Icom rigs, a finger hole being provided which is large enough to avoid 'finger burn'. A facility is provided for varying the tension on the tuning knob rotation.

A bail stand lifts the front up about 4cm, which is just about right for my taste. The loudspeaker is in the top lid. I am slightly surprised that there is no carrying strap on the side cheek.



Rear panel

An IEC mains socket is complemented by a mains fuse, and the 13.8V dc output from the internal mains PSU comes out of the rig and plugs back in again to the special dc input socket, into which you can plug a dc lead instead.

There are 3.5mm jack sockets for feeding an external loudspeaker and for interconnecting a key. I feel that it is extremely inconvenient that Icom did not provide a quarter inch key jack which is far more usual, and do note this when you take your key to a contest site, aiming to use it with perhaps a class B station's IC275 or 475! The rig's owner may not have noted the unusual socket, and you may well have forgotten an adaptor.

A special 13 pin socket provides interfacing for an external AQS adaptor; the AQS system being Icom's digital interfacing system which is not compatible with Kenwood's DCS type. It will allow display of station callsign and provide automatic channel QSY etc if other stations are also equipped, but perhaps it is a little early for this type of system to be taken up seriously.

An accessory socket having eight pins provides audio/data input and output, ALC input, 13.8V dc at 1A max, squelch on/off indication and external PTT. Note that this external PTT pin is in parallel with the rig's own Tx switch and microphone PTT, and can either switch the rig to Tx when grounded, or switch an external high impedance circuit having a positive voltage on it, which will have to be compatible with the rig. Once again I have to criticise the absence of a separate short on the Tx relay pin, which would be far more useful to most owners of large valve linears.

The antenna socket is a high quality N type which gives significantly lower loss than the dreaded SO239! Pre-sets are accessible through holes in the back panel, and these adjust CW sidetone level, microphone tone quality and audio compressor level. The UHF block module PA seems to be adequately ventilated with holes in the top cover and back panel for allowing quite a good air throughput.

Rx front end circuit

The receiver front end includes two GaAsFETs, a dual gate 3SK121 feeding into a grounded gate configured single gate 2SK125. A degree of feedback is used around the pair, and it is very interesting that the combination gives a very good RF input intercept point, as well as a reasonable noise figure. The mixer uses a pair of NPN UHF transistors (2SC2026) feeding a first IF of 70.451MHz. The second IF is at 9MHz, whilst the third is at 455kHz.

Subjective trials

I used the rig over a period of several days on both my stacked double 16 element array for SSB and on a simple Kenwood dual band vertical antenna for FM. Reports of speech quality on FM were excellent, the deviation seeming just about right, and articulation very good, without any nasty spitchiness. Reports of the SSB transmitted quality were slightly critical though from one station, the modultion being thought rather narrow in response, and apparently slightly rough, although I could not find the reason for this as the measurements were excellent. I must assume that the mic supplied and the narrow SSB transmitted passband were not particularly suitable for my voice. With the power control backed off a little, results seemd to be rather less rough and quite acceptable, and when the compressor was switched in, the transmissions were quite punchy.

I noted slightly more warm up drift than usual for an Icom rig, and the maximum drift of around 600Hz was noted over the warm up period of about 20 minutes, after which time stability became excellent.

The front end seemed reasonably sensitive on FM and SSB, and slightly better than the Kenwood TS811E. The rig interfaced with my old SSB Products GaAsFET masthead pre-amp extremely well, and I noted quite a useful improvement in sensitivity when I switched it in. Icom can supply their own masthead, but it was not supplied for review. Their pre-amp is type AG35 and costs £88 including VAT.

The notch filter was quite effective in the rare instance of carrier QRM, but I noticed something rather odd with the passband tuning. There was a tendency of a slight whistle being present which varied in frequency as the PBT was moved when on SSB, although this odd breakthrough was completely obscured when I switched on the external masthead pre-amp (the added receiver hiss presumably masking out the whistle).

The VFO tuning speeds were just about right on the different modes, but I would have much preferred a 25kHz stepping rate as the norm for FM. The mind boggles when considering what one can do with 99 memories on the 70cm band, and I wonder what Icom had in mind here! Memory access, writing and converting back to VFO all worked extremely well, and I have no criticisms of any of the special functions. I set the 'call' frequency to 432.2MHz USB, and you can put this into VFO by pressing call first then mem to VFO, followed by the VFO button, which will be quite useful.

The scanning facilities are very comprehensive, and an internal switch, accessible under the top cover can be switched to fast or slow scanning speed. You can scan many memories in only a few seconds, and you can choose to scan only a given mode, or all modes, or alternatively you can select skipping various memory channels if required.

I very much prefer this rig to the older IC471E, and the Rx filter leakage problem has been completely eradicated in the new design, although there is just a slight amount of phase noise very close to the main local oscillator. This is a lot cleaner though than that of many other synthesizer rigs at UHF. The interfacing possibilities are almost boundless, as a computer interface for RS232C is already built-in. Icom UK can supply a JT602 kit for £19.95, which includes a circuit board and floppy disc or cassette programme which is compatible with BBC computers.

This is very clearly the best 70cm multimode available on the market in terms of technical performance and facilities, although I have to admit that, as with the IC275E, I preferred the Kenwood equivalent, as I think that the latter has better ergonomics.

Laboratory tests

The receiver front end did measure well, although RF sensitivity was not really quite as impressive as that of the rig's 144MHz counterpart. The sensitivity was very well maintained across the entire band on both FM and SSB. The RF input intercept point was excellent however, and as good as you are likely to need, unless you have a very tiresome portable contest station operating 10 miles away on the next hilltop, running

an awful lot of power and ERP! The front end is about 1.5dB better in sensitivity, and 1dB better in intercept point than the Kenwood TS811. The reciprocal mixing performance is remarkably good for a UHF rig, bettering even some HF recent transceivers close in to the carrier. IF selectivity proved to be quite sharp on SSB, but oscillator phase noise caused difficulties in measurement at −60dB and below. Down to −40dB the shape was better than that of the 811E, but the −60dB measurement seemed wider than the Kenwood's, although there was no audible filter leakage.

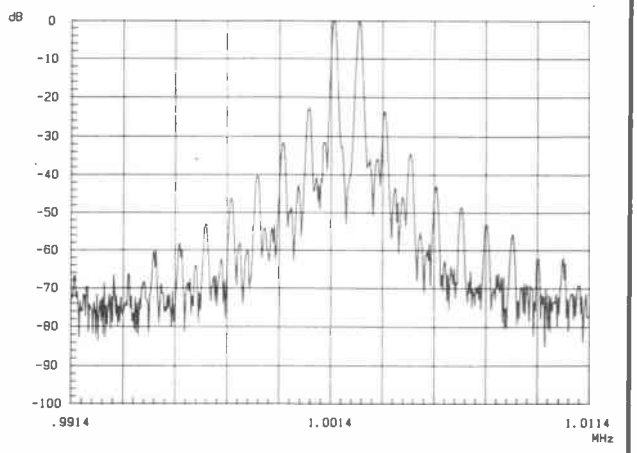
FM selectivity was adequate for 25kHz channelling, but again the Kenwood was very slightly better, although I don't think this will be relevant in practice.

The S meter was a little odd, as we noted only 12dB difference between S1 and S9 on SSB, whilst the two 20dB increments above S9 required only 8dB increases to reach them, although 'top of the shop' did require a 22dB increase from +40 to +60dB! S meter characteristics on FM were very similar, although S1 seemed to be indicated on a rather weaker signal, and only very small RF increases were required above S9 to reach FSD.

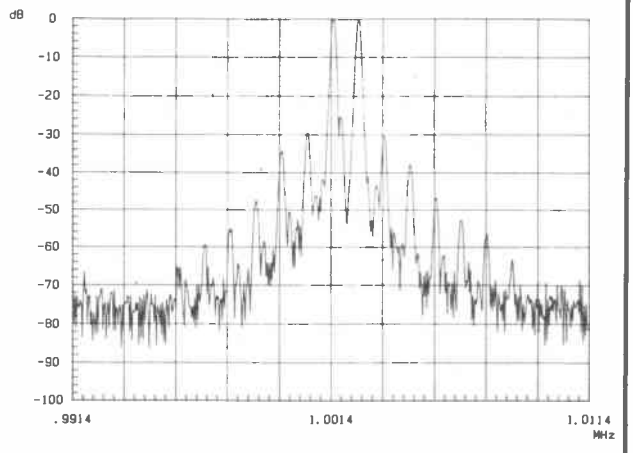
The distortion of the product detector was quite low, and FM distortion was also quite acceptable. The maximum power output was a little limited into 8 ohms, but quite a lot more power was available into 4 ohms, which could be useful. The AGC characteristic could be changed from slow to fast, and the attack and decay times seem just about right for me, slow certainly not being too fast.

The received frequency response on FM had a very steep bass cut below 300Hz, whilst the response was very flat from 500Hz to 3kHz, and just about ideal for reproducing very good audio quality from the band. The tone control gave a good range of adjustment, and I tended to prefer it mid way most of the time, this position giving a slight tilt up in the 400Hz region compared with the output at 3kHz. It was useful to have more treble though from some transmissions that were rather woofy! The quality of the internal speaker seemed rather better than from some earlier Icom rigs, and I did not note any rattles. The notch filter gave around 32dB null, and had a good range of adjustment.

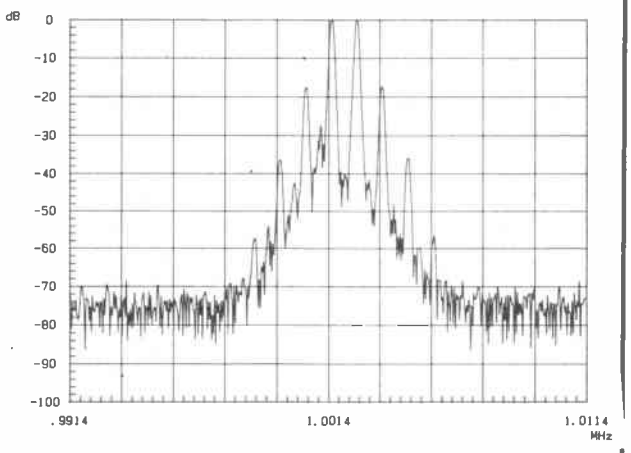
The receiver's frequency accuracy varied from up to 500Hz in error to almost spot on frequency, depending on both time and Tx periods. Icom can supply a high stability oscillator option, however, type CR64, costing £67 including VAT, which might be more appropriate for DX working on precise frequencies when CW is in use with narrow filters.



Plot 1 *Tx two tone test. 30W PEP 700/1700Hz tones into ALC. Resolution bandwidth 100Hz. 2kHz per division*



Plot 2 *Tx two tone test. 25W PEP 700/1700Hz tones. Resolution bandwidth 100Hz. 2kHz per division*



Plot 3 *Tx two tone test. 250mW PEP 700/1700Hz tones. Resolution bandwidth 100Hz. 2kHz per division*

Transmitter section

Maximum transmitted power on SSB was around 30W PEP on a two tone test, although single carriers on SSB, FM and CW seemed to limit at about 25W. It was most useful that one could decrease power with the mini power control down to just over 1W. Two tone tests on SSB showed that intermodulation products were just a little high if you were driving the rig well into ALC, and only a slight reduction of power to marginally below the ALC threshold cleaned up the products a great deal (see *Figures 1 and 2*). *Figure 1* shows that at 30W PEP, the third order is on the rough side at −23dB, with products reaching below −60dB at above the 13th order. The 25W performance is a lot better, with third order at around −30dB, and the −60dB product level is reached by the 11th order, which is quite good.

Because of one particular subjective comment about roughness, we carried out a two tone test at only 250mW PEP output. This revealed very poor third order products, but high order ones were almost immeasurable, *Figure 3* showing that at 250mW the third order distortion is at −18dB, but −60dB is reached with products higher than the 7th, which is excellent. This performance would indeed cause audio quality to be rougher, subjectively, when the rig is used at a lower level of RF output, but the spreading characteristics clearly improve dramatically with lower output levels. Turning back the power output to say 5 or 10W PEP by resetting ALC thresholds would clearly show a great improvement for contest working, for example.

SSB alternate sideband rejection was excellent, and the carrier rejection was also very good, so you should not have

any problems in this area. I did not note any harmonic or spurious RF output problems, and the rig gave a very consistent performance over long time periods. At one time, we left two tones transmitting at around 25W PEP for some five minutes without any variations in RF output, which is saying a lot for the PA stages and temperature compensation circuitry.

On FM modulation showed comparatively little distortion up to around 4.5kHz but rose rapidly above this deviation until the onset of limiting at just below 5kHz. This had been very accurately set at the factory, the highest deviation being noted at 425Hz.

The toneburst frequency was just 2Hz low and deviation was very well controlled, being set just about right. We checked the transmitted FM response by feeding the output into a Marconi deviation meter, and noted a very flat response with 3dB down points at 300Hz and 2.6kHz, ref 750μS pre-emphasis. The response was curtailed fairly rapidly outside these frequencies. Perhaps, however, I might have liked a slightly more extended HF response on the 70cm band as we are likely to be retaining 25kHz channelling on this band for a long time to come, and this wider channelling permits a wider response without causing adjacent channel interferance problems.

The transmitted signal to noise ratio on FM was adequate, as it was on SSB. A total drift with time of around 500Hz was noted on FM Tx when the rig was left on high power for about 10 minutes from switch on.

Icom IC475E Laboratory Test Results

Receiver Tests	
RF sensitivity SSB ref 12dB sinad	−126dBm
RF sensitivity FM ref 12dB sinad	−123dBm across entire band
RF input intercept point	−4.5dBm
Reciprocal Mixing	
ratio noise floor to level required for 3dB increase in noise	
5kHz	75dB
10kHz	83dB
20kHz	89dB
100kHz	104dB
200kHz	110dB
SSB selectivity	
3dB	1.5kHz
6dB	2.1kHz
40dB	3.1kHz
60dB	7.1kHz
FM selectivity ±25kHz	63dB avge
S meter SSB	
S1	−110dB
S3	−107dB
S5	−105dB
S7	−102dB
S9	−98dB
S9+20	−91dB
S9+40	−83dB
S9+60	−61dB
AGC threshold	approx −118dBm
FM limiting threshold	−127dBm
FM capture ratio	4.7dB
FM quieting at 12dB sinad point	−14.3dB
SSB product detector distortion	1.5%
FM distortion at 3kHz deviation of 1kHz mod	3.3%
Audio output power for 10% THD 8/4 ohms	2.3/3.8W
Transmitter tests	
Maximum Tx power SSB	30W PEP
FM/CW	25W
SSB carrier rejection	approx 50dB
Alternate sideband rejection/1kHz	<−62dB
FM max speech deviation	4.95kHz
Typical speech peaks	4.5kHz
Toneburst deviation	3.6kHz
Toneburst frequency	1748Hz
FM signal to noise ratio, ref 5kHz deviation	40dB
FM Tx frequency accuracy	within 500Hz, stable after 15 minutes
Dimensions including projections	244W × 108H × 295D
Weight	6.3kg

Conclusions

This rig definitely receives a strong recommendation, as it seems to give the best performance overall of any rig that I have yet tested for the 432MHz band. Its nearest competitor is the Kenwood TS811E, a rig which I still like very much, and which is probably better ergonomically. Icom have designed a very good synthesizer for the 475, and if you are that fussy about drift and finite frequency accuracy, you can go in for the high stab crystal oscillator option.

I very much preferred this rig over its predecessor, the 471E, and please note that there should be an optional narrow CW filter available (FL83 costing £39 including VAT) as well as a speech frequency readout option (UT36 at £27.50 including VAT). These two options have still not come into the UK, even for the IC275 which has been on the market now for over five months, although I have just heard that they should be available during July, so it might be advisable for you to order the options with the rig in order to get priority.

The rig should be superb for contest operating and for general DX working, and the provision of the external masthead pre-amp control is a very welcome bonus. Although the price is high, (£1125 including VAT), I feel sure that this rig will establish itself as the 70cm Rolls Royce which will set a standard by which others will be judged. I very much enjoyed using it.

Very many thanks to Icom UK for the loan of the review sample, and to Fiona for helping with all the measurements.

KENWOOD TM221ES

2m high power FM mobile

How fascinating it is to see, year by year, the average Tx power increase, whilst size is decreased. Not so many years ago this new Kenwood rig, the TM221ES, would have been considered amazingly compact, even if it had had just 10W capability, but in fact it gives over 45W output across the entire 2m band in selectable channel steps of 5, 10, 12.5, 15, 20 and 25kHz. Lowe Electronics, the importers, mentioned to me that Kenwood wanted to include all important basic features, making the rig very comprehensive, but at a price which was much more competitive than earlier models, and indeed they have, for the basic cost of the rig is only £334.60 including VAT; decidedly cheaper than some of its competition.

The rig comes complete with a mobile mount and the usual Kenwood microphone with PTT and up/down stepping buttons. It measures 141W × 42H × 193Dmm, and weighs 1.2kg.

Front panel facilities

A smoothly rotating VFO knob changes channels in the selected steps, or from one memory to the next when in the memory mode. The rig includes 14 memories, 0 to 9 and A to D. Memory 1 doubles for storing the priority channel, whilst A and B store the lower and upper limits for the programmable band scan. Memories C and D can be used for storing separate Rx and Tx frequencies. All the memories allow storage of simplex or duplex modes and various tone information, much of which is not of interest in the UK. Two small rotaries adjust audio gain on Rx and squelch, the remaining functions being selected by push buttons, including dc on/off, low-high power on Tx, VFO/memory switching, memory write, MHz shift up, ± repeater shift or simplex, reverse repeater, scan enable (full or programmable), priority channel monitoring, and auto toneburst for repeaters on/off.

The microphone socket is a Trio standard 8 pin screw type connector. A very comprehensive liquid crystal display indicates frequency and all the basic status functions, including memory and repeater info.

Rear panel and case

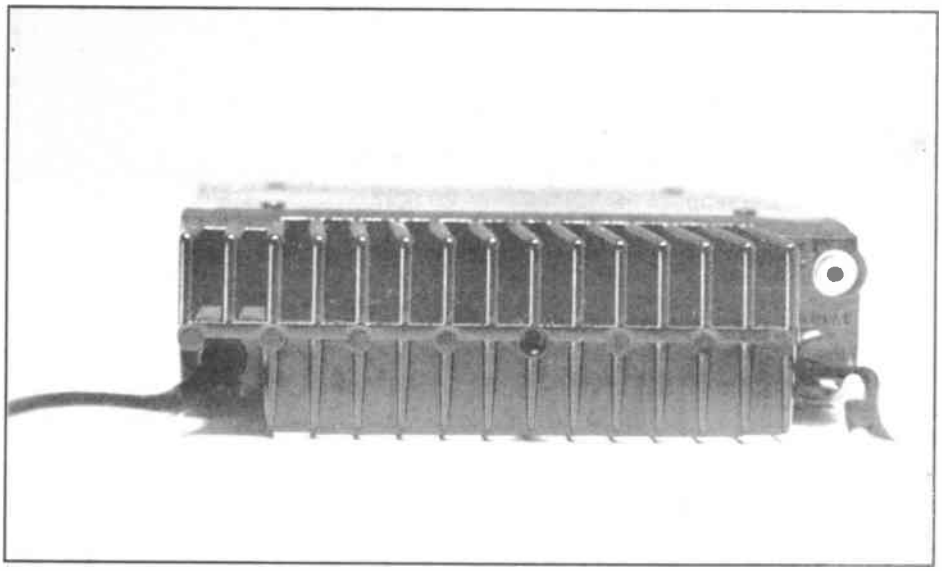
The internal loudspeaker is located in the top lid, and thus throws sound upwards. This may just about be satisfactory in some cars, but you may well have to use an extension speaker if your car dashboard system blocks the top of the rig when it is mounted. On the back panel is a standard 3.5mm jack socket for an extension speaker, and two captive wires for 13.8V dc supply. An in-line 10A fuse is fitted in the positive wire, and the wires are approximately 30cm long, terminated in a special dc plug. A 2m dc extension lead is supplied, which is fused in positive and negative.

The antenna connection is on a flying SO239 socket, so much more convenient to use than a chassis mounted one. A very large heatsink covers the entire rear panel and dissipates the heat remarkably well, although the rig did get quite hot when running full power on a long over. There is no internal fan, so don't put the children's large bars of milk chocolate in the glove compartment above the rig!

Subjective trials

I have no doubt that this is my favourite 2m mobile so far, for it seems to offer all the facilities that I would want in such a box, with the sole exception of a speech frequency readout! The RF sensitivity seemed good, and I did not note any spurii or IM products at all, even when the rig was used with a large vertically mounted beam 17 metres above ground level behind my house. Adjacent channel selectivity seemed quite good, and the receiver could cope with 12.5kHz channelled stations which separated quite well, unless the unwanted one was very much stronger than the wanted one. The facility for changing the channel spacing is very useful, for in some areas you will get by with 25kHz channelling, whereas in other, and usually more populated areas, 12.5kHz channelling is becoming more and more popular. Note that 15kHz channelling is used in the US, and 10 or 20kHz channelling is used in other parts of the World.

I liked the quality of the internal speaker, which seemed to be loud



enough, and the received response was excellent, being clear and without rattles etc. I obtained good reports for the transmitted quality, which was well up to Kenwood's norm.

All the functions were very easy to use, and operation was obvious. It was only necessary to glance briefly at the instructions as a check on what was fairly obvious. Using the reverse repeater function, one can transmit on repeater output as well as listening on input, which will be very useful. I must applaud Kenwood for avoiding second functions on their buttons, which tend to be very confusing on other models.

Optional remote control

An optional remote control that duplicates all the microprocesor controlled functions is available (type RC10), but no price has yet been fixed. The control can also interface additionally with the 432MHz FM mobile, and allows duplex control of all types.

The Kenwood manual was reasonably helpful, but once again I quote a sentence for your delectation: 'The figure below shows how the tuning control and up/down switches will increase or decrease in size'.

Laboratory tests

The RF input sensitivity measured very well, and was consistent across the whole band. It is as sensitive as almost any other mobile rig that I have measured recently. I doubt whether you will have any front end intermodulation problems, for the input intercept point measured quite well, and it is in this area that modern rigs show a significant advance over many older ones. The measurement is around 15 to 20dB better than average walkie talkies used as mobiles, to put the comparison in context. The 25kHz selectivity was very good, and the 12.5kHz measurements were noticeably better than usual, but hardly surprising as Kenwood are very wisely using F filters rather than the wider E types chosen for some years by Yaesu and Icom. This means that the rig will be far more satisfactory when used on 12.5kHz channels.

The S meter is in the form of several groups of two blobs, giving indications of the odd numbers only, ie omitting S2, 4 and 6 etc. The difference between S1 and 9 was only 12dB, and the two indications above S9 required only 2 and 3dB RF increases. Thus, as is so often the case, the FM S meter is not a stunning success, although it usefully serves as an indication that you are receiving a reasonable signal.

The capture ratio measured quite well, showing that a weaker signal would be quite well rejected on the same channel as a stronger one. At the 12dB sinad sensitivity point, some 16dB quieting was noted, and so very weak signals should be fairly easily detectable. FM limiting was excellent, all readable signals being reproduced at very similar audio levels, entirely dependent on their deviation.

The reproduced response showed quite an accurate 750μS de-emphasis curve from 500Hz to 2.5kHz. The rsponse fell off below 400Hz very steeply indeed, which is very welcome in a mobile installation, clearly contributing to improved intelligibility and the lack of rattles. High frequencies were attenuated fairly well, and the response was nearly 9dB down by 5kHz.

