

WEATHER SATELLITE RECEIVER ANTENNA

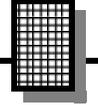


Ramsey Electronics Model No. WSR-ANT

Now you can bring in those hard to get satellites without the need of an automated antenna, or having to run up on the roof! This circularly polarized antenna will allow you to receive a satellite from horizon to horizon without repositioning! A perfect match for our WSR-1 Weather Satellite Receiver.

- **Made from PVC pipe for durability and weather proofing**
- **Turnstile antenna for horizon to horizon reception with a clear picture and no repositioning!**
- **All parts included for antenna**
- **Details given on how to mount antenna on a stand or chimney**
- **Clear concise manual, easy to follow and assemble**
- **Troubleshooting guide to help you with any problems**
- **WSR-LNA recommended with this project.**
- **Will work for any weather satellite receiver, but designed with the WSR-1 in mind.**

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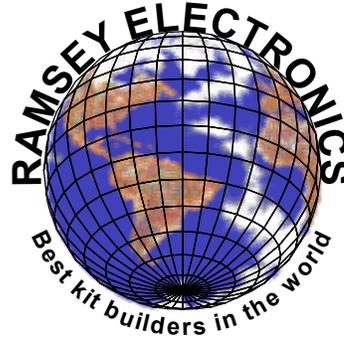
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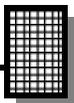
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WSR-ANT KIT INSTRUCTION MANUAL

Ramsey Electronics publication No. MWSR-ANT Revision 1.0
First printing: March 1995

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**KIT ASSEMBLY
AND INSTRUCTION MANUAL FOR**

**WSR-ANT SATELLITE
ANTENNA KIT**

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RAMSEY

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Introduction to the WSR-ANT Kit

Receiving a weather satellite is not as easy as it seems. There are many factors involved in getting a clear picture during the whole length of the transmission. The primary problem is that the satellites do not transmit very strong signals, and the signals are polarized as well. In many cases people will use a directional antenna and point it directly at the satellite as it passes overhead using computer software to help guide them.

There are several different antenna types used to receive satellites. Many satellites are received using dishes such as what you use for television transmissions. We can't do that in our case due to the frequency of the transmission from the satellite.

There are several considerations when deciding what antenna to use with your WSR-1. As with almost everything there are some sacrifices to be made with each gain. Here are a few ideas, pros and cons that you can go by when choosing a suitable antenna.

The crossed Yagi antenna is a popular form of antenna for polar orbiting satellite reception. This antenna is about the size of a TV antenna, has greater gain, yields stronger signals, and must be aimed towards the satellite as it passes. This requires two rotators, such as TV antenna rotators, to move the antenna in both elevation (altitude) and azimuth (bearing).

The satellite tracking software used for timing the rise and set of the satellites will also give you the information you need to track the satellite in azimuth (from 0 to 360 degrees) and elevation (0 to 90 degrees). The antenna is often "pointed" manually using the rotator controls located near the receiver. This means that automatic, unattended recording cannot be done without additional equipment. More sophisticated systems use a computer to track the satellite with software and a controller interface to the antenna rotators. The advantage of this type of antenna setup is that low satellite passes of high image quality can be easily recorded. Satellites only a few degrees above the horizon can

