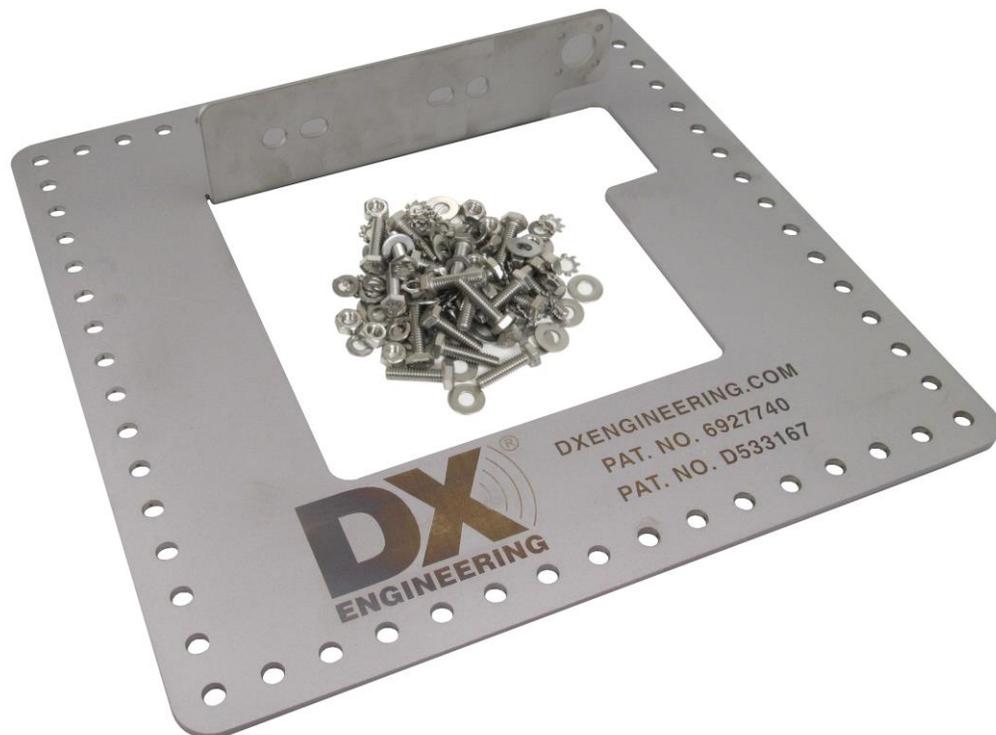


Radial Plate

DXE-RADP-3

Installation Guide

DXE-RADP-3-INS Rev 1c
U.S. Patent Nos. 6,927,740 and D533,167



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Introduction

The patented **DXE-RADP-3** Radial Plate is made of 0.125 inch thick, laser cut 304 Stainless Steel. Outside dimensions are 11-5/8" x 11-5/8"; with an inside open area of 6" x 6". The plate has 60 laser drilled holes for attaching ground radial hardware, a built in bracket for attaching a V-Bolt Clamp for mounting, and laser cut holes for mounting a bulkhead SO-239 type feed through connection.

The DX Engineering Radial Plate is meant for those of you that have or are building a quarter wave vertical antenna and who want an easy, neat and effective way to connect those essential radial wires and the coax to your vertical antenna for the lowest takeoff angle and strongest signals.

This plate will work perfectly with the commercially available vertical antennas such as the Hustler® BTV series (4-BTV thru the 6-BTV), Butternut® series (HF2V, HF6V, HF9V), DX Engineering Vertical Antennas, or your very own home brew variety.