Audio distortion produced within the IF strip and discriminator was at a far lower level than usual, and even at 5kHz deviation the measurements were favourable. The set was very well aligned, as there was no improvement in distortion or sensitivity when the signal generator was offset slightly. Although the maximum power output into an external 8 ohms load was only slightly more than average, I was very impressed that as much as 4.7W was available into a 4 ohm load, so you will get appreciably more volume if you feed two 8 ohm speakers in parallel, and you like to turn the wick up in a noisy environment.

The total current drawn by the receiver at around 280mA is perhaps a little on the high side, and this did not decrease even with Rx on squelch, but of course increased if you turned the audio well up on a reasonably well modulated signal.

Transmitter tests

The rig gave just over its rated output at all frequencies when switched to high power, the low power output being just over 5W. Current consumption at 13.8V dc averaged 7.8A when the rig was delivering 46W, whilst on low power the dc consumption fell vey appreciably to 2.8A.

We had a long hunt for spurii and RF harmonics, and could see no trace of any of these above −70dBc, a credit to Kenwood. We checked the accuracy of the transmitted frequency over quite a long period. When first switched on the frequency was just 20Hz high, whilst after five minutes it was around 60Hz low, falling to 100Hz low after 10 minutes. The entire test was carried out at full power, at the end of which the PA had become quite hot. This not only shows excellent crystal oscillator accuracy, but very good drift characteristics.

Laboratory Test Results for Kenwood TM221ES

RF sensitivity (12dB sinad)	−124dBm average accross band
RF input intercept point	−11dBm
Selectivity ±12kHz channelling	15dB average
Selectivity ±25kHz channelling	71.5dB average
Quieting at 12dB sinad point	−16dB
Capture ratio	4.4dB
3dB limiting threshold	−129dBm
Distortion of 1kHz mod at 3kHz deviation	0.65%
Max output power for 10% THD	
8 ohms	2.8
4 ohms	4.7W
Typical Rx current	280mA
High power Tx current	7.8mA
Low power Tx current	2.8mA
Typical high power output	46W
Typical low power output	5.4W
Typical Tx frequency error	within ±100Hz
Typical speech deviation	4.8kHz
Absolute max deviation	6.3kHz (under extreme provocation)
S meter	S1 ..... −117dBm S3 ..... −112dBm S5 ..... −110dBm S7 ..... −107dBm S9 ..... −105dBm S9+ ..... −103dBm S9++ ..... −100dBm

Typical speech deviation was set just about right, but when provoked under extreme conditions, I did manage to make it go a little bit over the top. The toneburst was accurately set, and I did not note any particular problems in the entire transmitter, the repeater shifts being very accurate, and output power very stable.

Conclusions

I liked operating this rig a lot, and I could not find any points to criticise at all, for it had just about everything that one would normally wish for in a mobile. I must particularly praise the selectivity with the F filter, and the excellent front end performance. I think Kenwood have a winner here, which should do very well in European markets as the price tag is favourable. A very strongly recommended product, both for mobile and home use, but check that your whip will take the power!

Very many thanks to Lowe Electronics for the loan of the review sample, and to my XYL, Fiona, for helping with all the measurements.

THREE DUAL BAND MOBILE ANTENNAS

Kenwood TW4000A, Oscar 720 and Diamond DP-EL770H

Some might say that having one antenna on the car is bad enough, in addition to the normal broadcast aerial, but having separate verticals for 2m and 70cm is perhaps pushing it too far, and draws too much attention to the car, thus encouraging vandalism and theft.

The Trio Kenwood TW4000A was the first of the FM only dual band mobiles to be introduced, but this rig was soon followed by the Yaesu FT2700 and Icom IC3200 models. The first two of these had separate outputs for the two bands, but the Icom had just a single socket. More recently, the Yaesu FT727 hand-held was introduced, which was also capable of transmitting on both bands.

In 1983 Trio Kenwood introduced the MA4000 dual band antenna which operated as a 5/8 wave on 2m and a double 5/8 on 70cm, a cylindrical bobble separating the two halves of the antenna, and containing phasing components. The base of the antenna incorporated a matching coil and a PL259 shrouded connector, which allowed the entire whip to be screwed onto an appropriate SO239 mount. The antenna is supplied complete with fitting instructions and a duplexer designed to take the two outputs of the TW4000A, or two separate rigs, and combine them to a feeder and antenna mount.

Impressive performance

The present price of £50 including VAT excludes the cost of a gutter mount and cable. The duplexer has an SO239 connector for the antenna lead, and flying leads fitted with PL259 and N type plugs for 2m and 70cm respectively. I have always been very impressed with this antenna since I first acquired it in September 1983, and it has been extremely convenient. Alas, during the first holiday period of use, I forgot its maximum power rating of 50W continuous, and used it for an hour or so with a linear delivering 100W at the antenna, and discovered with horror that the rig seemed deaf even for the Highlands of Scotland! Fortunately, I had some alternative single band antennas with me, which saved the day, but I had to pay dearly for my slip up.

In practice it is true that the dual band antenna is slightly down on a dedicated mono band one having higher gain, but differences seem to be minor rather than major when comparing the performance with a 7/8 wave on 2m, and a triple stacked 5/8 collinear on 70cm. I have noted less QSB on the dual band antenna, and in any case it is somewhat shorter (940mm overall) than the average high gain mono bander. The duplex unit has a very low through loss, but once again has a 50W through power limitation. It should also be suitable for separate rigs as well as dual band ones, as long as you connect up the transmitters on the two bands to the correct cables.

SWR performance

The chart opposite will give you an idea of the SWR performance of the Kenwood MA4000 on both bands in comparison with two other dual band antennas that I have also looked at. These are the Oscar 720, also available from Lowe Electronics, and the Diamond DP-EL770H, available from Waters & Stanton. The Oscar costs £24.59 for the complete whip, whilst a duplexer, HS770, costs £18 including VAT. This antenna is rated at 100W PEP input, which suggests that you would be unwise to push more than 50W continuous power on FM through it. It has a large single turn thick coil in the centre, and is stated to be equivalent to a half wave on 2m and two stacked 5/8 waves on 70cm. The basic construction is almost identical to that of the Kenwood model, except that it feels slightly more robust, and has a thicker and very slightly shorter whip section.

Diamond DP-EL770H

The Diamond antenna type DP-EL770H costs £29.95, and its duplexer an additional £26.50, including VAT. The antenna is very similar to the Oscar one in styling, again having a one turn coil in the centre, but being slightly longer it operates as a 5/8 wave on 2m, and a double 5/8 collinear on 70cm.

Both the Diamond and Oscar antennas have PL259s built into the bases like the Kenwood model has. The Diamond antenna has a power rating of 120W PEP, and the instructions claim this rating to be a cumulative one for both bands simultaneously. This antenna would probably take 100W FM, but it would be wise to get a definite guarantee of this if you purchase it. The duplexer, I am told, is quite a substantial one which should take quite high power. It is fitted with an SO239 socket for the antenna lead, and has two flying leads with PL259 plugs for connection to the 2m and 70cm transceiver outlets.

Dual band mobile antennae SWR chart

	TA4000	Oscar 720	Diamond DP-EL770H
144.025	1.3	1.4	1.37
144.825	1.0	1.13	1.16
145.475	1.0	1.0	1.0
145.8	1.0	1.0	1.0
430.2	1.3	1.3	1.47
432.2	1.16	1.25	1.42
433.2	1.13	1.25	1.37
435.2	1.18	1.3	1.35
437.2	1.5	1.45	1.4
439.2	1.85	1.7	1.7

Performance

The Kenwood MA4000 only required very slight tuning when initially installed in 1983, and I do not remember having to tune up the later one which replaced the earlier one which I had blown up. Both the Oscar and Diamond models required very careful setting up, and it was necessary to use the hexagonal wrenches supplied in order to pull the whip out of the base from 1 to 1.5cm. This effective lengthening of the whip brought down the SWR both in the centre of the 2m amateur band and just below the centre of the 70cm band, both in areas where FM is used much of the time. As supplied, these two antennas were resonant at the extreme top end of the band, and I checked the Oscar one at the bottom of 70cm before adjustment, and it gave a 2:1 SWR. It is important to tune these antennas up properly, for not only will many rigs cut back their power on Tx when the SWR is on the high side, but a whip that is off resonance may well give poorer receive signals.

I compared the three antennas in turn, screwed on to a gutter mount on our Volvo estate, with the antenna cable plugged through a Bird throughline wattmeter and duplexer into a Trio TW4000A. We noted down S meter readings of many 2m and 70cm repeaters, and quite frankly there was very little to choose between the three antennas on 2m, but the Oscar was just very marginally down on the other two on 70cm. This antenna is shortly to be discontinued anyway.

Conclusions

Unless you want the ultimate performance on 2m or 70cm mobile, you should certainly consider a dual band mobile antenna. All three models gave a good performance, the Kenwood being only marginally preferable on Rx, whilst the Diamond was capable of taking perhaps twice as much power as the Kenwood. Unfortunately, the Kenwood is not available without the duplexer, so the Diamond would be the one to go for with rigs such as the IC3200E or FT727 with common outputs for both bands. It is slightly curious that the Kenwood gave a better 50 ohm match on 70cm than the other two, but I don't think this is too important.

Both Kenwood and Diamond market base station dual band antennas, and again, on consmetic grounds, it is quite useful to cover both bands with one antenna on the roof. However, you might also consider the Icom or Diamond discones, which are superbly made, the Icom version being fitted with an N type socket which enables it to work well right up to 934MHz.

Finally, the most important thing to remember about these dual band antennas is that you will need a high quality SWR meter, usable on both bands, in order to set the antenna up for minimum SWR.

Very many thanks to Lowe Electronics and Waters & Stanton for the loan of the review samples, and to Fiona for helping me take all the readings, and for coping with our cat, Smudgie, who insisted on walking over the Bird every time we started taking power readings!

Don't miss next month's review by G3OSS on the Yaesu FT23R

T1154/R1155

An update on the installation by A H Cain

As a result of the article published in the January 1985 issue of *Amateur Radio* on the T1154/R1155 WWII equipment, quite a number of letters were received from enthusiasts requiring further information on various aspects of this airborne equipment, especially for display purposes.

The original article made the assumption that a transmitting licence would be held, or alternatively, a licensed amateur could be persuaded to operate the transmitter into a dummy load when the installation had been completed up to the stage where it could be put on the air. It has become clear however, that there are many collectors and enthusiasts who would like to make up the installation, but do not wish to put the transmitter on the air. Several letters ask about the best way of doing this.

Having constructed or obtained a power supply for the R1155 (200V dc at 60/70mA, 6.3V ac at 3 to 4 amps), the easiest step would be to merely stand the R1155 on the T1154 (or the other way round) and tuck the receiver PSU out of the way!

If cables are available, or have been made up, there is another route avaiable which, although not very sophisticated, does conform to the original set up in routing all the receiver communication inputs via the transmitter.

Linking Tx plug 3, pin 6 to Tx socket 1, pin 3, is a length of insulated wire which should be left intact. Also from pin 6, P3, is a connection going to the keying relay. With side cutters, cut this wire about half an inch from the back of pin 6 and fold the wire out of the way. Do not attempt to unsolder the wire from pin 6. The wiring on the plug tags were mechanically made first, and then soldered up with a very heavy iron, it is an extremely difficult and messy business to get them unsoldered. By cutting there is sufficient slack on the wire to resolder to the ½ inch tag left on the plug, should the transmitter need to be restored and energised at a later date.

On pin 3 of SK1 another wire will be found going to the transmitter valve heaters. Cut this in the same fashion as for pin 6, P3.

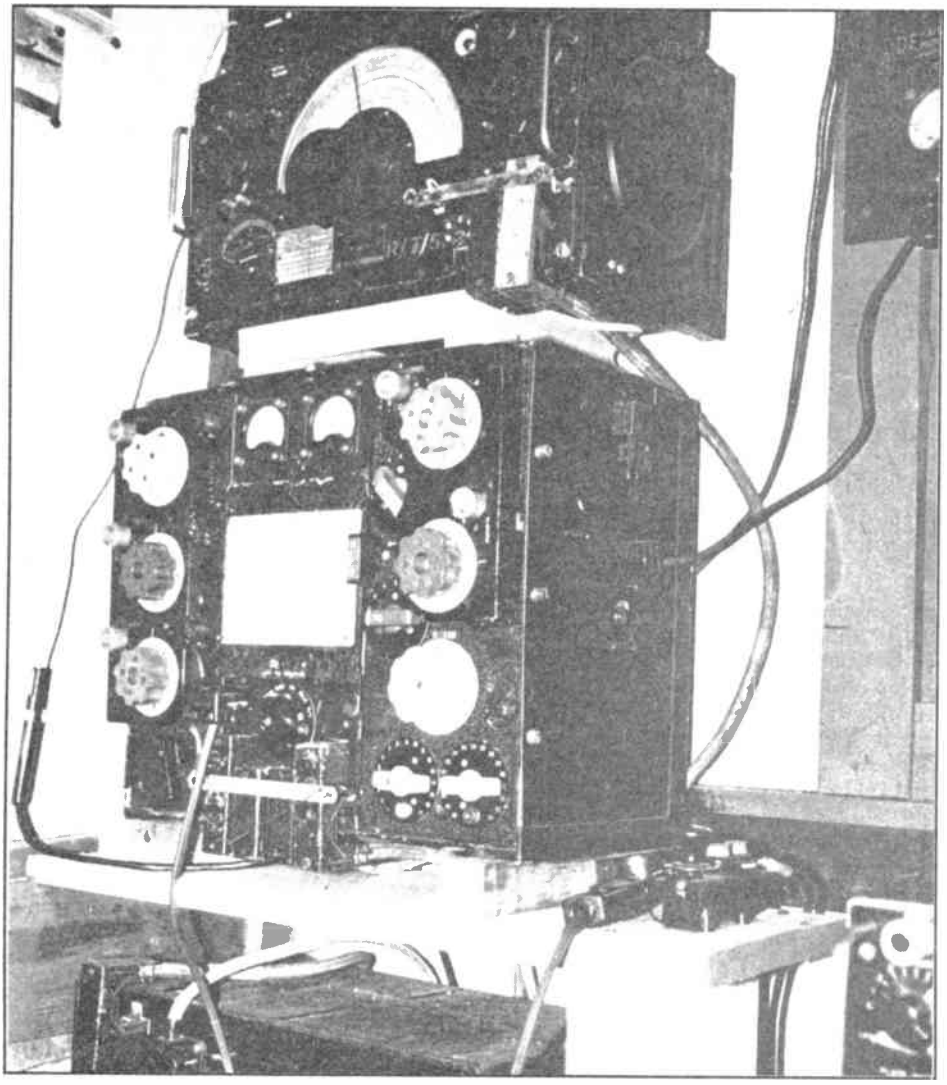
The transmitter valves and the keying relays are now isolated from the LT supply. The keying relay which carries the receiver HT and audio needs to be wedged in the receive position; a rubber grommet will perform this task if placed between the relay armature and the relay frame. It is possible that considerable oxidisation of the keying contacts could have occurred over the years and a light rub with fine grade glass paper would clear this. A continuity check could be made at the same time from the transmitter Ae sockets to pins 1 and 2 on SK1 with the relay in the receive position.

The installation is now cabled together and the socket which mates with P3 on the transmitter wired with 6.3V ac to pins 5 and 6, HT200+ to pin 2 and HT200 – to pin 1. Switching on your PSU will now route the 6.3V ac to the receiver valve heaters, and the HT+ via the keying relay contacts. Audio from the receiver will also be routed through the relay to pin 6 on SK1. There is sufficient wiring around the relay to provide some aerial signal, and these should be heard on the receiver providing a headset has been connected between SK1, pin 6 and earth. Connecting an aerial proper to the transmitter Ae sockets should give normal signal strengths.

A 4 pin Jones plug, P4, will be needed if the DF circuitry is to be used. This is the interlock which prevents transmission when using the loop. As no transmission is possible, pins 5 and 7 of SK1 can be linked if required, and P4 omitted. A blank transmitter HT plug will complete the front panel. It has taken longer to write this than the actual job itself, and is a worthwhile exercise where some authenticity is required but the collector does not have authority to set up or operate a transmitter.

Naturally with this modification the transmitter master switch does not have any function, as with the keying relay wedged in the receive position, HT, LT, Audio and Aerial inputs are all permanently routed through the contacts and Jones plugs, and the HT and LT from the power supply unit, switched at the PSU itself (usually the ac supply ON/OFF).

However, there are a spare set of contacts on the Tx master switch, which would normally carry 24V and operate the master PSU relay. These contacts are isolated from the chassis or any other supply, and it would clearly be possible to use them as a means of switching on the installation when moving the Tx master switch from OFF to Std BY. An examination of the contacts show that they could switch 230V ac, but a preferred method would be to use them to operate a small relay on the receiver PSU, whose contacts would close the primary ac supply to the mains transformer, either in series, or parallel with the normal ON/OFF switch.



SHORT WAVE LISTENER

TREVOR MORGAN GW4OXB

It's funny how coincidences occur. A couple of issues ago I mentioned the 'good old days' when London's Lisle Street was the venue for listeners. A couple of days after that particular issue went to print I received a very nice letter from Dr Harold Cones, who is President of the Great Circle Short Wave Society.

It appears that, in the era of which I was reminiscing, the 1950s and 60s, the American based *Practical Electronics* magazine started a scheme for short wave listeners and issued numbers to interested parties with the prefix WPE. Of course, over the years many of the original crowd either took up operating or disappeared from the radio scene. However, in 1982 some of these original devotees decided to get together again, and the Great Circle Short Wave Society was born.

There are a number of societies catering for the 'old timers' of the radio hobby and even a few for the modern 'whiz kids' of the eighties. This group, however, caters for those short wave listeners who have their roots in the 1950/60 period and, moreover, still use equipment dating back to that period. Naturally, the society serves as a fraternity for holders of the original WPE numbers (and there were over 40,000 issued!), but they are interested in hearing from anyone who started listening in that period and is still interested in the hobby from the nostalgic viewpoint.

The Great Circle Short Wave Society has become a 'sister' club of the International Listeners Association, so if you are interested in hearing more about them, please drop me a line.

On May 3rd I had the pleasure of meeting some of our readers at the Swansea Rally, and I thank those who came over to the ILA stand for a chat. The rally was certainly well attended, as usual, and there was plenty of the classic 'junk' to be found as well as some nice receivers for those on the look out. A mint FRG7 at £140 and a number of various Eddystones were available, as well as the odd Heathkit and Hallicrafters, but the most sought after items seemed to be the ex-workshop test equipment, such as signal generators and scopes, so someone must be doing a bit of home-brew!

The next rally I will be at will be the Longleat affair where the ILA will have a stand. If you are there please pop over for a chat!

So, on to this month's awards. First in line with her claim for the Bronze Prefix Award is Joan Slater ILA185, from Matlock. Joan uses the R1000 and a random endfed wire which certainly seems to work well. Offerings included AL7, A71, A92, BY5, CP5, HC1, HH7, J37, PJ8, VK7, VK9, 4N7, 6W2, 9Y4, and 4S7. A later list of stations heard shows her to be well on the way to the Silver. Well done Joan!

Next in the frame was Brian Pearson of Bradford with his claim for Bronze on twenty metres only. Some nice catches here included AA4, C31, CP4, HK6, H44, KP4, T77, VU2, YT3, 6Y5, 8Q7, 9K2 and 7X5. Brian is about to invest in an ATU so his scores on other bands should soon start to mount up. Currently the FRG7 is the pride of the shack, but an old No 19 set still takes to the air on occasion.

To the general mail now and P F Buckmaster ILA066, of Kirkby in Ashfield mentions April 26th as being a super day for the pile-ups, with every band jammed solid (blooming typical . . . with my shack in boxes . . T!), enabling him to get his first ZSs and JAs into the log. Having recently moved he reports that the XYL likes the house, but he likes the 18ft x 10ft shack even better! Nice to know you've got your priorities right Peter!

Stan Taylor has been putting his home-brew 20m receiver to good use and picks AL7, AP2, D44, HV3, KP2, P43, PJ2, T77, UL7, UL8, V2A, VE8, VP2, ZF2, ZP5, ZZ5 and 5X5 out of the log as a sample! The most interesting QSO was between 5X5 and VE8, who were both putting in good signals to Hartlepool. A late session (0300GMT) on eighty found some unusual ones in CG1S (Canada), a string of Yugoslavs with YT and YZ prefixes and RO4OA in Moldavia. Twenty metres seems to be opening later each night with South America, in the guise of PY5, being heard quite strongly at 2300. At any rate, Stan seems to be well ahead on the Silver award path.

Denis Travis ILA108, of Guisley, Leeds, has been putting the 7700 through its paces and, with his current set-up, tends to concentrate on 20m.

However, some nice ones from the log included VK7AC, VK9YS (Cocos Is), YB1BI, YC3FNL, YC4GB (Sumatra), 9M8CH (Sarawak), VU2GI, N6IV/port KL7, KH0AC (Saipan), KX6DS (Marshall Is), VP9JY, DU7RLC, VP8BLT (Mount Pleasant Airport), AP2MQ, 4S7RO, 6W2EX and IC8SDL . . . just to keep the mouth watering! Denis hopes to have his Howes filter finished shortly, so he may get some real DX in the next list . . HI HI!

Maurice Small ILA189, of Chinnor, has also been suffering from the dots and dashes but still awaits his results with baited breath. His current set-up of the Bearcat DX1000 is keeping him occupied meanwhile, and he is very active with WAB, QRP and the RNARS. He soon hopes to swap his G1 call for a G0 . . . good luck Maurice!

Are you into Scouting as well as radio? If so, you may be interested in the new *Scout Radio Newsletter*. Produced by Duncan Wheelhouse G8TRP, it is a very informative newsletter, giving details of forthcoming events and some interesting news from Scouts abroad. One item quoting that 'the average American Amateur is over 50 years of age' had me wondering what the average was for this country . . . anyone have any idea? One of the longest running Radio Scouting Groups is that at Rainworth, Mansfield, which has been running since the 1960s. Listen for their GB4HRC call on September 18th-20th from their annual camp.

As I stated earlier, Joan Slater has sent in a report on her loggings. Unfortunately (!) she listed so much good stuff that it will fill a couple of pages so we'll just list a few choice ones here. On eighty metres V31CV, KP4PZ, HI8DLA, YC6EAR, YV2YBT, HC1BI, VS6DO and ZP2EM deserve a mention. Twenty metres yielded PT7BZ, 9K2AN, VK0GC, ZB2GR and IK3ABY/P/IL3, which seemed to be a special for Pallestrina Island. Forty metres was alive with YV2FGA, HK1DOX, XE1XYP and a mass of VKs around 0600 to 0900. On the twenty metre band JW5E had a field day on April 24th, when K9PPY interjected to mention that VK9XP was on from Christmas Island, and a successful two way QSO was subsequently logged . . . nice one!

Joan didn't have much joy on fifteen with the long wire however, so reverted to a revamped CB vertical which seemed to do the trick. Certainly a nice set of loggings, anyway!

It's not often I get up to London nowadays, but I do like to have a browse around when I do make it. Unfortunately, the aforementioned Lisle Street area has changed somewhat and it's certainly not radio that is for sale there nowadays! Mind you, what is for sale would probably cost a lot more! However, I had a wander amongst the mass of radio dealers that abound in Tottemham Court Road and came across a very neat little receiver that did not cost the earth.