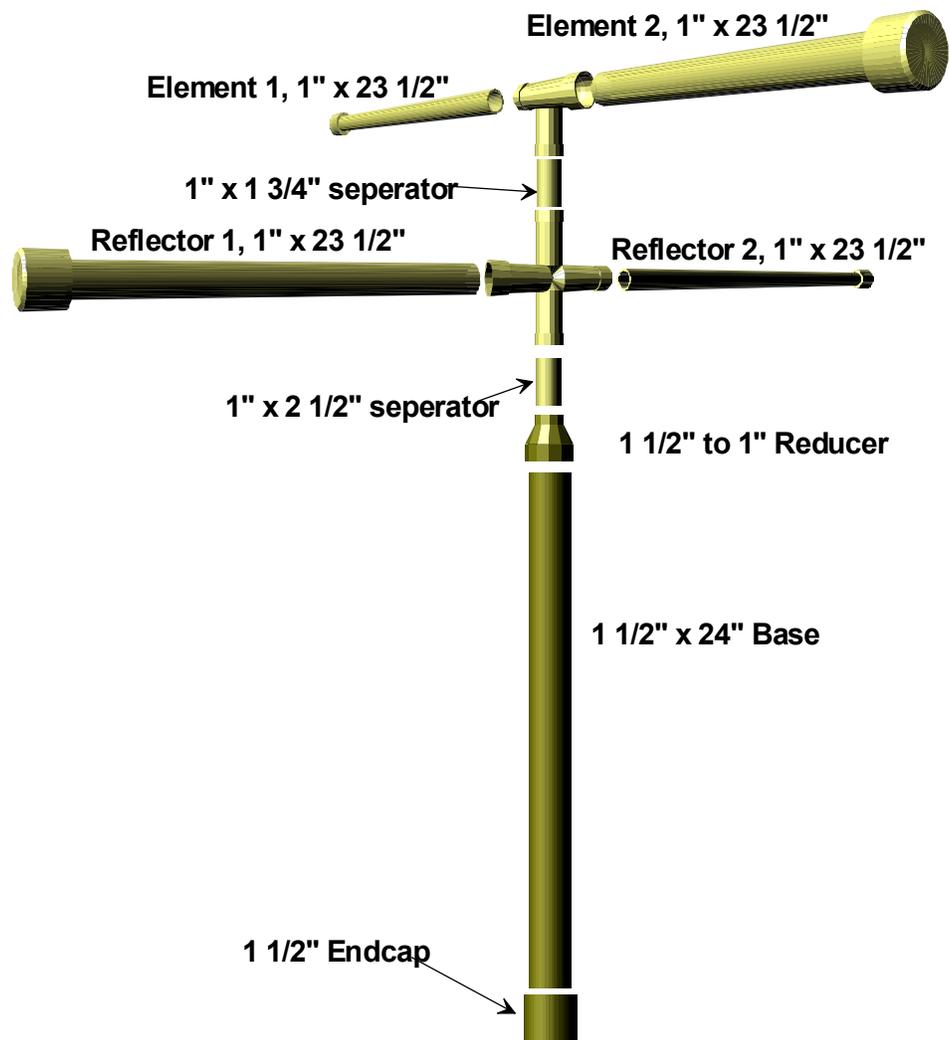
often be recorded with very little noise. This allows a full, high quality pass, nearly horizon-to-horizon to be recorded with the NOAA satellites, a picture 2940 miles long by about 1875 miles wide, it comes to over 5.5 million square miles with a resolution of 2 to 3 miles (in the center of the pass). For a receiver in Florida that means a picture from the northern part of South America to Hudson Bay! In addition, because of the narrow beam width, extraneous noise sources often do not interfere with the satellite signal.