Advantages over the other radial plates on the market

First, the DX Engineering Radial Plate will attach easily and rigidly to a 4" x 4" or 6" x 6" wooden post using simple wood screws or a steel or aluminum pipe (up to 3" outside diameter) using a DX Engineering clamp, a fence post or whatever you have supporting your vertical. DX Engineering V-Bolt Clamps make it easy to attach the antenna and the Radial Plate to a vertical piece of 1-3/4" to 3" Outside Diameter (OD) galvanized steel pipe, which you have driven or cemented into the ground. For attaching to a 1/2" to 1-3/4" OD mounting pipe, the **DXE-CAVS-11P** Stainless Steel V-Bolt Clamp. For attaching to a 1" to 2" OD mounting pipe, the **DXE-SSVC-2P** Stainless Steel V-Clamp, or the **DXE-CAVS-2P** Stainless Steel V-Bolt Clamp. **The standard 1-1/2" galvanized water pipe (with its 1.9" OD) is just fine for this application and can usually be found at your local home building supply store.** For mounting pipes between 2" and 3" OD, use the **DXE-SSVC-3P** Stainless Steel V-Clamp.

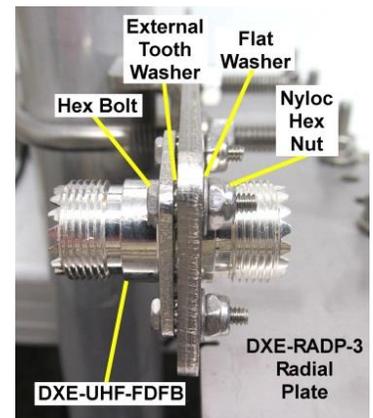
Second, this Radial Plate actually has a place where you can attach your coax.

The Radial Plate assembly has been laser drilled for the optional **DXE-UHF-**



FDFB-KIT SecureMount™ SO-239 bulkhead fitting. This is a **MUST** item for proper handling of RF ground current! If you are going to be using a Hustler BTV or another brand of similar commercially available verticals, using this laser cut bulkhead connection hole is how to use a bulkhead fitting as a pass thru for your coax

connection on the way to the antenna from the Radial Plate. This will ground your coax to the Radial Plate before it goes to the antenna. It is *imperative* that your coax be grounded to the radials to complete the circuit for your radial current return for maximum performance.



Third, the DX Engineering **RADP-3 Radial Plate** is laser cut from tough stainless steel so that it has smooth edges, won't corrode and will always look good. You will be proud of how good your installation looks.

Fourth, it is square. Why? Because a square has more lineal distance around it than the round plates you usually see. This allowed adequate spacing to put 60 holes in it; use larger bolts for more clamping power and still not crowd them together. If you want to go all-out with 60 to 120 radials you will be able to put them on easily. You can put two radial wire terminals on each bolt set. Remember: The more current that flows in

through your radials and then through this Radial Plate, the stronger your signal is going to be and the more DX stations that you are going to hear. So, put on as many radials as you can.

Fifth, DX Engineering supplies the correct Stainless Steel bolts, nuts, star washers, flat washers and lock washers to attach the radials. Since its unknown how many radials that you want to attach (some experts suggest at least 32 radials) the first 20 sets of hardware are included with the plate. This means that with the supplied hardware that you can attach 20 radials or double them up and attach 40. If you want to attach more, order **DXE-RADP-1HWK** radial plate hardware kits.

Why a 1/4" bolts and not the *cheaper* #10 that others use? Because the 1/4" bolt has a lot more clamping force for the best connection possible. The Stainless Steel external star washers that are supplied have about twice the area of even the best star washers for the smaller bolts. You want the best connection that you can get here.

There are optional DX Engineering Radial Wire Kits available. The **DXE-RADW-500K/BD** contains a 500 foot spool of 14 gauge copper stranded wire with relaxed black PVC insulation, 20 Terminal Lugs and 100 Steel or Biodegradable Lawn Staples. The **DXE-RADW-1000K/BD** Radial Wire Kit contains a 1,000 foot spool of 14 gauge copper stranded wire with relaxed black PVC insulation, 40 Terminal Lugs and 200 Steel or Biodegradable Lawn Staples. The **RADW-20RT**, **-32RT** or **-65RT** contain sets of 20 radial wires with 1/4" terminals attached. These kits come in 20 Ft, 32 Ft, or 65Ft lengths.

