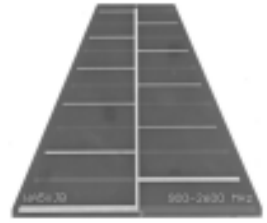


THE 'LOGI' LOG PERIODIC ANTENNA



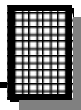
Ramsey Electronics Model No.

LPY915

Constructed on rugged FR-4 material, it requires no tuning and has no fragile antenna elements to break or twist! Covers the entire 900 to over 2,500 MHz frequency range.

Why settle for any old antenna... this little baby "compresses" the signal into a powerful beam that is 4 times more powerful in the direction you desire!

- **Easy hookup to your Receiver or Transmitter**
- **Small thin size with excellent broadband performance**
- **Solid 6 dB gain from 900 to over 2,000 MHz!**
- **VSWR less than 2:1 - great for transmitters up to 10 Watts!**
- **Easily mounted by itself or makes a great feed for reflector dishes**
- **Construction ideas for a wideband corner reflector and a 'grid' reflector dish are covered in the manual!**
- **Very directional - ideal for point-to-point links**



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LPY915 INSTRUCTION MANUAL

Ramsey Electronics publication No. MLPY2 Rev 1.1

First printing: December 2001

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KIT ASSEMBLY AND INSTRUCTION MANUAL FOR

Logi LOG PERIODIC ANTENNA

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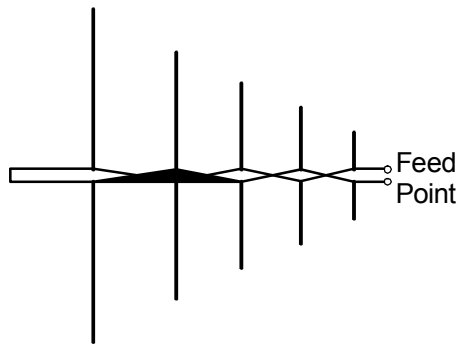
INTRODUCTION

This small log periodic antenna, which we call the 'Logi', is ideal for getting the maximum performance out of any UHF to low frequency microwave wireless system. Its directional properties "compresses" the signal into a powerful beam that is 4 times more powerful in the desired direction. It is the ideal antenna for scanners, wireless LANs, and other wireless devices. Its directional properties make it exceptionally well suited for point-to-point links! The units small size and wide bandwidth also make it ideal for feeding reflector antennas, such as the easily constructed corner reflector or grid that are discussed later in the manual.

ANTENNA DESCRIPTION

To start with, what is a log periodic antenna? The seeming simplicity of the log periodic antenna belies the remarkable features of the design. It uses a common transmission line to alternately feed a group of $1/4 \lambda$ dipoles that are strung together. These antennas together display excellent radiation qualities over a wide range of frequencies as well as relatively uniform input impedances and good VSWR characteristics. While the log periodic design has been around since the late 1950's it has now been discovered to be at the cutting edge of antenna development.

Looking at the physical layout of a log periodic antenna, one would see that it is comprised of multiple elements working together to provide a wide bandwidth of usable frequencies. The active (radiating or receiving radiation) portion of the antenna effectively shifts with frequency as one stage becomes 'more resonant' than the next. The lowest operating frequency is determined by the longest element

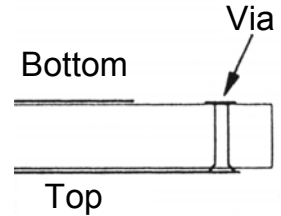


and the highest operating frequency is set by the shortest element. As the frequency of the transmission (or reception) increases, the active region of the antenna shifts forward to the shorter $1/4 \lambda$ dipole elements or vice versa as the frequency decreases. Obviously then the 'secret' for proper operation must lie in the length and spacing of the antenna elements. These and other factors must be carefully chosen to cover the desired frequency range for the antennas' application. Instead of forcing you to figure out all the math and spend hours experimenting, the creation of the Logi antenna (for frequencies between 900 and 2600 MHz) comes to the rescue!