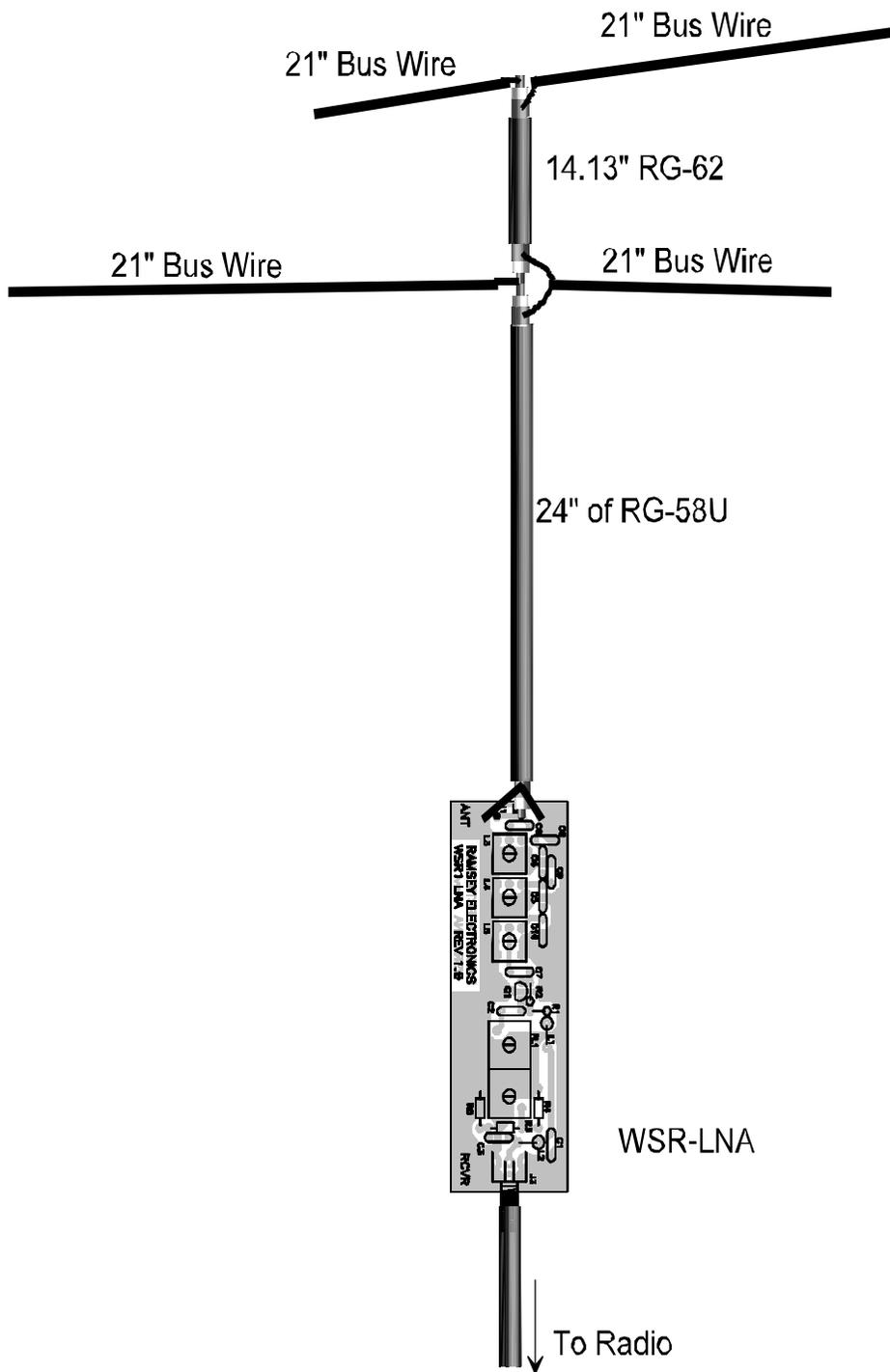
The disadvantages of a controllable Yagi are complexity, higher maintenance, and cost. Many users find that the stationary turnstile antenna is very adequate for their needs.

Another practical type of antenna is the volute VHF antenna. It looks like a twisted set of wire, but it is quite effective for receiving satellites, since it doesn't have as many nulls and peaks due to polarization of RF signals. These are tough to assemble out of household equipment and it is very difficult to bend the wires 'perfectly', but are widely available through weather satellite companies.

TV transmissions and GEO synchronous satellites transmit in the microwave region, making a dish an effective solution for clear reception. Dishes are very directional, and have plenty of gain at these frequencies. The satellites that this antenna is designed for operate in the VHF band, making the size of the required dish impossibly large for good gain and directionality.

