THE WEST RAND AMATEUR RADIO CLUB

October 2007
Volume 8, Issue 2

ANODE

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Editor's Comments

Volume 8 Issue 2
October 2007

Dates to remember / diarise

17th & 18th November SARL HF Field day - At the club. Visitors [What's "Visoitors" Stuart?] and operators welcome starts 10:00am on Saturday and runs for 24 hours

24th November Flea Market and social 8:00am gates open Afternoon Braai for members, please bring a salad!

Also please put in the Bank Account details for members to pay their subs directly (Using their Call Sign as reference). Please contact Craig as he has all the details.

News Readers for October

7-Oct, ZS6PVT, Phillip, 14-Oct, ZS6BZF, John, 21-Oct, ZR6RON, Ron, 28-Oct, ZS6C, Joop,

Can you shut down Escom?

An Associated Press report was posted on the internet last month showing an internal test by Homeland Security in the US to see if hackers could tap into the power network and shut down a turbine. The test succeeded.

SARL/HMO BEACON PROJECT TO THE DISCUSSED ON THE INTECNET ON SUNDAY 7 OCTOBER at 20:00

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RING BASE ANTENNA (PART 1 and 2)

Special points of interest:

- Contact details on back page (updated)
- Next Ham-Comp and Club open day is on the 20th October.

With the exception of the popular "Slim Jim" two metre omni-directional antenna published some time ago in Practical Wireless, there have been few, if any, single element end-fed vertical antennas designed for "free-space", 144MHz operation i. e. without the necessity of a ground plane.

Although tests carried out recently by PW proved the Slim Jim to have a very good performance by comparison with various mobile ground-plane type antennas, the normal construction of the Slim Jim makes it mechanically difficult to use for mobile working. A Slim Jim was, however, designed by the writer specifically for mobile operation but this employed a helical stub drive system which owing to its complexity made it unsuitable for publication as a home constructed project.

An alternative to the Slim Jim but having the same performance and "'free-space" function has therefore been considered for both fixed station and mobile operation and particularly with the capability of working efficiently on vehicles of glass fibre construction.

The designs offered in this article not

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Editor's rants and raves - comments

(continued from page 1)

The next Intecnet will be held on Sunday 7 October starting at 20:00 CAT.

Dr Lee-Anne McKinnell, ZS2LAW and John Willescroft ZS6EF [I think that's Williscroft. Ed.] will discuss the ins and outs of the SARL/HMO beacon project to be going live soon. They will focus on the design of the beacons and some of the research aspects.

Learn how you can contribute to propagation research.

The beacon service will be of great value in confirming actual propagation conditions in real time for research and prediction of the ionosphere. The Space Physics Group of the HMO includes an active ionospheric component, and provides ionospheric data for the purpose of Space Weather predictions, which includes HF propagation prediction. The HMO has recently become the Space Weather Regional Warning Centre for Africa, which includes amongst other parameters the provision of HF propagation predictions. Therefore, the current Space Weather provider and the HMO will now be working together to provide one Space Weather Centre for Africa.

A PowerPoint presentation will be used during the Intecnet. The presentation is available on the web at www.amateurradio.org.za/armi.htm

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RING BASE ANTENNA (PART 1 and 2)

(continued from page 1)

only fulfil tile above requirements but can, in addition, be tuned for operation in the v.h.f. marine band (156MHz) for use by boat owners who have the appropriate marine equipment.

It must be mentioned however, that construction for mobile operation, as will be described in Part 2, would be somewhat difficult without the use of a lathe and certain other. machine tools and that the materials would not be very easy to purchase. An arrangement has therefore been made with an engineering company to supply the essential machined parts at reasonable cost.

A simplified version of the ring-base antenna can be constructed without too much difficulty for 144MHz home base operation, or for use oil a boat for either 144MHz or 156MHz v.h.f. marine communication. Details are included in this part of the article. Once the principle of operation of this antenna is understood, many will no doubt see ways of constructing it other than as described, providing the physical lengths of the elements, etc., are adhered to. The diagrams and photos should provide ample information for construction on one basis or another.

