ANODE

Editor's Comments

August 2005
The First issue for the "new year"
Issue 1 Volume 6

Ooh! This is different. Why?
The Anode this year has changed format to make better use of the email and other technology. The pdf format was getting cumbersome, difficult to search and could not be issued as text only for distribution by packet radio. [Subsequently put back into pdf in 2006 - to try out two column format]

Some members still do not have email addresses. This issue can be transferred via packet radio as text or html. The text file will be avail-able from the web site.

The main html file will come to you as an email formatted as html. The pictures will reside on a web site and transfer to your pc as you read the email. The overall effect will be one of speedy delivery of the text and a small delay in downloading the pictures.

There is a contact email link on the top page, which you will have to edit to make it work. This is to stop or slow down spammers, who trawl web pages for valid email addresses.

Now the only problem for me is that I

Four Bands One Whip

Did you ever want to change bands while operating mobile but did not want to stop in the rain to change resonators? Now you can change bands without a thought about your mobile antenna. How about a bandwidth as much as one megahertz (see Fig. 8), with swr of no more than 1.5:1? You can build this mobile antenna for a fraction of the cost of a commercial mobile antenna. The materials are readily available and are not costly.

A Look at the Basics

The six-foot mast is constructed from 0.5 inch copper water pipe. The overall length is not critical, but sig-nal reception will suffer at anything much less than a five-foot mast length. If you own a Hustler or similar mast, you already have the first part of your new multi-band mobile antenna.
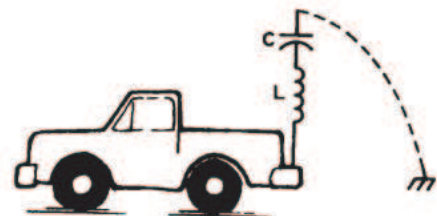
Fig. 1. Top-loaded mobile antenna.

Editors Comments & News

now have to take all the old An-ode issues and convert them to a database.

JB

Reading the WATTS club newsletter....

Watts / Pretoria Club is how old? 70 or 75 years. When I was shown one of last year's issues, my attention was drawn to the number of years the club has been in existence. Compared with the latest issue, which says they are 75 years old.
Does the year seem longer in Pretoria or does it go by faster?

The West Rand Amateur Radio Club is also very old. Some would say geriatric. At the recent AGM the age was stated as 57 years. The WATTS newsletter is interesting reading and of a high quality. You can catch a copy at the club house.

The main monthly meeting takes place tomorrow night at 19:30. The 8th of August.

No 'Ham-Comp' meeting this month

There will be no meeting at the club house on the Saturday the 13th or 20th as the Cycle race and the SARL seminars will take most of the members away.

Four Bands One Whip

Multi banding is obtained by the use of multiple LC circuits-one for-each band desired. A typical mobile antenna has resonators (LC circuits) with an adjustable whip. The adjustable whip is actually the C of the resonant LC circuit. You might think of such a mobile antenna as shown in Fig. 1.

Adjusting the whip changes the C and raises or lowers the resonant frequency.

A tip: In general, a greater amount of capacitance will result in a greater bandwidth. These mobile antennas are 'top-loaded'.

i.e., the LC circuit is at the top of the antenna and, for all practical purposes, the only part of the antenna that radiates is that portion below the resonator. That is the reason you should make the mast as long as is practical. Since the whip is basically C, why stick it up in the air where it will just give your antenna increased ability to reach all those nearby objects-trees, carports, etc.? You can actually place a typical resonator at a 90 degree angle to the mast and probably notice no difference in performance, although tuning may change slightly. This could present an eye hazard or you might even spear a bird. Let us look at this change as shown in Fig. 2.
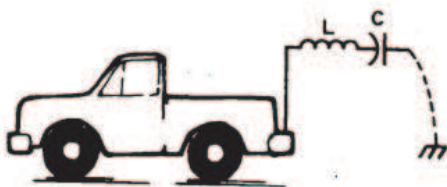

Fig. 2. Resonator positioned at 90° (vertical polarization retained).