Since we didn't want you to have to go through the expense of an automated antenna system that can rotate on two axes, or the trouble of tracking a satellite manually, we came up with a simple solution. The antenna we have chosen is called a turnstile antenna, and has the characteristics that we require. This antenna is directional in the upward direction to receive signals in the sky. The antenna is circularly polarized as well, just like the weather satellites, and makes for better reception.





WSR-ANT Parts List:

PVC Pipe

- 1, 23 1/2" long 1 1/2" diameter PVC pipe
- 4, 23 1/2" long 1" diameter PVC pipe
- 1, 2 1/2" long 1" diameter PVC pipe
- 1, 1 3/4" long 1" diameter PVC pipe

PVC Pipe parts

- 4, 1" PVC endcaps
- 1, 1 1/2" PVC endcap
- 1, 1x1x1x1 PVC 'X' connector
- 1, 1x1x1 PVC 'T' connector
- 1, 1 1/2x1 PVC reducer

COAX Cable

- 1, 27" piece of RG58U 50 ohm coax cable
- 1, 14 1/8" piece of RG62 75 ohm coax cable

Miscellaneous

- 4, 21" pieces of stiff buss wire
- Mounting hardware for 'F' connector

Optional, not required

- WSR-LNA or other preamp that fits within 1 1/2" PVC

Stuff required for assembly

- PVC Glue (available at any hardware store)
- PVC cleaner or semi fine sandpaper (any hardware)
- Thin Rosin Core Solder (Radio Shack #RS64-025)
- X-ACTO knife, or razor blade
- Needle Nose Pliers (Radio Shack #RS64-1844)
- Small diagonal cutters (Radio Shack #RS64-1845)
- Soldering iron (Radio Shack #RS64-2072)
- Mounting hardware for permanent setup (See text)
- Patience

Notes on assembling your WSR-ANT

There really isn't a heck of a lot involved with the assembly of this kit, as you will see. Several pieces of pipe, some wire, and a little willingness to read directions is all that is required. You will definitely want to follow each step one at a time, checking it off as we go. This will prevent us from performing a step out of order, and assembling something that can't be undone.

DO NOT! glue any of the PVC together unless the manual tells you to until you have tested your antenna for proper operation. Since the antenna is polarized, this means it can receive signals that are polarized in the same direction as itself. If we accidentally reverse two of our connections, the polarization is reversed as well as the directionality, and we will be looking at the ground instead of the sky. No, you can't receive pictures of Russia that way.

The solution to the problem for directionality is to twist the top or bottom dipole 180 degrees, and the solution for polarization is the same. A problem occurs if you have already glued everything together! You won't be able to correct the problem, unless you rip the whole thing apart. Let us tell you now, it is not fun.

So off we go into the world of antenna building, and if you need any assistance in final appearance, look at the diagrams on the previous two pages for reference. Good luck!

Assembly Steps

- ❑ 1. OK, first things first. Find the buss wire that we have supplied with your kit. This is the thick, silver, stiff wire. Cut this piece (if not already cut for you) into four pieces 21 inches long. Set these aside.
- ❑ 2. Locate the four pieces of 1" x 24" PVC pipe, as well as the four end caps. You can glue one end cap onto each of the four 1" x 24" PVC pipes.

Gluing PVC for best strength and to be water proof is not as easy as it seems. There is more to it than just simple pouring on of the glue and slapping it all together. If there is any grease or dirt on the PVC while you are gluing, the area will become a potential spot for the elements to get inside, destroying your antenna over time. Use semi-fine sandpaper to clean the areas that are to be glued together before applying glue. You can also use specialized cleaning agents which are also available in any hardware store.

After the pipe is cleaned, you will want to apply an ample amount of glue. Go ahead and glob it on. If it is dripping, the quantity of glue is good. A thin film of glue will lead to gaps which can also be a path for the elements.

- ❑ 3. Locate the 1 1/2" x 24" piece of PVC pipe and the 1 1/2" to 1" reducer. Glue these two pieces together.
- ❑ 4. Glue the 2 1/2" long pipe pieces into the other end of the reducer.
- ❑ 5. Glue the 1 3/4" piece of pipe into one of the legs of the 'X' joint. (doesn't matter which leg)

Now we are going to do some wiring with coax cable. Take your time stripping this cable as you don't want shorts or opens after you have glued everything together.