How the Ring-base Antenna Functions

Basically it is a half-wave radiating system with an overall full wavelength resonance. The quarter-wave ring and small inductance, L, serve only to provide a suitable low impedance (50 ohms) feed and a voltage drive to the half-wave radiator. This method obviates the use of a ground-plane. The diagrams in Fig. 1 illustrate the evolution of tile ring-base antenna from what is a normal dipole (a). First, the lower quarter-wave portion is set at right angles as in (b) and then formed into a circle (c). This still enables a low impedance (50 ohm) feed to what is now the base of a quarter-wave vertical antenna.

However, to obtain the required voltage drive to a half-wave radiator, the quarter-wave vertical section is replaced by a small inductance, L, as in (d) so as to maintain the necessary half-cycle current distribution around 'the ring base' and the inductance, L. This ensures the voltage feed required for the radiating

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Editor's rants and raves - comments

(Continued from page 2)

The Intecnet is interactive on many repeaters in South Africa and streamed on the web. Go to the above URL and click on the link

http://www.amateurradio.org.za/armi.htm

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Dear Radio Amateur Operator / Club Representative

Following the West Rand Flea market on 1 September 2007, a number of HAMS expressed their renewed interest in BACAR (Balloon Carrying Amateur Radio)

Much enthusiastic discussion at the flea market led to HAMS committing themselves to working toward getting a BACAR into the air during APRIL 2008.

Following the flea market a little investigation led to the discovering of the already existing SA AMSAT BACAR initiative. As a result of this the following initiatives are being taken and your participation is encouraged:

1. Register yourself with the SA AMSAT BACAR initiative available online at http://www.amsatsa.org.za/bacar.htm

2. Participate in the online forum at http://groups.google.co.za/group/bacarSA

3. Blog your additions and suggestions at http://bacarsa.blogspot.com/

4. Encourage your club members to participate in this initiative.

We need the participation of experts able to help us in getting this initiative going. Thanks to OM Steve ZS6XU, that is willing to help us make this happen.

Now the million dollar question: When is the next BACAR meeting and where?

I just received an e-mail from the AMSAT SA guru Hans ZS6AKV with a date for the next SA AMSAT BACAR Meeting:
Time: 11:00
Venue: NARC – SARL HQ
Date: 26 January 2008

Thank you Hans for the swift response. We will now do our homework and get ready for the BIG meeting.

Any persons wishing to contribute are requested to contact OM Steve ZS6XU who has already started putting together a list.

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url:

* http://www.zs6cog.co.za
* http://www.zs6erb.co.za
* http://www.ncscur.co.za

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A new email address for the club

We have a new email address for the club - it is:

zs6wr@gmail.com

RING BASE ANTENNA (PART 1 and 2)

(Continued from page 2)

half-wave section and that radiation from the quarter-wave ring and the inductance is otherwise virtually cancelled out. By adjustment to the inductance, L, and the physical length of the radiating section, the antenna can be tuned to operate on either the 144MHz band or the 156MHz marine radio band.

The Basic Model

The possibilities for home construction are illustrated in Fig. 2. The size of the plastics box which is used to protect the feed connections and inductance should be as near as possible to that shown, but it is very important to ensure that water cannot enter when the antenna is finally assembled and ready for use. To this end all possible entries that would allow water to seep through must be scaled with a suitable adhesive or rubberised sealant. Note the "filler" at the base of the radiating element which may be a tightly fitting piece of cork set in with adhesive. This is to prevent water running down from the telescopic radiating section to the inside of the box.

The support blocks should be Delrin, Perspex, Tufnol or other good insulating material, as the top of the inductance and the driven end of the radiating section is at high r.f. potential. For 144 to

(Continued on page 5)