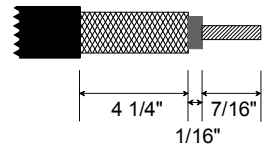
STANDARD HOOK-UP

Normal applications are well suited by the default performance of the unit without the need for cumbersome reflective elements. The standard wiring configuration is simply to use the Logi as the complete antenna and merely add a means of connection for your radio. The easiest method to interface your antenna and radio is through the use of a coaxial cable with a pre-mounted connector. Standard RG-58 and a BNC connector are often used by 'scanner buffs' to quickly and easily monitor the airwaves. Other types of coaxial cable such as RG-142, .141 and .085 semi-rigid will also provide you with a good low loss connection as well as excellent high frequency characteristics.

Let's take a look at the circuit board for a moment to become more familiar with its layout. The bottom side is the 'ground' connection and is labeled with the designers call sign "WA5VJB". Notice that the via (the small plated through hole) near the narrow front of the board is not directly connected to the center trace on the bottom side. It is directly connect on the top side however.

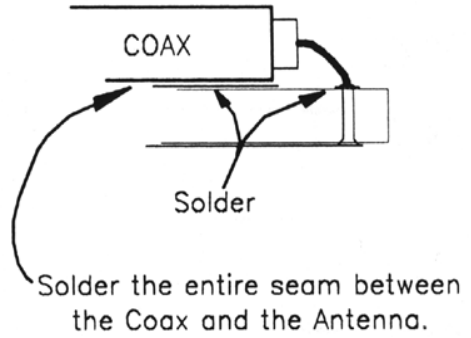


- 1. Scrape off the protective solder mask coating on the bottom side center ground trace with a razor. Only remove the mask along the center trace, not the perpendicular elements. Be careful not to accidentally cut them while removing the mask. This is where you'll attach the ground shield of your coax.
- 2. Tin the center ground trace you just scraped with a thin layer of solder. This will make mounting the ground conductor easier in a moment.
- 3. Measure back 4 3/4" from the open end of your coax and remove the outer protective sheath (if applicable) to expose the ground conductor.
- 4. Using a small pair of wire cutters (or a razor for the semi-rigid coax variety), clip away a 1/2" of the ground braid from the same open end to expose the inner dielectric layer.
- 5. You now need to trim away the end 7/16" of the inner dielectric layer giving access to the center conductor. Position your razor for the cut and roll the coax on the table top to slice through the entire circumference (Don't mark-up the wife's table!!). The end goal is to leave about 1/16" of the dielectric between the ground conductor and the center conductor.
- 6. Carefully tin (solder the braid wire together to keep it from fraying) the first 1/4" of the ground braid. Be careful not to melt the dielectric with too much heat.



- ❑ 7. From the bottom side, slide the center conductor of the coax through the open via at the front of the circuit board.
- ❑ 8. Gently bend the remaining cable to mount flush along the tinned center ground strip.
- ❑ 9. Look closely at the ground conductor and make sure there are no stray braid wires hanging around. They can short out the coax near the via when you solder it in place rendering your antenna useless!
- ❑ 10. Solder the length of the ground conductor to the circuit board along the tinned center ground strip. Be careful at this point not to overheat the ground conductor and melt the dielectric layer. Spot soldering the ground braid at the element junctions works well to avoid overheating the coax.
- ❑ 11. It's time for the last connection! Solder the center lead of the coax in place on the top side of the circuit board where it passes through the via.
- ❑ 12. Visually examine the junction you just soldered and again make sure the center feed of the coax is not shorted to ground.