Stripping Coax cable for soldering

- 1. Make a slice using a sharp knife 3/4 inch back from the end of the wire. Be careful not to cut through the wire underneath the insulation.



- 2. Pull the outer piece of insulation off, exposing the first layer of shield wires.



- 3. Pull all of these strands off to one side, then twist them together. If you want at this point, you may solder these strands together.



- 4. Using your sharp knife again, cut a slice around the inner insulation about 3/8 inch back from the end of the wire.



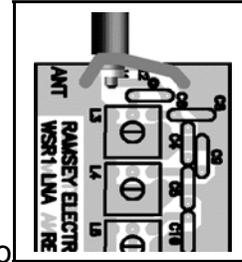
- 5. Pull the insulation off, and twist the wires together.



- 6. You can now solder all of your connections
-

- 6. You will want to perform the above process for both ends of the RG-58U and the RG-62. It is important that the lengths of the wires that are given to you remain the same as what is provided, as changing the lengths will decrease the performance of your project.
- 7. If you are planning on using the WSR-LNA preamp, you will need to solder one end of the RG-58U cable to the end of the board marked 'ANT'. Use a spare piece of uninsulated wire to 'strap down' the shield of the coax to the preamp PC board.

- ❑ 8. Cut the excess ground braid off so that there aren't any stray wires.
- ❑ 9. Thread the other end of the coax through the 1 1/2" PVC pipe with the reducer, starting at the 1 1/2 inch end, and exiting at the 1" end. The LNA board should fit snugly inside of the PVC pipe. You can use a sock or rag to temporarily stuff in the pipe to hold things in place while your working. Make sure and give yourself enough wire to work with on the exiting end.
- ❑ 10. Using the diagram on page 7 as a guide, solder the center conductor of the RG-58U to the center conductor of the RG-62.
- ❑ 11. Solder one end of a 21" piece of buss wire to the center conductor joint as well.
- ❑ 12. Solder the two outside shield wires on the connected cables together.
- ❑ 13. Solder another piece of 21" wire to the outside shield wires for the other half of your lower reflector dipole.
- ❑ 14. At this point the outer shield and the center conductor should not be connected together in any way. Check this out with an ohm meter if you need to; it shouldn't be less than 1 Meg ohms.
- ❑ 15. Use the 'X' connector for this step. Thread the unused end of the RG-62 through the opposite opening of where you mounted the 2 1/2" pipe piece, and then on through the pipe piece.
- ❑ 16. Thread the two dipole wires through the two remaining holes. Make sure the wires don't touch or cross over inside of the 'X' connector.
- ❑ 17. On the free end of the RG-62, solder one 21" piece of wire to the center conductor.
- ❑ 18. Solder the other 21" piece of wire to the outer shield wire of



the RG-62.

- 19. Thread the RG-62 and its two wires through the base of the 'T' and the two wires should come out opposite ends of the 'T'.
- 20. Again make sure that the wires aren't shorted together inside the pipe. Use an ohmmeter or continuity checker for this.
- 21. Now we want to slide the 'T' onto the 2 1/2" piece of pipe that is attached to the 'X'. This may be a little tricky since the RG-62 coax is longer than the pipe. You may have to stuff some rags into the pipe to hold the wire where you want it so it doesn't shove the dipoles down the central pipe. You can also fold the wire inside of the pipe if you have nimble fingers. DO NOT GLUE YET!
- 22. Straighten out your dipoles and slide the 23 1/2" pipe assemblies over each of the four dipoles. The straighter you make the dipoles inside these pipes, the better. Orient the dipoles so that they cross one another (see page 6).
- 23. You can glue each of these dipole 'arms' into their respective pipe joints.
- 24. Things should look pretty good at this point. We are almost finished. Check the diagram on page 6. Compare your antenna with the one in the diagram for any mistakes.
- 25. Now you can pull the rag and the LNA down to the base of the 1 1/2" pipe.
- 26. At this point, if you're sure that your LNA works, you can find a way of securely mounting it at the end of the pipe. You can use a screw through a hole drilled in the pipe to pin the board within the pipe, or glue it into place using silicon sealant, or rely on the connector hardware to do the job.
- 27. Use the 1 1/2" endcap with the hole drilled in it. Guide the LNA's jack through the hole. Use mounting hardware to secure the jack to the pipe. Press fit the endcap on.