Capacitance does not have to come in the form of a whip. Two wires in the shape of a V form a capacitor proportional to the area within the V. The V is easy to adjust (change

C). In fact, I used exactly this method in my initial experiments. It does not work too well for actual mobile use because the V is not rigid during vehicle motion and the vibration of the V causes fairly wide and constant changes in resonance.

Now that I had decided to place the LC in a horizontal position, I also decided to multi band the antenna by using more than one LC circuit. The configuration now becomes that shown in Fig. 3.
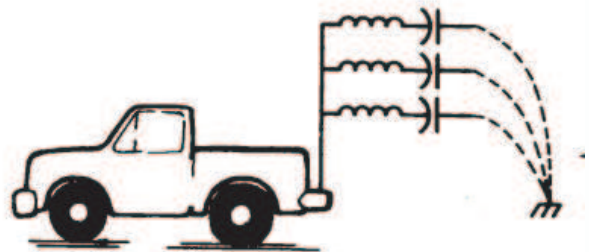

Fig. 3. Multiband antenna setup.

I am currently using four LC circuits on my mobile antenna. But you can use one, two, three, four, or more. I haven't tried five yet, but that's one of the next steps. The LC for the lowest frequency should be at the top of the mast with the next higher frequency below that and so on.

Mechanical Construction

The idea for the mast came from an article in 73 Magazine (February, 1979, p. 42). I used non-ferrous materials to avoid any rust problems. The mast itself is a six-foot length of 1/2 101 copper water pipe. The details of the fitting which attaches the mast to your mobile mount are shown in Fig. 4. I used a brass end cap through which I drilled a 3/W' hole for the 3/W' X 24 stainless steel bolt. The brass end cap is considerably stronger than the copper end cap used in the 73 Magazine article. However, it

Four Bands One Whip

(Continued from page 3)

does require that the head of the bolt be reduced to allow it to fit in the inner diameter of the brass end cap. I simply chucked the 3/81f X 24 bolt in my 3/W' electric drill and used my shop grinder on the bolt head while letting the drill rotate the bolt for a nice even "machining." The end cap is assembled with a bronze or stainless steel lock washer and a brass or stainless steel nut. If you have any difficulty in finding a stainless steel bolt, you might try a local boat or marine dealer.
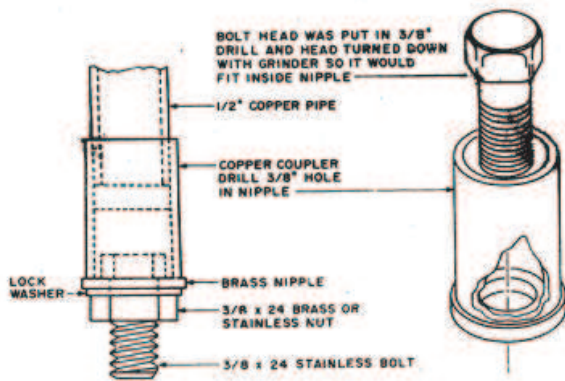

Fig. 4. Mast-to-mobile attachment.

The end cap is assembled to the mast with an ordinary copper sleeve and soldered with a propane torch. Do a good job here because there is a lot of force at the base of the mast. I use a rigid mount and do not tie or guy my antenna. Now we close the end of the mast to keep out water. I soldered a flat piece of copper to the end of the mast.

LC Construction

I used some spare trap covers from my Cushcraft HF antenna for the supporting structure for the inductor and capacitor. These trap covers are thin and do not offer much wind resistance as the wind f lows through them. They are probably a phenolic material, which is very suitable for an inductor form.

