AN INTRODUCTION TO AMATEUR RADIO - FOR BEGINNERS OF ALL AGES

RADIO D-I-Y

£2

TESTING TIME

D-i-Y RADIO
AN INTRODUCTION TO AMATEUR RADIO - FOR BEGINNERS OF ALL AGES

September • October 1996
Volume Six: No 5

PROJECTS:

ANTENNA SYSTEM TUNING UNIT

AUDIO AMPLIFIER

WAVEMETER

PLUS:

FEATURES

DIARY

NEWS

REVIEWS

ON THE AIR

COLOUR POSTER

COMPETITION

http://www.rsgb.org

COVER PICTURE:
A suspect resistor is checked using a multimeter. The use of test equipment is described on page 16.

comment

AMATEUR RADIO usually involves direct person-to-person communication. But there are cases when information can be broadcast to radio amateurs in general or, indeed, those outside our hobby.

This month's poster on pages 12 and 13 shows two ways in which the RSGB runs broadcast networks to help all amateurs and listeners. Firstly, there is the GB2RS News Service which gives up to date news about our hobby each week - including details of local club meetings. Secondly, the GB2CW Morse Practice Service which is provided to give useful on-the-air code practice for those studing for their 5 or 12 words-per-minute tests.

The main part of the GB2RS News script is also available over the telephone on 0336 407394 (calls cost 39p per minute cheap rate, 49p per minute at other times). The entire script is now published on the RSGB's World Wide Web pages (see opposite) several days before it is available off-air, so if you want really up-to-date amateur radio news, check us out.

Mike Dennison, G3XDV

Editor

CONTENTS

CONSTRUCTION CODE

FOR THE COMPLETE BEGINNER . . . . .

REQUIRES A LITTLE EXPERIENCE . . . .

FOR THE MORE EXPERIENCED

At the Royal Tournament, ATC Cadet Oliver Waits (right) chats to a British Midland pilot at 35,000ft on HF SSB. He is supervised by Pilot Officer Mike Mulroy (left). See news story on page 3.

Managing Editor: Mike Dennison; Production Editor: Jennifer Preston; News Ed: Steve Lowe; Tech Ed: Peter Dodd; Illustrator: Bob Ryan; Prod Asst: Wai-Yee Man; Secretary: Samantha Ralph
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ATC AT ROYAL TOURNAMENT

SPECIAL EVENT STATION GB4ATC was on the air from the Royal Tournament at Earl's Court from 9 to 20 July. It was operated by full and Novice licensed volunteers of the ATC, including Ray Degg, G0JOD; Flt Lt Malcolm Wood, G7VRT; Flt Lt David Horsley, 2E1DQQ; Flt Sgt Gareth Horsley, 2E1DQK;. John Maunder, G0PKU; and Dawn Read, G0OIF.

In addition to amateur stations on HF, 2m and 70cm using equipment loaned by Icom (UK), communications were also established on HF and VHF using the ATC's own specially-allocated frequencies. Pilot Officer Michael Mulroy had made arrangements with pilots of British Midland, Britannia, and Virgin Atlantic airliners to call the Royal Tournament station on an ATC HF SSB frequency. Air Cadets were able to exchange greetings messages with the pilots using a Racal BCC39B tactical HF SSB transceiver loaned by Racal Ltd.

COLLOQUIUM A SUCCESS

ALMOST 100 delegates from 17 countries attended the AMSAT-UK Colloquium at the University of Surrey in July. The AMSAT-UK Phase 3D Fund received a boost in the form of an RSGB cheque for £11,000. It was presented to AMSAT-UK's Ron Broadbent MBE, G3AAJ, by RSGB President-Elect Ian Kyle, GI8AYZ, and is in addition to the £25,000 donation made to the fund by the RSGB last year.

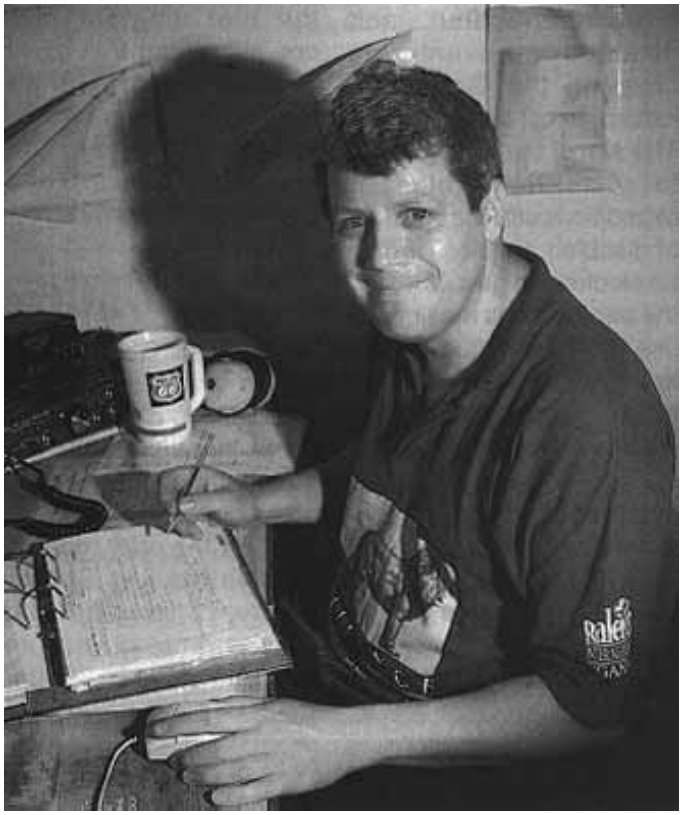
Laurence of Uganda

LAURENCE HOWELL, GM4DMA, flew to Uganda in June, just three days after RSGB HQ received an urgent request for help from the youth development charity Raleigh International.

Raleigh International have eight remote field sites in Uganda, at which a team of 130 young venturers work on scientific, community and conservation projects. HF radio links are their only means of keeping in contact with HQ in the capital, Kampala. But Raleigh needed someone to set up the communications network and train the venturers in how to the use the equipment. The RSGB contacted Laurence because of his known experience with expeditions and, fortunately, he was able to arrange one month's paid leave from his job with Phillips Petroleum at the very short notice required.

Despite power shortages and his heavy workload, Laurence also found time to operate on the amateur bands as 5X1LH during his African adventure.

Raleigh International needs more communications officers for future expeditions to Uganda, Belize, Chile, Eastern Malaysia and Namibia. Assignments are normally for 10 weeks and volunteers are responsible for paying their own air fare and subsistence costs. For further details, contact the Staff Recruitment Office, Raleigh International, 27 Parsons Green Lane, London SW6 4HZ, tel: 0171 371 8585, fax: 0171 371 5116.



Laurence Howell, GM4DMA, operating as 5X1LH from Kampala, Uganda.

RSGB ON THE WEB

THE RSGB LAUNCHED its Internet World Wide Web Home Pages on 1 July. Radio amateurs can browse the latest GB2RS news script (including the regional news bulletins) and examine our on-line book catalogue. Information about what's in the current *RadCom* and *D-i-Y Radio* also appears, so that non-RSGB members can see what they are missing! For non-radio amateur users of the Internet, the pages will provide a way for them to find out more about our hobby.

New pages will be added regularly, so it will pay to visit the site frequently. And of course we will be able to publish 'hot' news stories on the Internet first.

The URL is **http://www.rsgb.org**

● BADGER BOARDS, manufacturer of the Piccolo transceiver kit, have moved to new premises. Their new address is: 87 Blackberry Lane, Four Oaks, Sutton Coldfield B74 4JF, tel: 0956 374918, fax: 0121 353 9326.

● THE POOLE RADIO Society is organising the second National Novice Contest. It is on Sunday 22 September from 1400 to 1600UTC and full details can be found in our Contesting for Novices feature on pages 10 and 11.

TRANS-GREENLAND EXPEDITION

BLIND RADIO AMATEUR Terry Robinson, G3WUX, is one member of a team of four able-bodied and disabled adventurers crossing the Greenland icecap from east to west. The aim of the expedition is to raise the profile of expeditions utilising the skills of disabled people: Terry is an electronics graduate and the expedition is making full use of his communications and DIY skills. A second team member, Carl Wilkinson, is a qualified ski instructor and trauma paramedic who lost the sight in one eye during a Royal Artillery exercise.

Terry is operating as OX/G3WUX during the expedition using an 5W QRP transceiver and other equipment loaned by a number of UK firms. His is the first amateur radio operation from that part of Greenland and he is also the first blind person to attempt to cross the Greenland icecap.Trans-Greenland Expedition

ALINCO WINNER

IAN WADE, G3NRW, was the lucky winner of an Alinco DX-70 HF / VHF transceiver worth nearly £1000 in a competition in our sister magazine, *RadCom.* The draw for the prize, donated by Waters & Stanton Electronics, took place at the Longleat Amateur Radio and Electronics Fair on 30 June.

PITCAIRN ISLANDS STAMPS

PITCAIRN ISLAND in the Pacific, famous as the final refuge of the mutineers from the *Bounty,* issues four amateur radio stamps on 4 September.

They are at 20c (listing the callsigns of this year's members of Pitcairn's amateur radio club), two at $1.50 (showing VR6IM requesting and receiving medical assistance) and one at $2.50 (showing Andrew Young, VR6AY, Pitcairn's first amateur in 1938). Pitcairn has the largest population of amateurs per head of population of anywhere in the world: almost one in four.

SCHOOL RADIO CLUB APPEAL

JOHN ALLSOPP, G4YDM, is organising a radio and electronics club at his local school.

Lack of funds means that the school is unable to purchase any equipment, so John is appealing for the donation of old receivers, converters or even simple VHF / UHF transmitters. As John says: "Anything is acceptable, when you have nothing". So if you have something to offer, please call John on 0191 4162606, or on his mobile: 0378 386843.

RSGB ON LINE
http://www.rsgb.org.uk

Building Blocks

THE THOUGHT of constructing a radio receiver is often regarded as a rather daunting task. However, there are very good reasons for building your own radio equipment:

- It is an ideal form of 'hands-on' learning; you learn far more from constructing a radio than just reading about it.
- The cost is far lower than buying a commercial receiver.
- You can maintain or modify home-made equipment; modern commercial equipment is difficult to repair if it goes wrong.
- The sense of achievement when you make a radio contact, using a radio that you have constructed yourself, is very real - why not try it. The best method is to use the 'building block' approach.

All radios require a front panel on which to fix the operation controls, such as the volume and the tuning controls. A radio also needs a speaker or a pair of headphones and an antenna so you have to give consideration to this when building equipment. It is always a good idea to use a larger box than you think that you might need so that you have more room to add extra circuits if you want to improve the original design.