Installation

The **DXE-RADP-3** kit includes:

1	Laser Cut Stainless Steel Radial Plate	20	1/4"-20 Stainless Steel Hex Nuts
20	1/4 -20 x 1" Stainless Steel Hex Head Bolts	20	1/4" Stainless Steel Split Lock Washers
20	1/4" Stainless Steel Flat Washers	20	1/4" Stainless Steel Star Washers

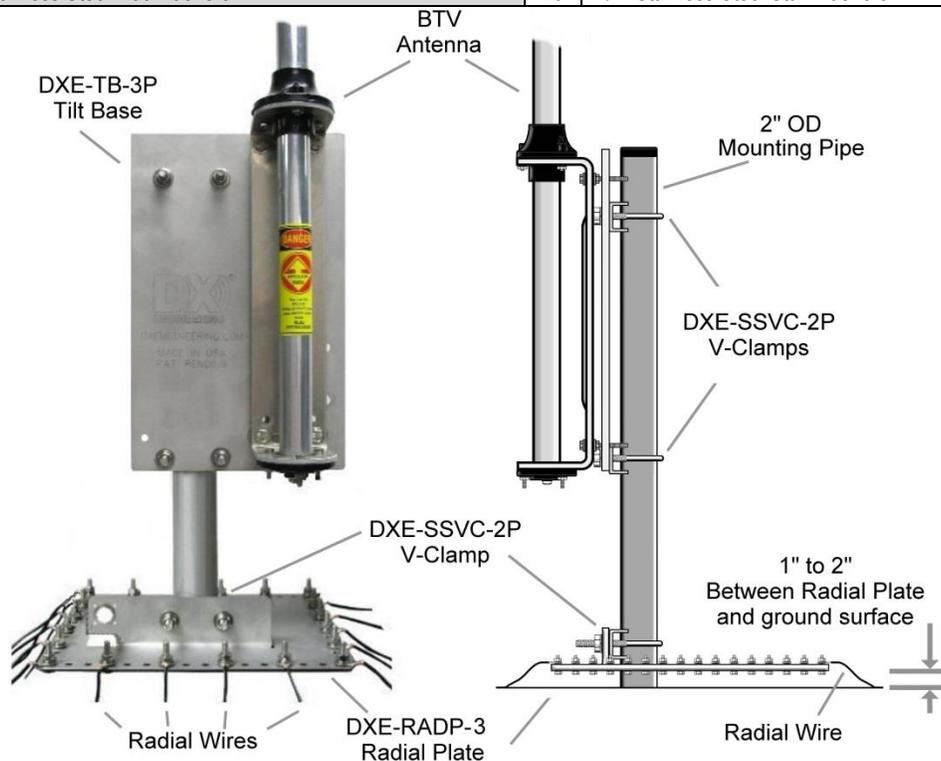
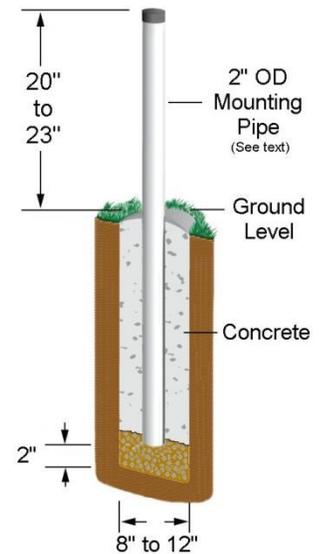


Figure 1: Completed assembly for Hustler® BTV (shown with optional BTV, DXE Clamps and DXE Tilt Plate)