The Steepletone MBR7 is a smart looking receiver boasting long wave, medium wave, two short wave bands, VHF/FM and the Air and

Marine bands. Seemed like just the job to fill a hole in one of my new shelves, so I invested 50 quid. It's a nicely presented little receiver, with smart chrome handles, an input socket for an external aerial, AFC for the FM bands and a PA facility (handy for calling the XYL for a cuppa!). The short wave section is split into two bands and there is fine tuning on the concentric knobs. Band 2 is marked SW/MB. The FM bands are also split into two sections marked FM and FM/MB/AIR. The coverage is: MW – 540 to 1600; LW – 150 to 300; SW1 – 7 to 22; SW2 – 2.3 to 7; FM – 88 to 108; Air – 108 to 135; and MB/FM – 140 to 175.

As a pukka short wave receiver, it leaves a lot to be desired and there is a noticeable backlash on the main tuning. However, reception has proved quite good and the air and marine sections are very useful.

One good feature is a rotatable ferrite aerial on top of the casing which is marked in degrees for easy re-setting; useful for nulling out unwanted medium wave stations. At the price, it's quite a nice receiver and suitable for broadcast, air, marine and even 2m amateur reception. Certainly useful for someone on a budget. The instructions were a bit 'Chinese' but a list of broadcast station frequencies was included, although the times were EST (obviously for the American market). If you spot one, take a good look at it.

Well, that's it for another month. By this time next month I should be more settled. Meanwhile, I hope the few delays in replies to letters have not caused too much inconvenience. Have a good month DXing.

Letters, please, to 1 Jersey Street, Hafod, Swansea SA1 2HF.

2 NEW MOBILE MASTERPIECES

IC-900 Super Multiband FM System.

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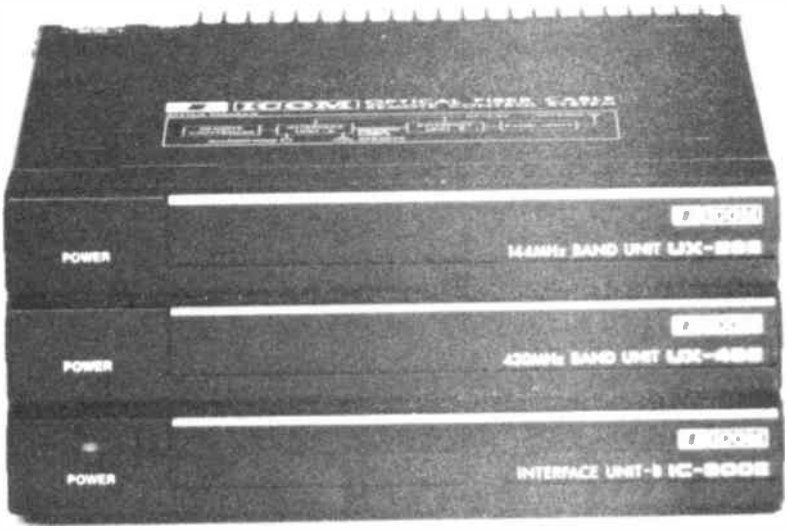
*(No mobile operation allowed in UK)		
UX29	144—146MHz	25 watts
UX29H	144—146MHz	45 watts
UX49	430–440MHz	25 watts
UX129	1240-1300MHz	10 watts

IC-1200, 23cms FM Mobile.

To complete the range of VHF/UHF FM Mobiles this new model is now available for the 23cm Ham band, it is based on similar features to the already existing IC-28E 2m and IC-48E 70 cms mobile units. This Mini-mobile transceiver will fit easily anywhere in your vehicle or shack. Power output is 10 watts or 1 watt low. The IC-1200 is so new we do not even have a picture of it, however, the large front panel LCD readout is designed for wide angle viewing and front panel controls are straightforward to make mobile operation safe and easy. The IC-1200 is a superb example of ICOM's dedication to exploring new communication equipment.



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ICOM

Communications

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A Short Long Wave End

The long wave band is now one of the most unknown and neglected, but interesting radio bands. After all it is, more or less, where radio transmission really got started.

A look at the opening pages of most amateur radio textbooks, especially those intended to introduce readers to the mysteries of amateur radio will, invariably, tell you that amateurs throughout the World are divided into two separate ethnic races: the listeners and the TXers, or licensed amateurs, and also that life, for both, begins at 1.8MHz. Usually carefully ignored are those who experiment with DX TV, weather satellite transmissions, medium wave DXing, long wave DXing, and further LF to MSF Rugby, the standard time transmission on 60Hz. This statement does not, of course, apply to many of the magazines who usually have much wider interests.

The long wave band is popularly defined as covering 1000-2000 metres (300-150kHz) though, in fact, it does sometimes seem to overflow the band edges. There are broadcast stations located throughout Europe, in N Africa, the near East, and also in Asiatic Russia, way over to the Pacific. Throughout the World there are a number of LW 'information' stations and large numbers of radio beacons. In the USA there is an amateur 1750 metre band using low power transmitters with imposing looking antennas. Altogether there is a lot of LW activity out there!

Better results

The LW band can be searched using a modern transistor radio with an inbuilt ferrite rod antenna, providing, of course, that it covers LW as well as MW and FM. However, a receiver which needs an external antenna will produce far better results – if you have such a receiver and an external antenna! These RXs come in two basic types: those with an antenna input impedance of 50 or 75 ohms, and those designed for end fed antennas, in which case there are usually separate antenna and earth sockets (or terminals) somewhere at the back.

The antenna impedance requirement of those Rxs requiring an end-fed antenna are seldom quoted, but invariably seem to lie between 300 and 600 ohms, with 400 ohms appearing to be the most usual. Right or wrong, it is not critical anyway. If used with a low impedance loop antenna some sort of impedance matching device should be used, and yet, if not used in practice it will only marginally affect the results.

Long, long ago, as a young schoolboy of 10 years onwards, when home building 1, 2 and 3 valve wireless sets (we didn't have radios) the writer used a 200 foot long end fed aerial (had never heard of antennas then) for LW reception (also used on MW and SW). This 200 foot wire took off from the bedroom window uphill to the top of a very tall tree. From there it proceeded to the top of another very tall tree and then took a right turn, downhill, to an apple tree. A kind of semi-horizontal 'J' affair, duly held airborne with clothes line and large white ceramic insulators. This 200 foot antenna really delivered the goods! It is admitted that, at that time, there was little QRM or manmade noise, and if the planning permission people had been invented, the youthful wireless enthusiast was quite oblivious to it.

Try again

These days, when on long waves, a box loop, a spiral loop and an unusual 18in long ferrite loop are used. It was therefore felt that an end fed long wire LW antenna should be tried again.

A 200 foot end fed antenna being completely out of the question, it was decided to experiment with a short end fed loaded affair. A sort of short long wire LW antenna! The results are shown in the circuit and layout sketches.

The antenna is based on a mere 24 feet of wire across a room, and is matched/loaded by ferrite inductances L1/L2. The ferrite rod is a piece of 9.5mm diameter grade F14 cut to 4in long, with L1/VC for resonating and L2 for loading. The rod is type FRA, and L1/L2 are both LWC1 type coils supplied by Cirkit. The specification of type LWC1 coils states that when placed flush at the rod end the inductance is 3mH, but is 4.5mH when just 1cm from the rod end. The further the coil is moved away from the rod end, the higher the inductance. As used, L2 is about 5mH. This factor, plus the inductive coupling between L1 and L2 is the basis of this unusual design. VC is one section of a good quality 2 gang x 500pF variable capacitor (from J Birkett), and if the spare section is clipped in parallel with the section used, then the LF end frequency of the antenna is further reduced (which may be of interest to some experimenters).

Construction is simple, consisting of a small non-metallised plain paxolin board panel screwed to a wooden base as shown. The VC is mounted on the panel with a large plastic knob (to avoid hand capacity effects). The postage type trimmers should be removed from VC, and the rod supported at the far end by two Terry clips, with L1 and L2 slipped on the other end. A terminal block is screwed alongside the ferrite rod to enable an assortment of leads to be used for connection to the 24 foot wire and the Rx in use.

Layout and dimensions are not critical, providing that the rod/coil assembly is exactly as specified. The positioning of L1 and L2 is a critical adjustment for best performance. It should be noted that these coils arrive with a small coupling winding which should be ignored.

The first operation is to get L1 exactly located to cover the LW band. Ideally this should be done with a signal generator probe adjacent to the antenna, but it can be done quite well by using the Rx calibrations and convenient signals. The outside edge of coil L1 should be lined up with the edge of the rod end with an overhang of paxolin tube, and L2 coil about ½in away from L1. See the dimension marked X on the sketch.

With the 24 foot wire attached to the unit, the high frequency end of the combined antenna should peak at around 1000 metres (300kHz). A minor movement of the coil L1 will line it up, after which it should be sealed in place with a few drops of hot candle wax. Resonate the device at around 2000 metres (150kHz) with VC, and move L2 for maximum signal strength, which gives the correct loading point. Adhere L2 to the rod as L1. Recheck at a few points throughout the band, and any necessary minor adjustment can be made by softening the wax slightly with a soldering iron. L2 must be positioned at the LF end, not the HF end, of the band. Fill the overhanging paxolin tube of L1 with candle wax as illustrated.

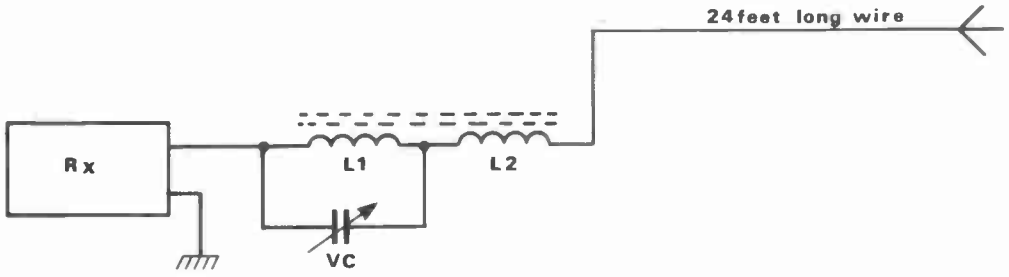
Results

The results with this antenna are interesting. In the writer's case the wire runs roughly from a little North of West to a little South of East. Although it is 'all round looking', there is a definite larger lobe towards the East and South East. For example, when compared with a good frame loop antenna, Minsk is a stronger signal, whereas Radio 4 is slightly down. With an indoor antenna of this nature, it is impossible to plot an accurate polar diagram because of the reflections from the walls etc when moving a small captive signal source around the room. The rod/coil assembly is not directional when the 24 foot wire is connected, however.

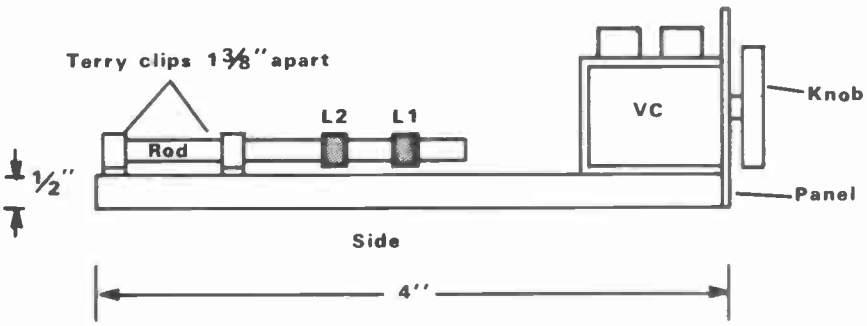
This antenna produces excellent results, except when QRM is high when a loop antenna should be used. When listening to/for a weak signal it gives an alternative arrangement to a loop, with the option of alternating for best results.

Fed Antenna

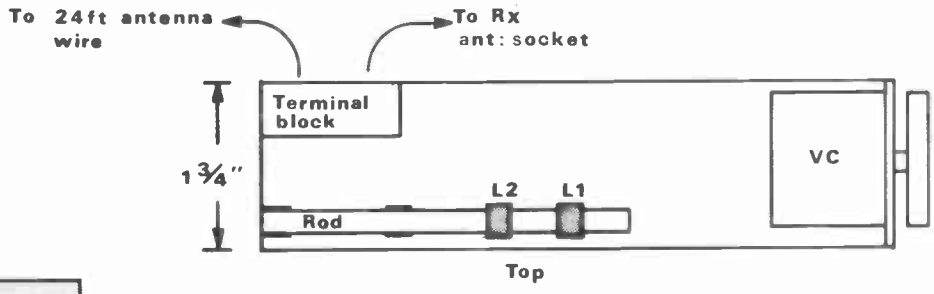
by Richard Marris



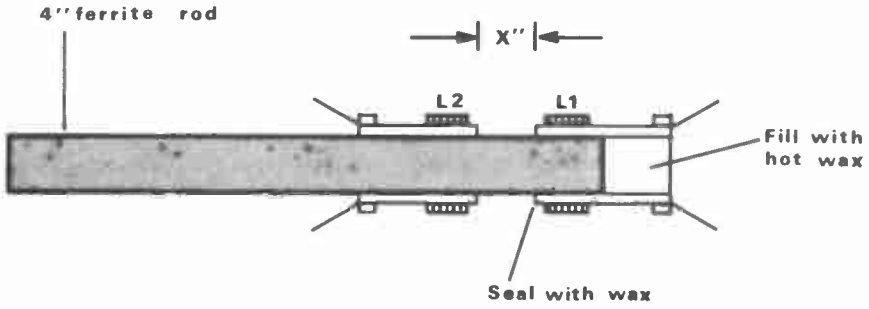
Circuit diagram of the short long wire LW end fed antenna



Layout of the short long wire LW end fed antenna (above & below)



Section through L1-L2-rod assembly of the short long-wire LW end fed antenna



Components

VC	2 x 500pF two gang variable capacitor (remove trimmers)	(J Birkett)
L1/L2	Coils type LWC1 stock no 35-00108	(Cirkit)
Rod	Grade F14 diameter 9.5mm type FRA stock no 35-14147. Cut to size	(Cirkit)
2	Terry clips	
Panel	Non-metalised paxolin or fibre glass board	
1	terminal block	

GENERAL PURPOSE PSU

by A Skaife G4XIV

Power supplies for the shack or hobby room are always a useful extra, and even more so when the PSU is variable and of sufficient capacity to handle just about every need. With this in mind, and also with an eye to keeping down costs, I set about designing a supply that could handle up to 20 amps, cover a voltage of 8 to 15 volts and finally be easy to construct.

When the circuit is looked at it may be seen that it does not contain many components and, as will be shown, some may even be left out. There are also some simple alterations that may be used to suit one's needs or availability of bits from the junk box.

If when building the power unit it is considered that 5 amps will be adequate (eg running up to 20 watts on a 2 metre transceiver), then further simplification of the design and construction is possible.

Building the PSU is not very demanding and may even be termed as 'constructor friendly'.

As an experiment I even made and now run a PSU that I built in breadboard fashion, just by laying out the components in the same manner as the circuit diagram. I mention this just to stress how simple the construction is and give hope to anyone nervous of trying to make things for themselves.

For the absolute novice I would recommend a chassis of shoe box proportions. Layout all the components loosely prior to wiring to lessen any risk of error in construction.

Now, back to the circuit of the 20 amp, version, as shown in *Figure 1*. The primary of the transformer is fed via a 3 amp fuse and for safety a double pole on/off switch. My choice of transformer is the torroid type and is a very compact component. To obtain the desired current the secondaries may be connected in parallel and fed to a 35 amp rated bridge *(Figure 2)*. However, 20 amp bridges are easier to obtain, so let's follow the main diagram *(Figure 1)*.

Smoothing of the now raw dc is taken care of by C1, which consists of three 33,000μF capacitors rated at 40V. Resistor R1 acts as a bleeder when the mains is switched off. These components are readily available from the rallies or component stockists.

My choice of regulator was a 78HGKC, which over the last 2 years has proved a very reliable component. Both regulator and bridge rectifiers have their cases 'electrically' insulated internally, so it's fine to bolt them directly on to the chassis in a convenient place. However, the pass transistor, 2N3771, must be fitted to a large heatsink. A heatsink rated at 0.5° C/W is ideal, but a smaller one may be used and the addition of a fan will augment the cooling. Large heatsinks and fans are cheaply available from rallies.

I prefer to bolt the transistor directly to the heatsink then insulate it from the chassis with paxoline (see *Figure 3)*; perspex may also be used. A check with a multimeter on high resistance, between the collector of T1 and the chassis when it's all bolted together (but not yet wired) should show an open circuit reading. T1, the pass transistor, is rated at 30 amps and so suited in its present role.

The choice of resistors R2, R3 and VR1 should cover most needs of the user since they will give a range of 8 to 15 volts from the supply.

As a final touch, both amp and volt meters may be added to the output. These can of course be left off and the output voltage set by VR1 to the required

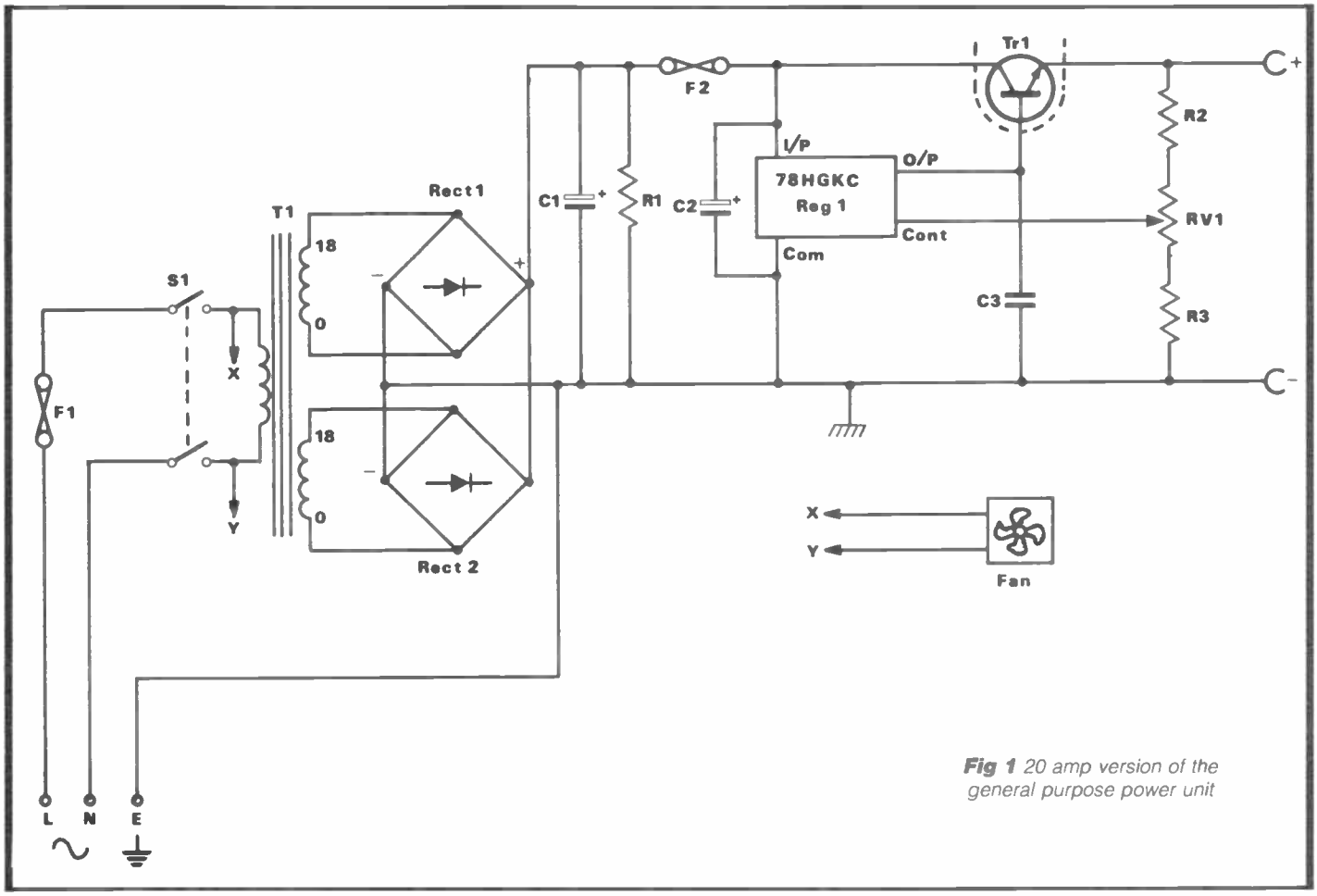


Fig 1 *20 amp version of the general purpose power unit*

level by monitoring the output on a multimeter. If a voltmeter is not available a small current meter can easily be converted.

To convert an ampmeter into a voltmeter, use a multiplier resistor in the circuit shown in *Figure 4*. Rm is the multiplier and a combination of variable resistors was chosen in addition to allow the meter to be set as required. This also takes account of any differences in the resistance of different types of meter. If the meter used has an fsd of 1mA then it will require 1,000 ohm (Rm) for each volt fsd it is required to read. So to make the meter read up to 20 volts a 20kohm Rm is needed. Such an Rm could be: R4=18k and RV2 = 4.7k variable.

To calibrate, set the output to 10 volts with RV1 (measured on a mulitmeter), then set RV2 for centre scale reading. The meter is now converted and set. Should another meter, eg 200 micro amp fsd be used, then a different Rm must be calculated. In this case R4=82k and RV2=47kohms. Once again adjusting RV2 for a reading that suits, using an external multimeter for calibration checks.

Capacitors C2, C3 and C4 are transient suppressors and for best effect should be connected close to the components which they are covering. If after all this you decide 5 amps will be adequate, then the circuit may be simplified by using *Figure 5*. Also the value of C1 may be reduced to a single 33,000μF capacitor, and the transformer can be changed for one rated at 5 amps, which are plentiful at most rallies.

Then to add even more versatility, assuming enough room is available on the chassis, both high and low current circuits may be built and separate outputs used for the two independent supplies.

Now the PSU has been built it may be tested on a home made dummy load. A simple one can be made with car headlamp bulbs. A 60 watt filament will draw about 5 amps (at 12V) and less at lower wattages. Therefore, by connecting the filaments of dip and full beam, a dummy load capable of consuming about 9 amps is at hand. Remember the lamps become very hot very quickly, so ensure they are mounted where their heat won't cause problems.

So there it is – an ineXpensive Interesting Versatile PSU from G4XIV.