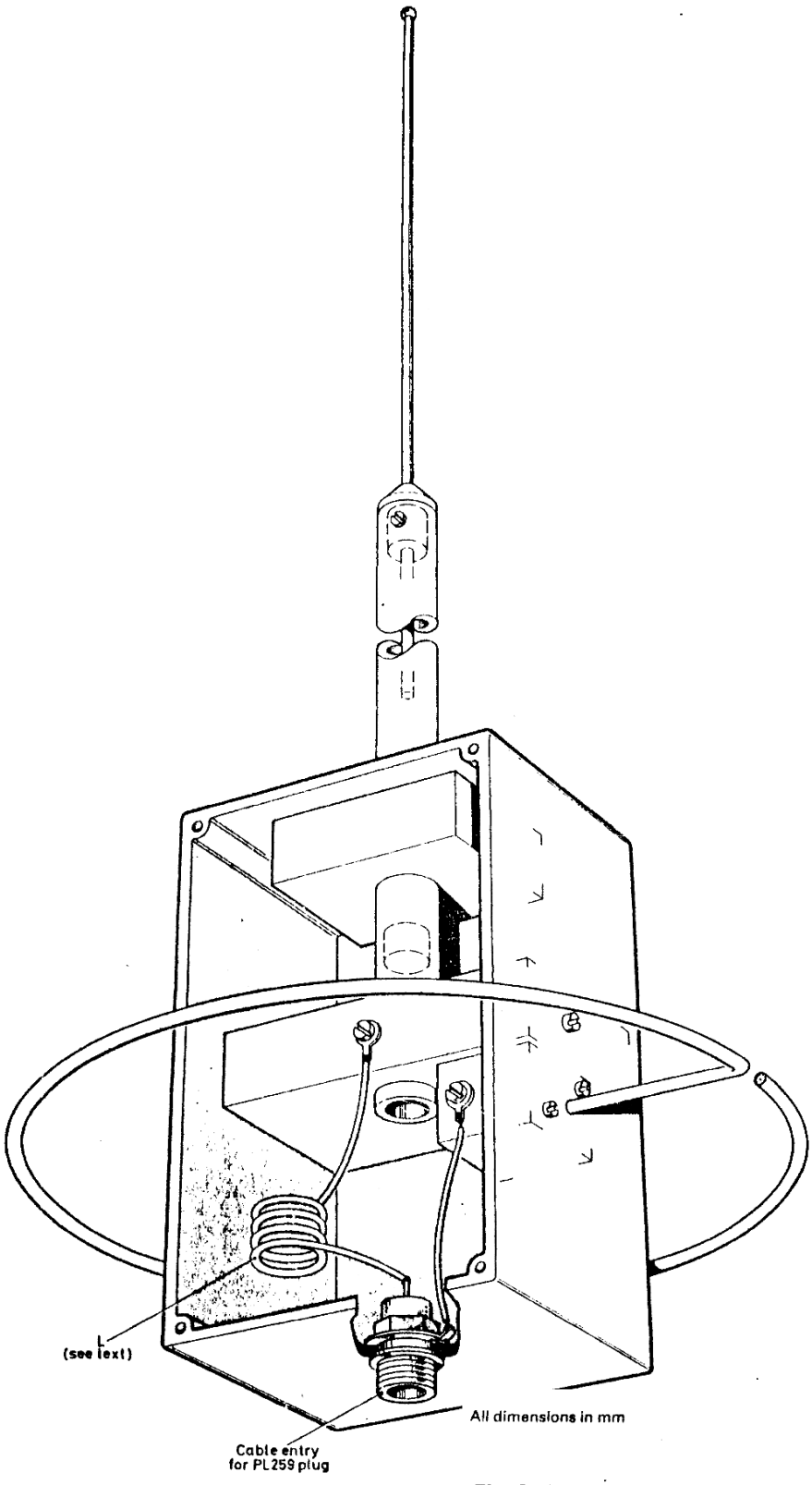

Fig. 2: Construction of a Ring-Base antenna. See text for further details

RING BASE ANTENNA (PART 1 and 2)

(Continued from page 4)

146MHz, the inductance consists of 4 turns of 16 s.w.g. tinned copper wire 12.5mm diameter and pulled out to approximately 19mm long.

The length of the radiating sections are as shown and have enough adjustment for either the 144MHz band or the 156MHz marine band. For 156MHz marine operation, however, the inductance consists of 3 turns of 16 s.w.g. tinned copper wire, 12.5mm diameter and pulled out to about 12.5mm, long.

A side view of the main antenna assembly is shown in Fig. 2 and this also shows how mounting is effected by a rear support plate and a pair of 'U clamps (car exhaust pipe clamps) for attachment to a mast top. Details for this plate are also given in Fig. 2.