The part which kept me from building the an-

tenna for over a year (I love to procrastinate) was deciding how to fasten the LC circuits to the mast. Fig. 5 and Photo A show the construction details of the mounting bracket. I cut a copper sleeve in half longitudinally and brazed copper, tabs to the half coupling. Copper for the tabs was obtained by splitting a short length of copper pipe, opening it up, and flattening it with a hammer. (I had four feet of copper pipe left after cutting six feet off for the mast, so the material was handy.) The tabs were bent 900 and a piece of 1/4 "' copper tubing was brazed between the 900 tabs so that the inductor form would not be crushed when attaching it to the bracket. Brass nuts, 61/ X 320 were soldered to the top and bottom of the bracket. You might want to use one long screw to attach the whole assembly and not be bothered with the brass nuts.
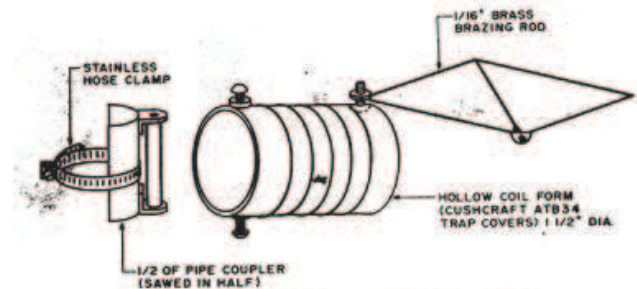

Fig. 5. Details of mounting bracket.

A word about brazing the copper parts: The high heat anneals the copper. It becomes soft and I have had one bracket fail due to the vibration. It lasted over eight months and over 20,000 miles. The 15-meter LC was made with #12 copper wire and was quite heavy. You might solder or silver solder your bracket or find an even better method of attaching the LC assembly to the 'Mast.

I have made inductors using #12, #18, and #20 wire. The #12 wire is quite heavy for a 20-meter LC circuit and probably impractical for a 40-meter LC circuit. The #20 wire gets warm when using a steady carrier but has caused no problem with SSB. If you run a kilowatt mobile, the #12 wire should do just fine.

Four Bands One Whip

The capacitance was added by using 1/16" brass welding rods. I chose the modified rhombic because it did not have a sharp end as would a V and should avoid some static problems. I had hoped to adjust the C by bending the rhombic (increasing or decreasing its area). I found that vibration and vehicle motion caused erratic changes in resonance, so I added the adjustment spanner to the centre of the rhombic. This allows easy adjustment of the resonant frequency.

Determining LC Values

If you like to experiment by trial and error. You will love this. I spent many hours removing one turn at time, varying capacitance, and trying to find where the LC was resonant. I would be looking for a 15-meter or 20-meter resonance and would all of a sudden find myself in the 10-meter range. This is not the best way to start, although you will probably have to use this cut and try method for the 10-meter LC

I found that I could use my Heathkit grip-dip oscillator (gdo) to find the resonant frequency of the LC. The secret is to put a pickup coil at the base of the antenna and insert the gdo coil inside the coil (see Photo B). The Heathkit gdo is a handy piece of equipment but hardly a laboratory-grade instrument. I first found a resonant frequency of 14.2 MHz., so I connected the antenna to the transmitter and checked swr. It was not resonant anywhere in the 20 metre band! Suspecting something funny, I used the same pickup coil and connected it to my frequency counter and. since a gdo is actually a signal generator, the counter showed that the indicated 14.2 MHz was actually 13.8 MHz. It was convenient that the error was on the low side because I had to remove only one turn to raise the frequency of the LC circuit (or decrease capacitance, which would not be as desirable as it would reduce, bandwidth).

You don't need a frequency counter to check your gdo.

Just use a short antenna on your HF rig and sweep the frequency with the gdo until you hear its signal on your HF receiver. This is an easy method to calibrate or compensate your gdo.
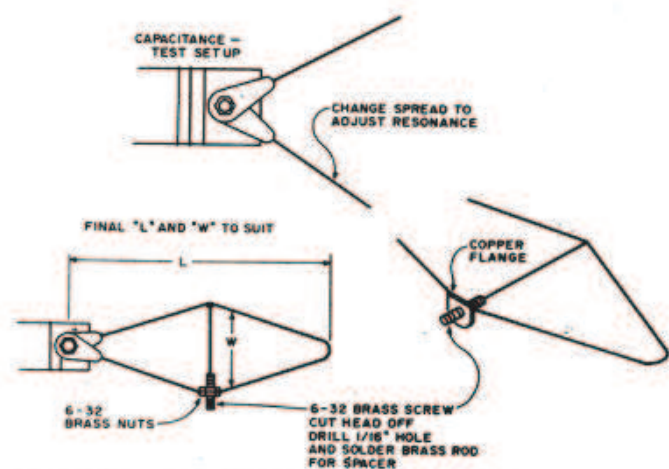

Fig. 7. Resonance adjustment assembly. Inductance—any diameter, any wire size (to suit power level), number of turns to suit frequency.