Components

F1	3 amp slow blow
F2	20 amp
S1	DPST 250V 3A switch
Tr1	18.0-18.0 x 300W toroid from (ILP Canturbury)
Rect 1&2	100V piv 20A
C1	3 x 33,000μF
R1	100k 1W
C2	22μF
C3	0.1μF
Reg1	78HGKC
T1	2N3771
R2,R3	500Ω
Vr1	500 unwired
Fan	230V ac
Large Heatsink	

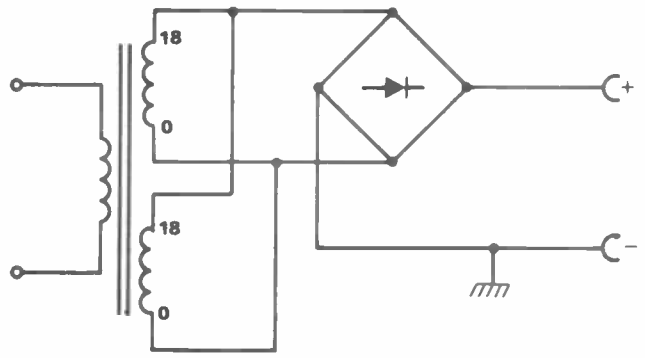


Fig 2 *Showing the secondaries connected in parallel to a 35 amp rated bridge to obtain the desired current*

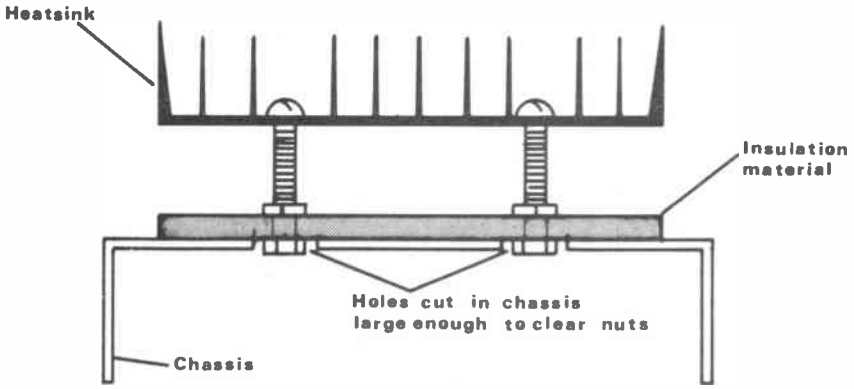


Fig 3 *Showing the use of paxoline to isolate the chassis from the heatsink*

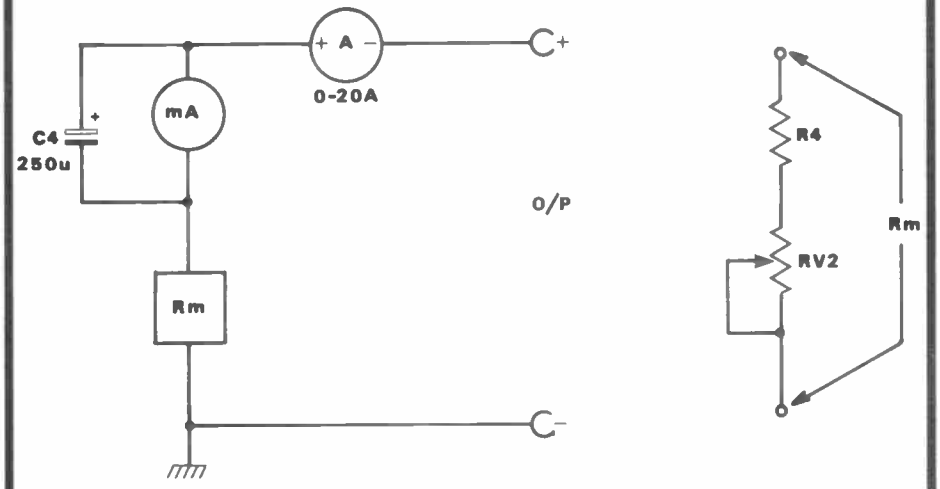


Fig 4 *Showing the connection of a multiplier resistor to convert a ampmeter into a voltmeter*

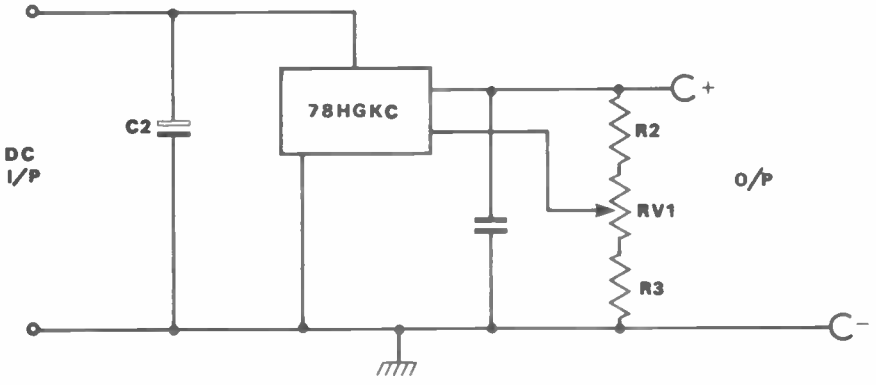


Fig 5 *Showing the simplified circuit if 5 amps is adequate*

50MHz What to

For over 30 years now, scientists, propagation experts and radio amateurs have been trying to find a solution to the mystery of how and why the form of radio propagation known as 'sporadic E' causes long distance two-way communication during the summer months at some VHF frequencies (particularly 50MHz), even during the sunspot minimum period. In the following appreciation, Charlie Newton G2FKZ, a member of the RSGB Propagation Studies Committee, who has done a considerable amount of research on the subject, combines his own theories with the work of others.

'If we ask the question 'what causes sporadic E?', then the honest answer is, 'at present we really do not know!'

'Initially we have to define what we mean by sporadic E, and secondly where we are talking about. To answer the first point we will take the VHF bands, 28-70MHz, so 50MHz is well placed in terms of this review. If anomalous propagation takes place, ie signals can be received over long ranges, say 2000km or more by means of ionospheric refraction, then it is most likely by means of a patch of dense ionisation which has formed in the E layer: sporadic E.

'The second point which presents greater difficulty is in the auroral zones, because we are talking about energetic particles, and the injection of electrons etc. If we are at the equator then the Farley two stream plasma instabilities would give a good explanation, but when we get nearer home, into the temperate zones, there is no firm theory, and from time to time wind shear, turbulance, instability, jet streams, meteoric dust and the metallic etc, all have a go. Consequently, when theorizing about the temperate zone sporadic E, the theory you like best is probably the one you would like to believe in, even though it may not fit all the relevant facts.

'Let us be very honest. To my knowledge there isn't currently a theory that can explain all the known aspects, and like most people I am biased in that I believe in some theories more than others – but I will try to be impartial. We have to find a mechanism that can move ionised plasma in such a way that it is concentrated. We require a blob or a thin sheet to form, and this must occur in the E layer.

'It was thought at one time that meteoric dust, mainly composed of metallic ions, was being swept up by ionospheric winds, thus providing the source of material. I am afraid, however, that the idea fell rather flat when Geoff Grayer G3NAQ, using considerable computer power and the best data available, analysed it to produce a best fit curve. It showed that the sporadic E was more likely to appear first, and the meteorites with their metallic ions afterwards. Since his effort others have shown that correlation is very poor.

'Regarding the turbulance theories, possibly the best known of these is the thunderstorm idea by Rastogi. It was suggested that gravity waves would propagate up to the E region and so transport material. However, if we apply this over a long period, most storms are in the wrong place, and other aspects, such as the magnetic fields are ignored.

'A more recent idea, that of jet streams, may have something, but it is not very clear how the magnetic field would fit in, and how it would fit the world picture. In the end we are left with the wind shear idea. It's been around a long time – since 1956, and still stands up to all the attacks. Perhaps you may have your own pet theory, but there are a lot of related facts that have to be fitted in with it somehow.

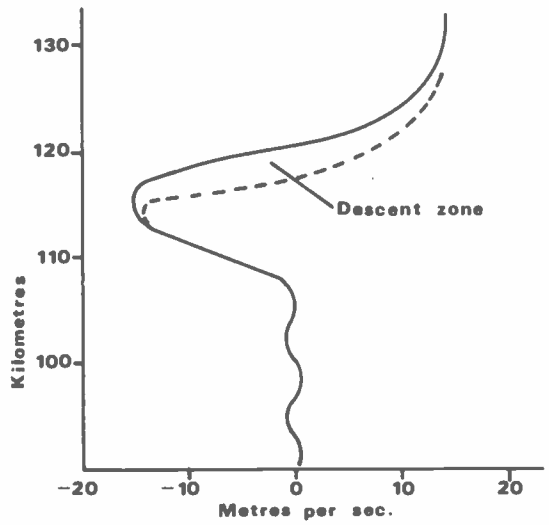
'If we look world-wide, there is much more sporadic E over Asia and very little over South Africa; so what's the connection? If we look at the Earth's (horizontal) magnetic field component, we find that the force over Asia is 0.35 CGS units, but only 0.15 over South Africa, and if we plot world-wide then we find a definite correlation between the H magnetic force and the incidence of sporadic E, so obviously this must come into our theory.

'If we speculate about when the event is most likely to happen, then without doubt it's summer time around midday. But if we look world-wide, then the most intense events observed by the World's ionosonde stations show that in the higher latitudes it tends to be pre-noon, and for the lower latitudes post noon. But the most dramatic events have been noticed to occur near sunset. So, the seasonal and time dependent aspects must also come into our theory.

'Looking into the solar cycle we find it disputes this theory, but some American work suggests that there is a negative correlation – as the cycle increases the probability in hours of sporadic E decreases. Events are shorter at sunspot maximum and longer at minimum. However, the correlation with magnetic activity is very much better as the geomagnetic A index goes down; then the probability of events goes up. However, we need quiet conditions and there is another point that I feel needs looking into. When we have a quiet ionosphere, the F region height changes (it is lower) and the effect of this is to squeeze the E layer into a thinner sheet. This means that it is concentrated somewhat before we apply wind shear, or any other ideas.

'The size of the ionised cloud is very much dependent on what frequency we are talking about, but recent work seems to suggest that the weaker low frequency events may extend over a 1000 kilometres or more, with a size reduction as we increase the frequency to 70MHz to only 200/300 kilometres. This very important aspect is now being looked at in considerable detail by workers from the University College of Wales, and we await their findings with considerable interest. We should also consider the drift speed of the cloud. It would appear on present evidence that the slower the drift the longer and stronger the event. Also, the decay seems to be due to recombination of the ions, and not so much to the dispersal of the cloud – hence the interest in long life ions.

Fig 1



expect.....

by Ken Ellis G5KW

'So, we are back to wind shear. Let's look at it in detail. The Earth's atmosphere is dragged round with the rotation, but as we go higher the degree of slip increases. In the lower ionosphere there are always winds, but there are also other forces at work which affect the steady slip, such as higher temperatures expanding the atmosphere. The surface massive weather systems transport by vertical convection, pushing up or pulling down massive amounts of atmosphere. This, in addition to the Lorenz rotating force, affects the lower ionospheric interface. There is also the varying plane between the polar and temperate zone atmospheres, and the very high jet streams that feed the lower weather patterns, and possibly other events of which we know little.

'It therefore comes as no surprise that the lower ionosphere is mainly subjected to forces from below. In 1956 Dungay pointed out that ionisation could be concentrated by a compression process. Consider a North/South wind shearing motion moving the ionisation up and down the magnetic field lines. This idea was looked at by many, and it soon became obvious that although this was so, the effectiveness was very poor. However, Whitehead showed that if this was applied to East/West wind shears, the magnetic field, together with the Lorenz rotating force, would produce ionisation levels up to those observed.

'Let us suppose that if we have a situation where over the critical E layer height we have a decrease in wind speed (see *Figure 1*), and the shear is East/West; ie we have less wind velocity with increase in height and an Eastward shear component, the shear could be about 60 metres per second or more for a kilometre of height. Here is a concentrating mechanism that occurs where the ions are converging and the vertical drift velocity is close to zero. In later work it was suggested that gravity shock waves are also set up. This has the effect of causing a downward phase velocity from higher up, transporting ionisation by the corkscrew effect and concentrating even more material.

'We must also look at the magnetic field. When you move ionised material across magnetic fields, electric currents flow and further local magnetic fields are generated that help concentrate the layer still further. So, the stronger the magnetic field, the more the effect. By these means layers of ionised material from one to a few kilometres in thickness, and up to at least 1000 kilometres across, can build up.

'Possibly the best evidence of what wind shear can do was seen in 1971 when rockets probed an event over Woomera; this was real evidence, not theory. A wind shear of over 100 metres per second was measured at E layer height (see *Figure 2*). Unfortunately, the E layer is too high for balloons to probe, and too low for satellites, otherwise we may have had some better answers by now.

'So, wind shear at least seems to offer a plausible explanation that fits many of the requirements. Of course, in the end it may turn out that there are different sorts of E, that gravity waves are more influential sometimes than at others, and no doubt that the electric currents vary considerably. Also the underlying weather systems may have more effect in some places than others. By now

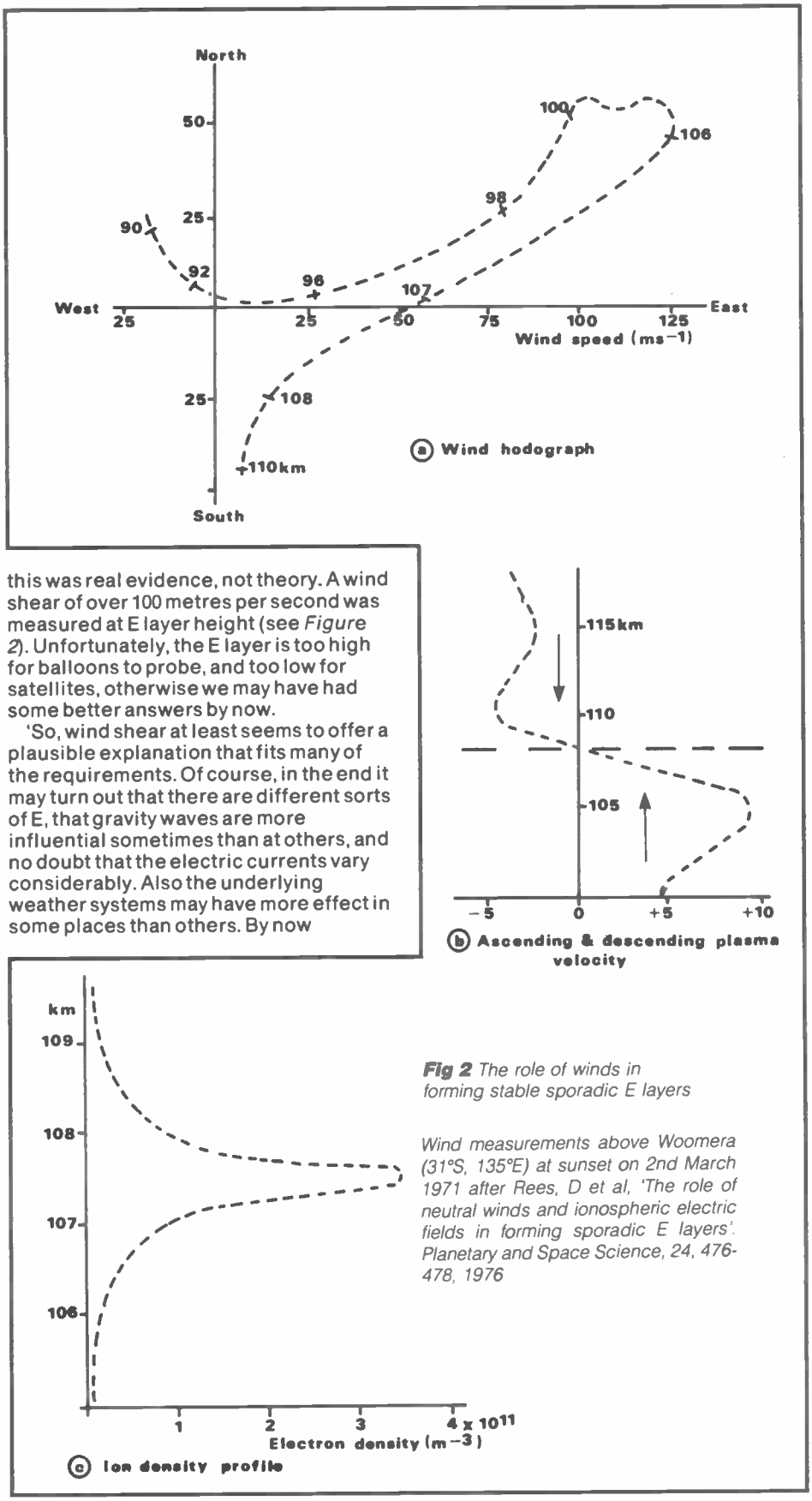


Fig 2 *The role of winds in forming stable sporadic E layers*

Wind measurements above Woomera (31°S, 135°E) at sunset on 2nd March 1971 after Rees, D et al, 'The role of neutral winds and ionospheric electric fields in forming sporadic E layers'. Planetary and Space Science, 24, 476-478, 1976

perhaps you can see why the bulk of our sporadic E is to the South, or South East – the concentration is stronger there. Over Scotland the H field is only 0.15 units, whereas over the Mediterranean it is 2.5 to 3.0 units.

'There are of course nagging problems. At the very high frequencies, ie 144MHz, theories suggest that it is just not possible to concentrate enough ionisation even with considerable wind shear. It brings us to the most major question of the lot: How do we get a 50MHz signal across the Atlantic? Is it by a series of E patches and wind shear in just the right places? If so, then why does it only occur on a seasonal and time basis? If you think that your theories can explain what wind shear cannot, then we would all like to hear about it, or do we have to go back to the drawing board and look for other explanations like electron gradients at the polar/temperate zone ionospheric interface? I have my own ideas, but who knows?'

References

S Whitehead – *1970 Review Geophysics and Space Physics* – V8, 65, 144.
D Rees – *1976 Planetary and Space Science* – V24, 476, 478.
Kersley I Walker – *1987 Conference Publication 247* – IEE 180, 181.

The 50MHz reporting club

The first report from the 50MHz reporting club has just been circulated to members. Membership was limited to 50 members (36 British and 14 overseas members).

The report is a summary of the 42 reports received and covers the first 12 months of the release of 50MHz to all class A licence holders, albeit with severe restrictions on ERP and only between 50 to 50.5MHz, but without any time restrictions.

On the first day of general release (1st February 1986) over 200 stations were heard on the band, and since then numbers have increased steadily. 626 stations have been heard on the band in Great Britain and Ireland, and 77 stations elsewhere in Europe. These have been recorded either operating on 50MHz or have been heard working crossband and receiving on 50MHz. 6 stations were reported from Portugal, 18 from Federal Germany, 14 from Spain, 3 from France, 2 from Switzerland (plus 1 from 4U1ITU), 8 from Norway, 4 from Austria, 4 from Finland, 8 from Denmark, 1 from Holland, 3 from Sweden, 1 from Rumania, 1 from Jugoslavia, 1 from Gibraltar, and 1 from Malta.

Overseas beacons which are monitored regularly include 5B4CY, FY7THF and OX3VHF, with LA3BQ and W2CAP being observed occasionally. Expeditions to Azories, Iceland and Greenland have also provided contacts during the summer months.

Several stations reported working a large number of QSOs, one claiming over 800. Most contacts were by extended groundwave of up to 200km. Under good summer anti-cyclonic weather conditions, distances up to two or three times as great were worked. The summer sporadic E season (May to October) provides excellent communication conditions over ranges from 500-2000km, and there were several good openings to the Americas, Greenland, and Iceland at two or three times the distance possible for a single reflection from sporadic E ionisation.

1987 is a year of special interest in that sunspot activity is at a minimum. Until recently it was thought that all forms of long distance propagation at 50MHz, or even 28MHz, were phenomina appearing only during years of sunspot maxima. Our results during the last year have shown this idea to be fallacious.

Under normal conditions, at latitudes as far North of the equator as Britain, propagation via the F layer is most improbable at 50MHz during sunspot minimum, but sporadic E, which is generated almost certainly by a wind-shear mechanism, has proved to be better during periods of low solar activity.

The summer sporadic season opened on 28th April and finally closed for 50MHz on 2nd December (this year the sporadic season opened a few days earlier – 20th April).

From mid-May to mid-September conditions were very good, propagation often lasting almost daily from very early morning until nearly midnight. The only blank days when no sporadic E was recorded totalled 5 in May, none in June, 7 in July, 1 in August and 3 in September. Conditions on 28MHz are almost invariably good when 50MHz is usable, and hence crossband contacts on 28/50MHz provide an excellent form of communication.

Stations in North America were worked by British stations on the 9th, 12th, 17th, 19th, and 21st July, and the pattern differed from previous years when openings tended to occur at the beginning and end of July. One very noticeable factor is that very few American stations were active. On the 9th N4VA was reported over a wide area, (Jersey to the Midlands) at 2200-2250Z, but no other stations were recorded. Similarly on the 12th WA1OUL and W2CAO/1 were the only stations reported.

W6JKV/CU2 working portable from the Azores worked the USA practically every day, and in addition worked British stations on 26th June and 3rd July 1986, and the FY7THF beacon was heard in Britain on 29th and 31st May and 2nd, 4th, 5th, 6th and 7th June and the 4th and 9th July in the late afternoon and evening. OX3VHF was heard during the February aurora (probably by auroral E) and sporadically during the summer E season, usually for short periods associated with the USA openings. On 24th June OX3LX worked several British stations around 1830Z, and reported hearing ZB2VHF at good strength. LA6HL/TF from Iceland worked British stations on 50MHz on the 8th and 9th July 1986.

In spite of sunspot minimum activity, transequatorial propagation on 50MHz was reported from the three main zones. JA1VOK reported several contacts between Japan and Australia/New Zealand and SV1DH on the African circuit, while it is understood several openings occurred between the Americas. There was also one report of a British signal being heard in the Argentine (presumably TEP plus Es).

Backscatter from British and Irish stations as well as the GB3SIX beacon was frequently reported during the transatlantic openings, but observations and reports show that backscatter is not an infallible indicator of transatlantic openings and is not always present when they occur. Interestingly its frequency of occurance seems to be greater than for one hop propagation to the South, for example.

Undoubtedly backscatter results will provide a powerful clue in determining exactly how sporadic E transatlantic signals are propagated, but before we can do so we must have a signal from which propagation time delays can be calculated. Steps to provide this facility are already in progress and will be discussed later.

What to expect this summer on 50MHz

Over the last two or three years the summer sporadic E DX season has followed a similar pattern. In fact GJ3YHU has reported openings to the USA at the same time and dates in 1985 and 1986, so it is reasonable to expect a repeat of some of the openings listed in the report to occur this summer. By the time this appears in print the sporadic E season will be well under way, as we have already had indications of Band I TV from the East and Spain, direct contacts with Portugal and Spain and crossband QSOs with European stations.

Solar and propagation information

The 2800MHz solar flux values S are quoted in the broadcasts made daily at the NRC radio observatory near Ottawa in Canada at local noon (1700GMT). However, although it is made in North America it is valid world-wide. The Ottawa S figure measures solar radio emmissions at 2800MHz. This frequency most closely approximates to the size of the visual sun. A lower frequency would, in effect, view a larger sun, while a higher one would see a smaller sun, and a very high frequency, ie X-rays, would see only spots. Consequently 2800MHz is the most appropriate frequency for this purpose.

At the bottom of the solar cyle daily S readings will be below 70. At times of moderate activity they rise to 100-130, while at times of intense activity they can exceed 200. Anything above 150 is considered high, and in the absence of any countervailing information, can be taken as a pointer to good HF propagation.

50MHz – WHAT TO EXPECT

Geomagnetic information

Every three hours the geomagnetic field is measured in three dimensions: horizontal (H), declination (D) and vertical (Z). The one showing the greatest variation at any time is for computing the 3-hourly K Index. Sometimes the bulletin will refer directly to this K Index, but more often it will express magnetic activity in terms of the 24 hours A Index.

The A Index is, in fact, derived from the K data, but where K is compressed into a 0-9 log scale, the A scale is linear and more extended and allows variations to be shown in rather finer detail.

Where a bulletin refers to quiet conditions, this means that over the period 0000-2359 A variations did not exceed 10 units, unsettled indicates variations of 10-20 units, 'substorm' or 'minor storm' means an A reading of 20-50 and 'severe storm' means 100-200 or even more.

At various times reference is made to special events which either have occurred or are expected, such as:

Coronal Holes

These are areas in the solar corona where helium 10830 A (Angstrom Units) have been detected by the Kit Peak Observatory USA. There seems to be a strong association between the presence of weak auroras and coronal holes. In practice it is only the more northern stations who can actively take part in this type of event, so they have tended to be called Scottish type auroras. An A index of up to 35 or 40 can result due to the passage of coronal holes past the sun's central meridian, especially if it is near the solar equator.