All radios require an audio amplifier to increase the level of the signals from the previous stages to a level that can be heard on the loudspeaker or headphones. In this *D-i-Y Radio* we will find out how to make the audio amplifier; the other stages will be described in later issues.

Building the radio from the last stage instead of the first has one outstanding advantage; you can use the amplifier as a test circuit for the other circuits.

THE AUDIO AMPLIFIER

HERE ARE MANY audio amplifier ICs and modules on the market which can be used to simplify the construction. If you completed a Novice Licence course, and you built the amplifier described on pages 55 to 59 of the Novice Licence Notebook, then you already have this stage built and you can use it without any modification in your receiver design.

THE TBA 820M IC

IF YOU HAVE to build an audio amplifier the design using an integrated circuit, in **Fig 1** is simpler than building it from discrete transistors. You can buy all the components and fix them to a board, as shown in **Fig 2**, and wire them up as shown in the circuit. If you feel that this is a bit too complicated, a printed circuit board is available, see the note at the end of the article.

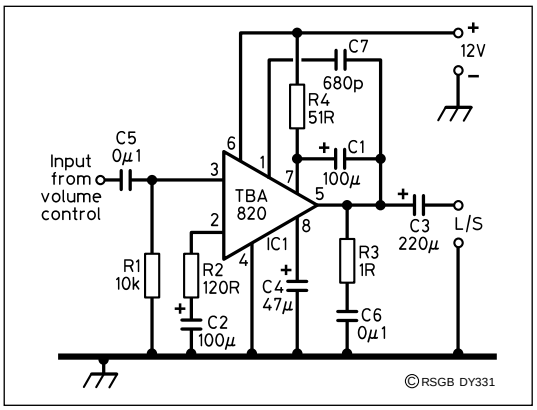


Fig 1: Audio amplifier, circuit diagram.

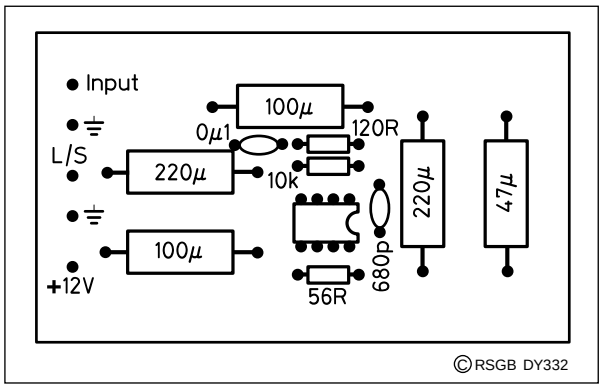


Fig 2: Audio amplifier, component layout.

It is a good idea to use a volume control with a switch, as is used with many radios. The PC board external wiring is shown in **Fig 3**.

The audio input is fed to the input of the TBA820M IC via C5, a 0.1µF coupling capacitor. The output of the IC is fed to the speaker via another 220µF electrolytic. These capacitors allow the audio signal to be input or output to the IC but block any

COMPONENTS LIST

Resistors

R1	10k
R2	1 20R
R3	1R
R4	56R
RV1	50k log potentiometer with switch

Capacitors

C1, C2	100
C3	220
C4	47
C5, C6	01l1
C7	680p
C8, C9	11l

Semiconductors

IC1	TBA820
IC2	1 2V regulator type 7812

Additional Items

Speaker 8Ω

Phono socket

DC component that may upset the working of the IC.

All audio ICs have very high gains and wide bandwidths in very small packages. It is reasonable to expect that if care is not taken they will burst into oscillation at odd frequencies. In many cases we do not realise that this is happening until we find that they are drawing unusually high currents or are getting rather hot for no apparent reason.

Some of the resistors and capacitors in the circuit, shown in Fig 1, are to control the gain and bandwidth and to ensure that the IC does not become unstable and oscillate.

When the amplifier is built it has many useful functions in addition to being the last stage of the receiver project. For example it can be used for tracing audio signals in amplifier circuits or for testing that suspect microphone insert. It can also be used for amplifying a Morse practice oscillator for group Morse practice sessions.

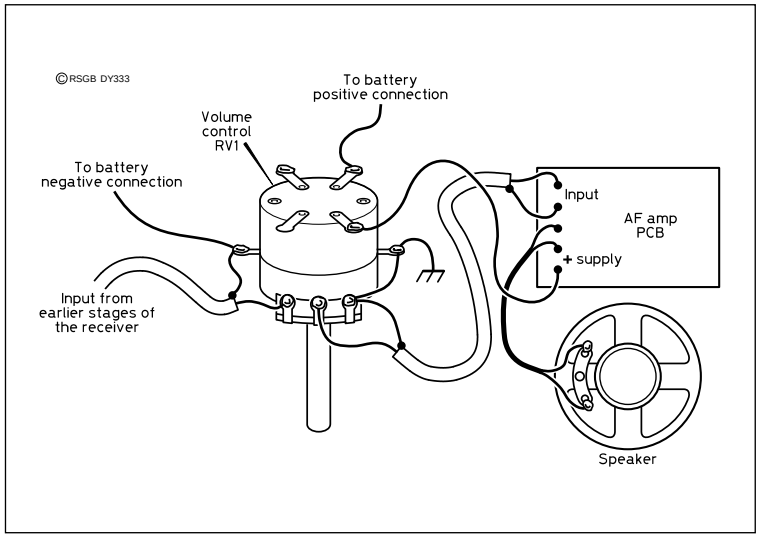


Fig 3: Twelve volt regulator interconnections.

A kit of parts for this amplifier can be obtained, price £8.95 + £1 P&P from JAB Electronic Components, 1180 Aldridge Road, Great Barr, Birmingham B44 8PB, tel: 0121 366 6928, fax: 0121 366 6237.

The Students Handbook Novice Amplifier Kit is also available from JAB Electronic Components at £6.95 + £1 P&P.

Key items of RSGB News for HamClub Members

● THE **AMATEUR RADIO Insurance Services** scheme (available only to RSGB members) is upgraded from 1 September to include breakdown cover on most types of equipment at *no* extra charge. For full details on ARIS, write to them at Shepheards Hurst, Green Lane, Outwood, Surrey RH1 5QS, tel: 01342 844000 or fax: 01342 844554.

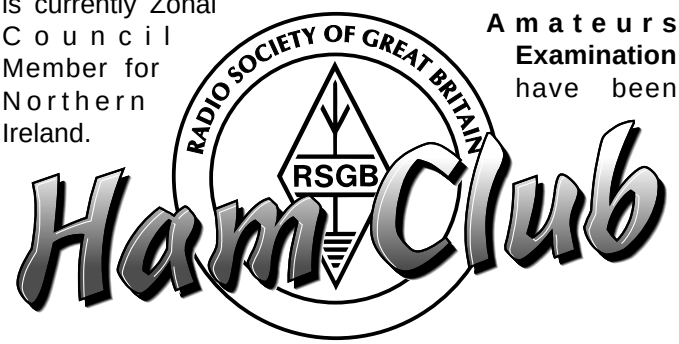
● A FREE 'JOTA PACK' will be sent to all groups applying for a GB special event callsign for **Jamboree On The Air** (19/20 October). The pack includes lists of JOTA stations and countries permitting third-party greetings messages *plus* a newsletter from the Scouts Association. Groups intending to operate during JOTA using GX, GS etc club callsigns should inform Eva Telenius-Lowe at RSGB HQ **by 4 October** if they also wish to receive a free JOTA Pack.

● **AMATEUR RADIO car boot sales** will take place at RSGB HQ in Potters Bar from 10.00am to 4.00pm on **21 September** and **19 October.** The RSGB HQ building will also be open, with the bookshop, GB3RS shack, National Amateur Radio Museum and Library available to visitors. Morse tests are available on demand between 11.00 am and 12.30 pm. For further details contact Marcia Brimson, 2E1DAY, on 01707 659015.

● THE RA HAS agreed to a rise in the fees for **Morse code tests.** From 1 September the new rates will be £15 for the Novice 5WPM test and £20 for the full licence 12WPM Morse code test.

● THE NEW Chairman of the **RSGB Executive Committee** is Hilary Claytonsmith, G4JKS.

● AT ITS MEETING on 13 July, the Council of the RSGB elected **Ian Kyle, GI8AYZ,** as the Society's **President for 1997.** He is currently Zonal Council Member for Northern Ireland.



●THERE ARE TWO Ordinary Member **vacancies on RSGB Council** for the term 1996 - 97 caused by the resignation of David Evans, G3OUF, and Nigel Roberts, G4IJF. Ian Kyle's, GI8AYZ, election as 1997 President has also created a vacancy as Zonal Council member for Northern Ireland. Further details from Fay Huxley, 2E1EUA, at RSGB HQ.

● THE RSGB WAS at **Europe's largest** amateur radio exhibition, *HamRadio,* in Friedrichshafen**,** Germany, in June. RSGB Marketing Manager Marcia Brimson, 2E1DAY, reported that the sale of RSGB books was brisk, with the *RSGB IOTA Directory* and *Radio Communication Handbook* being the two best sellers.

● REPORTS ON THE May 1996 **Radio Amateurs Examination** and the June 1996 **Novice Radio Amateurs Examination** have been received from City & Guilds. Anyone wishing to receive a copy should send a 1st or 2nd class SAE to Lynnette Ranger, 2E1EKT, at RSGB HQ, specifying which report is required.

● ADMINISTRATION of the RSGB **Audio Visual Library** (AVL), previously run on a volunteer basis, has now been taken over by RSGB headquarters. The new contact for enquiries about the AVL is John Davies, G3KZE, tel: 01707 659015.

● THE RSGB WILL have a **bookstall** and membership information stand at the following rallies and events: 1 Sept Telford Radio Rally, Shropshire; 21 Sept Scottish Amateur Radio Convention, Glasgow; 4 - 6 Oct RSGB International HF and IOTA Convention, Old Windsor; 18 - 19 Oct Leicester Amateur Radio Show.

● THE CHAIRMAN OF the **VHF Contests Committee,** Steve Thompson, G8GSQ (formerly GW8GSQ), has recently changed address and phone number. He can now be contacted at PO Box 2399, Reading, Berks RG7 4FB; tel / fax: 0118 982 0848 (phone evenings / weekends only); or e-mail: g8gsq@blacksheep.org

A Novice ASTU

By K Ruiz, G4SGF/ZB2MD

IF YOU ARE A short wave listener or a licensed radio amateur an ASTU (Antenna System Tuning Unit) is very useful. The purpose of an ASTU is to adjust the antenna feed impedance so that it is very close to the 50Ω impedance of the antenna of the receiver or transmitter, a process known as matching. When used with a receiver an ASTU can dramatically improve the signal-to-noise ratio of the received signal. On transmit it is essential that the antenna is matched to the transmitter so that the power amplifier operates efficiently.