Fig. 7. Resonance adjustment assembly. Inductance-any diameter, any wire size (to suit power level), number of turns to suit frequency.

As previously mentioned, I used a V configuration for the initial capacitance as-it could be easily changed to adjust the resonant frequency. Work on one LC circuit at a lime. Table 1 gives some dimensions, which are intended to, be a guide and give you a place from which to start. Differences in form diameter, wire size, and materials will require that you find your own right combination.

Weatherproof

Your LC assembly must be weatherproof. I learned from experience what a little rain would do to the resonant frequency. I guess I just figured out why-commercial antenna's use trap covers! My first attempt at weatherproofing was by dipping

Four Bands One Whip

the LC assembly in polyurethane varnish. This lowers the resonant frequency about 500 kHz and is heavy. I have used epoxy resin, the type used to make fibreglass repairs, with good results. There is no appreciable frequency change; it is tough, medium in weight, easy to apply (pipe cleaners make excellent disposable paint brushes), and cures in about 30 minutes.

My preferred method is to put some silicone seal at the end of the LC assembly and enclose the inductor in heat shrink tubing (obtained surplus or at a hamfest, in case you don't know how much a piece of new 2" diameter heat-shrink tubing costs!).

Assembly and Adjustment

When you have completed the desired number of LC assemblies, they are attached using stainless steel clamps. The LC assemblies should be positioned fore and aft very carefully to minimize wind resistance. They should be carefully aligned or you may have one big rudder and a very "mobile" antenna. I have used care in alignment and have watched the antenna at highway speeds-it does not whip around. Proper positioning may actually create a stabilizing effect.

Fig. 6 shows the positioning, 1 am presently using. There is some interaction between the LC assemblies and "four in a row If I caused some swr problems, particularly on 15 meters.

Adjust each LC circuit to the frequency you desire. Start with the highest frequency first (10 meters) and adjust each until you have adjusted the LC circuit of your lowest band.

More Thoughts

You don't have to make a multi band antenna. You may make an LC assembly for only one band. It might be used on a four-foot mast when height is a consideration such as on a motor home or tractor-trailer. You might combine two or more LC circuits on a single inductor form. You might use a circle instead of a rhombic for capacitance. You might leave the circle or rhombic open at the end and adjust the spread with, a movable insulator. You might use a ferrite core to reduce the size of the inductor. You might use the LC assemblies for a temporary or space-restricted base antenna (with proper radials: or counterpoise). You. might build a small beam or rotating shortened dipole. You might ...

CU on 10 ... or 15 ... or 20 ... or 40 ... or ... M

By:
William C. Cloninger, Jr. K3OF
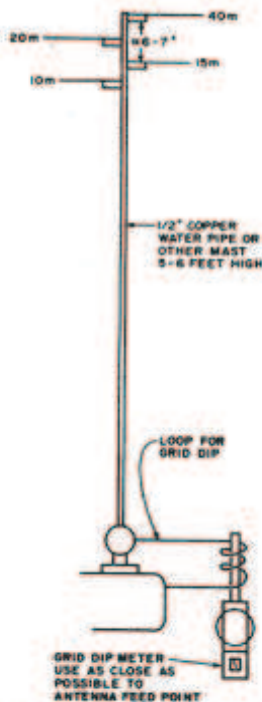4409 Buckthorn Court
Rockville MD 20853

From:
73Magazine April 1984

Fig. 6. Grid-dip meter positioning.

Another Antenna Approach

This Timex I Sinclair program goes to great lengths.