Soldered Coax Positioning

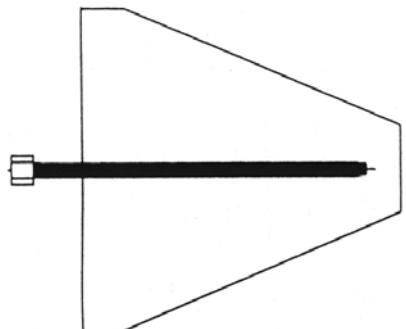


Note that using an ohmmeter to check you LPY915 antenna for shorts will not work. By default, the top and bottom layers are connected together by small traces near the end of the board. Normal operation requires these traces to be left intact. An optional low frequency modification for improved performance near 825 MHz will be discussed next. Time to start playing! Interface the other end of the coax feed with your radio and enjoy the benefits of a broadband directional antenna!

LOGI LOW FREQUENCY MODIFICATION

If your radio system requires DC isolation or you plan to use your Logi below 900 MHz, the small connecting traces near the rear of the antenna should be cut. By removing these traces you can extend the effective frequency range down to 825 MHz. You will however wind up with some 'lumps' in the matching response on the

Final Installation View



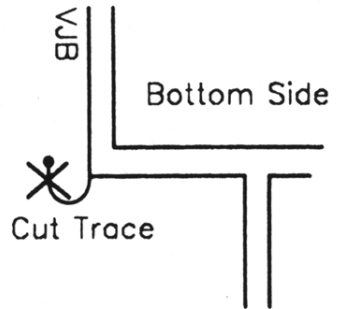
high frequency end.

BUILDING A CORNER REFLECTOR

Corner reflector antennas have long been used by the Military and Radio Amateurs for high forward gain applications like field data links.

Using a properly sized 90° angle corner reflector will typically give you a 10 dB gain or higher over that of a stand alone dipole antenna. The construction of a traditional corner reflector is

very simple. Two plates are connected at a 90° angle with a feed element, usually a dipole, positioned along the vertex at the angular focal point of the plates. The dimensions of the reflector plates are luckily not critical (within reason of course) and the frequency characteristics are much better than most other parasitic arrays with the same gain rating. One drawback of the normal corner reflector arrangement is the fact that the active (radiating or receiving) element is usually a narrow bandwidth dipole. In our case, we suggest using the 'broadband' Logi as the feed element. This gives you the same corner reflector benefits but without the normal narrow bandwidth limitations!



With the wealth of information available today on the Internet, countless articles and design schemes can be found covering the construction of corner reflectors. The main difference from the norm is the use of the Logi as the main element versus a simple dipole. The following diagram gives a few basic dimensions for an experimental corner reflector. The main points to key in on are the base reflector size and the element (the Logi) placement for proper broadband coverage.

Different types of materials can be used to form the reflector plates. Any type of perforated aluminum or copper sheet will work well. Small holes in the material help to cut down on wind resistance. The overall reflector length and width sizes should be chosen to properly work at the lowest frequency you plan to use. In the case of the Logi, 900 MHz was used to calculate the dimensions. A gain of 10 dB can be obtained with a reflector side length of one wavelength. A two wavelength reflector can be used to achieve upwards of 12 dB gain! It just means you'll have a bit more wind resistance to factor in.