The ASTU described here is based on a design by Doug DeMaw, W1FB. The components used are readily available (see note at the end of the article) and the unit will handle transmitting powers up to around 5W. It matches over the frequency range of 1.8 to 30MHz without difficulty.

CIRCUIT

THE BASIC CIRCUIT is shown in **Fig 1**. On transmit, the signal presented at L1 is coupled into L2, which forms a resonant circuit with C1. The RF energy from L1/C1 is coupled to the antenna via C2.

Unwanted components of the transmitter waveform, such as harmonics, are rejected because they are not on the resonant frequency of C1 and L2.

On receive only the signals in the resonant pass-band of C1/L2 are coupled to the input of the receiver via L1.

In this design C1 and L2 are initially chosen to be resonant in the 80m band. In order to make the ASTU operate on other bands we need to change the value of either L2 or C1. It is easy to change the value of L2 by a simple modification using switched inductors as shown in **Fig 2**. S1 in position 1 leaves the circuit as in Fig 1. In positions 2, 3 and 4 it brings L3, 4 or 5 into circuit in turn. The new coils are placed in parallel with L2 changing the inductance of the tuned circuit so that C1 now tunes other frequencies. By choosing appropriate values continuous coverage from 10 to 80m is obtained. Inductances in parallel behave as resistors in parallel:

$$[1/L_{tot} = 1/L_a + 1/L_b]$$

In order to tune 160m we need an extra coil as shown in **Fig 3**. When S2 is in position 1 the circuit is exactly as in Fig 2. With S2 in position 2, L6 is placed in series with L2, and the total inductance is the sum of L2 and L6. C1 can now tune 1 60m. The functions of S1 and S2 can be combined in a single switch, as in **Fig 4**.

COMPONENTS LIST

Capacitors

C1, C2	350pF

Inductors

L2	27µH coil
L3	10µH coil
L4	2.2,µH coil
L5	1µH coil
L6	65µH coil

Other items

2 SO239 sockets (in and out)

1 2P6W switch S1

Box - Any small plastic or metal box can be used.

2 Plastic knobs for capacitors

4 Stick-on feet

Mounting screws for the capacitors specified are M2.5.

Screws, nuts and washers required are also to mount the input and output sockets.

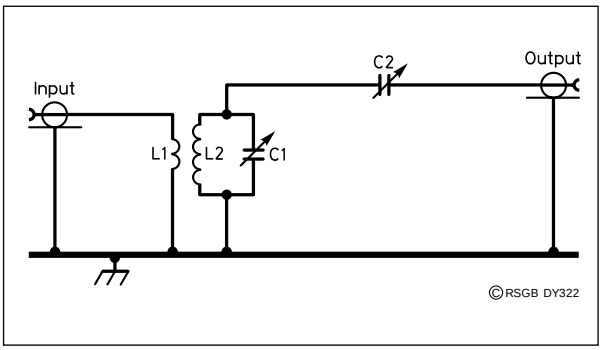


Fig 1: Basic circuit of the ASTU.

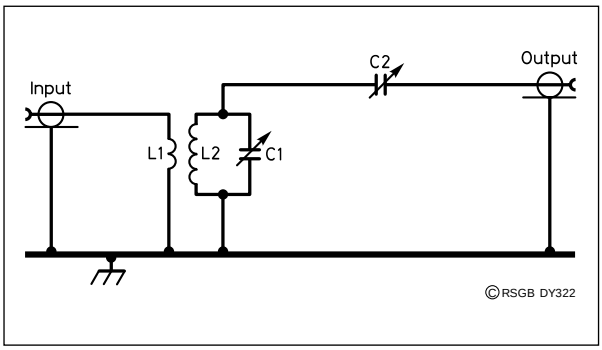


Fig 2: Coils added for other bands.

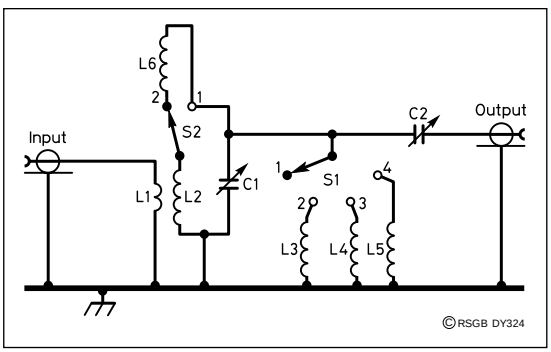


Fig 3: L6 added for 160m.

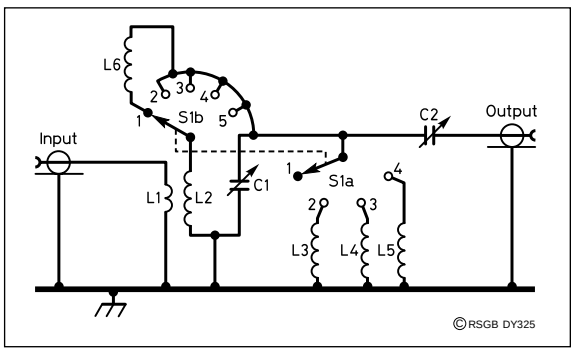


Fig 4: Two-pole switch for all bands.

CONSTRUCTION

L1 IS FORMED BY winding four turns of 22SWG enamelled copper wire over L2, as in **Fig 5**. One end of L1 is connected to the end of L2, and where these are joined is a common earth connection. The transceiver input is connected to the other end of L1.

All components except the capacitors are assembled on the switch, see **Fig 6**.

Note from the circuit diagram that the rotor of C1 is earthed, whereas no part of C2 is at earth potential. In order to avoid severely detuning the ATU when making adjustments to C2, a plastic control knob should be used for C2. If a metal box is used, ensure that no part of the shaft touces the box.

The capacitors are mounted using M2.5 screws. Take care that these do not foul the vanes of the capacitors, which is easily done. An appropriate number of washers between the box and the capacitors will prevent this happening.

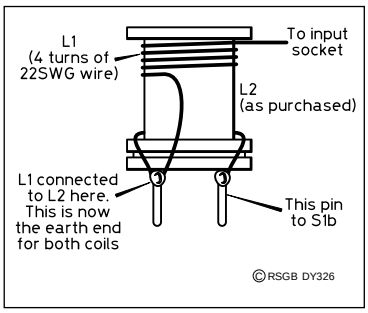
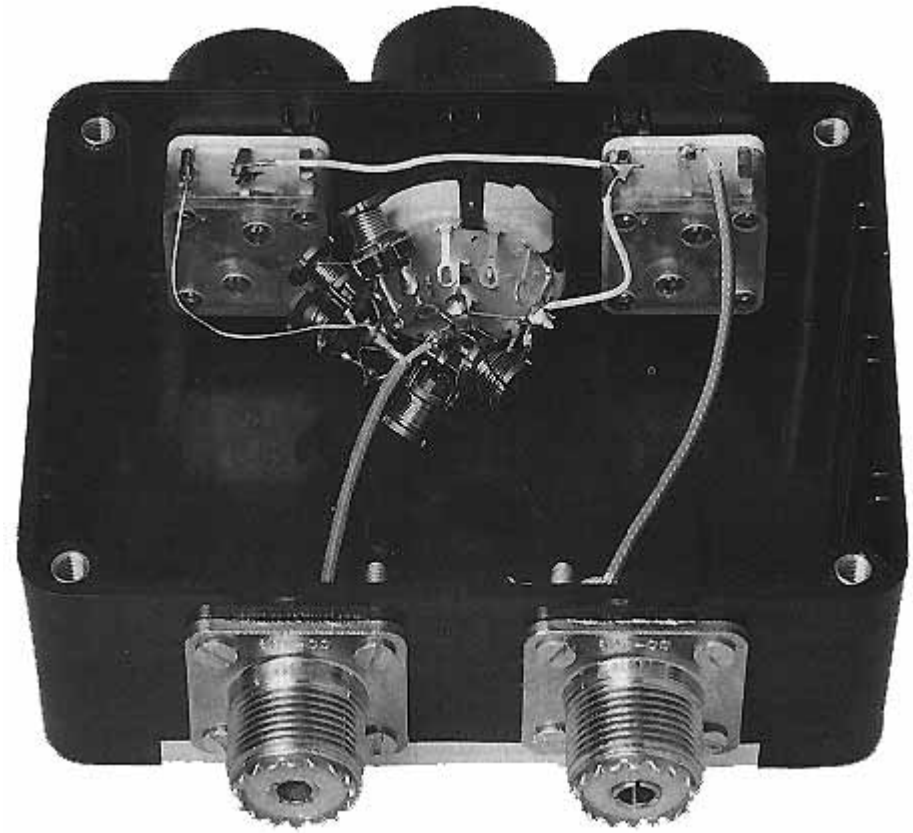


Fig 5: L1is wound over L2 as shown.



Internal view of the ASTU. A small plastic or metal box makes a suitable housing.

OPERATION

The best indication of optimum matching on transmit can be achieved using an SWR bridge; the ASTU is tuned for minimum SWR. If the ASTU is used for receive only the best antenna-to-receiver match can be achieved by listening for maximum signal while adjusting the ASTU.

NOTE

ALL PARTS can be obtained from JAB Electronic Components, 1180 Aldridge Road, Great Barr, Birmingham B44 8PB. A complete kit, included a punched box, is available from the same source at £24.95.

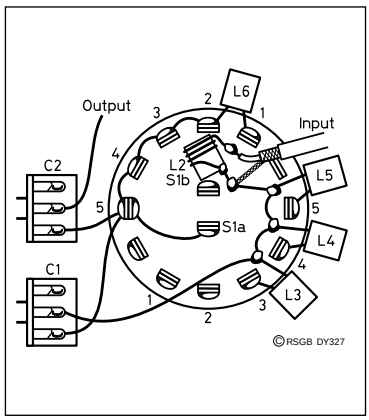


Fig 6: Coils are mounted on the switch assembly.

Contests for Novices

NOVICES AND contests do not usually go together in the same sentence. After all, don't you need high power and big antennas to take part in contests? In fact, the answer is 'no', you don't, at least not in *all* contests. The organisers of several contests have realised there is a need to cater for Novices and have introduced special rules for them to put them on a more equal footing.

The Poole Radio Society has even organised a contest specially for Novices. It has been designed to give Novices their first taste of contests, with rules specifically designed to be simple and easy to comply with, encouraging the greatest possible participation. The Poole Radio Society's National Novice Contest takes place on Sunday 22 September, and the full rules are given opposite.