Proton Events

These are detected by satellites if the energy level is in excess of 10MeV (mega electron volts). They are given in the news as a guide as to whether active regions on the solar disc are intensifying or are expected to continue active as proton particles cause high absorption in the D region, and so affect the lower HF bands. They are also responsible for Polar Cap absorption which affects communication over the Poles.

Solar Filaments

These are, as the name implies, tenuous streams of flare type gases often protruding into space from the solar surface. It sometimes happens that one of these in a very active region will disintegrate very rapidly with considerable consequences on earth. A disintegrating solar filament was responsible for the wide scale visual and radio aurora of August 28th 1978. It was 0.8 of a solar diameter long and all but the stump suddenly disintegrated. These events are unpredictable, sudden and violent. In the UK the A Index can reach 100 plus with this type of event.

The interpretation of the solar and geomagnetic data is undertaken in the bulletins themselves. However, in general terms, an A Index of 25 or more may produce aurora conditions over Northern Europe and Scotland, although for aurora working from the South-East at least 45 is required, or about 60 if moderately powered stations are to participate. 90 plus is required for auroral working to be widespread throughout Europe.

A complete copy of this information sheet may be obtained from the Membership Services Officer RSGB on receipt of a SAE.

I received a telephone call from Jim Trebig W6JKV (see last month's mailbag) who was passing through London. He says that the sporadic E season started in the USA mid-April, with good conditions on 50MHz. He has applied for a permit to operate on 50MHz from the Virgin Isles during the 50MHz Contest weekend. Jim will be running 500 watts to two 6 element beams – one permanently beamed on Europe. And don't forget, Friday night is activity night on 50MHz.

Reports and information for this column to: Ken Ellis, 29 Stanbrook Rd, Northfleet, Kent DA11 0JW.

Starting Out

I had been searching for a short wave receiver to get underway with my new-found hobby of amateur radio. Someone at the radio club recommended I look out for an FRG7 so I put an ad in one of the radio magazines.

Several people rang with one for sale. They quizzed me about my interest in the hobby (was I really a fit person to own a radio?), and the same advice kept coming back – don't spend a lot of money on a receiver if you are planning to take the Radio Amateur's Exam. They were hopeless salesmen, but helpful and honest amateurs. But blow them, I wanted a set – and quick!

I called in at the local emporium somewhat naively to enquire about secondhand receivers. I explained I was a greenhorn. 'Are you looking for a VHF or an HF receiver, Sir?' I didn't really know. What would they advise? It depended on my interests. Was I planning to take the RAE? (The third degree again!) The prices quoted for secondhand gear seemed astronomical and it wasn't available anyway. I decided there was a plot afoot to prevent me from obtaining a receiver and to make me sit the RAE. I was desperate.

Discisions made

Eventually, I rang CM Howes Communications, whose kits I had seen advertised. Dave G4KQH confirmed that he had an 80m version of their DcRx short wave receiver in stock. A friend suggested that I opt for the 80m band as it would provide me with a range of both local and European stations to listen to day and night, with longer distance stuff on occasions.

I arranged with Dave to call and collect the kit myself as he is not far from where I live. He said he would 'wind the coils' as I drove over, whatever that meant! When I arrived I was ushered into the small workshop – an inner sanctum of amateur radio!

Dave talked about the kit in a modest but confident way. It had been developed from some local RAE courses he had run and proved very popular with course members. They learned about what goes into a radio and ended up with sets they had built themselves and which actually worked. I was tight for cash at the time and deliberated about buying a case in which to put the works. Dave seemed a bit embarrassed that the case and the hardware cost more than the kit. I wanted something that looked like a radio so I bought the lot!

The Howes DcRx is a direct conversion design. Incoming signals are converted directly into an audio frequency resulting in a much simplified superhet receiver (see block diagram). It operates from a recommended 12-14V dc power supply, although mine works well from a small 9V battery. You need to supply headphones or an 8 ohm speaker. The kit can form the basis of a low power (QRP) Morse (CW) transmitter and reciver when you are licensed, using other kits in the range or indeed your own designs. (Whilst on the subject of QRP, Douglas DeMaw's book *QRP Notebook* published by the American Radio Relay Leauge is a good way of getting into the subject).

Although I had done a little soldering before, the fact that I had never tackled a project like this mattered not one jot. The instructions were very clear and included some hints on soldering. Dave even tells you about the bits you might find a little tricky which in the event made them quite straightforward to tackle.

No special tools are needed, apart from a small-tipped soldering iron of about 30 watts, some small side cutters, a pair of long-nosed pliers and a trimming tool. A set of tweezers can be substituted for the long-nosed pliers if your electrical tool kit is like mine. Making the holes in the case involves the inevitable electric drill and bits plus a rat-tailed file. You'll need a couple of screwdrivers, too.

Each kit comes with all the parts needed, including a printed circuit board together with a parts list. Reassuringly, all the bits were there. The step by step instructions were very easy to follow and there's a helpful check list once you have finished the soldering. It is important to read through the instructions first which gives you a general picture of how things progress. It reduced my impatience too because I knew what stage I was at in relation to the finished article – very important when you are as desperate as I was to listen to short wave transmissions!

The first step is to fit the resistors to the printed circuit board. The board is clearly marked showing where the parts have to go so it's hard to go wrong at this stage. Re-checking the joints for their soundness is good advice at the end of each stage as there is less clutter around on the board if you need to resolder a component.

Next the diodes and integrated circuits are fitted, taking care to fix them the right way round and not to overheat them. 'Cooking the chips' can happen to experienced constructors too apparently!

Soldering on the three transistors comes next, ensuring that 6mm of the leads show above the PCB, unlike the resistors earlier which mostly lie flat or occasionally up on their end if space is limited. Advice is given along the way so no decisions about positioning are needed.

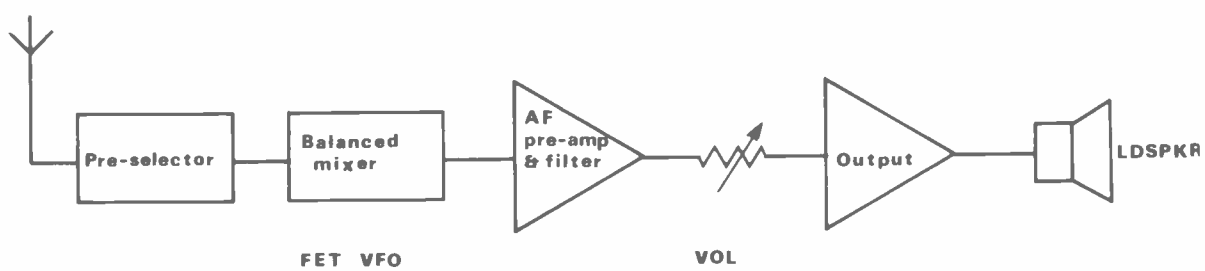
Triple checking

After a link wire to the PCB is soldered in position using an off cut from an earlier component, the three coils are installed. Extra care is needed in locating the wires in the correct holes as incorrect connections at this stage is the most common mistake made by constructors. Only solder after triple-checking!

CM Howes will supply two 50pF variable capacitors (the ones that tune the stations in, that is!) which are recommended for full band coverage. In the 80m version of the set I built, a 22pF capacitor (supplied) is wired across the terminals of one of the variable capacitors. If larger value variable capacitors are used, this item is not needed.

I had an experienced amateur confirm that my 'joints' were all OK (they should be smooth and shiny) before I mounted the printed circuit board, tuning capacitors, volume control and sockets in the case. There is a suggested layout given, which I followed. I realised afterwards that it would have been easier to have marked out the holes for the PCB on the inside of the case before

Block diagram



soldering the components to it but otherwise only patience at this stage was needed so as not to drill any unwanted holes! A 500mA fuse is recommended in the power supply lead or in the receiver itself.

Once I had grasped the concept of 'alignment' (or 'twiddling' if you prefer the term!) adjustment of one of the coils was very simple. Another short wave receiver was used to tune the rig into the band. Connecting the receivers via their aerial sockets is suggested as the ideal method, but is not essential.

Calibration of the dial was achieved by plotting the line between two stations of known frequency at each end of the band on graph paper. Other methods are possible, including buying and building CM Howes crystal-controlled frequency marker!

Did it work first time? Well yes and no! After I'd discovered that I'd wired the output socket for the loudspeaker/earphones wrongly, the rig was suddenly alive and hissing.

It took me quite a while to appreciate that the iron core inside one of the coils had a habit of shifting its position as I moved the radio from place to place. This meant that having aligned the reciever by tuning this coil (the only bit of 'twiddling' necessary in case you're wondering), I found that regular stations, eg the RSGB News, tended to change position on the dial. I hit on the idea of dropping a bit of candle wax down the core to secure it. I thought this quite ingenious until I discovered that there is some special stuff available for this very job!

The end product

The end product was quite amazing. There were all the stations I had been promised including ones in Canada, the USA, Australia and New Zealand, all with a random length of long wire for an aerial. Advice about erecting a simple dipole aerial is given in the instructions.

This little set, in a neat professional looking case, taught me about hand-capacitance, the significance of an earth and how the propagation of radio waves was affected at different periods during the day (and night!). I was also beginning to pick up some of the radio amateur's language and particularly appreciated the friendly references made on the air to the presence of short wave listeners like me.

The receiver remains in regular use and I've loaned it to other budding radio amateurs, remembering how it felt to want to get my hands on a set.

Dave at CM Howes is on the end of a 'phone if you need help at any stage. Should you really get stuck, you can return the kit to him with a small fee and he'll fix it for you.

In short, I think the CM Howes Communications DcRx receiver represents terrific value and gives amazingly good performance from a simple design.

Taken steadily (it's the way I work!), the complete kit can be built and fitted in its case by a beginner in a few hours or less. I've proved it and it does wonders for the self-esteem.

There are different versions, ie for 160m, 80m, 40m and 20 or 30m bands. Currently the kit costs £15.30 plus 90p for postage & packing. The fully assembled PCB can be bought for £20.90, but that's no fun, is it? A case, two tuning capacitors and all the necessary hardware can also be purchased from CM Howes for an additional £15.50. Why not have a go?

YES MINISTER, BUT . . .

Under the title 'Thank you Minister', *Radio Communication*, May 1987, carries a rather encouraging interview with John Butcher, MP, Parliamentary Under-Secretary of State to the Department of Trade and Industry. Mr Butcher was very supportive of amateur radio in his comments, and said that if he were not so busy in other matters he might even become an amateur himself. The RSGB, not surprisingly, found it heartening that the Minister who is ultimately responsible for our hobby had a positive and comprehensive view of amateur activities, and expressed the hope that it would be possible to capitalise on his and the Department's goodwill for the Society's future endeavours.

There is no reason to doubt the Minister's support, and the present good relations the RSGB has with the DTI, but there is a chill wind in the air which may change all that.

The government sponsored report by management consultants on deregulation of the radio spectrum in the UK has now been published. Despite earlier speculation that amateur radio would be outside its terms of reference, its comments on the subject give considerable cause for alarm if there is any possibility of its recommendations being adopted as government policy.

Commercial terms

The basic recommendation regarding future licensing is already well known. It is proposed that users of the radio spectrum should pay the market price for what is now regarded as a marketable commodity. For substantial portions of the spectrum it is recommended that a new form of licence, a Spectrum Management Licence (SML), should replace existing licences. Such a licence would be issued to Frequency Planning Organisations (FPOs) who would be primarily concerned with sub-licensing the use of the spectrum on commercial terms to end users.

The report reviews amateur use of the spectrum as follows: 'Amateur users have primary use of 2.9MHz in the HF band, 2.5MHz in the VHF and 50MHz in the SHF. In addition, secondary allocations have been made in all bands. These allocations have been adopted internationally in virtually all cases, either within Region 1 or world-wide.

'Licences for amateur users cost £12 a year in the UK currently. An amateur typically pays £2000 for equipment, and there are about 56,000 current licence holders of whom only 27,000 have class A licences with access to HF bands. The remainder are class B licence holders, who are restricted to the use of the bands above 144MHz only . . .

'The benefits of amateur radio use accrue to both the individual amateur and to the nation as a whole, through the generation of interest in radio techniques. In addition, there are significant educational and research benefits. Specific examples include: personal educational benefits; initial training and experience for future professional radio engineers; experimentation, amateur research, and propagation tests; and use of amateur equipment in emergencies.

'These benefits by their nature are extremely difficult to quantify, but it should be noted that many radio engineers' interest in radio started through their becoming amateur users.

'The number of amateur licences is currently rising at about 3% per annum, and this gradual rate of growth may be expected to continue, so that by 1995 we forecast that there will be a totalof 70-75,000 amateur licences in the UK, assuming no significant changes in current licensing procedures and charges'.

Rationing

The report discusses the activities and needs of all spectrum users in a similar way, at the same time exploring the bases on which charges for use could be applied. If, for example, demand exceeds supply, prices can be used as a means of rationing spectrum among alternative users.

In making recommendations about amateur radio, the report says, 'We accept the argument that the spectrum allocation process should make some room for access by members of the public for non-commercial users, and for such use to be available on non-commercial terms. An analogy can be drawn with the allocation of land; although most land is allocated to owners for their private use by the price mechanism, parks are maintained by public authorities for recreational use by the public. It is our opinion that the quantity of spectrum set aside for amateur use is larger than economic considerations would dictate, although this judgement is difficult to prove quantitatively. Therefore, we would recommend that the UK government apply pressure in international discussions to avoid further increases in this allocation, or even to reduce existing allocations. However, so long as the principle of amateur use is to be recognised, the implication that amateurs must have access at a price consistent with their amateur status (as opposed to a price consistent with the commercial opportunity cost) must follow.

'We propose therefore that amateurs should continue to enjoy a degree of protection in the following way:

■applicants for SML status should be required to accept the existing amateur allocations within their band (primary and secondary) for a minimum period of five years.

■FPOs should also be reauired to accommodate any future amateur allocations, primary or secondary, when they are internationally ratified following WARC/RARC decisions.

'Citizens band radio presents a case somewhere between that of amateur and that of other mobile radio users. Like amateurs, they are hobbyists whose use is (or should be) primarily recreational rather than functional. The similarity between citizens band and amateur radio has been increasing recently, due to the acquisition of amateur licences by increasing numbers of people with much lower technical skills (and a different motivation and orientation) than the traditional amateur radio enthusiast.

'Nevertheless, we believe that the distinction between amateur and CB radio users is important, and should be reflected in their spectrum licensing status . . .

When it comes to implementation, the report recommends three distinct rounds over a period of ten years, until the majority of spectrum in the VHF, UHF, and SHF bands and selected bands at higher and lower frequencies have been allotted under spectrum management licences. Amateur radio is not specifically mentioned in the proposed timetable, and it must be assumed that individual bands happening to fall within part of the spectrum allotted to a particular FPO can be taken into the system at any time during the implemantation period.

Not proven

Some of the comments in the report are fair and reasonably well informed, but all amateurs must surely take exception to the statement, 'It is our opinion that the quantity of spectrum set aside for amateur use is larger than economic considerations would dictate, *although this judgement is difficult to prove quantitatively*'. If it cannot be proved, such a statement should not be made. To then recommend, 'that the UK government apply pressure in international discussions to aviod further increses, or even to reduce existing allocations', is an apalling and totally unjustified response to an unproven judgement.

Amateurs have fought for and established their place in the international radio spectrum over a period of 80 years. They cannot be dismissed and pushed aside in a few glib words by 'management consultants' seeking to justify their brief at whatever cost.

If the recommendations of this report

ever become government policy, the UK's major input in support of amateur radio at international conferences will no longer exist. Not only British, but international amateur radio will be the loser because on many occasions it is the work of the UK delegates and their advisers behind the scenes which has won the day for amateur radio when under attack by countries less sympathetic to the needs of the hobby.

Confusion

What is meant by the need for applicants for SML status to accept existing amateur allocations for a minimum period of *five years*, when the very next recommendation says that FPOs should be required to accommodate *any* future amateur allocations ratified internationally?

Is that also for five years? If so, what happens after that? Will the FPOs be free then to put the amateur allocations on the market to the highest bidder?

If, instead, it means that FPOs will *always* have to observe international agreements, why is it necessary to mention a five year period at all? The trouble with reports of this kind is that the organisations created from them take on a personality and character of their own, often some distance from the original ideals. How long will it be before the hard-headed business men sitting round the board table, whose sole purpose is to get money out of spectrum users, will look at the privileged amateurs in their protected 'parkland' and say, 'its about time these people paid their way like everyone else?'

Danger

The report says the right things about amateur radio in parts, it even puts in a reasonable argument for a continuation of our amateur status, but it leaves what is to be done about us wide open to interpretation, and its recommendations on frequency allocation spell D-A-N-G-E-R to us all.

The report is not government policy yet, and the DTI is inviting views and comments from interested parties. Amateur radio could well be facing its most serious crisis for years. What we need is a rejection of the recommendation for reduced frequency allocations, and a cast-iron definition of our amateur status to be built into any plans for setting up FPOs, together with a constitutional direction that they are unable to interfere with that status.

What can be done?

Undoubtedly, the major input of the amateur viewpoint to the DTI will come from the RSGB. This is a time when the Society needs the support of *all* amateurs. If you are not a member you should seriously consider joining now, for the protection of your hobby. If you already belong, you should write to the RSGB expressing your views on what it should say to the DTI. If you also belong to a club persuade them to write to both the RSGB and the DTI.

So often, when important issues are raised there is complete indifference among the majority of amateurs. Will it be the same on this occasion? There will be no pleasure in a few years time, to put pen to paper again and say, I told you so!

The report on *Deregulation of the Radio Spectrum in the UK*, by CSP International, costs £9.50 from Her Majesty's Stationery Office.

PROJECT BOOK

by Martyn Williams

A most useful piece of equipment to have around the shack is a reliable RF powermeter, whether it is simply used to keep an eye on the performance of your equipment or is used as an aid to align home constructed equipment. The cost of commercial gear can be very high, but the meter can be home brewed with a little care. The unit to be described is simple to build, accurate up to at least 70cms and is usable with slightly reduced accuracy up to 1296MHz.

Ranges

Two ranges of power measurement are provided giving full scale readings of a nominal 20 watts on the high range and 2 watts on the lower one. This last range is very suitable for tuning up low power driver and multiplier stages. The ranges could be easily altered to suit your own requirements, it being simply a matter of calculating the meter circuit resistors to provide the calibration you require.

How it works

If you feed the output from your transmitter into a dummy load (or an aerial) then an RF voltage which is proportional to the power in the circuit is developed across the load. If we now rectify the RF voltage we shall obtain a dc voltage, still proportional to the power, which we can now read on a dc meter. This can then be calibrated to read power directly or a calibration graph can be drawn. The maths involved is simply Ohm's law. For instance, if we measure 50 volts on a 50 ohm load then Ohm's law tells us that there must be a current of 1 amp. Power is simply stated as volts times current, so in this example the power developed must be (50 times 1) 50 watts.

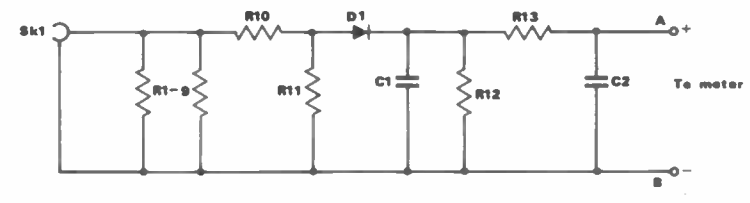
Your choice

If you want to change the ranges to suit your requirements the above information is all you need to know except that, for purposes which will be explained later, the meter only indicates *half* the expected voltage. This means that for a 50 watt range the meter should be set to read only 25 volts full scale. The wattage rating of the dummy load resistors (R1-R9) must also be increased so as to take the higher power without overheating.

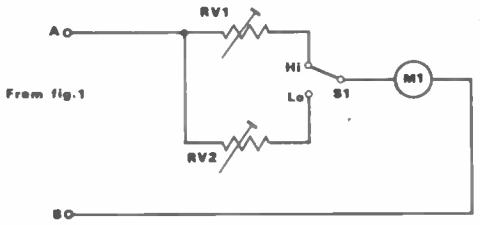
Metering

You have several choices here. If you already have a suitable multimeter, then the unit can simply be fitted with a couple of terminals connected to points A and B on *Figure 1*. The external meter, set to a suitable range, can be connected to these. However, it is probably more convenient to fit a meter to the unit and to use a small toggle switch to set the range.

The circuit for this is shown in *Figure 2*, from which it can be seen that VR1 and VR2 can be used to set the meter to compensate for any slight error in the circuit values. This requires comparison with the readings taken on an accurate power meter and if this is not possible then VR1 should be replaced with a fixed resistor of 12k and VR2 with 2.7k ohms. The range switching components can be mounted on a small piece of Veroboard or simply hung in the wiring.

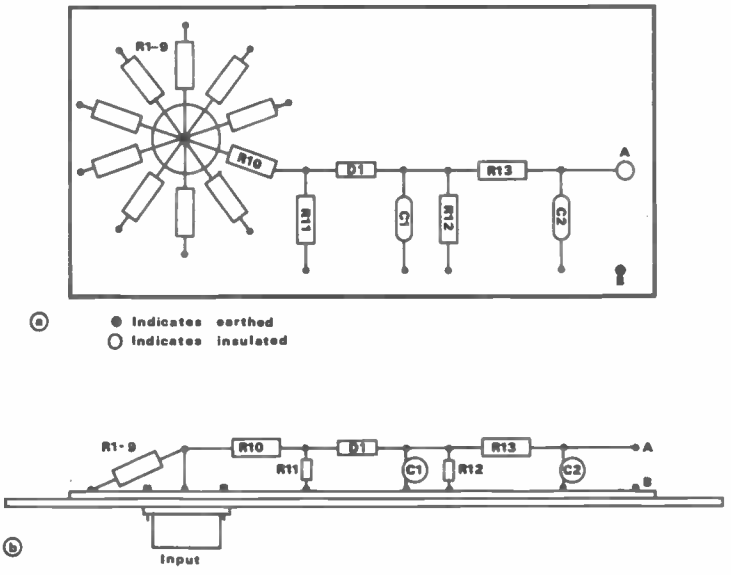


▲ **Fig 1** *Head circuit*



◀ **Fig 2** *Metering circuit*

▼ **Fig 3** *Head layout*



Low Range

Reading		Watts
0	=	0.0
1	=	0.02
2	=	0.08
3	=	0.18
4	=	0.32
5	=	0.50
6	=	0.72
7	=	0.98
8	=	1.28
9	=	1.62
10	=	2.00

High Range

0	=	0.0
1	=	0.18
2	=	0.72
3	=	1.62
4	=	2.88
5	=	4.50
6	=	6.48
7	=	8.82
8	=	11.52
9	=	14.58
10	=	18.00

Construction

The most critical part of the whole unit is the dummy load; if you make a sloppy job of this the upper frequency accuracy will be reduced. If you want to use the unit above 146MHz then you *must* use an N or BNC type socket on the input; SO types are not 'constant impedance' and will not do, they are also far too lossy. The unit should be built in a die-cast box with dimensions of about 5 × 3.5 × 2 inches. Mount the input socket about one and a half inches in from one end on the longer side face of the box. Cut a piece of PCB material to fit inside the same face, and securely fix it using the mounting bolts of the input socket. A nut and bolt should be used to fix the other end of the board to the box. The meter and switch should be fitted as required.