Radial Plate Assembly to Pipe or Mast

Use a thick-walled galvanized steel mounting pipe *at least* 4 feet long. This will allow approximately 2 feet or more to be below ground and 2 feet above ground. Depending on the antenna you are installing, this height above ground may vary, check your antenna installation guide for details. A thick-walled steel pipe 1-3/4" OD to 3" OD **maximum** with a minimum thickness of 1/8" (1/4" preferred) should be used. **2" OD is recommended and the standard 1-1/2" galvanized water pipe (with its 1.9" OD) is just fine for this application and can usually be found at your local home building supply store.** For permanent mounting, use a post-hole digger to make the hole deep enough to accommodate 2 feet of pipe and a couple inches of gravel at the bottom for drainage. Set the pipe on the gravel, use the pre-mix concrete to fill around the pipe, adding water and mixing as you fill or mix the concrete first, then pour in the hole (depending on the type of concrete obtained). Fill the hole until the concrete is level with the ground around it. Use a level as you fill the hole to be sure the pipe is straight. Allow to set overnight or longer depending on the type of concrete used. Your location, landscape and ground conditions may require different mounting solutions in order to have the mounting pipe and the vertical antenna in a secure position.



Note: *Galvanized steel, rather than aluminum, is much more suitable for mounting in concrete. Aluminum will quickly corrode due to incompatibility with the materials used to make concrete.*

Attach the Radial Plate to a metal mounting pipe or wooden post at the location you intend to use the antenna, making sure the unit is securely mounted. You need approximately 1" to 2" of clearance between the bottom of the Radial Plate and the ground to allow installation of the radial wire hardware. If you are using an optional **DXE-TB-3P** or **4P** Tilt Base, allow approximately a 7" clearance from the Radial Plate surface to the bottom edge of the Tilt Base. Reference **Figure 1**.

Note: *The mounting hardware is not supplied. For best results, use one **DXE-SSVC-2P** V-Saddle Clamp for metal pipes from 1" to 2" OD or **DXE-CAVS-11P** for a metal pipe that is 1/2" to 1-3/4" OD or one **DXE-SSVC-3P** V-Saddle Clamp for metal pipes from 2" to 3" OD.*

Note: *You must use an anti-seize lubricant such as **JTL-12555 Jet-Lube™ SS-30** on all stainless hardware to prevent galling of the stainless steel threads.*

Here's an example of the Radial Plate mounted to a 4" x 4" wooden post using lag bolts. The Radial Plate can accommodate up to a 6" x 6" finished wooden post. This picture also shows the Tilt Base and other optional items mounted to the post as well.



Ground Radials

The following procedure describes installation of radials onto the surface of the ground over an existing lawn. You may encounter installation in undeveloped ground, weeds, woods, and even sand. You will have to adapt your particular installation to your surroundings. Radial wires may also be buried up to 6" depending on local ground type and landscaping requirements.

Installing Ground Radials on Existing Lawn

The best time to do this is early spring but it can be done other times, as well. The idea behind this is to get the grass on your lawn to grow over the radials and protect them from the mower.



First, mow the grass pretty short in the areas where you will be laying

the radials down. Notice we didn't say "scalp" it. Just lower the mower until the grass is about 1 inch long after cutting. Readjust the height of the mower back to normal and put it away.

Next, connect the radials to the Radial Plate with wire terminal ends and stretch them out evenly around the antenna. Some AM broadcast engineers tell us that the radials should be as long as you can make them up to about 1/2-wavelength. If you can only do 1/4 or 1/8-wavelength in certain directions then do that and don't worry about it. You will be surprised how much better your vertical will work. After you install a few radials and see how much better your antenna performs you will have an urge to put in more of them. Don't resist, more really is better. (Note: the photos shown have red wire for picture clarity. The DX Engineering Bulk Radial Wire is black).