RSGB CONTESTS

SEVERAL RSGB contests are also particularly suitable for Novices, although all RSGB members can take part, regardless of their licence class. Here are some RSGB contests in which Novices may like to have a dabble:

The **Slow Speed Cumulative** Contests encourage participation by those whose Morse is perhaps a little rusty. This is because the maximum speed is set at 12WPM - and never faster than the other station is sending - so even if you can only manage 5WPM you can still take part. These contests are on *now:* **Monday 2 Sep, Tuesday 10 Sep, Wednesday 18 Sep, Thursday 26 Sep** and **Friday 4 Oct,** from 1900 to 2030UTC, between 3540 and 3580kHz on CW. Send an RST report plus your first name. Contacts with Novices count 20 points (and only 5 points between full licence holders), so Novices are much sought-after by all taking part. There is another session of Slow Speed Cumulative Contests in April.

The **RSGB 21 / 28MHz Contests,** on **SSB** on **6 October** and **CW** on **20 October,** each have QRP sections which allow a maximum of 10W output power, so Novices are competing only against others using low power. In these contests, you should send an RS(T) report and serial number, starting at 001, as well as your county. The idea is to contact as many different countries as possible on each of the two bands. In the SSB contest Novices can, of course, only participate on 28MHz.

For Class A Novices, the **'LF' Cumulative** Contests, which take place in January, will also be of interest. Three short (two-hour) mid-week evening sessions take place on both 160 and 80 metres CW. A 'speed limit' of 12WPM is enforced from 1950 - 1960kHz and 3560 - 3580kHz, so even those who are not yet completely proficient in Morse code should have no fears. Entrants receive 3 points per QSO, except for QSOs with Novices, which count 20 points, so Novices are again always very much in demand!

Both Class A and B Novices will find the two **50MHz Backpackers** Contests in June and July great fun. A 3W output section means that Novices are competing on equal terms with full licensees. The idea is to operate from a good VHF location by literally 'back-packing' your complete station to the transmitting site. You are allowed to use a car battery, but you're *not* allowed to charge the battery by running the car engine!

For Class B Novices who operate only on 70cm, the **432MHz FM** Contest, also in June, will be of particular interest. The single band and mode means that Novices often have all the necessary equipment already available. You can operate from home or try to improve your score by operating portable from a local high spot, and in this contest you *are* allowed to keep your car battery fully charged!

PHOTOGRAPH: STUART MCKINNON, G0TBI

Club contest operations provide an excellent opportunity for Novices to learn from more experienced amateurs. This is a typical club contest operation: members of the Stourbridge and District Amateur Radio Society at their HF SSB Field Day site in September last year.

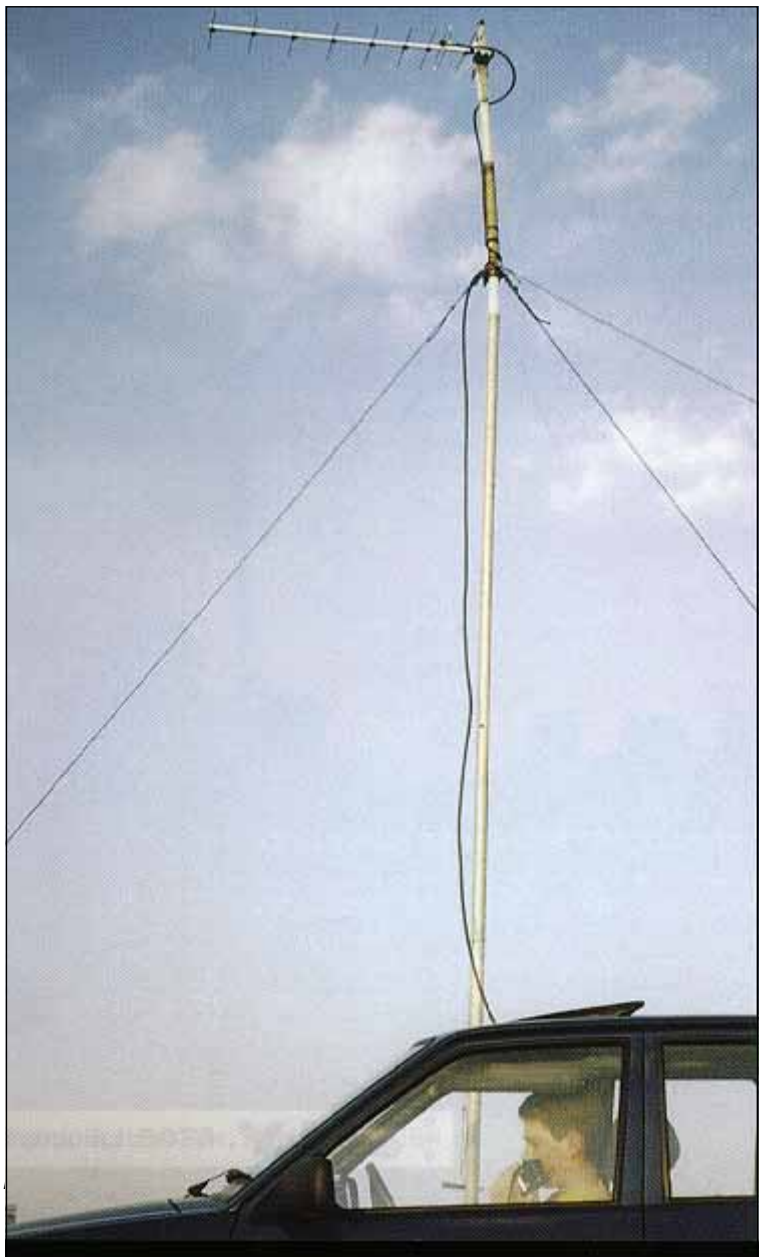
THE EXCHANGE

OF COURSE, these aren't the only contests in which Novices can take part. Most weekends there are international HF contests on SSB or CW (or sometimes both) on at least one or two bands. And there are many more RSGB VHF / UHF contests in which Novices can 'have a go'.

Always listen first to make sure you know what 'exchange' (information) is expected of you. Almost all contests require an RS or RST report (59 or 599 is usually sent), plus some other data. In some contests this is a 'serial number' (001 for the first contact, then 002, 003 etc), but others require a zone, IARU Locator, County, IOTA Reference or WAB Square etc. A few minutes spent listening will enable you to discover just what is required.

Contests are one of the best ways for all operators (not just Novices) to improve their operating skills, but - perhaps just as importantly - they are great *fun.* Contests are also good club activities, and once you have developed your contest operating skills a little you will find that your club will be calling on your skills to help them in the next club contest effort. Join in and have some fun!

Paul Dennison, 2E1DBI/P, on Dunstable Downs during the RSGB 432MHz FM Contest in June. His antenna is a 9-element Yagi, with a cunning mechanical (hinge and string!) arrangement to provide horizontal / vertical polarisation switching.



FULL RULES FOR THE SECOND POOLE RADIO SOCIETY NATIONAL NOVICE CONTEST

1. Date and Time: The contest takes place on Sunday 22 September from 1400UTC (3pm local clock time) to 1600UTC (5pm local clock time). NB: times one hour later this year!

2. Bands / Power: Contestants can use the 50MHz (6m) and 430MHz (70cm) bands, using only those sections of the bands, modes and powers permitted by the Novice licence, and in accordance with published band plans. Stations working Novices using CW are particularly asked to ensure that they send no faster than the Novice station.

3. Sections: There will be a single section for all Novices. The station should be operated by the Novice licence-holder throughout the contest in accordance with the Novice licence. Help and encouragement in setting up stations and logging etc is welcomed, subject to licence conditions. The same basic callsign must be used throughout the contest (eg 2E1JHG and 2W1JHG/M are the same station).

4. Locations: Stations may operate from up to two locations during the contest. Stations entering may switch between the two locations as they wish. A location is any area of land within a circle of 10 metres diameter.

5. Exchange: Each station may only be contacted for points once on each band. Usual reports should be exchanged for the mode being used (eg 57 on phone, 579 on CW). In addition some indication of location (such as locator, county, town, village) must be exchanged. Serial numbers are not essential for this contest, but please make sure you log the time of each QSO accurately. A typical exchange might by "2W1GHF this is 2E1JHG, you are 5 and 4 in Poole, Dorset".

6. Scoring: Scoring is very simple. Novices score 3 points per QSO. No points will be available for duplicate contacts, even after a change of location. No points will be available for QSOs through repeaters etc. There are no multipliers.

7. Logs: Logs should be sent to Colin Redwood, G6MXL, 45A Lulworth Avenue, Poole, Dorset BH15 4DH to arrive in time for adjudication over the first weekend of October. Any recognisable paper log sheet will be accepted, provided it contains for each QSO, the time, band used, callsign of station worked, reports exchanged and location of station worked and points claimed. RSGB HF or VHF log sheets can be photocopied from a recent RSGB *Call Book,* and will make the adjudicators' job a lot easier. Separate log sheets for each band should be used.

Make sure that you include you own callsign, name and address, and details of the location(s) used for the contests. Please add up your score for each band and in total and write is somewhere clearly on the log sheet.

Checklogs from all listeners and transmitting stations will be very welcome.