Mounting Ideas

There are many ways of mounting this antenna, and a few things have to be taken into account when doing so. First and foremost, **STAY AWAY FROM POWER LINES!** They can not only induce noise into your system, they can also turn you into BBQ. Since we appreciate your business, try and mount your antenna away from power lines.

Next, you'll want to mount it where you can get at it easily. The roof is the most simple. Trees should be avoided if possible, since climbing them with an antenna is difficult at best.

You will want to mount your antenna as high as possible, so that there are no obstructions on the horizons. The problem is that the higher you mount it, the more likely it will become a target for ten million volts at 100,000 Amps (lightning). Needless to say, the LNA, the WSR-1, and your coax cable were not designed to power New York City. Consider lightning protection if it is within your budget, or make sure there is a higher conductive object nearby like a tree, or even the peak of your house. Of course you could also take your chances and keep a fire extinguisher on hand during storms.

The general idea is to use common sense in locating the perfect spot for your antenna, and somewhere near the chimney is usually the best place. Of course if you have a tower, there is no need for you to think twice.

There are several ways of mounting this system. We give two examples to get you started, the first being an all PVC stand. It uses 1 1/2" diameter PVC to match the lower part of your WSR-ANT.

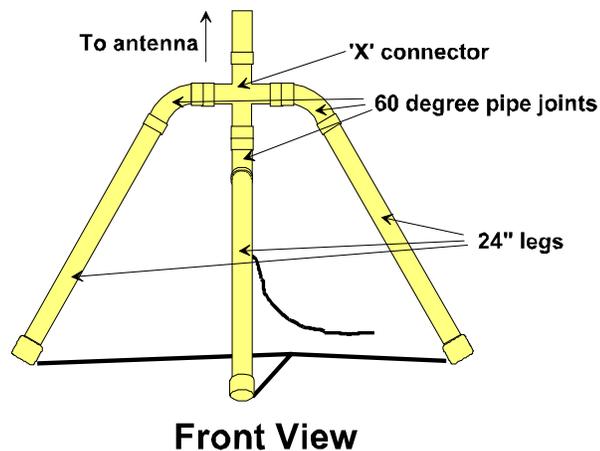
Building a PVC stand

The three legs are first capped off at one end, then filled with either self hardening plaster (for making molds), concrete, or even

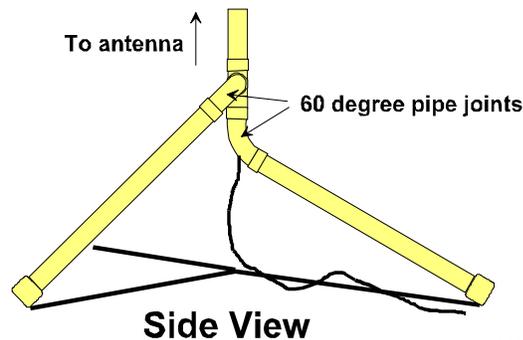
wax. This is for added weight so the wind won't blow it over. This is also the reason we use thick walled PVC pipe.

The 30 or 60 degree pipe joints are used to angle the legs out like a tripod. The center pipe joint has a hole drilled in it for the coax to pass through. Make sure and seal this hole with sealant before completion.