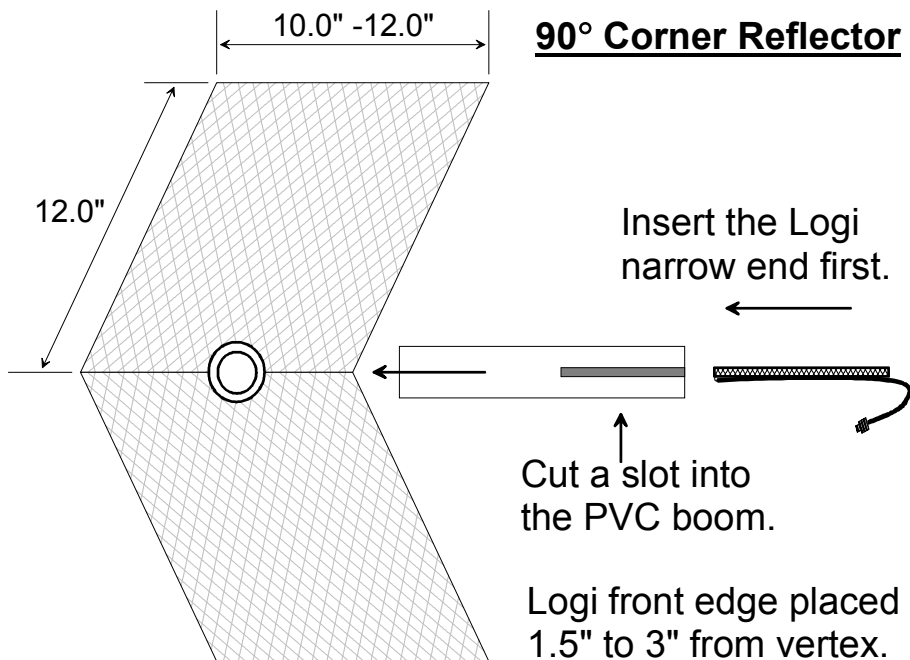
The positioning of the Logi as the active element must also take into account the frequencies you'll be dealing with. Thankfully, the physical layout of the circuit board takes care of this for us automatically! The narrow front end of the board should be placed so that it points into the vertex of the reflector plates. Rotate the board so that it lines up directly with the seam created by the two plates. This allows one side of the Logi to collect (in receive mode) or emit (in transmit mode) the electromagnetic energy from one plate to one side of the active element. If the Logi is turned 90° so that it does not line up in

parallel with the seam, the antenna will not function properly.

The boom length that positions the Logi at the focal point of the reflector is also critical factor. This will require a bit of trial and error to get things just right. Use a piece of PVC pipe (1/2" to 7/8" will work well) with a slot cut in the end just big enough to wedge the entire Logi in place. The narrow front edge of the circuit board should be positioned between 1.5" to 3" from the seam formed by the two reflector plates. PVC couplers can be mounted in the vertex of the reflector to allow you to slide the boom in and out while testing. Once the optimal position of the Logi is set, tighten the coupler and your ready to go!

BUILDING A REFLECTOR GRID

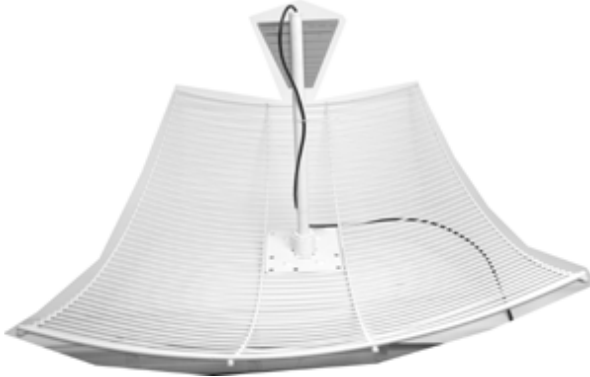
Building a reflector grid antenna as a home-brew project is a little harder than the corner reflector. It would be very difficult to achieve the proper parabolic shape for the reflector by banging on an old BBQ grill! The best way to insure your antenna will function the way you want is to use a pre-fabricated dish. There are a few different dishes that are easy to get and very affordable. We



experimented with the ISM19R and ISM24R and found that they work wonderfully with the Logi!

Look at the how the Boss used a piece of PVC and a few couplers to form a boom. He cut a slot in one end of the PVC pipe to hold the Logi antenna in place. Then he used a nylon wire tie at the end of the boom to squeeze the slotted pipe like a vise! Wow!!! Simple to make and highly effective!