In 1983, Time magazine selected the personal computer as the "Man of the Year." This is perfectly understandable since micro-computers are now priced low enough to allow virtually anyone to become involved in home-computer operations. The least expensive computer on the market (as I write this) is the Sinclair Timex 1000, which retails for less than $100. This is not a toy; it can be expanded to a 64K memory and has many of the features of much more expensive machines.

After purchasing a ZX-81, the predecessor of the Timex 1000, I began to look for ham-radio applications. The computer is now situated on one end of my operating bench and, as time goes on, I hope to use it for computerized CW and RTTY applications.

The program presented in this article is designed to compute the dimensions of a dipole and a vertical antenna for a given frequency. The program requests the centre frequency of the desired band and presents the data in feet and meters. The program is written in Sinclair Basic, but can easily be transposed to any other machine.

Before attempting to load the program, the program notes should be reviewed. Further, the illustrations show the computer monitor presentation of an actual run. With very little effort, the program can be modified to provide either more or less data. For example, the metric dimensions can be deleted or the decimal feet can be expressed as feet and inches through simple program changes.

In conclusion, we all can benefit from computerized simple program operations in ham-radio applications. Computers are not just useful tools but are critical elements of everyday life. Everyone should develop some degree of computer literacy in order to cope with future demands. The Sinclair-Timex is an excellent introduction to computer logic and programming. I hope to see a flood of ZX-81 applications in the near future.

Sample output.

PROGRAM NOTES

1. Lines 20-160 set up the screen, provide directions, and accept the centre frequency.
2. Lines 170-240 compute the variables.
3. Lines 250-260 are a timing loop. They hold the display and are only for graphic effect. They can be eliminated if desired.
4. Lines 280-470 control the output.
5. Lines 480-500 are a decision-making set. These allow input of additional frequencies.
6. The antenna calculations can be found in any ARRL hand book. They are:
 Dipole length in feet = 492 / Freq. in MHz
 Dipole length in metres = 150 / Freq. in MHz
 Vertical element in feet = 234 / Freq. in MHz
 Vertical element in metres = 71.31 / Freq. in MHz
 Radials are 2.5% longer than the vertical members
7. In order to provide results that are rounded to 2 significant decimal places, each INT function utilizes a number multiplied by 100. The result is then divided by 100 to give 2 decimal places. See lines 170-240.

From 73 Magazine * March, 1984
by
Thomas M. Hart AD1B
32 Westwood Terrace
Westwood MA 02026

Frequencies of Interest to QRP Operators

[From the Colorado QRP Club Website]

"Over the years there has been some disagreement as to what the QRP calling frequencies should actually be. These disagreements are due, in part, to changes in WARC frequencies, license structure, and other modes (i.e., RTTY calling frequencies, voice "watering holes," etc.). On 18 June 2000 WB0JNR proposed (over QRP-L, CQC-L and various private lists and on-air nets) that the amateur community re-examine the QRP calling frequencies. After a few months, and many Email exchanges, it was agreed that the calling frequencies would stay where they are (for the time being...)."

Maxwell Moon posted in the QRP-L list

"Five years have passed between that note & Jay's question. Below is a list of QRP calling frequencies for CW. I put this together by combining the lists posted on these websites: AC6V, ARRL Considerate Op List, Australian QRP Home Page @ VK3YE, Arizona sQRPions Club, Colorado QRP Club, DL-QRP Club (Germany), G-QRP Club (UK), K2 Quick Reference Guide (@ elecraft.com), ARRL QRP Columnist Tony Luscre (K8ZT), Maes Electronics (BE, Belgium), New Jersey QRP Club, QRP-ARCI, QRP-Canada, QRP Ring List, RAAG (Radio Amateur Association of Greece), and RSGB (Radio Society of Great Britain). I eliminated only the errors (e.g. 18.960, 18.069). If a frequency was unusual, I tried to note where I found it. "