The 'X' joint holds the antenna mast in place as well as all three legs. You will also need 3, 2 1/2" long pieces of pipe to join the 30 or 60 degree pipe joints to the 'X'. Glue the center leg in place, but don't glue the outer two until you have leveled the antenna in your mounting place. The angle of the roof can be compensated for in this manner. Glue these last, and then wait for the glue to dry before standing up.



Front View



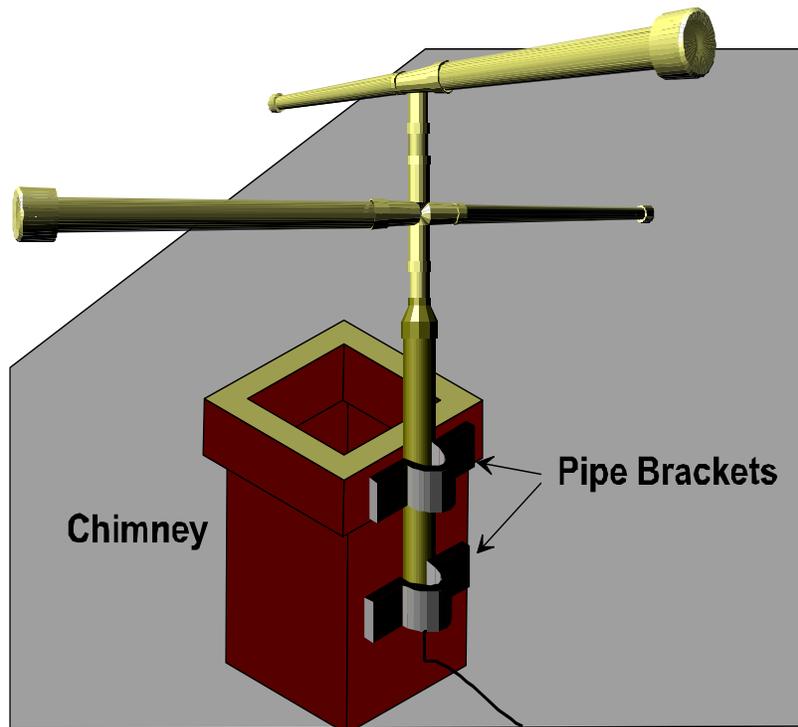
Side View

Mounting on a chimney

This is the simplest of methods, as you will need 2, 1 1/2" pipe brackets (plated metal preferably), 4 self tapping machine screws, and some plastic anchors.

First line up the antenna with the chimney. If the upper portion of the chimney is larger than the lower, you may need to mount a block of wood at the base to make the antenna mast plumb.

Drill the appropriate holes in the chimney for mounting, and then insert the plastic anchors. Now you can screw the machine screws into the plastic anchors with the antenna in place.



Troubleshooting Guide

Problem: When I try to receive a satellite, the reception is really weak all the way across. Lots of complete dropouts and not very much in the clear.

Solution: There are many factors involved with this problem, but the one that concerns this kit is simple. Just twist the top dipole 180 degrees from its current position. This should significantly improve reception. If it worsens reception, the problem may lie elsewhere.

Problem: I don't receive the satellite, even when it is overhead!

Solution: Again there are many possible problems. Look in your other manuals for more suggestions. With this kit it is possible that the elements have been shorted together. You may want to disassemble the antenna and test this theory out. Also check your WSR-LNA for proper installation.

Problem: I can't get it to work no matter what I do!! It must be Ramsey's fault!

Solution: Read the warranty information in the back of this manual.

Other information

If you need more information on antennas such as lightning protection, or making your own tower or whatever, the ARRL Handbook is probably the best source for this information. You can pick one up at any of your favorite HAM stores, or pick one up at a Hamfest (maybe we will see you there!)

ARRL Handbook. American Radio Relay League, 225 Main St., Newington, CT 06111. Annual publications are available.

The Ramsey Kit Warranty

Please read carefully BEFORE calling or writing in about your kit. Most problems can be solved without contacting the factory.