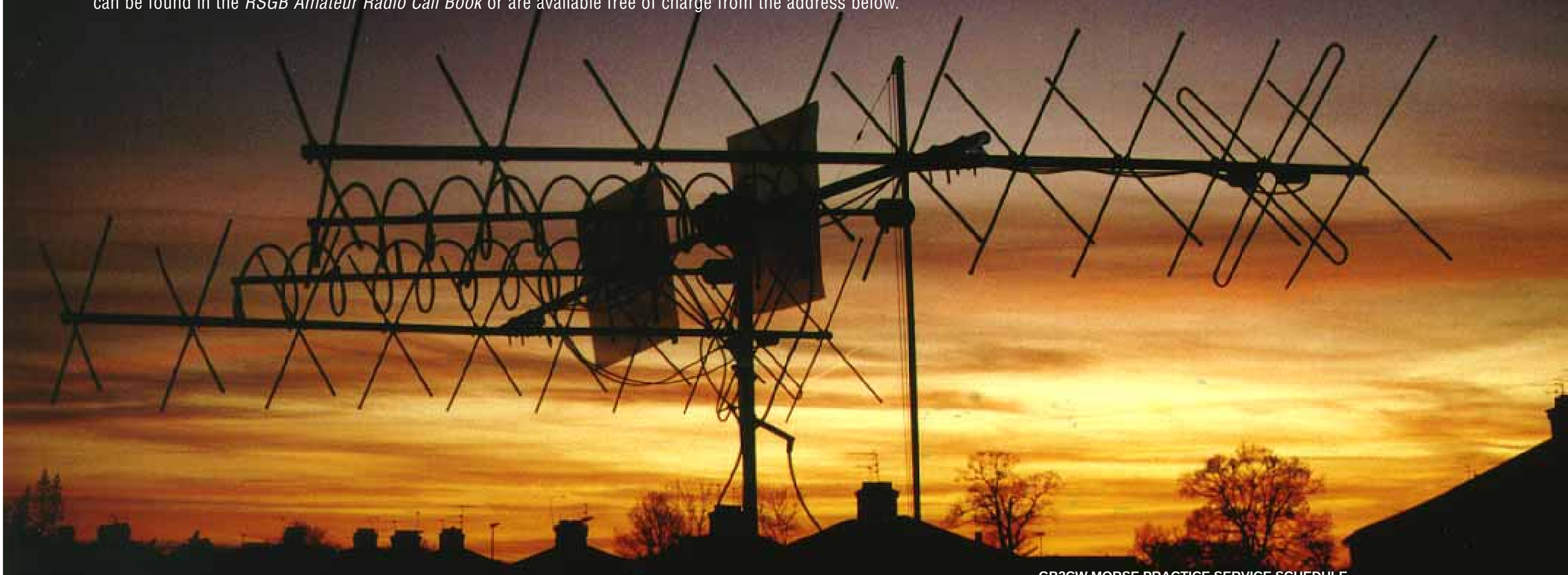
8. Winners: The winning station on each band and overall will each receive a small cup to retain. All entrants will receive an A4 certificate for entering and a summary of the results, providing a large enough stamped envelope is enclosed with the entry. Certificates and results summaries will also be available to anyone sending in a checklog on the same basis. Please indicate the names of each operator, if more than one operator requires a certificate. A special certificate will be awarded to the Novice station presenting the neatest hand-written log.

AMATEUR RADIO BROADCASTS

Broadcasting is not permitted by the ordinary Amateur Radio Licence, but the Radio Society of Great Britain has special permission to provide two broadcasts intended for all radio amateurs and listeners. The first is a weekly **news bulletin,** broadcast every Sunday under the callsign **GB2RS.** It is transmitted from a large number of stations throughout the country and on several frequency bands. The GB2RS bulletin consists of national amateur radio news, followed by details of club meetings in the listener's local area during the coming week.

The other broadcast is the RSGB **Morse practice** service, **GB2CW.** It is intended to assist those preparing for the RSGB 5WPM and 12WPM Morse code tests which are necessary for a Novice or Full Class A amateur radio licence. There are GB2CW broadcasts every day of the week. Some cover a wide area, whilst others have more local coverage.

There are nearly 100 transmissions from both GB2RS and GB2CW throughout the country each week - far too many to list in detail here. The full schedules of both GB2RS and GB2CW can be found in the *RSGB Amateur Radio Call Book* or are available free of charge from the address below.



GB2RS NEWS BROADCAST SCHEDULE (SUNDAYS)

Band & mode	Frequency MHz	Local time
80m SSB	3.640, 3.650 or 3.660	0900, 0930, 1000, 1030, 1100, 1130 or 1800
40m AM	7.0475	0900
6m FM	51.530	0930, 1030, 1100, 1130 or 1200.
2m FM	145.525 (S21)	0900, 0930, 1000, 1030, 1100, 1200, 1800, 1900 or 2100.
70cm FM	433.525 (SU21)	0930, 1000, 1030, 1200, 1900, 1930, 2000 or 2100.

GB2CW MORSE PRACTICE SERVICE SCHEDULE

Band & mode	Frequency MHz	Day and local time
160m SSB / CW	1.850	Sun 2015
160m SSB / CW	1.976	Mon 2030, Thu 1930
80m SSB / CW	3.550	Wed 1930, Fri 1830, Sat 1930, Sun 1930
80m SSB / CW	3.600	Sun 1100, Wed 2000
80m SSB / CW	3.640	Sun 0945
2m FM	145.250 or 145.275	Most days at 1830, 1900, 1930, 2000, 2030 or 2100.

RSGB, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE

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Go to next page

2's Company

News and Reports from Novice Licensees

EVEN NOW, at the solar minimum, it is still possible for Novices to contact many different countries on the 28MHz band (10m). **D Shallcross, 2E0AFI,** from Derbyshire sent in an entry to the 1996 28MHz Countries Table which is run in the *HF News* column in *RadCom.* He has worked 31 countries on that band using CW and SSB during 1996 alone.

Anand Raicha, 5Z4RAN, at his station in Kisumu, Kenya. Note Anand's brand-new log book, open at page 1!

2E0ANY made a number of contacts on 28MHz during the RSGB IOTA Contest on 27 / 28 July. He also participated in the first RSGB 'RoPoCo' (Rotating Post Codes) contest for 1996, which took place in April. This contest provides a real challenge in Morse-copying ability, as it requires the exchange of post codes between participants. **P A Williams, 2E0AJE,** of Wakefield, West Yorkshire also entered this contest, coming in 30th place out of 49 entrants.

It is good to see Novices entering UHF contests too. *D-i-Y Radio* subscriber **Mrs Margaret Snary, 2E1AQS**, in Enfield, London represented the Southgate Amateur Radio Club in the Affiliated Societies section of the 432MHz Fixed Station contest in February. She uses an impressive 48-element antenna array on 70cm. **S A Sugden, 2E1AXO,** in Bracknell, Berkshire also entered this contest, making 18 contacts with his 3W and 19-element beam antenna.

There are a number of HF and VHF / UHF contests which take place around this time of year which are particularly suitable for Novices. Turn to pages 10 and 11 for our feature on Contests for Novices.

FIRST KENYAN NOVICE

A NOVICE LICENSING scheme has been introduced in **Kenya,** and the first licence was issued to **Anand Raicha, 5Z4RAN,** on 13 June. Anand is a student at Kisumu Academy and has been a short wave listener for several years. He was one of the first few to start the preparations for the exams when a Novice licensing scheme was proposed in Kenya. Anand is a member of the Scout movement and has taken part actively in Jamboree On The Air over the last two years. His father is Max Raicha, 5Z4MR.

THE LOG BOOK

JULY WAS OFFICIALLY declared to be **'solar minimum'** month by the **Space Environment Centre** in Boulder, Colorado. This means that, slowly, HF propagation conditions should now begin to improve as solar activity increases. As this happens, the **maximum usable frequency** will rise, to reward radio amateurs with long distance contacts on the HF bands and, eventually, 6 metres. Even in July, 28MHz provided strong signals from southern Europe, thanks to **Sporadic E** propagation. For example, there was a good opening to southern Europe on the Sunday morning of the **RSGB IOTA Contest** on 27 / 28 July. Many **EA (Spanish), I (Italian)** and **CT (Portuguese)** stations on islands and the mainland were worked and, conversely, **9H**0A **(Malta)** contacted hundreds of northern European stations, including many in Britain and Germany.

Mal Johnson, VK6LC, has activated numerous islands off the coast of Australia for the RSGB IOTA awards programme. The small photos on his QSL card show him on some of them.

The **Historic Scotland Weekend** took place on 24 / 25 August. Ten **special event stations,** all using **GB2 prefixes,** were on the air from historic sites around Scotland. Most activity was on 20, 40 and 80 metres SSB, and an award is available for those who worked or heard a certain

Band by Band

The Amateur Radio Spectrum: The 2 metre Band

TWO metres, the 144MHz band, is the most heavily-used VHF / UHF band in most parts of the country. Available to both Class A and B full licensees (but not Novices), the 2 metre band provides good, reliable, local communications with the added excitement of occasional long-distance ('DX') openings.

The 2m band is two megahertz wide, from 144 to 146MHz. It is allocated on a primary basis to the Amateur Service and the Amateur Satellite Service, with a maximum power in the UK of 26dBW, or 400W.

Communications on 2m is normally limited to a few kilometres for low-power FM transmissions using simple antennas, up to a few hundred kilometres for higher-powered stations using high-gain antennas from good locations. Unusual propagation sometimes occurs on 2m which can extend these ranges considerably. **Tropospheric ('tropo')** propagation occurs typically when there is a high-pressure weather system close to the UK, and provides strong signals from the near Continent. **Auroras** can provide propagation to northern Scotland (from Southern England) and Scandinavia or even Russia; whilst **Sporadic E** gives strong signals from Italy and Central Europe.

There is a huge variety of commercial amateur radio equipment available for the 2m band. New equipment costs from around £100 for a simple hand-held transceiver, whilst **AKD** (tel: 01438 351710) makes a 2m FM 'base station' transceiver for under £200.

Antennas used on 2m vary from a simple quarter-wave vertical used for omni-directional local coverage, up to multi-element Yagis with boom-lengths in excess of 20ft (6m). However, a small rotatable 3 or 5 element Yagi will still provide useful gain and directivity and can look like a TV aerial if mounted on a chimney.

BAND FACTS

Allocation: 144.000 - 146.000MHz (Primary)

UK Band Plan:

144.000 - 144.150MHz ..... CW (Morse) only
144.150 - 144.500MHz ..... SSB and CW (Morse)
144.500 - 144.845MHz ..... All modes
144.845 - 145.000MHz ..... Beacons
145.000 - 145.200MHz ..... Repeater inputs
145.200 - 145.600MHz ..... FM Simplex channels
145.600 - 145.800MHz ..... Repeater outputs
145.800 - 146.000MHz ..... Satellites

Activity:

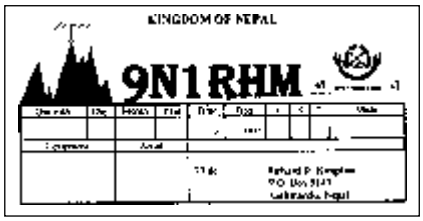
144.050MHz ..... CW calling frequency
144.300MHz ..... SSB calling frequency
144.600MHz ..... RTTY
144.625MHz ..... Packet radio
144.650MHz ..... Packet radio mailboxes
144.675MHz ..... Packet radio
145.200MHz ..... Emergency communications
145.225MHz ..... Emergency communications
145.250MHz ..... GB2CW Morse practice
145.500MHz ..... FM calling channel
145.525MHz ..... GB2RS news broadcasts
145.550MHz ..... Rally 'talk-in'

THE LOG BOOK

number of stations. Full details can be obtained from Mike Dalrymple, GM4SUC, 11 Shawfield Avenue, Ayr, Ayrshire KA7 4RE.

Listeners to the VHF bands can expect to hear plenty of activity over the weekend of **7 / 8 September.** The **RSGB 144MHz Trophy** contest takes place from 1400UTC on the Saturday, for a period of 24 hours.