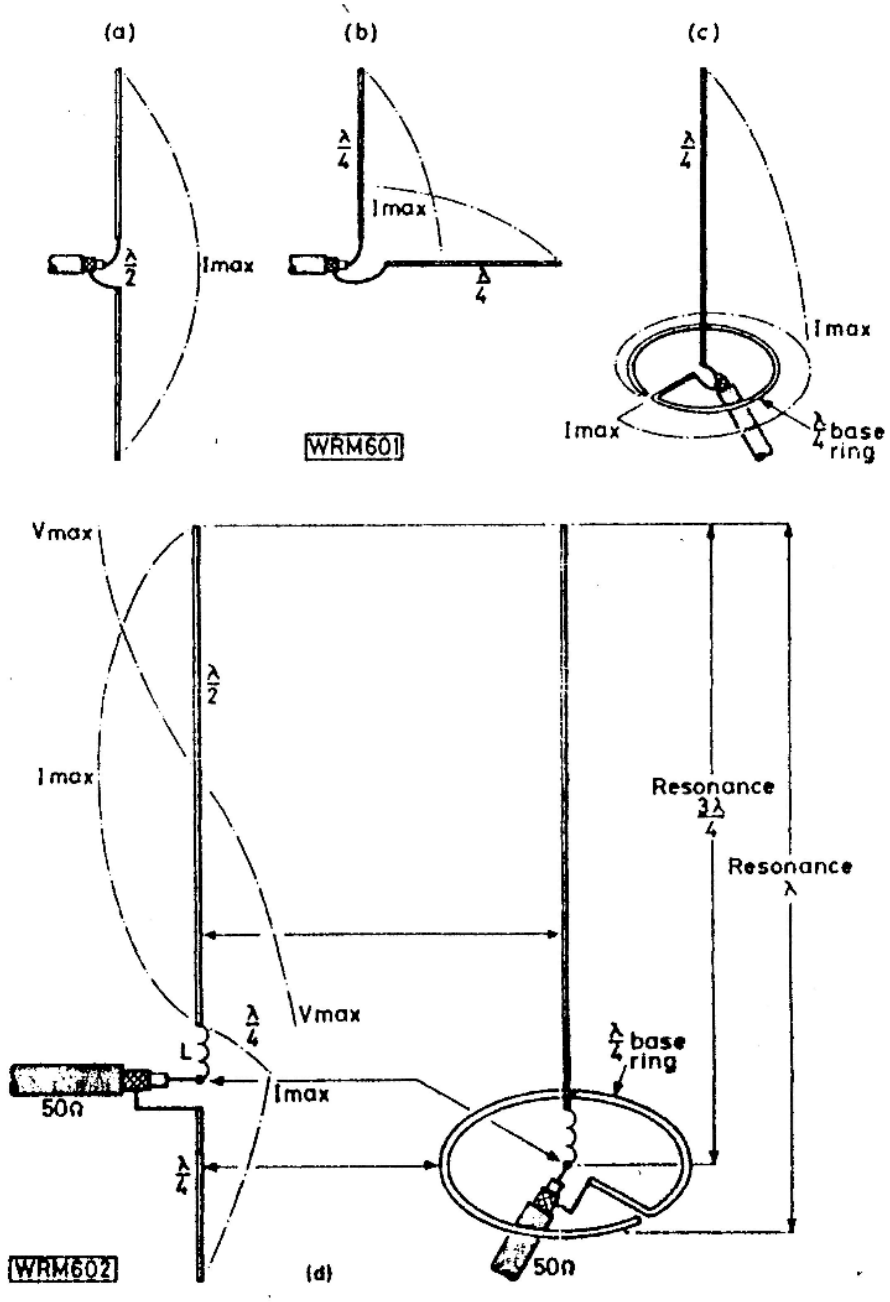

Fig. 1: Evolution of the Ring-Base Antenna

The only other item for construction is the quarter-wave ring, details of which are shown in Fig. 2. Made from 4.75mm diameter aluminium rod it is not difficult to form the circle by hand if done carefully and slowly. The sharp inward bend is best formed in a vice.