Notice that this is not a "fine print" warranty. We want you to understand your rights and ours too! All Ramsey kits will work if assembled properly. The very fact that your kit includes this new manual is your assurance that a team of knowledgeable people have field-tested several "copies" of this kit straight from the Ramsey Inventory. If you need help, please read through your manual carefully, all information required to properly build and test your kit is contained within the pages!

1. DEFECTIVE PARTS: It's always easy to blame a part for a problem in your kit, Before you conclude that a part may be bad, thoroughly check your work. Today's semiconductors and passive components have reached incredibly high reliability levels, and it's sad to say that our human construction skills have not! But on rare occasions a sour component can slip through. All our kit parts carry the Ramsey Electronics Warranty that they are free from defects for a full ninety (90) days from the date of purchase. Defective parts will be replaced promptly at our expense. If you suspect any part to be defective, please mail it to our factory for testing and replacement. Please send only the defective part(s), not the entire kit. The part(s) MUST be returned to us in suitable condition for testing. Please be aware that testing can usually determine if the part was truly defective or damaged by assembly or usage. Don't be afraid of telling us that you 'blew-it', we're all human and in most cases, replacement parts are very reasonably priced.

2. MISSING PARTS: Before assuming a part value is incorrect, check the parts listing carefully to see if it is a critical value such as a specific coil or IC, or whether a RANGE of values is suitable (such as "100 to 500 uF"). Often times, common sense will solve a mysterious missing part problem. If you're missing five 10K ohm resistors and received five extra 1K resistors, you can pretty much be assured that the '1K ohm' resistors are actually the 'missing' 10 K parts ("Hum-m-m, I guess the 'red' band really does look orange!") Ramsey Electronics project kits are packed with pride in the USA. If you believe we packed an incorrect part or omitted a part clearly indicated in your assembly manual as supplied with the basic kit by Ramsey, please write or call us with information on the part you need and proof of kit purchase

3. FACTORY REPAIR OF ASSEMBLED KITS:

To qualify for Ramsey Electronics factory repair, kits MUST:

1. NOT be assembled with acid core solder or flux.
2. NOT be modified in any manner.
3. BE returned in fully-assembled form, not partially assembled.
4. BE accompanied by the proper repair fee. No repair will be undertaken until we have received the MINIMUM repair fee (1/2 hour labor) of \$18.00, or authorization to charge it to your credit card account.
5. INCLUDE a description of the problem and legible return address. DO NOT send a separate letter; include all correspondence with the unit. Please do not include your own hardware such as non-Ramsey cabinets, knobs, cables, external battery packs and the like. Ramsey Electronics, Inc., reserves the right to refuse repair on ANY item in which we find excessive problems or damage due to construction methods. To assist customers in such situations, Ramsey Electronics, Inc., reserves the right to solve their needs on a case-by-case basis.

The repair is \$18.00 per half hour, regardless of the cost of the kit. Please understand that our technicians are not volunteers and that set-up, testing, diagnosis, repair and repacking and paperwork can take nearly an hour of paid employee time on even a simple kit. Of course, if we find that a part was defective in manufacture, there will be no charge to repair your kit (But please realize that our technicians know the difference between a defective part and parts burned out or damaged through improper use or assembly).

4. REFUNDS: You are given ten (10) days to examine our products. If you are not satisfied, you may return your unassembled kit with all the parts and instructions and proof of purchase to the factory for a full refund. The return package should be packed securely. Insurance is recommended. Please do not cause needless delays, read all information carefully.

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TOTAL SOLDER POINTS

8

ESTIMATED ASSEMBLY

TIME

Beginner 3.5 hrs

Intermediate..... 2 hrs

Advanced..... 1.5 hrs

Price: \$5.00

Ramsey Publication No. MWSR-ANT

Assembly and Instruction manual for:

***RAMSEY MODEL NO. WSR-ANT WEATHER
SATELLITE RECEIVER ANTENNA KIT***

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