LPY915 mounted on a Grid Reflector



If you plan to do the same, here is a quick shopping list:

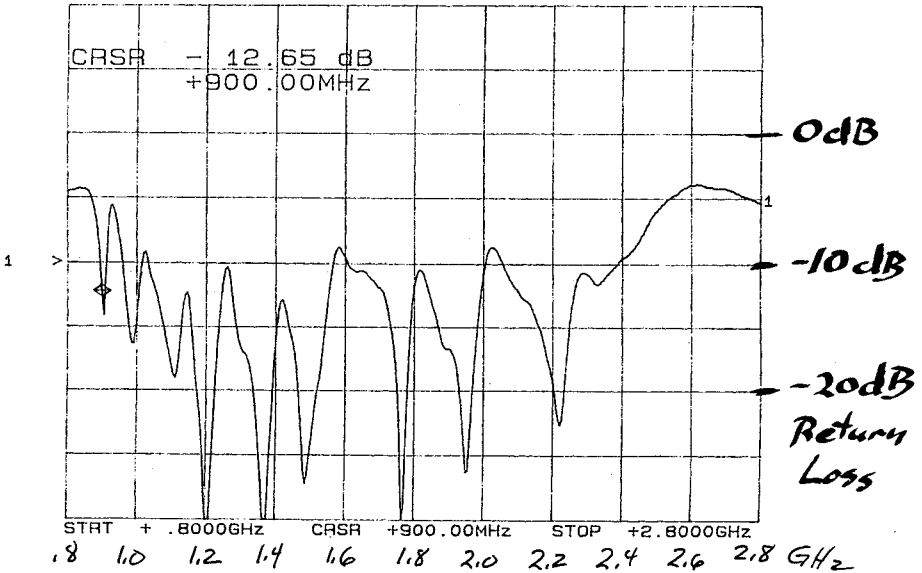
- 1 Ramsey ISM19R or ISM24R (or equivalent)
- 1 16 1/2" piece of 1/2" PVC pipe
- 1 1/2" to 1" PVC coupler (non threaded)
- 1 3/4" to 1" PVC coupler (threaded on the male 3/4" side only)
- 1 can of PVC cement
- 3 4" minimum nylon wire ties

LPY915 mounting Boom for a Grid Reflector



LPY915 RETURN LOSS PLOT

CH1: A -M - 12.65 dB
5.0 dB/ REF - 10.00 dB



RETURN LOSS VERSUS VSWR - CONVERSION CHART

Return Loss (dB)	VSWR	Return Loss (dB)	VSWR	Return Loss (dB)	VSWR
1.0	17.391	11.0	1.785	21.0	1.196
2.0	8.724	12.0	1.671	22.0	1.173
3.0	5.848	13.0	1.577	23.0	1.152
4.0	4.419	14.0	1.499	24.0	1.135
5.0	3.570	15.0	1.433	25.0	1.119
6.0	3.010	16.0	1.377	30.0	1.065
7.0	2.615	17.0	1.329	35.0	1.036
8.0	2.323	18.0	1.288	40.0	1.020
9.0	2.100	19.0	1.253	50.0	1.006
10.0	1.925	20.0	1.222	60.0	1.002

The LPY2 offers exceptional wide band characteristics from 900 MHz to 2.6 GHz and can be used as a Receive or Transmit (10 Watts max) antenna! Standard guidelines for antenna systems:

- Receiver Antenna Match > VSWR = 3.0 : 1.0 or better
- Transmitter Antenna Match > VSWR = 2.0 : 1.0 or better

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 \$25.00, 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 \$50.00 per 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.

LPY915 LOG PERIODIC ANTENNA

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REQUIRED TOOLS

- Soldering Iron Ramsey WLC-100,
- Thin Rosin Core Solder Ramsey RTS12
- Needle Nose Pliers Ramsey RTS05
- Small Diagonal Cutters Ramsey RTS04
- <OR> Complete Soldering Tool Set RS64-2801

ADDITIONAL SUGGESTED ITEMS

- Optivisor Magnifier Headband Ramsey OPMAG
- Holder for PC Board/Parts Ramsey RTS13,
- Desoldering Braid Ramsey RTS08

Price: \$5.00

Ramsey Publication No. MLPY915

Assembly and Instruction manual for:

RAMSEY MODEL NO. LPY915



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