Radiation Pattern and VSWR

As with the Slim Jim there is no tilt to the radiation in the vertical angle which has its maximum at right angles to the antenna as in Fig. 3. In the horizontal plane radiation is of course omni-directional and the gain of the system is unity, the same as a normal half-wave dipole. The very small lobe toward the base of the antenna is due to the residual radiation from the quarter-wave ring.

There should be little or no difficulty in obtaining a low v. s.w.r. across the band and the read-outs obtained with a Bird Thru-Line meter for both versions are shown in Figs. 4 and 5 respectively. Some

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RING BASE ANTENNA (PART 1 and 2)

(continued from page 5)

small adjustment to the inductance L may be necessary, i.e. opened out or closed in slightly, this being carried out in conjunction with adjustment to the telescopic top section so as to obtain the lowest possible v.s.w.r. reading at mid-band.

It is important that when this antenna is installed care should be taken over scaling against the entry of rainwater and that the cable entry and its connection should be well taped and also covered with some form of sealant. Such protection applies even more when an antenna of this nature is made for marine use.

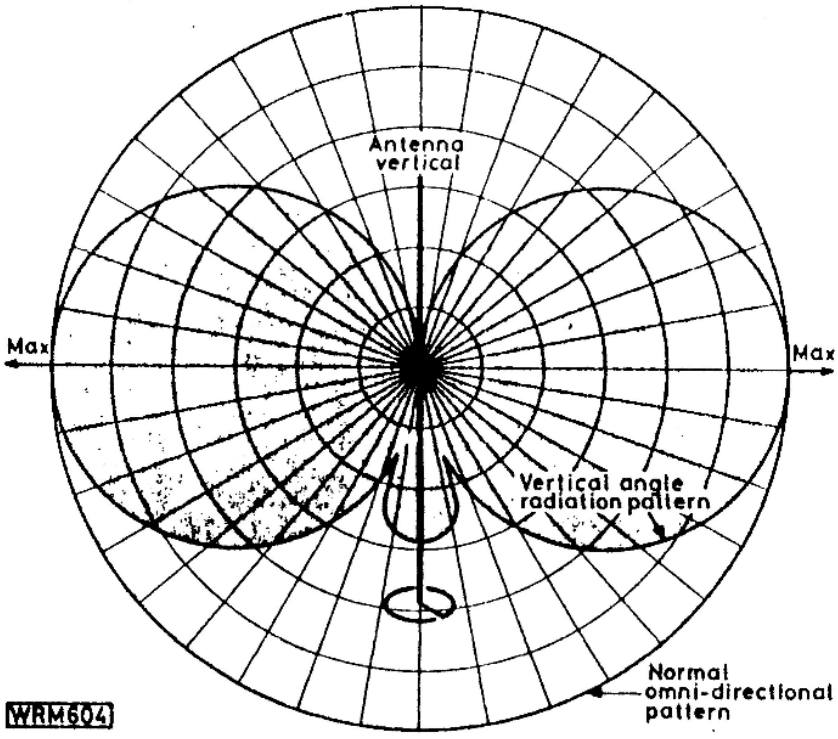

Fig. 3: Vertical angle radiation pattern taken from the prototype Ring-Base antenna as shown in the photo

Incidentally, by. virtue of the special transmitting licences held by the writer. tests were carried out on a ring base antenna tuned for the 156MHz marine band with the co-operation of the Great Yarmouth Coastguard. A fully readable signal with quiet background was received by them using a transmitted power of 1W at a distance of 12.5km and with the antenna sited at only 1m above water. Reception from them was at the same level.

Readers who have need for an efficient marine band antenna may be interested to know that a Slim Jim tuned to 156MHz also gives a very good performance. A prototype 156MHz Slim Jim was used for a radio survey on behalf of the Coastguard covering about 1000 square km of sea off the Norfolk and Suffolk coasts, first with the antenna operating at mast height on an ex-wartime motor torpedo boat and then at low height on a high-speed RNLI rescue vessel. Both the RNLI and the Coastguard authorities were not only pleased with the results of the survey but also very impressed with the efficiency of the Slim Jim (marine version) antenna at long range, its performance being quite superior to that of a typical commercially made v.h.f. marine antenna.