Components

Head Circuit

R1-9	470Ω 2W
R10-R11	220Ω 1W
R12	4K7Ω ½W
R13	2K7Ω ¼W
SK1	N or BNC socket
D1	OA81 or similar
C1-2	.01 disc ceramic

Metering Circuit

VR1	22kΩ preset (or 12kΩ ¼W)
VR2	5kΩ preset (or 2.2kΩ ¼W)
M1	1mA meter
S1	SPDT toggle switch

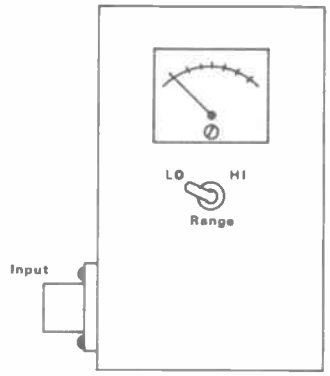
Measuring

The dummy load resistors R1 to R9 should now be mounted from the input pin to earth using the *shortest possible* lead lengths; this cannot be over emphasised. The remaining components can now be mounted and again all lead lengths up to, and including, those on C1 should be kept short. From this point on we are only concerned with dc and lead lengths are of little consequence, *Figure 3a* and *b* should make the construction clear.

Calibration

The figures given in *Table 1* assume that the meter scale is calibrated from 0 to 10. If this is not the case some mental gymnastics are required. If you have not fitted the presets then your meter is now ready for use. To set up using the presets you will first take a power output reading using a reliable meter. Now connect your own meter and adjust the presets to give as accurate a reading as you can. Repeat for the second range. This should be done using as high a frequency as possible to get the best accuracy, but keep in mind that no meter movement is completely linear. There will be some loss of accuracy across the scale, although this should not amount to more than one per cent or so.

Fig 4



Final notes

If using external metering remember that full scale deflection on the low range is 5 volts, and 15 volts on the high range. The reason that the output is only half that expected is because the diode is fed from a tapping on the load resistors to avoid excessive volts blowing it. The tapping also reduces loading effects on the input from the metering circuits, which would reduce the overall accuracy of the power meter.

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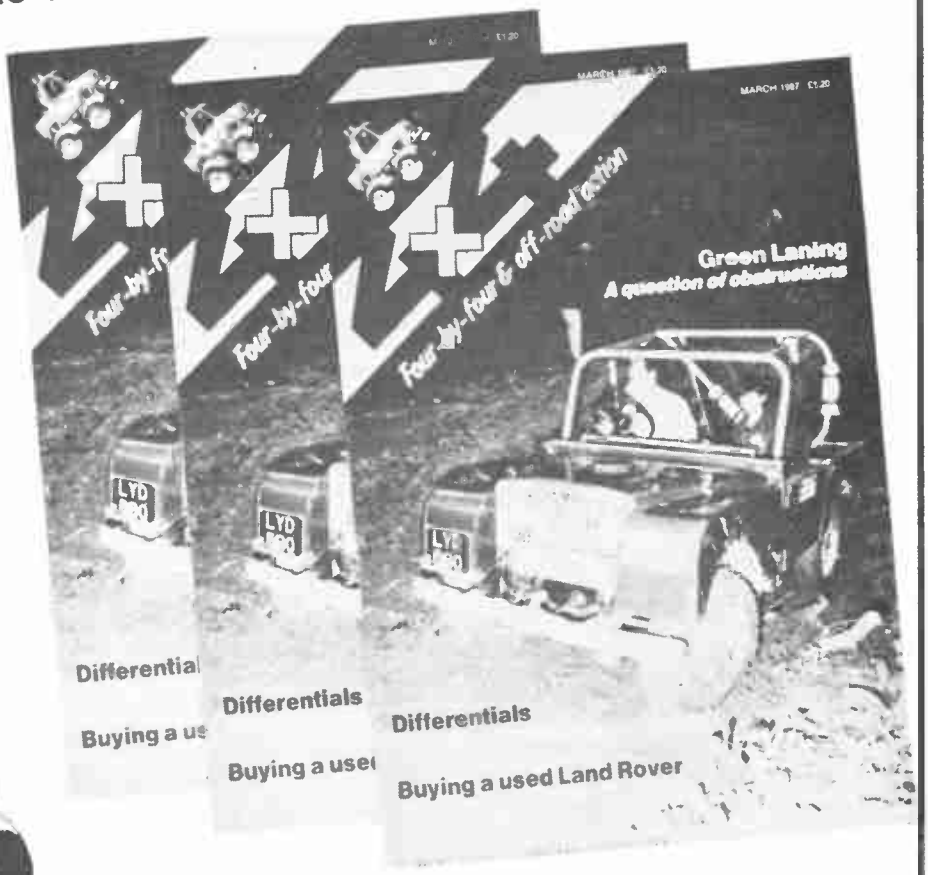

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Tony Smith G4FAI takes his bimonthly look at the world of dots and dashes

Few can have missed the media reports on 18th April about the CW SOS picked up by British Telecom's Lands End radio station, resulting in the rescue of the crew of a Cypriot cargo vessel in the western Mediterranean.

There was a time when stories of life-saving by Morse signals were commonplace, but they are rarer nowadays as Morse is used less and less. With this in mind, I asked BT just how much Morse their coastal stations still use today.

I was told that it is still used for ships' telegrams, weather reports, and navigational weather warnings, and all coastal stations still maintain a 24-hour watch, 365 days a year, on the wireless telegraphy distress frequency of 500kHz. It was on this frequency that Lands End heard the SOS from near Gibraltar.

Morse signals must have saved thousands of lives in the 75 years since the Titanic's SOS in 1912 saved over 700 from an icy grave. It is reassuring to know that good old-fashioned Morse telegraphy can still come to the rescue in these days of hi-tech communications.

Yeovil convention

As I write this, I have just returned from the third QRP Convention organised by the Yeovil Amateur Radio Club, on 10th May. As I indicated last time, although the convention was concerned with operating at low power levels, the mode of operating was almost entirely CW, with nearly a hundred enthusiasts signing in.

The morning lecture was by Rob Micklewright G3MYM, on the subject of 'Chordal Hop Propagation'. Like everyone else, I knew that it was possible for QRP signals to get to the other side of the world, arriving in VK, etc at good strength. Now, not only do I know that this *can* happen but *how* it can happen. The Yeovil Club is fortunate indeed to have such a fine 'resident lecturer' as Rob. He can put over a complicated subject to an audience of mixed abilities in such a way that everyone gets something from it.

In the afternoon, Chris Page G4BUE, talked about 'Construction Techniques', handing round a fascinating range of home-constructed QRP CW equipment, including his now well-known 'Fag Box(0)' transmitter, complete with key and power supply, housed in what is apparently a completely full packet of cigarettes. There were lots of hints and tips on home construction for everyone, from 'ugly' construction for those who just like to 'knock things together', to the superb professional style of projects designed and constructed by George Burt GM3OXX, who, as all G-QRPers know, has a very special place in the world of QRP.

So, if you didn't get to Yeovil, you missed a lot. Good company, interesting informal discussions on plenty of Morse related subjects, and an exhibition containing a variety of home-made projects of almost infinate ingenuity.

Class B morse

Morse enthusiast Angie Sitton G1XEO, received such conflicting advice from other amateurs, interpreting the RSGB's guidelines on the use of callsigns in class B CW operating, that she wrote to the DTI for clarification. She had been assured locally that she need only send her callsign in clear, easily read, Morse to meet the licence requirements, and there was no need to send her call by telephony since a guideline was not a regulation.

There was nothing confusing, however, in the DTI Radiocommunications Division's reply: 'I should emphasise the requirement to identify your station by telephony even when practising Morse. The requirement is based on Clause 9(2) of your licence and so has the force of law. You may wish to note, however, that we are looking again at the need for this requirement although nothing firm has been decided so far. As matters stand now you must continue to use telephony identification of your station when transmitting.

Angie received her B licence on 16th February. Like many others, she put the class B Morse facility to good use in preparation for the Morse test, taking the test on 27th March with nothing but praise for the way it was conducted. She received her new call, G0HGA, on 15th April and tells me she has been enjoying QRP CW with an HW9 since then.

No Morse test?

I have previously speculated on what would happen if there was no Morse test at all, so I was particularly interested to hear from Mike Molina EA3FHC, about what happened in Spain. In 1979, without consulting amateur organisations, the administration abandoned the Morse test. A number of amateurs objected, but overall the move was welcomed, and in the period 1978-81 the number of amateur licences increased from 15,000 to 30,000.

Since then, says Mike, there has been a 'cold war' between the defenders of Morse and the non-Morse amateurs. As a result of this the Hispania CQ Club (HCC) was created, with 200 members dedicated to keeping Morse alive.

Then, in May 1986, came another bombshell.

The Morse test was re-introduced and the controversy became worse than ever! Now there are class A and B licences as in Britain, with a 12wpm requirement for class A, together with a novice requirement of 8wpm.

Those who obtained a licence before the new regulations don't need to take the new Morse test, although from 1979 to 1986 a number of amateurs voluntarily did take a test to show their disagreement with the regulations.

According to Mike, the administration consulted amateur organisations before introducing the new licences, and Spain now has one of the most progressive licence structures in the world. He points out that under the 'no Morse test' regime many countries would not recognise Spanish amateur licences.

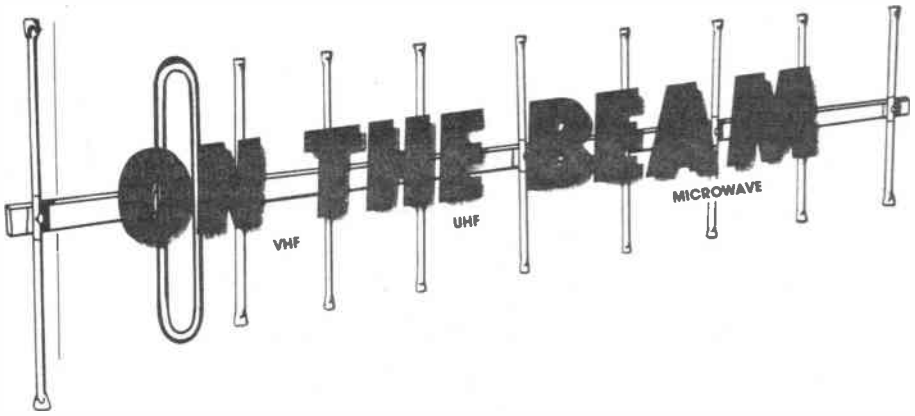
Now Morse telegraphy is on the increase again in Spain, and training courses are over-subscribed. As at last October, however, out of 30,000 amateurs, only 400 actually knew Morse!

Speed method!

Hugh Allison G3XSE wrote following my appeal for suggestions on increasing one's speed. 'I learnt from 0 to 18wpm in six weeks when I was 16 years old, but, although good enough to pass the test, I was never comfortable at speed.

'One night at the club we all went out drinking, then came back and went on the air. I was amazed to find I was reading 30wpm and could write it down without thinking. Thereafter, no problem. I presume that getting sloshed relaxed me and removed my lack of confidence.

This method of increasing your speed is now known as the 'Allison' method. It isn't guaranteed, but it's fun trying!'



News and comment from Glen Ross G8MWR

First things first: a hearty three cheers to the RSGB for getting us two new bands and a total of 2.5MHz of new airspace. For those of you who lead an ostrich like existence, let me break the news to you that we now have full class B participation at both 50 and 70MHz, and that the band limits have been extended to 50 to 52 and 70 to 70.5MHz.

The new bands become available at 0001 on 1st June, but remember you keep your log in GMT, so this is actually 2300GMT on 31st May!

Historical

We did have an allocation in this area before the war and also for a short period afterwards, but this was lost when the BBC television system came back on the air. A few years ago the RSGB managed to get permission for a few permit holders to use the band outside TV hours and this facility was later extended to 100 operators. At this point there was a lot of pressure for the RSGB to get an all class operation when the band became available.

When the class A only allocation was announced there was considerable unrest to put it mildly, but the hope was expressed that we would all get it in the near future. An announcement at the NEC rally did not raise much hope of an early release to class B operators, so the present release of the band and its extension comes as a very pleasant surprise.

What do we get?

We get primary status between 50 and 51MHz and secondary status between 51 and 52MHz. What this means in effect is that we have the same allocation as most countries that have always had the bands available. There are some countries with restricted bandwidths, but even these fall within our allocation, so working the World should be no problem when the conditions are right. The old restrictions on /A and /P operating have been lifted, but there is still no permission for mobile operating.

On 70MHz we have some extra space but only with secondary user status. This means that you must not cause interference to other users, and if you do you can be ordered to cease operation on the band until the trouble is sorted out. The power limits on this band are 16dBW carrier power and 22dBW PEP, but these are generated power not radiated, so you can use as much aerial gain as you can get up aloft.

Aerials and power

The limitations on power and the aerials that may be used on 50MHz are still in force because of the possibility of interference to Continental TV stations which are still using the band. Because these stations use vertical polarisation our aerial systems must be horizontally polarised and not more than 20 metres above ground level.

The power restrictions are rather more complex than for the other bands and are defined in terms of the radiated, rather than the generated, power. This means that we have to take into account the gain of the aerial, which means a decrease in allowable generated power; and the losses on the cable, which allow a power increase.

Sounds frightening

It is not really as bad as it sounds and a couple of examples of the sort of thing that you might find at the average station will soon help to clear the matter up a bit. The actual figures are a carrier limit of 14dBW and a 20dBW limit on PEP, or SSB type transmissions. For our first example let us assume that you are using a dipole and that your aerial feeder has 3dB loss. Under these conditions the maximum generated powers are 200 watts PEP or 50 watts of carrier. If you were to use the same feeder and a small yagi with a gain of 6dBd, then the levels would be 50 watts PEP or 12.5 watts of carrier. Note that these figures have been rounded out slightly.

How about losses?

If your feeder loss is higher than in the example, then you can increase your power by the same amount as the extra loss incurred in the feeder. Equally if your aerial gain is higher than in the example you must reduce the power by the same amount as you have increased the gain.

You should know the gain of the aerial you are using, but to help you with the feeder losses the following figures may help; they are all calculated for a 25 metre cable run and show losses of 4dB for UR 59; 2dB for UR43; 1dB for UR67 and .75dB for H100.

Twice the cable run means doubling the figures and half the cable length means halving the loss figures; other lengths work out pro-rata.

Who is there?

For a first class review of the band and what to expect, you cannot do better than read the series we are publishing which has been written by Ken Ellis G5KW. As far as activity goes, the band is readily available to amateurs outside Europe, Africa and Russia.

In Europe the band is available, usually with some restrictions, in Eire, Portugal, Gibraltar, Norway, Spain, Iceland and Greenland. Future operation is also possible from Yugoslavia, West Germany, Malta and Cyprus. The modes of transmission which we are permitted to use are Morse, RTTY, Telephony, Data, SSTV and Facsimile.

Beacons

A good indicator of band conditions can be obtained by monitoring the various beacons that are operating on the band. The listing given in the table shows only a small selection of those on 50 and 70MHz.

Band plans

Looking at 50MHz first; 50 to 50.1 is for CW only; 50.1 to 50.5 is for narrow band modes. There are no nominated calling frequencies on the band, but general usage seems to be 50.2 for SSB, 50.3 for CW meteor scatter and 50.35 for SSB meteor scatter.

50.5 to 51 is designated for all permitted modes, 51 to 51.1 is kept clear for .DX working into the Pacific area, and 51.1 to 52 is designated as all permitted modes.

The 70MHz plan

On 70MHz we have 70 to 70.15 CW and beacons, 70.15 to 70.26 for CW and SSB with 70.2 being the SSB calling frequency. 70.26 to 70.4 is all mode with 70.3 being the RTTY calling spot and 70.4 to 70.5 the FM section with the calling frequency on 70.45MHz

Cautions

There are two things to bear in mind. Firstly, we have 50MHz, but if there is

serious interference to the Continental TV stations we could lose it much more quickly than we got it. Bearing that in mind means that you must keep your power to the minimum required to work the paths. 40 over 9 signals mean you are running more power than you need to, back it off!

Secondly, remember that the high frequency end of the normal broadcast band is around the second harmonic of 50MHz (there are also some rather sensitive users other than entertainment up there), and any spurious radiation could mean trouble. A good filter in the aerial feeder is definitely essential.

Equipment

Commercially an arm and a leg game, again! Home brew is the answer and our contributor Martyn Williams will be describing aerials, filters and convertors in the next few issues of the magazine; get the soldering iron out.

Sign off

News of the certificates and other matters have had to be held over to next month's issue, I doubt if you will mind that! Please let me have your news and comments at 81 Ringwood Highway, Coventry, or on Prestel using 203616941 as the MBX address. Good hunting on the new bands.

List of beacons operating on the 50 and 70MHz band

50.005	H44HIR	Solomon Is
50.010	JA2IGY	Japan
50.015	SZ2DH	Athens
50.020	GB3SIX	IO73TJ
50.025	6Y5RC	Jamaica
50.035	ZB2VHF	Gibraltar
50.045	OX3VHF	Greenland
50.050	GB3NHQ	IO91VQ
50.060	GB3RMK	IO77UO
50.062	PY2AA	Brazil
50.070	4U1ITU	Switzerland
50.075	VS6SIX	Hong Kong
50.088	VE1SIX	New Brunswick
50.099	KH6EQI	Pearl Harbour
50.110	ZS6LN	South Africa
50.500	5B4CY	Cyprus
50.925	ZS5VHF	Durban
52.200	VK8VF	Darwin
52.510	ZL2MHF	New Zealand
70.030	GB3CTC	IO70OJ
70.050	GB3BUX	IO93BF
70.060	GB3ANG	IO86MN
70.112	5B4CY	KM64PR
70.120	7B2VHF	IM76HE
70.130	EI4RF	IO63SN

SECONDHAND EQUIPMENT GUIDE

I was delving through some rubbish in the car boot area of a rally recently and came across a synthesized receiver board of some sort. I was instantly attracted to it due to it containing a Motorola MC145152 synthesizer chip, and, joy of joys, it was on a socket. I asked how much, and the seller proceeded to give me a tale of woe about the board, ending up saying something rude which basically translated down to 'give me ten pence and take it away'.

The interesting part about the seller's tale was that he had built this two metre FM board up from a kit. On completion it all appeared to work yet the synthesizer was unstable. What really intrigued me was the fact that he said the lock light was coming on. Now I have a great respect for the 145152, the lock light is a sophisticated animal, and if the light comes on it means the loop's locked, thus how could it be unstable?

Back on the bench

Back on the workbench, stuffing 12 volts up the board, helpfully aided by the fact that the seller had lost the circuits, layouts etc, revealed that the light was on and yet it was, indeed, jumping about frequency wise. What was wrong? The synthesizer was addressed from adders (to do the business on repeater shift), and there were no tie down resistors. The inputs to the adders were thus occasionally charging themselves up and the board was randomly hopping up and down the band. A handful of 10k resistors to earth later (I fitted 10ks for the best reason, a bundle of them were to hand) and the board was tamed. Moral: fit tie down resistors if required.

An interesting dilemma then arose. What to do with it? The board itself was a complete 2 metre FM synthesized receiver, with audio stages etc, plus a 'direct-on-two' buffered low level output for the transmitter. It was decided to try and build the cheapest ever two metre rig, just to see what could be done if you were determined.

A crystal controlled toneburst cost 5p at one rally and an old all transistor Cossor PA module was picked up at another for 10p. A switch bank to do the channels cost 15p and the mike, which looks disgusting but sounds great, was 5p. I must admit that, bored out of my mind one afternoon I built up the mic amplifier/audio processor/modulator on a scrap of veroboard, but it was built up out of bits from an old IBM power supply board that I'd bought five of for 10p. The result is a superb rig that looks a heap. Who says amateur radio is expensive?

I must admit to one mistake in the building of the above rig. I'd tried to use an ex CB switch and channel display out of a very dead Icom set, 'cos I knew it had a BCD type stepping system. Forty channels at 25kHz seemed ideal. Who forgot that CB starts at Channel 1 and goes up to Channel 40? Who had built a set that was one channel out all the way? Who got cross when amused colleagues suggested a permanently illuminated –1 sign be added after the channel display?

Buying chokes

A reader, thumbing through a stack of old radio magazines, had found a circuit for a VHF receiver he fancied building. He had scavenged all the components except a RFC (Radio Frequency Choke), which was somewhat scantily described in the article as choke, 200μH. He had tried a few suppliers with no luck, and eventually wrote into this magazine in the hope of getting some help. He had been offered 220μH by one supplier and was in a dilemma as to whether this would work or not.

When I was a little boy of ten my father bought me a radio kit which, it transpired when I tried to build it, had a choke missing. Between my father buying the kit and the attempt to build it up the shop had, of course, gone bankrupt. I wandered round dozens of suppliers before someone kindly looked at the circuit and gave me the correct one. It was thus my pleasure to try and sort this reader out.

A choke is a choke you might say. Wrong. For starters, how much dc current is flowing through it? Can it carry the required current without saturating or, indeed, burning out? If you look up some suppliers data for 500μH+ examples you would probably be quite surprised to see how little current they can carry, sometimes only a milliamp or so.

Often a choke is just used to stop RF getting into another part of the circuit, but even then care is required. The choke core may not be usable at the frequency you are trying to 'loose' and the RF goes straight through.

Another special case with a choke that can catch you out is where it is 'tuned' as a broadband filter into a device, often a FET. If you have, say, a 1000μH choke 'tuned' with an otherwise inexplicable 150pF capacitor in a 450kHz IF strip, take care, its value may be critical.

I hope the above has now given you an insight as to why it can be difficult sometimes to obtain a perfectly straightforward choke. In the end I did what the man did to me all those years ago. I asked the reader for a copy of his circuit. It was then obvious that, since the RFC was only keeping RF out of the audio, the 220μH (which is the nearest normally available present day standard value) would give him no problems, and so I sent him one.

IC255E

At a car boot sale at a local school I came across a very battered, very sad looking IC255E that had been 'got at' to a very high degree. In fact it had very nearly been fixed beyond repair. Still, a fiver seemed reasonable!

I was very pleasantly surprised to find that the only fault on it (apart from those inflicted during its previous 'repair', ie the twiddling of everything in sight and the snapping of ferrite cores etc) was a dodgy plated through hole in the vicinity of the high/low power switching transistor. Warning: if taking the PA module to bits, note where all the wires are dressed *before* you strip it down!

I then had, after re-aligning, a moderately working 2 metre FM synthesized rig with mike, but no power lead/plug. No sweat, in with a couple of insulated croc clips and the other end up the cigar lighter rat hole in the car. 36p later, spent acquiring a replacement fuse for the car, I rang up one of the importers to enquire about a proper lead.

Eight quid seemed a bit strong for a power lead for a rig that only cost a fiver. Well it did to me. Discussing my dilemma down the pub a CBer mentioned the goodly range of rig type plugs stocked by Tandy. Eighty pence later I had the correct lead! I must admit I was quite surprised to find such a good range of specialist stuff in the high street. Incidentally, if you need one of those impossible to get hold of miniature coaxial power plugs for the Sinclair 'flat screen' pocket TV, they stock them too.

Perhaps the early bird doesn't always get the worm?

A friend of mine is a grade one lazy so-and-so. For him the day doesn't start till the pubs open, and normally I see him arriving at rallies more or less as I'm leaving. I must confess to being a get-there-as-the-doors-open type myself, rushing round and buying all the bargains and setting off home by lunch time. It had never before dawned on me that he, too, often gets great bargains. If he wasn't there at the start, how was he doing it? One night, after he had perhaps had one too many, he let me into the secret of his success.

He works on what he calls the *they*

by Hugh Allison G3XSE

don't want to take it home with them principle. He plans to get there at the latest an hour or so before the close, and walks round eyeing up what he wants to buy. As soon as the trader/boot seller/ what have you makes a move to go, he is in there. His normal patter starts off by pointing out that the seller has obviously been trying to flog the item all day and it is severely overpriced; it must be because it hasn't sold. He then offers, normally, half the asking price and is amazed at how often it works straight off. If not, well, he has laid the grounds for a haggle and there is still a chance of a bargain. Quite a clever technique, and he gets a lay-in Sunday mornings!