Frequencies of Interest to QRP Operators

FREQUENCY
FREQUENCY	NOTES
1.810	Std NA-EU
1.815	Australia
1.843*^	HB projects esp
3.530^	Australia
3.560*+	Std NA-EU
3.579^xr	Colorburst Crystal (HB projects) Rockmite
3.580^xr	Rockmite
3.586r	Rockmite - Noice Band
3.587r	Rockmite - Noice Band
3.6864	Cheap microprocessor crystal in Novice/Tech+ segment; used by the Knightlites (NC) in the Knightlite 'SMiTE', and the North Georgia QRP Club in their 'Noganaut' project. Also, an 80 meter Rockmite kit is available with this Rock. The Knightlites, North Georgia QRP Club, have nets on this frequency.
3.710	Std US Novice
7.030*+^	Std EU
7.035	QRP-L (According to several non-QRP-L websites)
7.040	Std-NA
7.060	EU @ BE
7.110	Std US Novice
7.112x	NorCal Crystal
7.121xr	Rockmite kit is available for this frequency in the 40 meter Novice/Tech+ band.
7.121xr	Rockmite kit is available for this frequency in the 40 meter Novice/Tech+ band.
10.106*^	Std
10.116*+	QRP-L & Other lists as the ?new? Std (to 10.106 - also DX Calling Freq)
14.060*^r	Std - Rockmite
14.061r	Rockmite
18.080	Only @ CO QRP Club
18.086*	G-QRP Club Only
18.096*+	includes several errors @ 18.069)
18.106	Only @ G-QRP Club
21.060*+^	Std NA-EU
21.110	Std US Novice
24.906*+	Std NA
24.910	CO QRP Club Only
28.060*+^	Std NA
28.110	Std US Novice

Notes:

* * = G-QRP Club
* + = RSGB
* ^ = VK3YE?s Australian QRP Home Page
Lli>r = Rockmites - fix-tuned, two frequencies

Frequencies of Interest to QRP Operators

(Continued from page 8)

  * x = indicates primary crystal controlled operations(Added by Thom LaCosta K3HRN)

  * VK QRP page & ARRL Considerate Operator's Guide list no QRP CFs for either 17M or 12

Submitted by Maxwell Moon - k0max
Additional information submitted by Curt Milton - wb8yyy

Frequencies of Interest to QRP Operators - Six Meters

Frequency	Note
50.060 - 50.080	CW beacons (unattended sub-band)
Note:	See also: http://www.keele. ac.uk/depts/por/50.htm
50.080 - 50.100	CW QSOs
50.100 - 50.125	DX Window
50.110	DX Calling Frequency
50.125	NA SSB Calling Frequency
50.133 - 50.430	Voice Nets
Note:	See also: http://6mt.com/ nets.htm
50.255	FSK441 CQ D## lower practical limit for most QSOs
50.270	FSK441 Calling Frequency
50.285	FSK441 CQ U## upper practical limit for most QSOs
50.290	PSK31
50.291	BeaconNet^31 (with +1500 Hz PSK audio)
50.300	FM Simplex on West Coast
50.360 - 50.550	AM Voice
Note:	See also: http:// vhfradiobuff.tripod.com/ amnet6m.htm
50.400	National AM Calling Frequency
50.550	BeaconNet.25 USB (experimental)
50.600	DX Packet Cluster Links (California)
50.620	National AX.25 Packet Calling Frequency (some APRS)
50.740	2400 baud AX.25 Links in Minnesota
50.800 - 50.980	Radio Control every 20 kHz

The frequencies from here up to 54 MHz are pretty much the way they are listed in the ARRL Repeater Directory.

Submitted by Chuck Carpenter - W5USJ
This table first appeared in the Summer 2004 QRP Quarterly.

Frequencies of Interest to QRP Operators -Two Meters

Frequency	Note
144.00 - 144.05	EME (CW)
144.05 - 144.10	General CW and weak signal
144.10 - 144.20	EME and weak-signal SSB
144.200	National SSB Calling Frequency - (note by W5USJ - also CW)
144.200 - 144.275	General SSB Operations
144.275 - 144.300	Propagation Beacons - (unattended)

Pretty much the rest of the band is packet, repeaters and satellites. Packet is generally on the odd steps 145.01, 03, 05, 07 and 09.

Submitted by Chuck Carpenter - W5USJ
This table first appeared in the Summer 2004 QRP Quarterly.