Slim Jim antennas should not be made from 300 ohm ribbon feed as this reduces the radiation efficiency to vary considerably and more so when enclosed in ordinary p.v.c. pipe. A 300 ohm ribbon version is really only suitable for a quick-to-make standby antenna, although it will give reasonable results over a limited range. To obtain the wide bandwidth and full radiating efficiency a Slim Jim should be made of aluminium rod not less than 4.75mm diameter and with a spacing of 12.5mm between the folded sections. Otherwise construction should be according to the design originally published in PW and reprinted in Practical Wireless publication "'Out of Thin Air".

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RING BASE ANTENNA (PART 1 and 2)

(Continued from page 6)

PART 2

The electrical theory behind the ring-base antenna was given in Part 1, together with details for construction, on a simplified basis, for either 144MHz base station operation or for the 156MHz marine communications band when suitably tuned.

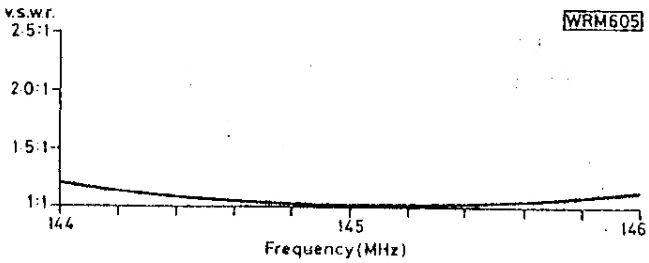

Fig. 4: VSWR—bandwidth readout from a Ring-Base antenna tuned for the 144MHz amateur band

The designs presented here are for 144MHz, suitable for either mobile or base station operation, but are much more complex with regard to construction. A lathe and bench drill will be required to turn out most of the parts. However those constructors who have access to these tools may find that the project is not so difficult as might first appear.

There is no difference between the base station and mobile versions except for the cable connections at the base.

Constructional details are given in Fig. 6 which show a PL259 plug at the base so that the antenna can be used for mobile operation and connected to a matching UHF socket fitted on a gutter mount, or directly onto the car body. Ideally, the mobile version should be roof-mounted to achieve maximum height above ground. The omni directional properties of any v.h.f. antenna can be affected by wing, side or boot mounting.

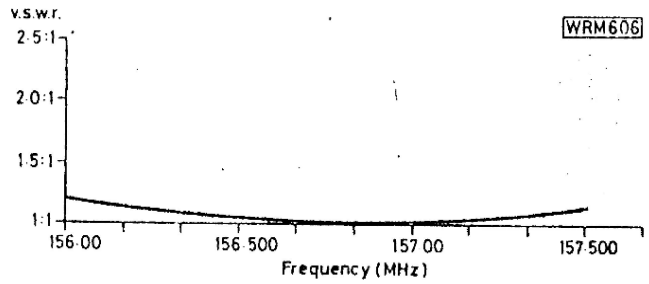

Fig. 5: VSWR—bandwidth readout from a Ring-Base antenna tuned for the 156MHz marine communications band

Construction

The base section to which the PL259 plug is attached and the section for holding the base ring can be turned from brass. The radiator base section or ferrule can be made from 9.5mm diameter aluminium rod drilled through as indicated. Details for the ring base are also given in Fig. 6 and this can easily be formed into a circle by hand if done carefully. For the antenna described here the ring is made from 3mm diameter aluminium or brass rod. The assembly of the finished antenna with a PL259 base connection and set up on a gutter mount is shown in the photograph below. The inductor must, of course, be covered as will be explained later.

Details for the lower section of the base station version are also shown in Fig. 6. The base is turned from brass as is the section attached to it to hold the ring-base. The inductor and the remainder of the antenna are constructed as shown. Assembly and details for a base station mounting bracket are also shown in Fig. 6.

The inductor on either model must be protected against rainwater and is covered with heat-shrink sleeving. with a bore diameter of 19mm. When heated, the sleeve will wrap tightly around the inductor and the lower part of the antenna ferrule, as can be seen in the photo.

The length of heat shrink sleeve required is 65mm.