Short-wave listeners interested in increasing their 'countries heard' score should find the **CQ World Wide SSB** contest on **26 / 27 October** a productive time. This contest runs for 48 hours from 0000UTC on the Saturday and is the biggest international HF contest of the year, with literally thousands of stations taking part. Many groups mount major 'DXpeditions' to rare countries or islands specifically for this contest. A number of American amateurs travel to Caribbean islands for 'CQWW', as it is known, whilst Europeans tend to make tracks for the **Canary Islands (EA8), Corsica (TK), Malta (9H)** and other Mediterranean countries, **Luxembourg (LX)** and the **Channel Islands (GU or GJ).**



QSL card from Rich Kingston, G4RHM, who is now working in Kathmandu, Nepal, and is active as 9N1RHM.

Using Test Equipment

MOST electrical measurements rely on the measurement of voltage and current. To this end many types of instrument have been developed such as meters, oscilloscopes, spectrum analysers etc. This article describes the simplest yet most used of measuring instruments, the multimeter.

CURRENT AND VOLTAGE MEASUREMENTS

THE MULTIMETER, shown on the cover, tends to be used for most voltage and current measurements. A multimeter can be either analogue or digital. They are relatively cheap and usually provide resistance measurement as well. Because these instruments are so cheap it is usually not worth making one, other than for the experience.

The following description of measuring voltage and current is restricted to the method of measurement using an analogue meter.

The analogue meter comprises a coil in the field of a permanent magnet. The coil, to which the pointer is fixed, is free to move on a spindle and is biased to the left-hand side of the scale with a small spiral spring.

Current flowing through the coil creates a magnetic field in opposition to the permanent magnet field. The greater the current the more the coil and the pointer is moved to the right-hand side of the scale. The meter is calibrated in units of current, usually microamps (μA).

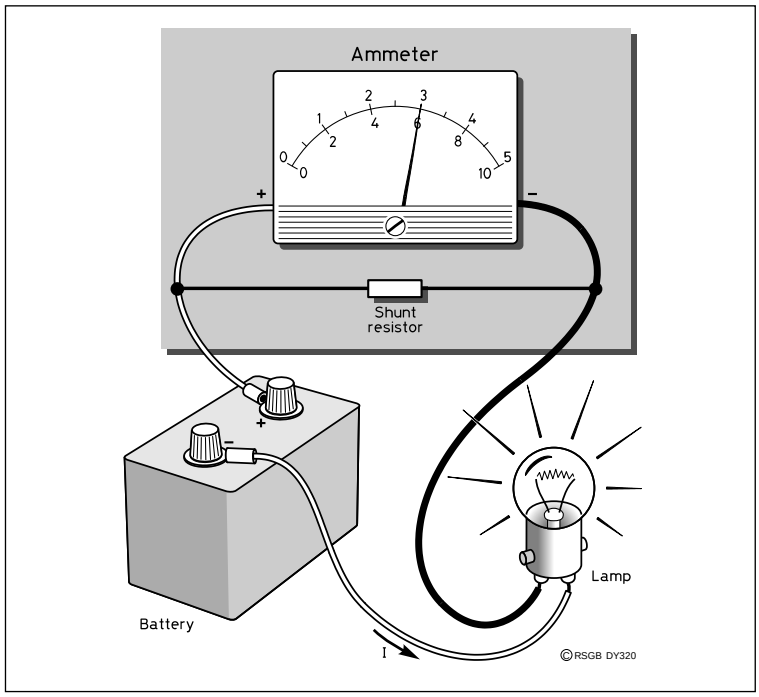


Fig 1: To measure current you must break the circuit at some point and connect the meter in series at the break. A shunt resistor expands the scale of the meter to measure higher currents than it could normally handle.

MEASURING CURRENT - THE AMMETER

TO MEASURE CURRENT the meter is placed in series with the circuit. As a result of this, all the current flowing in the circuit must pass through the meter.

Because the meter can only measure μA, the range must be extended if it is to measure milliamps (mA) or amps (A). This is achieved by connecting a resistor in parallel with the meter to provide a path for the additional current. This resistor is called a shunt resistor and is shown in **Fig 1**.

If the meter is to cover several current ranges then a selection of shunt resistors are required. These are usually inserted into the meter circuit with a switch in a multimeter (described later).

MEASURING VOLTAGE - THE VOLTMETER

THE SAME ANALOGUE μA meter can be used to measure voltage. In this case the basic meter movement is used with a resistor in series, as shown in **Fig 2**. This resistance is called a multiplier. The current multiplied by the resistance, by Ohms law, gives the voltage drop across the resistance. An instrument used this way is calibrated in terms of the voltage drop across the resistor to read voltage.

The range of a voltmeter can be extended to measure a wide range of voltages. This is accomplished by adding additional resistances in series with the meter in a multimeter.

When used to measure voltage in an electronic circuit a the voltmeter must not affect the circuit under test. An ideal

voltmeter would have an infinite input impedance, which would prevent the voltmeter from drawing current from the circuit under test.

Real-world voltmeters, however, have a finite value of input impedance so be aware that in certain circumstances the voltage you are measuring will change when the measurement is made because the meter adds some load to the circuit.

MEASURING RESISTANCE

THE SAME ANALOGUE µA meter can be used to measure resistance. In this case the basic meter movement is used with a battery and a resistor in series. The resistor being measured is then connected in series with the meter and calibration resistor using the meter leads. The current flowing through the meter is determined by the value of the resistor being tested. Although the meter is measuring current the scale is calibrated in terms of resistance, as shown in **Fig 3**.

THE MULTIMETER

A MULTIMETER is a piece of test equipment that most amateurs should know how to use. The simplest kind of multimeter is the volt-ohm-milliameter (VOM). As its names implies, a VOM measures voltage, resistance and current. VOMs use one basic meter movement for all functions. The movement requires a fixed amount of current (often 50µA) for a full-scale reading. As shown earlier, resistors are connected in series or parallel to provide the voltage or current meter reading. In a VOM, a switch selects various ranges for voltage, resistance and current measurements. This switch places high-value multiplier resistors in series with the meter movement for voltage measurements. It connects low-value shunt resistors in parallel with the movement for current measurements. These parallel and series resistors extend the range of the basic meter movement.

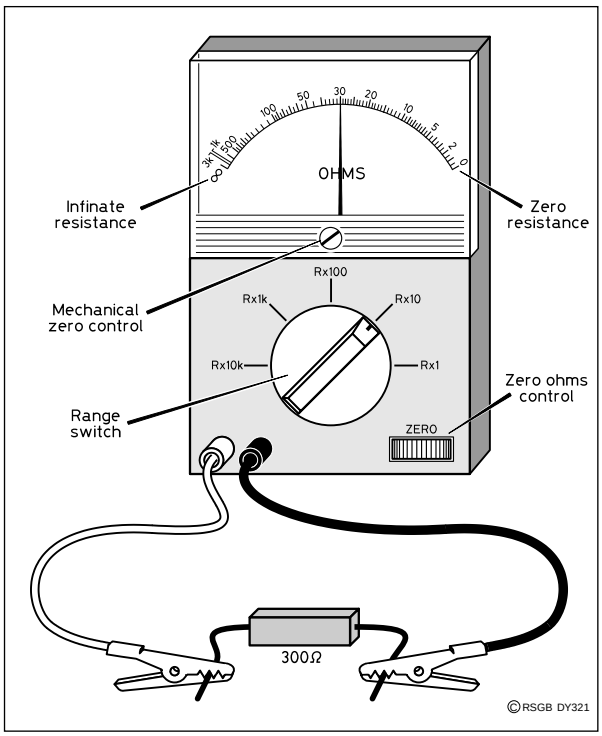


Fig 3: An ohmmeter being used to measure the value of a 300Ω resistor.

Measuring resistance with a meter involves placing the meter leads across the component or circuit whose resistance you wish to measure. Make sure you select the correct resistance scale. The full-scale-reading multipliers vary from 1 to 1000 and higher.

When the range you are going to use has been selected the scale has to be zeroed. This is done by connecting the test probe leads together and adjusting the 'Zero Ohms Control' for full scale meter deflection. The leads are then connected across the resister being measured as shown in Fig 3.

Note that the scale is compressed on the higher end of the range. For best accuracy, keep the reading in the lower-resistance half of the scale. On most meters this is the right-hand side. Thus, if you want to measure a resistance of about 5000Ω, select the R x 1000 scale. Then the meter will indicate 5.

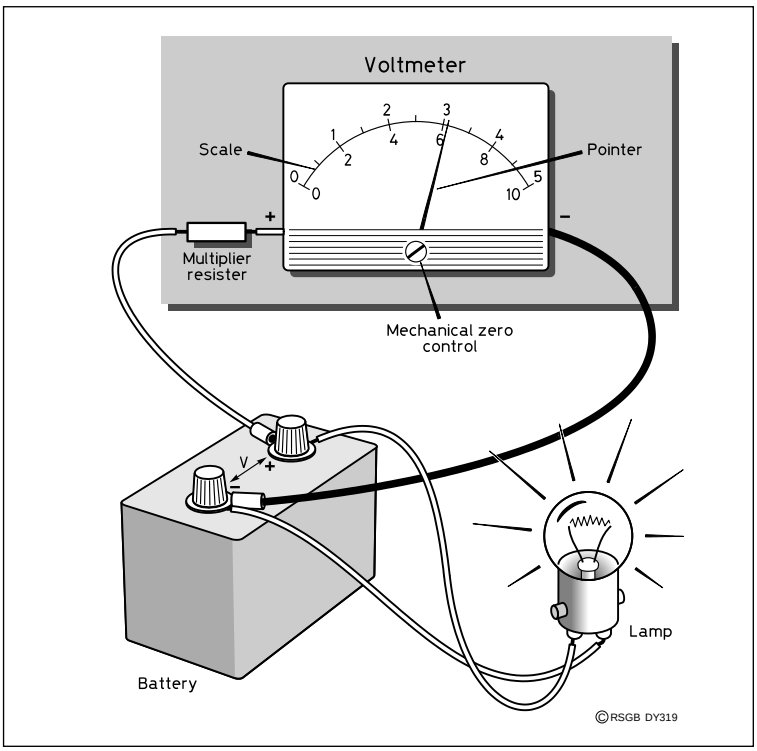


Fig 2: When you use a voltmeter to measure voltage, the meter must be connected in parallel with the voltage you want to measure.