Rigonda TVs

It's not often you get something for nothing, and, true to form, in this case when you get it you don't want it. Rigondas are small, neat, 240V or 12V, 625 line TVs by the way.

Here I am talking about the more modern Rigondas, the sort where when you take the mains power supply off the back there is a moulding sticking out for protection of the end of the tube, the model in question being either metal or plastic cased. Older Rigondas have a flat back with PSU removed, and are all metal cased. The hassel that is arising is due to a 0.1μF capacitor in the frame oscillator *increasing* in value. The symptoms start off by occasionally having to adjust the frame (vertical) hold control, always in the 'speed it up' direction. Next stage is an inability to get a lock, except on a strong signal, which is a real pain if you use them to receive amateur television via a converter. Finally, there is a total inability to lock at all, ie continuous vertical rolling. I hasten to add, by the way, that throughout all this gradual deteriorating the line lock has remained its normal excellent self.

The good news is that the 'faulty' capacitor is easy to spot. It's the only axial 0.1μF capacitor on the board. Axial, by the way, means the wires come out of each end (like a normal resistor), as against radial where both come out the bottom, like most electrolytics. The value of the replacement capacitor is quite critical. Quite a lot of your average 0.1μF capacitors are $\pm$20%, and 0.12μF seems too much capacitance, causing both lock and linearity troubles. I have now repaired so many of these TVs that I have a set sequence for repairing this fault.

First of all, remove the offending frame timing capacitor and check its value (quite often it has nigh on doubled). Now the golden rule, do not touch the frame and frame linearity internal pre-sets. Instead connect up a big bunch of 10 close tolerance 0.01μF capacitors all in parallel and remove them one at a time until the picture height is right, there is decent linearity and the sod locks up with, say, one third travel left on the external frame lock variable (the one on the back). For those readers who are not familiar with the term frame linearity I am sure you will understand what I mean when I say people displayed on the screen will have normal sized bodies and pointed heads if the set has the problem, ie circles would appear egg-shaped. Having found the value of frame capacitance that the set wants it is then fairly simple to make up the value required with a couple of fixed value capacitors, often something like a 0.068μF with a 0.01μF in parallel. A 0.1μF and a 0.22μF in series can often be close enough, depending on what's to hand. Once you have re-established the lock *then* you can do a fine tweak with the two internal pre-sets for height and lock. Even then I tend to note their positions before tweaking.

Some final points on Rigondas. The first is specific to the models described above. Inside owners are often surprised to see a small torch bulb, although it is illuminating nothing. This bulb is used in the power supply circuit, and if it fails the set appears dead. For the time and trouble to unscrew it and check it this must be move number one when presented with a totally dead set. Very often it is not the bulb as such, just a dirty contact on the middle, bottom solder blob on the torch bulb. Clean it by a quick rub over with sand paper.

Another point relating to all Rigondas is the on/off switch. The circuit is, in fact, mains straight into the power supply on the back, unswitched. The on/off switch on the set just turns the 12 volts out of this power supply into the set on and off. Thus if the set is left plugged in but switched off at the front, the power supply at the back is churning away day in and day out. The electrolytics therein are not generously over-rated and, without the set on to 'suck off' a few volts across them (due to the internal resistance of the diodes etc), their life is a bit short, like a week, and boy, do they die in style! Ends blow out with a bang and all sorts of goo and muck get thrown out, all out of an apparently switched off set!

Incidentally, I know that most models have another switch on the power supply which turns the mains on and off. Well, normally it does, although one or two examples have this switch but it is to allow the supply to be used to charge external batteries, so take care. I *always* unplug Rigondas when not in use.

I know this is an amateur radio magazine and it could be argued that TVs as such have no place, but the number of readers letters I receive about these TVs, plus their frequent availability at rallies, makes them of interest. I use them as amateur television monitors, via the excellent Microwave Modules converter. The (normally) excellent weak signal lock plus the small screen size make them ideal for this. Remember, a six inch display across the average shack bench probably equates to a twenty-two inch set across a living room. The sensitivity varies enormously from set to set, due, no doubt, to normal production tolerances. One set via a converter receives a 10 watt, eighteen mile distant amateur TV station at my shack as a grotty picture seen through a snowstorm, yet another identical example picks him up perfectly, via the same converter.

Identical pictures

It is interesting to note that both TVs referred to above produce identical pictures from anything containing its own modulator – viz an RF output camera, homebrew slow scan converter or the dreaded home computer.

When this column first started I mentioned that I would always buy non-working Rigondas at rallies for up to a fiver, or workers up to fifteen quid. The funny thing is that, after all the years of writing this column, the same prices still apply. Obviously the new type referred to above is worth a bit more (twenty to twenty-five quid being about right for a worker), although a fiver still applies for a dead one. All variants should take, very roughly, four to six hundred mA at 12V. If it takes one to one and a bit amps and you have a narrow picture that takes over about fifteen seconds to come up, then it's 70% likely the line output transformer has gone, 30% says the line output transistor has a leaky collector/emitter. New transformers are available, but at a price. That's why I buy up stacks of them not working.

There is a whole afternoon's entertainment in a pile of dead Rigondas, making up as many good ones as possible. Line output transistors and transformers appear interchangeable between models, as are some tuners.

Any article on Rigondas is not complete without mention of the dreaded Russian electrolytics. The type used in these sets are in plain aluminium cans (no plastic covering as in Jap products).

What happens is that the corrosive electrolyte slowly leaks out over the years and eats away at its (normally radial) lead out wires, the electrolytic eventually disconnecting itself! With the set turned off, and left for an hour or so to discharge, (or short out the eht) a gentle finger on the top of each electrolytic will indicate a loose feel about those that are affected.

Either that or leave the set alone for six months, give it a shake and see what falls out, I'm not joking! Some really mind numbing sync faults (both line and frame together) are often due to a duff electrolytic near the line output stage. I normally treat these electrolytics with suspicion, even if they feel all right, and often walk round all the electrolytics with a 'scope while the set is turned on. Any capacitor with one end to ground and more than, say, a volt of anything ac across it gets a careful investigation, and normally an equivalent value capacitor across it.

Alignment

Finally, a fairly common sad letter from the reader's postbag concerns sets that the owner has attempted to tweak up. Quite often the letter ends up 'it is now worse than before and I wish I hadn't touched it.' The trick is to note the positions of everything *before* going in with the screwdrivers. Preset potentiometers (pots) can sometimes be marked on their case with a felt tip to show the direction of the slot, wiper or flat, dependent on type. When adjusting multi-turn components such as compression trimmers or ferrite cores, count and record the number of turns you give it, and the direction. When all else fails and you've mucked it up, at least you can put it back as it was!

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■ Racal RA17W general coverage receiver, very good con, also home-brew ATU with manual, professionally serviced and aligned, £180 or exchange old but working FT77 or similar HF transceiver with cash adjustment for good rig. Mr Barker, 113 Wood Cross Lane, Bilston, West Midlands. Tel: Bilston (0902) 49992

■ Air gun, .22 Magnum, very powerful, £60 ono. J T Walker, 13 Walton Road, Aldridge, Nr Walsall, Staffs. Tel: 57609

■ Trio TS711E multimode base station for 2m, mint condition, £725 ono. C S Beynon, Bungalow No 1, Racal/Decca Tx Station, Llancarean, Barry, S Glam CF6 9AC. Tel: (04468) 261

■ Yaesu FT101Z, no mods, excellent condition, £375 no offers. Tel: Coventry (0203) 456128, evenings

■ Trio R600 Rx, 150kHz-30MHz, AM, CW, SSB, little used, £230 ono. Buyer must collect. Tel: York (0904) 798821, after 1830

■ Grundig satellite int 650 Rx, new, 7 months old, in vgc, best from Grundig, will accept £270 ono, post free. V Doe, 45 Trinity Street, North Shields, Tyne & Wear. Tel: (091) 2585289, 6-7pm

■ KW77 HF receiver and speaker in first-class condition, together with manual, £100. Also Eddystone 840C receiver in mint condition, used only approximately 400 hours since new, together with manual, £100. Buyer collects or pays carriage. Tel: Plymouth 782514, evenings

■ Superstar 2000, 25.9 to 28.005, mint condition, £120 ono. Zenith audio speech processor/power mike, fully switchable mike gain, master gain, limiting mode switch, battery condition LEDs, very handy black box, only £40 ono. 100W SSB/AM linear 12V amp, metered output straight through switch, £30 ono. WHY? All letters answered. S P Martin, 24 Collingwood Close, Worle, Weston-super-Mare, Avon BS22 9PQ

■ Icom 745 plus internal PS, Heath SB200 amp, Ten-Tec 229 ATU, A3 tribander with 40m attachment, Kenpro 400RC rotator. Prefer to sell as package deal for best reasonable offer. Alan Brennglass, 41 Tavistock Square, London WC1H 9EX. Tel: 01-387 1507

■ Commodore colour monitor model 1701, first-class cond, £110 ono, or exchange for 2 metre hand- held. CBM64/VIC20 spare keyboard complete, £10. Solatron dual beam scope. Offers. Tel: (021) 421 5625, after 6pm

■ FT290R 2m multimode, Alinco 230D 30W linear amp, NiCads plus charger for 290, carry case and strap, scanning mic, ⅞ whip with gutter mount, the lot £300. Quantity of ribbon cable, eg 5 metres of 34-way with series D connector one end and PCB mounting plug on other end, £2.50. Other lengths and widths available, ring for details. Andy, Southfield Road, Gloucester. Tel: (0452) 25989

■ Howes CTU 25 antenna matching unit, assembled, perfect with instruction manual, £10 plus postage. Tel: (091) 5267902, Tynside

■ 2 metre FM mobile rig, Standard C8900, latest model, only one inch high, 10 watts, mobile mount, manual, excellent condition, £125. Tel: Chas. 01-764 6767

■ Trio TS711E 2m transceiver, every extra possible on this top range radio, 14 months old, mint condition and still boxed, £650. Tel: Dronfield (0246) 410409 or Chesterfield (0246) 863069.

FREE CLASSIFIED ADS

WANTED

■ Tentec Argonaut 515, Drake R2B or R2C. Marconi type 889A or 966A power units with plugs and cables. Aerial plug AM type 161 (10H/184). G4FUY QTHR.
Tel: Reading 733633

■ Yaesu FT101ZD, latest model preferred, plus ATU etc. Must be mint condition, or Trio TS830S with ancillaries if reasonable price. Tel: (0224) 589440 after 5.30pm weekdays, anytime at weekend

■ Any information on R107 wartime general coverage receiver. Will buy or pay photocopy costs for service manuals, circuit diagram or any other information. I have just been given the receiver and need some help in getting it to work as it has lost a valve and is in need of an overhaul! Please contact Neil Jowsey, 9 Ribstone Grove, Appletree Village, Burnholme, York YO3 0NX. Tel: (0904) 416370

■ Outer casing for Racal RA17L, must be in good condition. Tel: Mike (0674) 76408

■ Manual or any information on Marconi receiver type 1475 and power supply. G1VXZ, 15 Thames Avenue, Sheerness, Kent ME12 1DH

■ WW2 German ex-service equipment, parts, spares. Electra rcvr, R208 VHF rcvr, WS65/66. Will collect. For swap or sale: WS38, WS19, WS58, Collins radio S1FY with 3 mech filters, 0.5-30MHz, high performance rcvr. Siemens funk 745 all-wave rcvr. Will bring to UK. OZ8RO R Otterstad, Vejdammen 5, DK-2840 Holte, Denmark. Tel: (010 452) 801875

■ Cobra 148, Super Star 360, Hygain, Tristar, Ham, or any other 120 channel multimode transceiver for conversion, working or non working, up to £60 depending on condition, London area only please. Tel: 01-605 1306

■ Nems Clarke receiver, type 1037, 2074 or similar unit by DEI, CEI Watkins Johnson. Manuals or information on any equipment manufactured by them. Allan Langer G6EII, 1 Moss Side Lane, Moore, nr Warrinston. Tel: (0925) 572332 or (0925) 571886

■ Handbook, operating manual, or any info for Solartron scope CT316. Will copy and return. Ball. Tel: Berwick (0289) 306965 pm

■ Please can anyone help? A TM56B scan Rx or similar required by semi-disabled medico-nine monitor for Marine channels. Crystals not required. Grateful for any help in purchase of such. Tel: (0289) 308607

■ Collector requires 19 set plus any accessories, ATU for WS C12, T1154 and R1155 plus any accessories, Scott SLR 12B for restoration, B13, B21A and B50 tuner amplifiers plus info, WS Canadian 52 all or part, accessories for WS Canadian 58 plus info, R1355 plus RF units 25 and 27. Tony Burke, Bridge Farm House, Tumby Woodside, nr Boston, Lincs. Tel: (0526) 42173

■ Private collector requires early/vintage radio/crystal/telegraphy/telephony sets and equipment, including horn speakers, books, magazines and odd components. Any item, good prices paid. Tel: Bookham (0372) 52569

■ Valves: 1L6, 1U6, HRO M Rx. Tel: (0228) 26436

■ Collector requires WW2 radio and radar gear in vgc, plus original manuals, spares, etc. Require ATU for C12, 19 set, S meters for AR88 and S27, SSB unit for B40, PSU for Adaptor Field CFS, any T1154 and R1155 equipment. Can exchange some very good quality vintage and classic. A R Burke, Bridge Farm House, Tumby Woodside, Boston, Lincs. Tel: (0526) 42173

■ Eddystone battery receiver EA, EB or EY series. Preferably good condition but anything considered. Richard Baker. Tel: (021) 556 3324 weekdays or weekday evenings

■ FDK TM56B marine receiver or similar, must be untampered with. Tel: (0674) 76503

■ £75 each offered for WS19 MK1 T1083 transmitter, T1115 transmitter, TR1133, WS No9, WS No11, WS No8, WS No78. These and others wanted for museum in Ashford, Kent. Ex-govt handbook also wanted, any nationality, good prices paid. Bob Warner, 45 Eastry Close, Ashford, Kent TN23 2RS. Tel: (0233) 36185

■ CW filter for FT501, non working, FT501 considered, also 501 connecting lead, 20 way, CW only Tx/Rx. TR9000 Trio base B09A, hand-held Tx/Rx, any model considered, eg IC2E. 50K Pmicrophone suitable for FT501, active aerial, dummy load 20W to 200W. P O'Brien. Tel: Caernarfon 5468 GW1SXN

■ National Panasonic RF8000 radio or Zenith 7000 radio. Tel: (0462) 33690

■ R1155/T1154, any condition, working/scrap, also parts/bits, odds and ends, paying up to £100 for complete loop aerial, pro rata for parts. Tel: (0908) 73114, Tony Howard

■ HW8 Heathkit HF QRP trans, must be in good condition, for my own collection. Dinky, Corgi, spot-on, die cast toys, unboxed, boxed. Tel: (0305) 813202

■ Wanted in exchange for my Czech made copy Strad violin (please note only a copy), value unknown, for CW/SSB HF rig, anything working 10m to 80m welcome. Please write to Angie G0HGA, 29 Hudson Road, Stevenage, Herts SG2 0ER

■ Eddystone 960 receiver and any old circular dial model, eg 504, 670, 680, 688 etc. Tel: (021) 556 3324 (not weekends)

■ FP757HD power supply unit for Yaesu 757GX. Jeff, PO Box 27, Norwich NR6 7HU

■ Spectrum Plus and Wafa drive, complete with lots of games. Will swap for good sideband radio. Must be in good order. Or what have you? G Bourne, 72 Cornish Way, Royton, Lancs OL2 6JY. Tel: (0706) 846 815

■ Cobra GTL150 volume and squelch knobs, also PTOS011 ADX crystal osc board. Tel: Kendal 27659, after 6pm

■ Have CBM64 computer, cassette, games etc. Exchange for FRG7 or DX302 or similar comm receiver. Tel: Bideford 77631 evenings, ask for John

■ Yaesu FT102, must be fully filtered, also fitted FM board, late model preferred. Tel: Coventry (0203) 456128, evenings

■ SEM tranzmatch HF ATU, preferably with Ezitune option fitted. Eric G1WEI (QTHR). Tel: (0939) 33638

FREE CLASSIFIED AD FORM

Send to: Amateur Radio Classified Ads · Sovereign House · Brentwood · Essex CM14 4SE

Classification: (tick appropriate box) If you want to insert ads under more than one classification use separate sheets for second and subsequent ads

For Sale..... ☐ Wanted..... ☐

USE BLOCK CAPITALS (One word per box)

To avoid mistakes please write clearly and punctuate your ad

Name/Address Postcode/Telephone							

USE SEPARATE SHEET FOR MORE WORDS

Ensure that you have included your name and address, and/or telephone number

CONDITIONS: Ads will be published in the first available issue on a first come first served basis. We reserve the right to edit or exclude any ad. Trade advertisements are not accepted

Amateur RADIO SMALL ADS

Selectronic

The UK's leading suppliers of 934MHz personal radio equipment

203 High Street
Canvey Island, Essex,
Tel: 0268 691481
(Open Mon-Sat 9-5.30)

Amateur radio equipment also in stock

DW ELECTRONICS G3 XCF

Amateur Radio Supplies
71 Victoria Rd, Widnes ICOM
Tel: 051-420 2559
Open Mon-Sat 9.30-5.30 (closed all day Thurs)
We supply YAESU, ICOM, Tonna, Jaybeam, Microwave Modules, Datongs etc

USED AMATEUR EQUIPMENT? I Buy, Sell & Exchange!

SELLING? I pay the BEST POSSIBLE PRICES for your Clean Used Equipment!

BUYING? I have the BEST SELECTION of top Quality Used Equipment Available!

For the Deal You've been Looking for,Phone Dave, G4TNY

ANYTIME ON HORNCHURCH (04024) 57722 (0836) 201530 9am – 7pm Mon – Sat or Send SAE

G4TNY AMATEUR RADIO
132 Albany Road, Hornchurch, Essex RM12 4AQ

D.P. HOBBS (Norwich) Ltd

13 St Benedicts Street, Norwich Tel: 615786
Open Mon-Sat 9-5.30
Closed Thurs 1.00pm
Stockists of
YAESU, FDK, ICOM, JAYBEAM
& Electronic Component Specialists
ICOM

JAYCEE ELECTRONICS LTD

JOHN GM30PW
20 Woodside Way, Glenrothes, Fife KY7 5DP
Tel: 0592 756962
Open: Tues-Sat 9-5
Quality secondhand equipment in stock. Full range of TRIO goodies. Jaybeam – Microwave Modules – LAR.

ETESON ELECTRONICS

E•E
15B Lower Green, Poulton-le-Fylde, Blackpool
Tel: (0253) 885107

Open. 9.30am - 12.30. 1.30 - 5.30. Closed Wed & Sun
Electronic Component Specialists.
A wide range of electronic components, IC's, capacitors, transistors, resistors, plugs and sockets etc

PNP Communications
Communications Interface
for RTTY – Morse – AMTOR

Our popular range of communication modules is now available, fully boxed and tested under the model number.

CTU 20

The CTU20R is RTTY only & costs **£62.50** whilst the CTU20RM is for morse as well and costs **£75.25**
For shortwave listeners the MF2-DX gives the option of 170Hz, 425Hz or 850Hz shift reception and costs **£56.95**

Send a large (A4) SAE for full Cat
Please add VAT at the current rate.
Access & Barclaycard (VISA) welcome.

62 Lawes Avenue, Newhaven
East Sussex BN9 9SB
Tel: (0273) 514465

AGRIMOTORS

MERTON CB AND RADIO CENTRE
MERTON GARAGE AND POST OFFICE, MERTON.
Nr OAKHAMPTON, DEVON EX20 3DZ

OPEN 6 DAYS 9-6 LUNCH 1-2pm THURSDAY 9-1
(SUNDAYS BY APPOINTMENT)
SPECIALIST IN 934 MHz
SUPPLIERS OF ALL 27MHz AND 934 MHz EQUIPMENT
AMATEUR EQUIPMENT CATERED FOR
08053 200

Amateur RADIO SMALL ADS

This method of advertising is available in multiples of a single column centimetres — (minimum 2cms). Copy can be changed every month.

RATES
per single column centimetre:
1 insertion £7.00, 3 — £6.60, 6 — £6.30, 12 — £5.60.

AMATEUR RADIO SMALL AD ORDER FORM

TO: **Amateur Radio · Sovereign House**
Brentwood · Essex CM14 4SE · England · (0277) 219876

PLEASE RESERVE.....centimetres by.....columns

FOR A PERIOD OF 1 issue.....☐ 3 issues.....☐ 6 issues.....☐ 12 issues.....☐

COPY enclosed.....☐ to follow.....☐

PAYMENT ENCLOSED: (Add 15%VAT).... £ —

Cheques should be made payable to Amateur Radio. Overseas payments by International Money Order and Credit Card

CHARGE TO MY ACCOUNT.....☐ CREDIT CARD EXPIRY DATE ☐☐ / ☐☐

COMPANY .....

ADDRESS .....

SIGNATURE ..... TELEPHONE.....

.....

C P I

ADVERTISERS INDEX

Amateur RADIO — ADVERTISING RATES & INFORMATION

DISPLAY AD RATES

depth mm x width mm	ad space	1 issue	series rates for consecutive insertions: 3 issues	6 issues	12 issues
61 x 90	⅛ page	£66.00	£62.00	£59.00	£53.00
128 x 90 or 61 x 186	¼ page	£115.00	£110.00	£105.00	£92.00
128 x 186 or 263 x 90	½ page	£225.00	£210.00	£200.00	£180.00
263 x 186	1 page	£430.00	£405.00	£385.00	£345.10
263 x 394	double page	£830.00	£780.00	£740.00	£660.00

COLOUR AD RATES

colour rates exclude cost of separations

depth mm x width mm	ad space	1 issue	series rates for consecutive insertions: 3 issues	6 issues	12 issues
128 x 186 or 263 x 90	½ page	£305.00	£290.00	£275.00	£245.00
263 x 186	1 page	£590.00	£550.00	£530.00	£470.00
263 x 394	double page	£1,130.00	£1,070.00	£1,010.00	£900.00

SPECIAL POSITIONS

Covers: Outside back cover 20% extra, inside covers 10% extra
Bleed: 10% extra [Bleed area = 307 x 220]
Facing Matter: 15% extra

DEADLINES

*Dates affected by public holidays

issue	colour & mono proof ad	mono no proof & small ad	mono artwork	on sale thurs
Aug 87	2 Jul 87	8 Jul 87	10 Jul 87	30 Jul 87
Sep 87	30 Jul 87	5 Aug 87	7 Aug 87	27 Aug 87
Oct 87	27 Aug 87	2 Sep 87	4 Sep 87	24 Sep 87
Nov 87	1 Oct 87	7 Oct 87	9 Oct 87	29 Oct 87

CONDITIONS & INFORMATION

SERIES RATES
Series rates also apply when larger or additional space to that initially booked is taken.
An ad of at least the minimum space must appear in consecutive issues to qualify for series rates.
Previous copy will automatically be repeated if no further copy is received.
A 'hold ad' is acceptable for maintaining your series rate contract. This will automatically be inserted if no further copy is received.
Display Ad and Small Ad series rate contracts are not interchangeable.

If series rate contract is cancelled, the advertiser will be liable to pay the unearned series discount already taken.

COPY
Except for County Guides copy may be changed monthly.
No additional charges for typesetting or illustrations (except for colour separations).
For illustrations just send photograph or artwork.
Colour Ad rates do not include the cost of separations. Printed – webb-offset.