The alternative antenna for mobile operation has a coaxial socket built into the base section as shown in Fig. 6. This fitting is suitable for standard mag-mounts with an ASP type coaxial connector but which would be somewhat diffi-

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RING BASE ANTENNA (PART 1 and 2)

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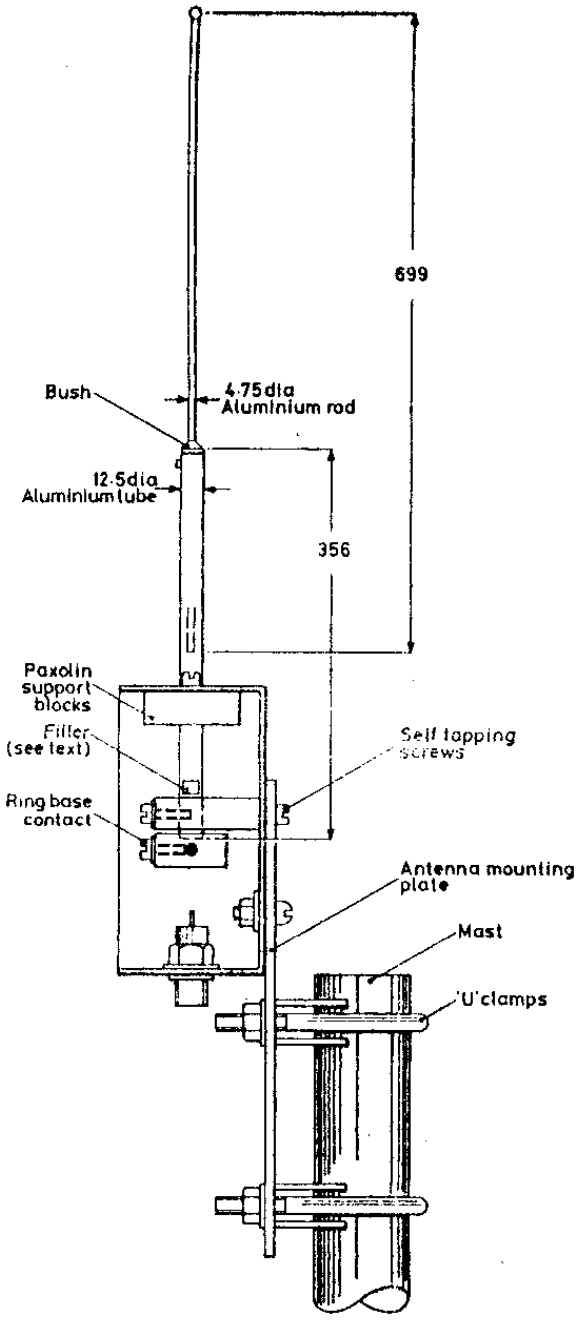
cult to make. The illustration is included however, so that readers may recognize the type of fitting.

All three versions of the ring-base antenna as described will be available in kit form with finished parts for assembly of the complete antenna, and an engineering company has been appointed to supply the kits. For details, see under "Kits

Assembly and Tuning

For either version of the ring-base antenna this, inductor 1, consists of five turns of 16 s.w.g. tinned copper wire with the turns evenly spaced as shown in the diagram. It Is advisable not to put the heat shrink sleeve on until the antenna has been checked and a satisfactory v.s.w.r. obtained. The whip section should be approximately the length given (1346mm) although the whip section supplied with the kits is a little longer and will require trimming by 25mm or so depending on whether the antenna is used in a "free space" condition e.g., as a base station antenna, or on a glass fibre vehicle or boat, or on a metal-bodied car. The whip section supplied with the kit of machined parts will be in two sections which are joined with a thin, threaded sleeve supplied with the kit.

For v.s.w.r. checking use the centre frequency of the band i.e., 145MHz. First set the bottom end of the whip about half-way down the base ferrule and lock with the set screw. Check v.s.w.r. at band centre and it will almost certainly be fairly high. Note the reading. Now cut about 25mm off the top of the whip and check v.s.w.r. again. If this is now a much lower value then adjust by altering the length within the ferrule at the base. If further trimming of the whip section seems necessary, snip off only 10mm at a time in conjunction with adjustment at the ferrule. If the top section of the whip is accidentally reduced too much in length a. new one can be supplied at very minimal cost. The v.s.w.r. curve for the



antenna when tuned is shown in Fig. 4 (Part 1).