Ham-Comp

Objective

To assemble as many complete working computer systems with amateur radio software for distribution amongst members and interested parties. To raise the club members ability and resources level.

Method

Collect all computer hardware at the club. Use 'bring & fix' meetings to teach/train members in hardware assembly of pc's. Use volunteer members to test and report on pc based software. Schedule assembly then software installation and then test and demonstration.

Requirements

Lowest level of hardware:

80386SX with 4MB+, 80MB hard disk drive, 2 x Serial ports, 1 x parallel port, monochrome display & monitor. Sound card.

Software operating systems:

- Linux with DOS compatibility: to run console applications.
- Linux with WINE (Windows Emulator): to run Win 9x apps.
- Windows 98se - if desperate.

Applications

- Morse Tx/Rx, RTTY, packet modes. Call book/Log database.
- We shall explore the use of Windows apps running under the Linux emulator. This cuts the cost and problems with legal versions of Windows.
- Use of pc for test equipment. Measurement of Voltage & Current. The Oscilloscope. Signal generation.

- We should also explore the software development tools available to provide innovation and amateur generation of usable software and systems.

Cost implications

Virtually nil for both hardware or software. We will 'scrounge' most of the hardware. The software we can install from the clubs Linux box. CD's can easily be created for use by members.

Another Antenna Approach [program listing]

```
10 REM "ANTCOMP.'
20 CLS
25 PRINT
30 PRINT
40 PRINT "************************"
50 PRINT " ANTENNA DIMENSION PROGRAM "
60 PRINT "************************"
70 PRINT
80 PRINT
90 PRINT
100 PRINT "TO DETERMINE THE SIZE OF A DIPOLE"
110 PRINT "AND VERTICAL ANTENNA FOR ANY"
120 PRINT "BAND, ENTER THE CENTER FREQUENCY'
130 PRINT "IN MEGAHERTZ:"
140 INPUT F
150 PRINT
160 PRINT "    ";F;" MHZ "
170 LET Ll=INT(49200/F))/100
180 LET L2=(INT(15000/F))/100
190 LET L3=(INT(23400,F))/100
200 LET L4=(INT(7130/F))/100
210 LET L5=(INT(102.5*L3))/100
220 LET L6-(INT(102.5*L4))/100
230 LET L7=(INT(L2*50))/100
240 LET L8=(INT(Ll*50))/100
250 FOR N=1 TO 70
260 NEXT N
270 CLS
280 PRINT
290 PRINT "*****************************"
300 PRINT " ANTENNAS FOR ";F;" MHZ"
310 PRINT "*****************************"
320 PRINT
340 PRINT
350 PRINT " HALF-WAVE DIPOLE "
360 PRINT
370 PRINT "LENGTH "," EACH ARM "
380 PRINT L1;" FEET ",L8;" FEET "
390 PRINT L2;"" METERS ",L7;" METERS "
395 PRINT
400 PRINT "QUARTER-WAVE VERTICAL "
410 PRINT
420 PRINT " VERTICAL "," RADIAL "
430 PRINT L3;" FEET ",L5;" FEET "
440 PRINT L4;" METERS ",L6;" METERS "
450 PRINT
460 PRINT
470 PRINT
480 PRINT "ENTER Y/N TO CONTINUE "
490 INPUT Y$
500 IF Y$="Y" THEN GOTO 20
520 PRINT "MEMORY USED: ";PEEK 16396+256*PEEK
16397-16509
530 STOP
```


Sample screens.

The West Rand Amateur Radio Club
26.14122 South - 27.91870 East

P.O. Box 562
Roodepoort
1725

Phone: +27 11 475 0566
Email: **zs6wrmail@mweb.co.za**
        [NEW EMAIL ADDRESS]

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

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

Radio Amateurs do it with more frequency!

Chairman/Treasurer	Dave	ZR6AOC	475 0566 (H)	zr6aoc@mweb.co.za
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Secretary	John	ZS6FJ	672 4359 (A/H)	
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Member	Craig	ZR6CRW	795 1550 (H)	craig.woods@absamail.co.za

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.
john_brock@telkomsa.net