PAYMENT
Above rates exclude VAT.
All single insertion ads are accepted on a pre-payment basis only, unless an account is held.
Accounts will be opened for series rate advertisers subject to satisfactory credit references.
Accounts are strictly net and must be settled by the publication date.
Overseas payments by International Money Order or credit card.

FOR FURTHER INFORMATION CONTACT
Amateur Radio, Sovereign House, Brentwood, Essex CM14 4SE.
(0277) 219876

Commission to approved advertising agencies is 10%

CONDITIONS
10% discount if advertising in both Amateur Radio and Radio & Electronics World.
A voucher copy will be sent to Display and Colour advertisers only.
Ads accepted subject to our standard conditions, available on request.

£1 BAKERS DOZEN PACKS

Price per pack is £1.00.* Order 12 you may choose another free. Items marked (sh) are not new but guaranteed ok.

1 5 – 13 amp ring main junction boxes
2 5 – 13 amp ring main spur boxes
4 5 – surface mounting
5 3 – electrical switches, white flush mounting
7 4 – in flex line switches with neons
9 2 – mains transformers with 6V 1A secondaries
10 2 – mains transformers with 12V ½A secondaries
11 1 – extension speaker cabinet for 6½" speaker
13 12 – glass reed switches
17 2 – ultrasonic transmitters receivers with circuit
19 2 – light dependent resistors
25 4 – wafer switches – 6p 2 way, 4p 3 way, 2p 6 way, 2p 5 way, 1p 12 way small one hold fixing and good length ¼ spindle your choice
28 1 – 6 digit counter mains voltage
30 2 – Nicad battery chargers
31 1 – key switch with key
33 2 – aerosol cans of ICI Dry Lubricant
34 96 – 1 metre lengths colour-coded connecting wire
39 1 – long and medium wave tuner kit
41 8 – rocker switch 10 amp mains SPST
45 1 – 24 hour time switch mains operated (s h.)
49 10 – neon valves – make good night lights
50 2 – 12V DC or 24V AC, 3 CO relays
51 1 – 12V 2 CO miniature relay very sensitive
52 1 – 12V 4 CO miniature relay
54 10 – rows of 32 gold plated IC sockets (total 320 sockets)
55 1 – locking mechanism with 2 keys
56 1 – miniature uniselector with circuit for electric jigsaw puzzle
60 5 – ferrite rods 4" × 5/16" diameter aerials
61 4 – ferrite slab aerials with L & M wave coils
63 1 – Mullard thyristor trigger module
66 1 – magnetic brake – stops rotation instantly
67 1 – low pressure 3 level switch can be mouth operated
69 2 – 25 watt pots 8 ohm
70 2 – 25 watt pots 1000 ohm
71 4 – wire wound pots – 18, 33, 50 and 100 ohm your choice
77 1 – time reminder adjustable 1-60 mins clockwork
85 1 – mains shaded pole motor ¾" stack – ¼" shaft
89 1 – mains motor with gear box 1 rev per 24 hours
91 2 – mains motors with gear box 16 rpm
96 1 – thermostat for fridge
98 1 – motorised stud switch (s.h.)
101 1 – 2½ hours delay switch
103 1 – mains power supply unit – 6V DC
104 1 – mains power supply unit – 4½V DC
107 1 – 5" speaker size radio cabinet with handle
112 1 – heating pad 200 watts mains
114 1 – 1W amplifier Mullard 1172
115 1 – wall mounting thermostat 24V
118 1 – teak effect extension 5" speaker cabinet
120 2 – p.c. boards with 2 amp full wave and 17 other recs
121 4 – push push switches for table lamps etc.
122 10 – mtrs twin screened flex white p.v.c outer
124 25 – clear plastic lenses 1¼ diameter
127 4 – pilot bulb lamp metal clip on type
128 10 – very fine drills for pcbs etc.
129 4 – extra thin screw drivers for instruments
132 2 – plastic boxes with windows, ideal for interrupted beam switch
134 10 – model aircraft motor – require no on/off switch, just spin to start
137 1 – 6½" 4 ohm 10 watt speaker
142 10 – 4 BA spanners 1 end open, other end closed
145 2 – 4 reed relay kits 3V coil normally open or c/o if magnets added
146 20 – pilot bulbs 6.5V.3A Philips
154 1 – 12V drip proof relay – ideal for car jobs
155 3 – varicap push button tuners with knobs
169 4 – short wave air spaced trimmers 2-30f
172 10 – 12V 6W bulbs Philips m.e.s.
178 3 – oblong amber indicators with lilliputs 12V
180 6 – round amber indicators with neons 240V
181 100 – p.v.c. grommets ⅜ hole size
182 1 – short wave tuning condenser 50 pf with ¼" spindle
184 1 – three gang tuning condenser each section 500 pf with trimmers and good length ¼" spindle
188 1 – plastic box sloping metal front, 16 × 95mm average depth 45mm
193 6 – 5 amp 3 pin flush sockets brown
195 5 – B.C. lampholders brown bakelite threaded entry
196 1 – in flex simmerstat for electric blanket soldering iron etc.
197 2 – thermostats, spindle setting – adjustable range for ovens etc.
199 1 – mains operated solenoid with plunger 1" travel
200 1 – 10 digit switch pad for telephones etc.
201 8 – computer keyboard switches with knobs, pcb or vero mounting
206 20 – mtres 80 ohm, standard type co-ax off white
211 1 – electric clock mains driven, always right time – not cased
216 1 – stereo pre-amp Mullard EP9001
232 2 – 12V solenoids, small with plunger
236 1 – mains transformer 9V 1 amp secondary C core construction
241 1 – car door speaker (very flat) 6½" 15 ohm made for Radiomobile
241 2 – speakers 6" × 4" 4 ohm 5 watt made for Radiomobile
243 2 – speakers 6" × 4" 16 ohm 5 watt made for Radiomobile
244 1 – mains motor with gear-box very small, toothed output 1 rpm
245 4 – standard size pots, ¼ meg with dp switch
249 1 – 13A switched socket on double plate with fused spur
266 2 – mains transformers 9V ½A secondary
267 1 – mains transformers 15V 1A secondary p.c.b. mounting
291 1 ten turns 3 watt pot ½ spindle 100 ohm
296 3 car cigar lighter socket plugs
298 2 15 amp round pin plugs brown bakelite
300 1 mains solenoid with plunger compact type
301 10 ceramic magnets Mullard 1" × 3/8 × 5/16
303 1 12 pole 3 way ceramic wave charge switch
305 1 tubular dynamic microphone with desk rest
308 1 T.V. turret tuner (black & white T.V.)
310 2 oven thermostats
313 5 sub miniature micro switches
316 1 round pin kettle plug with moulded on lead
453 2 – 2½in. 80ohm loudspeakers
454 2 – 2¼in. 80hm loudspeakers
463 1 – mains operated relay with 2 sets c/o contacts
464 2 – packets resin filler/sealer with cures
465 3 – 5A round 3 pin plugs will fit item 193
466 4 – 7 segment l.e.d. displays
470 4 – pc boards for stripping, lots of valuable parts
473 1 – 5" 4ohm speaker with built in tweeter Radio mobil
480 1 – 3A double pole magnetic trip, saves repairing fuses
498 4 – 1000uf 25V axial electrolytic capacitors

POWERFUL MOTOR (2 in. stack) fitted with gearbox with final speed 60 r.p.m. Mains operated. Suitable to operate garage doors etc. Price £4.00. Our ref. 4P15.

CAR STARTER/CHARGER KIT

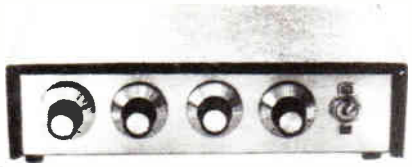
Flat Battery! Don't worry you will start your car in a few minutes with this unit – 250 watt transformer 20 amp rectifiers, case and all parts with data £17.50 post £2

VENNER TIME SWITCH

Mains operated with 20 amp switch, one on and one off per 24 hrs repeats daily automatically correcting for the lengthening or shortening day. An expensive time switch but you can have it for only £2.95 without case, metal case – £2.95, adaptor kit to convert this into a normal 24hr time switch but with the added advantage of up to 12 on/offs per 24hrs. This makes an ideal controller for the immersion heater. Price of adaptor kit is £2.30.

Ex-Electricity Board. Guaranteed 12 months.

SOUND TO LIGHT UNIT



Complete kit of parts of a three channel sound to light unit controlling over 2000 watts of lighting. Use this at home if you wish but it is plenty rugged enough for disco work. The unit is housed in an attractive two tone metal case and has controls for each channel, and a master on/off. The audio input and output are by ¼" sockets and three panel mounting fuse holders provide thyristor protection. A four pin plug and socket facilitate ease of connecting lamps. Special price is £14.95 in kit form.

12 volt MOTOR BY SMITHS

Made for use in cars, etc these are very powerful and easily reversible. Size 3½" long by 3" dia. They have a good length of ¼" spindle –
1/10 hp £3.45
1/8 hp £5.75. 1/6 hp £7.50

25A ELECTRICAL PROGRAMMER

Learn in your sleep. Have radio playing and kettle boiling as you wake – switch on lights to ward off intruders – have a warm house to come home to. You can do all these and more. By a famous maker with 25 amp on/off switch. A beautiful unit at £2.50

THIS MONTH'S SNIP

3" floppy disc drive unit plug in and with all electronics. Japanese made, brand new. We are told that this is suitable for use with the BBC, Commodore, Amstrad and most other popular computers, and we supply with technical information. Special snip price £29.50 including post and VAT.

12V BATTERY OPERATED SIREN

(Or you can work this off a 24V transformer) Makes a shocking noise, will frighten away any intruder. Japanese made one 50p each, 2 for £1, ref RD106. American, storage soiled but unused and guaranteed perfect, only 20p each, 5 for £1, ref BD221

WONDERFUL BREAKDOWN VALUE – HAND HELD STEREO UNIT

Contains two beautiful miniature moving coil loud speakers. These could also be used as microphones, also contains many other useful parts including mini stereo amp, transistors, condensors, rocker switches etc etc. To use this as a personal amplifier simply add a stethoset, only £1, ref BD29

SPIT MOTOR

Powerful mains operated induction motor with gearbox attached. Shaft has square hole which gives very easy coupling and quick release if required. Shaft speed 5rpm. Price £5, ref 5P54

NICKEL CADMIUM RECHARGEABLE BATTERY

The high capacity (4 Amp-hour) 'D'-size. £2 each. Our ref 2P141.

20V–0–20V 1A MAINS TRANSFORMER

Upright mounting. Primary thermal cutout to interrupt the supply if transformer overheats. Price £2, ref 2P138

4 BOOKS FOR £1

Book 1 describes the Mullard Unilex amplifier and gives details of a suitable cabinet. Book 2 describes several useful pieces of test equipment which could be quite easily constructed. Book 3 is electronic projects. Book 4 describes short wave receivers which can be easily constructed and is intended for mainly beginners. Our ref BD400

TRANSFORMER IN WATERPROOF METAL CASE

24V 5A output. Ideal for garden lighting or to operate pond pump etc. Case has cable glands for mains in and low voltage output leads. Price £5 plus £1 post, ref 5P88

MAINS RELAY

With transparent plastic cover. Could be pcb or clip mounted, has single 8–10A c/o contact. Real bargain 2 for £1, ref BD486

PANEL METERS

Engraved vu, approximately 1½" square. Luminate these from behind and you will have a really super looking panel. Real bargain 2 for £1, ref BD366

TRANSMITTER TUNING CONDENSOR

160pf made for a very famous RAF transmitter, only £1 each. Unused but mounting brackets will need a bit of cleaning up due to storage. Our ref BD424

MAGNETIC READ/WRITE UNIT

A read/write head mounted on a thumb operated lever is made to traverse magnetisable paper. The paper is held between top and bottom rollers which can be spun for localisation of the written message – new and unused only £1 each, BD381

IONISER KIT

Refresh your home, office, shop, work room, etc. with a negative ION generator. Makes you feel better and work harder – a complete mains operated kit which we guarantee is ten times more powerful than other popular kits. Price includes case and instructions. £9.50 plus £2.00 post.

TELEPHONE BITS

Master socket (has surge arrestor – ringing condenser etc) and takes B.T. plug £3.95
Extension socket £2.95
Dual adaptors (2 from one socket) £3.95
Cord terminating with B.T. plug 3 metres £2.95
Kit for converting old entry terminal box to new B.T. master socket, complete with 4 core cable, cable clips and 2 BT extension sockets £11.50
100 mtrs 4 core telephone cable £8.50

J & N BULL ELECTRICAL

Dept AR, 250 PORTLAND ROAD, HOVE, BRIGHTON, SUSSEX BN3 5QT

MAIL ORDER TERMS: Cash, P.O. or cheque with order. Orders under £20 add £1 service charge. Monthly account orders accepted from schools and public companies. Access & B/card orders accepted. Brighton 0273 734648. **Bulk orders:** write for quote.

£2 POUNDERS*

2P2 –Wall mounting thermostat, high precision with mercury switch and thermometer
2P3 –Variable and reversible 8-12v psu for model control
2P4 –24 volt psu with separate channels for stereo made for Mullard UNILEX
2P6 –100W mains to 115V auto-transformer with voltage tappings
2P8 –Mains motor with gear box and variable speed selector. Series wound so suitable for further speed control
2P9 –Time and set switch. Boxed, glass fronted and with knobs. Controls up to 15 amps. Ideal to program electric heaters
2P10 –12 volt 5 amp mains transformer
2P12 –Disk or Tape precision motor – has balanced rotor and is reversible 230v mains operated 1500 rpm
2P14 –Mug Stop kit – when thrown emits piercing squawk
2P15 –Interrupted Beam kit for burglar alarms, counters, etc.
2P17 –2 rev pr minute mains driven motor, ideal to operate mirror ball
2P18 –Liquid/gas shut off valve mains solenoid operated
2P19 –Disco switch-motor drives 6 or more 10 amp change over micro switches supplied ready for mains operation
2P20 –20 metres extension lead, 2 core – ideal most Black and Decker garden tools etc.
2P21 –10 watt amplifier, Mullard module reference 1173
2P22 –Motor driven switch 20 secs on or off after push
2P26 –Counter resettable mains operated 3 digit
2P27 –Goodmans Speaker 6 inch round 8ohm 12 watt
2P28 –Drill Pump – always useful couples to any make portable drill
2P31 –4 metres 98 way interconnecting wire easy to strip
2P32 –Hot Wire amp meter – 4½ round surface mounting 0–10A – old but working and definitely a bit of history
2P34 –Solenoid Air Valve mains operated
2P38 –200 R.P.M. Geared Mains Motor 1" stack quite powerful, definitely large enough to drive a rotating aerial or a tumbler for polishing stones etc
2P43 –Small type blower or extractor fan, motor inset so very compact, 230V
2P46 –Our famous drill control kit complete and with prepared case
2P49 –Fire Alarm break glass switch in heavy cast case
2P51 –Stereo amplifier, 3w per channel
2P55 –Mains motor, extra powerful has 1½" stack and good length of spindle
2P62 –1 pair Goodmans 15 ohm speakers for Unilex
2P64 –1 five bladed fan 6½" with mains motor
2P66 –1 2Kw tangential heater 115v easily convertible for 230V
2P67 –1 12v–0–12v 2 amp mains transformer
2P68 –1 15v–0–15v 2 amp mains transformer
2P69 –1 250v–0–250v 60 mA & 86.3v 5A mains transformer + 50p post
2P70 –1 E.M.I. tape motor two speed and reversible
2P72 –1 115v Muffin fan 4" × 4" approx. (s.h.)
2P75 –1 2 hour timer, plugs into 13A socket
2P82 –9v–0–9v 2 amp mains transformer
2P84 –Modem board with press keys for telephone redialler
2P85 –20v–0–20v ½A Mains transformer
2P88 –Sangamo 24 hr time switch 20 amp (s.h.)
2P89 –120 min. time switch with knob
2P90 –90 min. time switch with edgewise engraved controller
2P94 –Telephone handset for EE home telephone circuit
2P95 –13A socket on satin chrome plate
2P97 –mains transformer 24V 2A upright mounting
2P98 –20m 4 core telephone cable, white outer
2P99 –500 hardened pin type staples for telephone cable
2P101 –15V mains transformer 4A upright mounting
2P105 –capillary type thermostat for air temperature with c/o switch
2P108 –mains motor with gear box giving 110rpm
2P109 –5" wide black adhesive pvc tape 33m, add £1 post if not collecting

OVER 400 GIFTS YOU CAN CHOOSE FROM

There is a total of over 400 packs in our Baker's dozen range and you become entitled to a free gift with each dozen packs.

A classified list of these packs and our latest "News Letter" will be enclosed with your goods, and you will automatically receive our next news letter.

£5 POUNDERS*

5P1 12 volt submersible pump complete with a tap and switch, an ideal caravan unit.
5P2 Sound to light kit complete in case suitable for up to 750 watts.
5P6 12V alarm bell with heavy 6" gong, suitable for outside if protected from direct rainfall. Ex GPO but in perfect order.
5P12 Equipment cooling fan – mini snail type mains operated
5P15 –Uniselector 4 pole, 25 way 50 volt coil
5P18 –motor driven water pump as fitted to many washing machines
5P20 –2 kits, matchbox size, surveilance transmitter and FM receiver
5P23 –miniature (appr. 2½" wide) tangential blow heater, 1-2kw
5P24 –¼hp motor, ex computer, 230V, mains operation 1450rpm. If not collect add £3 post
5P25 –special effects lighting switch. Up to 6 channels of lamps can be on or off for varying time periods
5P27 –cartridge player 12V, has high quality stereo amplifier
5P34 –24V 5A toroidal mains transformer
5P35 –modem board from telephone auto dialler, complete with keyped and all ICs
5P37 –24 hour time switch, 2 on/offs and clockwork reserve, ex Elec. Board loading up to 50A. Add £1 post
5P41 –5" extractor fan, very quiet runner (s.h.), gntd 12 mths.
5P48 –telephone extension bell in black case, ex-GPO
5P52 –mains transformer 26V 10A upright mounting, add £2 post
5P54 –mains motor with gear box, final speed 5rpm
5P58 –Amstrad stereo tuner FM and LM. AM
5P60 –DC Muffin type fan 18 to 27V, only 3W. Brushless.
5P61 –drill pump mounted on frame, coupled to mains motor
5P62 –2½kw tangential blow heater, add £1.50 post if not collecting
5P73C high pressure mains operated gas or water valve with tube connection suitable soldering
5P74 6rpm 60W mains motor and gearbox with instant stop
5P79 30rpm 80 watt mains driven motor with gearbox
5P82 1 25rpm mains 60w motor with gearbox
5P84 1 delay time switch, adjust 0–20 seconds
5P69 1 light box size 14" × 12" for circuit tracing pcb's. Add £3 for postage and packing
5P72 1 turntable for vdu or scope
5P81 1 stepper motor bi-directional, 7.5° steps 12–14V coil
5P86 1 mains transformer with 2 × 100V 1A secondaries. Add £1.50 post
5P88 1 24V 5A mains transformer in waterproof case, ideal for garden lighting, pond pump etc.

LIGHT CHASER KIT motor driven switch bank with connection diagram, used in connection with 4 sets of xmas lights makes a very eye catching display for home, shop or disco, only £5 ref 5P56.

Hello, what's this then? The new Sony Shortwave radio.

Not exactly imposing, is it? What happened to all the knobs and dials... serried ranks of valves, throbbing into the night... dirty great drums of copper wire humming away like there's no tomorrow - it hasn't even got a cats whisker!

Oh, well... better have a look at the old instruction book. 'The Sony Computerised World Band Receiver.' There's never a computer in there!

What else has it got... dual display panel, yes, yes, get on with it... oh, a 15 station memory. Wonder if it remembers where I left me mother-of-pearl cuff-links?

Now then. 'First switch on.' Oh, very droll I'm sure... time for a fag while it warms up... hello, it's going already...

How peculiar. Right, a quick whizz round the dial for a basin full of the old hum and whistle, just to set the mood.

"Good Evening, this is Radio New Zealand."

Get off the line you great Antipodean fool! I haven't had a good crackle yet.

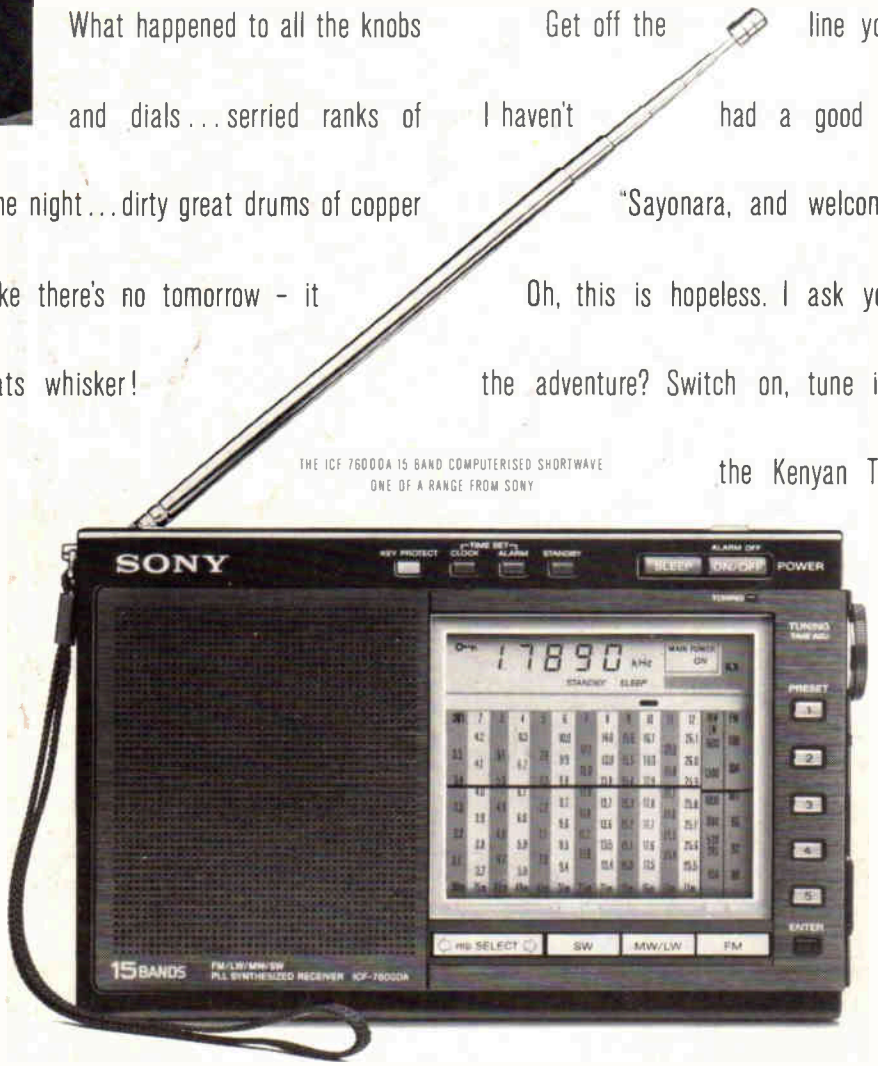
"Sayonara, and welcome to Japan Today."

Oh, this is hopeless. I ask you. Where's the romance, the adventure? Switch on, tune in and bang, you've got the Kenyan Top 40, clear as a bell. Where's the fun there?

You can keep your phased loop lock, your crystal clear reception and easy tuning.

No, no, no, sorry Sony. Give me a room full of watts, a coat-hanger aerial and a set hot enough to cook your breakfast on. I don't know... oh dear, oh dear...

THE ICF 7600DA 15 BAND COMPUTERISED SHORTWAVE
ONE OF A RANGE FROM SONY



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