A Simple HF Absorption Wavemeter

By E Chicken, MBE, BSc, MSc, CEng, FIEE, G3BIK

THERE IS A need for an absorption wavemeter in a licensed amateur's radio station. Its prime purpose is to check that the transmitter is radiating on the intended waveband, and that the transmission is free from spurious emissions such as harmonics of the carrier frequency.

It can also be very useful when tuning the frequency multiplier stages of a transmitter or of a receiver's local oscillator, or for broadly checking the frequency coverage of a home-built oscillator. It can even be used as a relative field-strength indicator whilst experimenting with transmitting antennas.

What it cannot do is precisely measure the frequency of a transmitted signal. It will indicate the presence of a locally generated RF radiation, but can only approximate the frequency to within a band some kilohertz wide, eg the 3.5MHz or the 18MHz amateur band, or the harmonics of such emissions.

THE CIRCUIT

THE ABSORPTION wavemeter, in its most basic form, consists of a parallel inductance/capacitance resonant circuit which is tuneable, plus some form of indicator to show the presence of RF energy within the wavemeter's tuned circuit. When located in the presence of a relatively strong electromagnetic field such as that from a transmitting antenna or the PA tank circuit of a transmitter, the resonant circuit of the wavemeter absorbs a small amount of the radiated RF energy by electromagnetic induction into its coil.

As there is no built-in method of RF amplification, the indicator within the wavemeter must rely entirely upon the absorbed energy to power it.

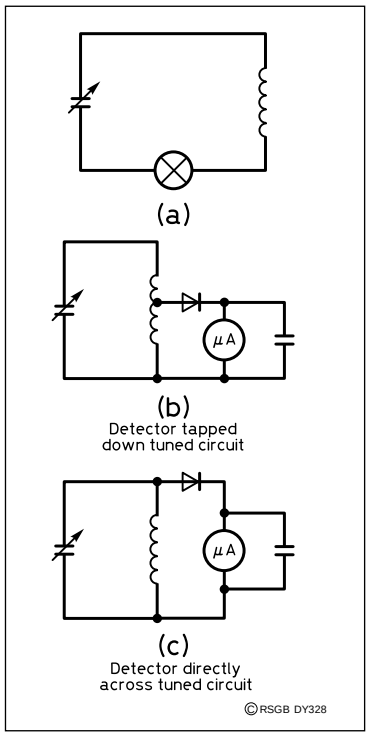


Fig 1: Evolution of the absorption wavemeter circuit.

Possibly the simplest form of indicator would be the inclusion of a low power torch bulb wired in series with the resonant LC circuit as shown in **Fig 1 (a)**.

Whilst this does work and should in principle satisfy the licensing authority, it is rather insensitive in practice, and hence would be of limited usefulness. A more sensitive indicator is the moving-coil meter but it requires a DC electric current.

Bearing in mind, however, that the RF energy absorbed by the wavemeter causes an oscillatory voltage to be developed across its tuned circuit, a simple diode detector can be used to convert that alternating RF voltage into a direct voltage, which in turn can be used to drive current through an indicating meter.

The voltage produced in this way will be very small in magnitude, hence the need for a sensitive moving-coil meter, ie one with microamps (μA) FSD (full-scale deflection). Fortunately, physically small meters, often described as 'volume level' or 'battery level' indicators, can be purchased at very modest cost, and are typically rated at 100μA FSD. Such meters are ideal for use in a wavemeter which seeks only to give an indication rather than an absolute value of current or voltage, the meter scale being ignored.

The limited selectivity of a single tuned circuit is one reason why the RF tuning indication by the wavemeter is broadband. Further, the electrical loading effect of the detector/indicator can significantly worsen that selectivity.

A bulb with its resistive filament is particularly likely to dampen the resonant circuit and hence broaden the tuning indication, as would a diode detector if connected directly to the moving-coil meter.

One way to minimise the loading effect of the diode/meter on the tuned circuit would be to connect the diode detector to a tapping point some way down the coil rather than to the top of it, ie by not connecting it directly

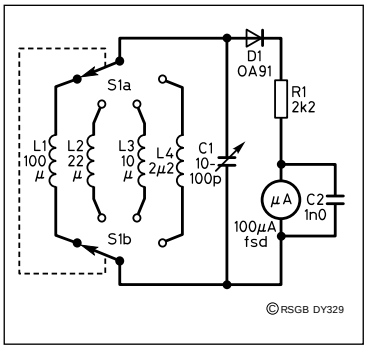


Fig 2: The simple but effective practical wavemeter.

PVC FORMER OF OUTSIDE DIAMETER 25mm			
L(µH)	No of turns	Span(mm)	SWG
2.2	9	9	20
10	24	24	20
22	44	44	20
100	110	60	26
PVC FORMER OF OUTSIDE DIAMETER 20mm			
2.2	10	10	20
2.2	9	5	26
10	32	32	20
10	24	12	26
22	63	62	20
22	41	21	26
100	134	70	26
PVC FORMER OF OUTSIDE DIAMETER 19mm			
2.2	11	11	20
2.2	9	5	26
10	35	34	20
10	25	13	26
22	68	67	20
22	44	22	26
100	157	79	26

Table 1: Close-wound coil values

across the tuned circuit (**Fig 1(b**)). However, that would complicate the construction of what is otherwise a simple test instrument.

This minor design problem is overcome by including a low-value resistor in series with the meter, as shown in **Fig 1(c)**, to increase the impedance of the detector circuit. The resultant selectivity and simplification of construction more than compensates for the slight reduction in sensitivity. **Fig 2** shows the circuit of the HF wavemeter. The small-value capacitor across the meter terminals is theoretically intended to maximise the level of the DC voltage output from the diode rectifier/detector, and to some extent protect the meter from excess RF. It can be omitted without noticeable effect on sensitivity.

COILS

THESE CAN BE PURCHASED commercially or hand-wound as detailed later. A convenient and low-cost range of encapsulated RF inductors, in the microhenry (µH) range and in a preferred series of fixed values, is available (see 'component availability' at the end of this article). Each consists of a coil wound on a ferrite-based former in polypropylene encapsulation, 11.4mm long by 5mm diameter, with axial lead terminations for ease of soldering into circuit. Alternatively, coils may be hand-wound on to short lengths of readily available PVC water pipe or conduit, using enamelled copper wire. **Tables 1** and **2** give the details. The frequency range for coils and capacitor of known values can be calculated quite simply by using the formula:

$$F\ (MHz) = 159 / \sqrt{(LC)}$$

where L is the inductance in µH and C is the capacitance in picofarads (pF).

A choice of 100pF or 150pF tuning capacitor would allow all HF bands to be covered. It would seem that all of the HF amateur bands, 1.8 - 29.7MHz, could be covered by omitting the 22µH coil and using only three of the above coils, but inclusion of this coil would in practice ensure that the bands were not at the extreme ends of the tuning scales.

CONSTRUCTION

HOME PRODUCED COILS wound on 25 - 19mm diameter PVC formers have close-wound single windings, with their wire ends secured by threading through two small close-spaced holes drilled at each end of the coil former. 7.1mm coil formers come complete with soldering anchor-tags for the winding ends. Note that the inner ferrite core must be purchased separately. The choice of a two-pole rotary switch allows the individual tuning coils to be mounted directly onto the switch for self-support. If pre-moulded RF inductors are used as the tuning coils, they are small enough to be mounted onto a midget wafer or miniature rotary switch. The more substantial standard metric rotary wafer switch should be used to support the larger hand-wound coils. The choice of a six-way switch allows for the possibility of extending the frequency-band coverage at no extra cost.

Coil tails should be kept as short as possible, preferably not exceeding 10mm, and the diode, resistor and wires should be self-supporting and reasonably rigid. **Fig 3** offers guidance for assembly of the wavemeter.

Any form of metallic enclosure must be avoided. It is essential that the coils of the wavemeter must not be screened from the incoming RF electromagnetic waves. The simplest approach to construction would be the use of a low-cost plastic project box, with the tuning capacitor, range switch and meter mounted on to the detachable front panel.

For economy, a survey of the kitchen cupboard might well yield a suitable container. Indeed, the prototype was

COMMERCIAL THREADED - INNER COIL FORMER OF 7.1 mm OUTSIDE DIAMETER AND 28mm LONG			
L(µH)	No of turns	Span (mm)	SWG
2.2	28	14	26 without ferrite core
10	60 in 2 layers each of 30t		26 without ferrite core
22	80 in 2 layers each of 40t		26 without ferrite core
100	80 in 2 layers each of 40t		26 with core 2/2 entered

Table 2: Close-wound coil values

COMPONENTS LIST

R1 2k2 0.125W carbon
C1 1000pF miniature ceramic 50V
L1 100µH or home-wound, see text
L2 22µH or home-wound, see text
L3 10µH or home-wound, see text
L4 2.2µH RS 228-129 or home-wound, see text
D1 Signal diode OA91 1 N4148, or similar
M1 Volume level or battery level meter, circa 100µA FSD
S1 Rotary wafer switch 2-pole 6-way, midget, miniature or standard Electronics project box, plastic, approximately 150 x 80 x 50mm

All components for this project (less the meter) can be obtained from JAB Electronic Components, 1180 Aldridge Road, Great Barr, Birmingham B44 8PB.

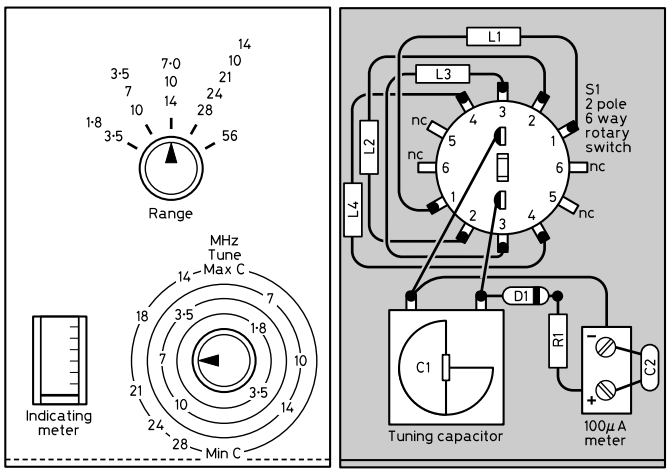


Fig 3: Suggested front Panel and component layout.

constructed in a clear plastic, Ferrero Rocher chocolate box of 145 x 70 x 70mm and it looked quite elegant! Self-adhesive paper labels can be used for the tuning scale and range switch legends.

Fig 3 shows a tuning scale with bands marked on it, but this should be taken only as guidance because each wavemeter will need to be individually calibrated.

WAVEBAND CALIBRATION

FOR THE METER to be of any use it needs to be calibrated.

This can be done with an HF/VHF signal generator. This is coupled to the meter with a single-turn loop of wire at the remote end of its output cable, which is brought into close proximity with the end of the wavemeter's selected coil.