The final job is to put the heat shrink sleeve on and heat this until it closes tightly around the inductor and lower portion of the antenna as shown in the adjacent photo.

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RING BASE ANTENNA (PART 1 and 2)

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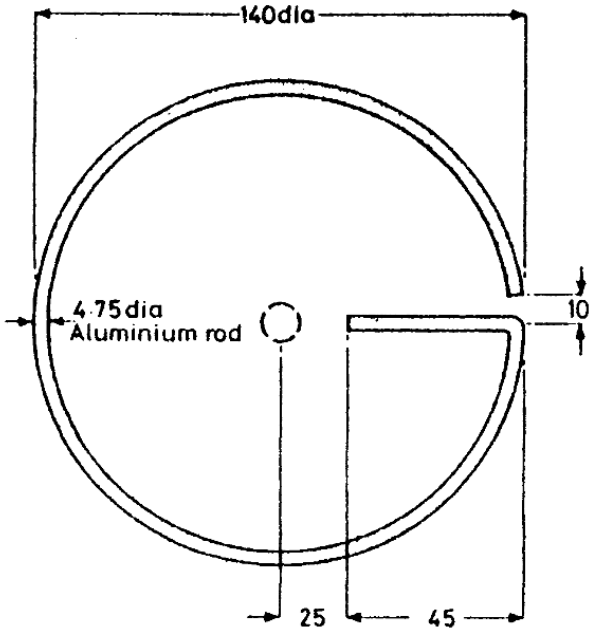
Trials

Prototypes of each version of the ring-base antenna have been tested under all kinds of conditions and in all weathers. The mag-mount version will remain stable at speed providing a suitable mag-mount with reasonable, magnetic strength is used. The performance of' a base station version bas not been affected by snow, rain



Ring base details

or frost during several months of use but it is advisable to put grease on metal parts, including the whip section and the mounting bracket, and also ensure that the cable connection is absolutely water tight by carefully covering with adhesive PVC tape and then giving the whole a coat of rubberised sealant.

The photograph (left) shows the vertical angle radiation from a scale model of the 144MHz ring-base antenna operating at 941.9MHz under the writer's special HO licence and call G913TN.

Radiation from a full-size version of the antenna was given as Fig. 3 in Part 1. Note that these are vertical angle radiation patterns for the free space condition. When mounted on a vehicle for mobile operation these patterns might be modified slightly depending on the position of the antenna.

Kits

Complete designer approved kits are available for each version of the antenna from M Communications, Cantley, Nr. Norwich, Norfolk, NR13 3RT.

For identification the kits are coded as follows: Kit A mobile, gutter mounting; Kit B mobile, for use with ASP type mag-mount; Kit C base station. A zinc-plated mounting bracket and mast clamp is also available for the base station version. .

By;
F. C. JUDD G2BCX
From;
Practical Wireless, September 1982 and
Practical Wireless, October 1982

The West Rand Amateur Radio Club
26.14122 South - 27.91870 East

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Roodepoort
1725

Phone: 082 573 3359 (Chairman)
Email: **zs6wr@gmail.com**

Bulletins (Sundays at …)
11h15 Start of call in of stations
11h30 Main bulletin start

Frequencies
439.000MHz 7.6MHz split
Input: 431.4MHz (West Rand Repeater)
145,625 MHz (West Rand Repeater)
10,135 MHz (HF Relay)

Radio Amateurs do it with more frequency!

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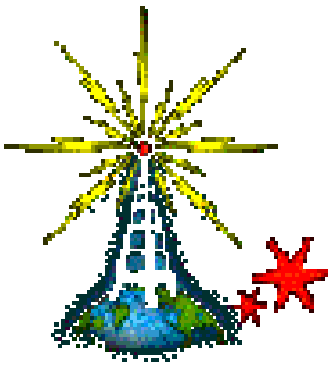
West Rand members - we need your input!

To make this the best ham radio magazine in South Africa we need your input. Please submit articles, comments, suggestions etc.

Please send plain text with no formatting to the email address below.

In July 2003, we re-published an Anode Compendium on CD. It has the issues from July 2000 until June 2005. This included the new Adobe reader. It has been updated, check with the chairman for details.



We need your input! Email us articles, comments and suggestions please.
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