The radio station transmitter could be made to radiate a low power signal on each of the amateur bands while the wavemeter is tuned for maximum indication on the appropriate range, and its tuning scale marked for each frequency band. When using the transmitter for this purpose, it is important to use a dummy load.

Remember that the calibration marks now on the wavemeter tuning scale represent frequency bands, not precise frequencies.

Finally, for those who might wish to experiment with extending the frequency range upwards to VHF, the 50MHz band could be included by fixing an additional self-supporting coil of 20SWG enamelled wire using 3 turns of 25mm ID or 4 turn off 19 or 20mm ID, or 12 turns of 71mm ID.

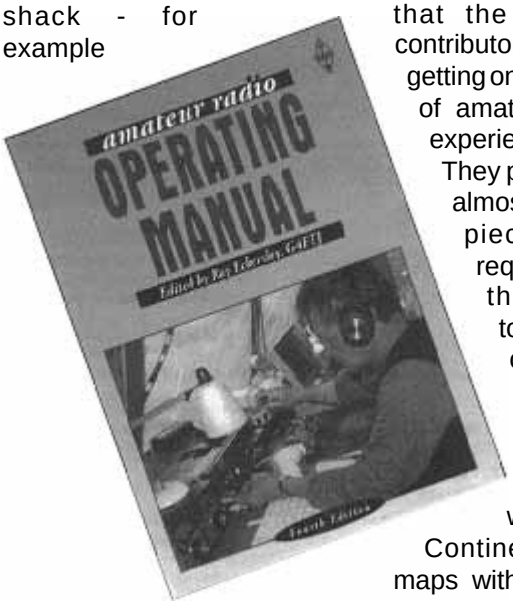
Amateur Radio Operating Manual

The Amateur Radio Operating Manual, edited by Ray Eckersley, G4FTJ, is described by RSGB HQ Staff

THE *AMATEUR Radio Operating Manual* is one of the RSGB's most popular books. The first edition was published in 1979 and quickly became a best-seller. But times change, and such a book requires updating from time to time. The fourth edition, again edited by Ray Eckersley, G4FTJ, was updated during the course of last year and has recently been published by the RSGB.

For the first time, this new edition includes features on digital communications, microwave bands DXing, 2 metre direction finding (or 'foxhunting'), fast-scan TV, and EME (moonbounce operation). Even if you have no intention of trying to bounce your signals off the moon in order to get your UHF signal to the other side of the world, the techniques involved do make fascinating reading!

Other aspects of operating which appeared in earlier editions of the book have now been brought right up to date in this new edition. These include using computers in the shack - for example for keeping your log, or for contest operation - and operating from abroad under the terms of CEPT Recommendation T/R 61-01. This is the piece of legislation which allows full Class A and B amateurs to operate from other countries in Europe and as far away as Peru and New Zealand, with the minimum of formalities. Nevertheless, there are still plenty of pitfalls for the unaware, and the *Amateur Radio Operating Manual* covers all these concisely and clearly.



The scope of the *Amateur Radio Operating Manual* is impressive to say the least. Its chapter headings give a clue to the wide range of subjects covered: The Amateur Service, Setting up a station, Operating practices and procedures, DX, Contests, Mobile and portable operation, Amateur satellite and space communications, Data communications, Image techniques, Special-event stations.

The 10 chapters give a detailed insight into the 'secrets' of almost all the areas of operating in amateur radio today. It is an amazing thought that the 29 authors and contributors to this book have getting on for a thousand years of amateur radio operating experience between them! They provide for the reader almost every conceivable piece of knowledge required for operating on the amateur bands today - HF, VHF, UHF or microwave.

Following these 165 pages, there are 80 pages more of Appendices, which include: Continental and regional maps with the amateur radio prefixes and the *CQ* and ITU zones; an IARU locator map; a callsign list which gives the ITU prefix allocation, normal amateur prefix, country name, continent, zone numbers and beam heading from the UK; a DXCC countries list, including a multi-band checklist for the user to fill in; recent amendments to the DXCC countries list; a worldwide time table, the official Amateur Service frequency allocations published by the ITU, complete with footnotes, for each of the three ITU Regions; a list of standard frequency stations; how to conduct phone contacts in French, German, Italian and Spanish; the band plans; and lists of beacons, UK repeaters, packet mailboxes and nodes.

The book is not a technical manual; it is about amateur radio operating and it stresses good operating practices throughout. All amateurs should be aware of these, and not just beginners. The *Amateur Radio Operating Manual* is written in an easy-to-understand style, with confusing jargon cut to a minimum.

For beginners (and who isn't a beginner in at least some of these subjects?!) there is so much to learn about amateur radio, which is one reason why it is such a fascinating hobby. The *Amateur Radio Operating Manual* goes a very long way to providing 'the knowledge' which will help to make you an expert in at least some of the many subjects covered.

There are very few books of which it can truly be said "every shack should have one", but the *Amateur Radio Operating Manual* is certainly one of them.

[Now turn to page 23, where you have a chance to win a copy of the *Amateur Radio Operating Manual - Ed*]

The Amateur Radio Operating Manual, 252 pages, 273 x 200mm, softcovers. Price £10.40 (members) (£12.23 non-members) from RSGB Sales. Published by the Radio Society of Great Britain, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE, ISBN 1 872309 34 8.

D-iar-Y SEPT-OCT

SEPTEMBER

1 Bristol Radio Rally & Computers and Electronics Market. Details 01275 834282.

1 Milton Keynes & DARS Radio Fayre. Details 01908 672920.

1 Telford Radio Rally. Details 01743 235619.

2 Slow Speed Cumulative Contest, 1900 - 2030UTC, 80m CW.

3 144MHz CW Cumulative Contest, 2030 - 2300LOCAL.

7 AGCW Straight Key Party Contest, 1300 - 1600UTC, CW.

7 Wight Wireless & Computer Rally. Details 01983 567665.

7 / 8 144MHz Trophy, 1400 - 1400UTC, All modes.

7 / 8 All Asian DX Contest, 0000 - 2400UTC, SSB.

7 / 8 IARU Region 1 SSB Field Day, 1500 - 1500UTC, SSB.

7 / 8 LZ DX Contest, 1200 -1200UTC, CW.

8 4th 144MHz Backpackers Contest, 1100 - 1500UTC, All modes.

8 24GHz Cumulative Contsest, 0900 - 2100UTC.

8 Lincoln Hamfest. Details 01522 525760.

8 Middle Wallop Boot Sale. Details 01264 391383.

10 Slow Speed Cumulative Contest, 1900 - 2030, 80m CW.

14 Ballymena ARC Annual Rally. Details 01266 659769.

14 /15 European DX Contest, 0000 - 2400UTC, SSB.

15 BARTG Rally. Details 01394 420704.

15 Central Lancaster Radio Rally. Details 01524 64239.

15 East of England Rally. Details 01733 331211.

18 144MHz CW Cumulative Contest, 2030 - 2300LOCAL.

18 Slow Speed Cumulative Contest, 1900 - 2030UTC, 80m CW.

21 RSGB HQ Saturday Opening and Car Boot Sale. Lambda House, Cranborne Road, Potters Bar, Herts. 10am to 4pm. Details from Marcia Brimson, 2E1DAY, on 01707 659015.

21 Scottish Amateur Radio Convention. Details 0141 773 2882.

21 / 22 Scandinavian Activity Contest, 1500 - 1800UTC, CW.

21 / 22 Weinheim VHF Convention. Details ++49 6207 3311 (during office hours).

22 Poole Radio Society National Novice Contest, 1400 - 1600UTC. For full details see page 10.

26 Slow Speed Cumulative Contest, 1900 - 2030UTC, 80m CW.

28 / 29 Scandinavian Activity Contest, 1500 - 1800UTC, SSB.

29 10GHz Cumulatives Contest, 0900 - 2100UTC, All modes.

29 70MHz Trophy, 0900 - 1500UTC, All modes.

29 Harlow & DARC Rally. Details 01279 832700.

29 Three Counties Radio Rally. Details 01905 773181.

OCTOBER

1 1.3 / 2.3GHz Cumulative Contest, 2030 - 2300LOCAL, All modes.

4 Slow Speed Cumulative Contest, 1900 - 2030UTC, 80m CW.

4 - 6 Christian Amateur Radio Conference. Details 01474 533686.

4 - 6 RSGB International HF & IOTA Convention. Details 01707 659015.

5 1.3 / 2.3GHz Trophies, 1400 - 2200UTC, All modes.

5 / 6 VK-ZL-Oceania Contest, 1000 - 1000UTC, SSB.

5 / 6 432MHz - 248GHz IARU, 1400 - 1400UTC, All modes.

6 21 / 28MHz Contest, 0700 - 1900UTC, SSB.

6 Belgian 3.5MHz ON Contest, 0600 - 1000UTC, SSB.

6 Blackwood & DARS Rally. Details 01495 227550.

6 Great Lumley Radio Rally. Details 01207 237927.

9 432MHz Cumulative Contest, 2030 - 2300LOCAL, All modes.

12 / 13 VK-ZL-Oceania Contest, 1000 - 1000UTC, CW.

13 Belgian 3.5MHz ON Contest, 0600 - 1000UTC, CW.

13 Computercations 96 Computer / Radio Rally. Details 01803 522216.

13 Kidderminster & DARS Rally. Details 01384 894019.

13 North Wakefield Radio Club Rally. Details 01924 827572.

16 1.3 / 2.3GHz Cumulative Contest, 2030 - 2300LOCAL, All modes.

18 / 19 Leicester AR Exhibition. Details 0116 287 1086.

19 RSGB HQ Saturday Opening and Car Boot Sale. Lambda House, Cranborne Road, Potters Bar, Herts. 10am to 4pm. Details from Marcia Brimson, 2E1DAY, on 01707 659015.

19 / 20 Worked All Germany Contest, 1500 - 1500UTC, CW / SSB.

20 RSGB 21 / 28MHz Contest, 0700 - 1900UTC, CW.

24 432MHz Cumulative Contest, 2030 - 2300LOCAL, All.

26 / 27 *CQ* World Wide DX Contest, 0000 - 2400UTC, SSB.

27 1.3 / 2.3GHz Fixed Station Contest, 1800 - 2200UTC, All modes.

27 Hornsea ARC Club Rally. Details 01964 532588.

27 Tyne & Wear Repeater Group Annual Auction. Details 0191 3882913.

28 144MHz CW Cumulative Contest, 2030 - 2300LOCAL, CW.

31 1.3 / 2.3GHz Cumulative Contest, 2030 - 2300LOCAL, All modes.

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