Starting from the antenna end of the radials, and about every 3 to 4 feet, hold the wire down with a radial wire anchor pin while pulling the radial out from the antenna to keep it taut. Push it in as far as possible to get the wire as close to the grass roots as possible. You can use a rubber mallet to drive it home. If the radial wire is sticking up any place due to uneven ground or the wire is loose just put another staple there. The idea is to get all parts of the wire down as close as possible to the ground so that the grass will grow over it.

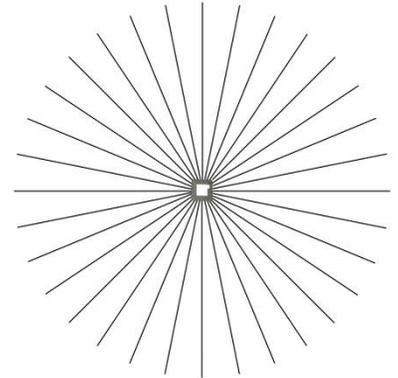
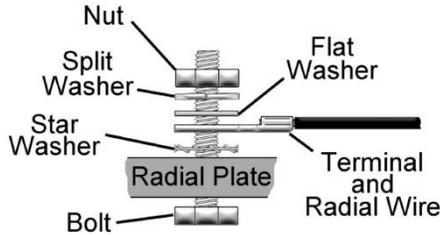
When you finish the last radial, your job is done and Mother Nature will do the rest. If you have done this in most parts of the country in early spring, the grass will grow up, surround the wire and pull it down firmly along its full length. If you do it in the fall after the grass has stopped growing, it will happen the next spring. This will be done so completely that in a few weeks you will have to actively look for the radials to see them. Your mower will miss them completely, too; but you and your contacts will hear them right away!

Attaching Ground Radial Wires to the Radial Plate

Using the 20 sets of supplied stainless steel hardware; connect the ground radial wires to the Radial Plate as shown. Note the Star Washer goes between the Radial Plate and the Radial Wire Terminal - This helps to ensure a positive electrical connection for long lasting performance.

Depending on the number of radial wires used, space them out evenly around the Radial Plate.

The Radial Plate will accommodate up to 60 radial wires (60 laser drilled holes), or up to 120 radials if doubled up.



Optional Items

JTL-12555 Jet-Lube™ SS-30 Pure Copper Anti-Seize 12555

Jet-Lube™ SS-30 Pure Copper Anti-Seize is the top choice of engineers and technicians in government, industry and leading Amateur Radio contest stations, for protecting mechanical assemblies of aluminum tubing, general hardware and copper grounding systems. On bonded metal surfaces Jet-Lube™ SS-30 assures electrical and RF conductivity while preventing oxidation and corrosion. Surpassing the capabilities of other aluminum anti-oxidants, the wide temperature range of Jet-Lube™ SS-30 prevents long-term drying and caking, and allows easy disassembly and effortless cleaning of parts. An environmentally preferred thread lubricant and conductive termination compound, Jet-Lube™ SS-30 helps keep your equipment in serviceable condition. It contains a high concentration of copper flakes, a requirement for heavy loads or compression; controlled frictional characteristics allow the surfaces of nuts and bolts to be tightened to their design torque specifications. This anti-seize product assures full hydraulic efficiency by allowing the metal surfaces to slide over each other without damaging metal-to-metal contact. Jet-Lube™ SS-30 is also designed to work as a similar and dissimilar component between two metal surfaces to prevent seizing and galvanic action. The SS-30 compound formula improves conductivity and ground continuity - and will not melt in high temperatures.

Jet-Lube™ SS-30 Pure Copper Anti-Seize Features include:

- * Meets MIL-PRF-907E spec
- * K-factor: 0.13
- * Service rating: -65 degrees F (-54 degrees C) to 1800 degrees F (820 degrees C)
- * SS-30 Resistivity (ohm-CM x 108) 5

*** This product is limited to domestic UPS Ground shipping only**



DXE-CAVS V-Bolt Saddle Clamps

These V-Bolt Clamps are made to fit tubing from 1/2" to 2" OD as used in antenna construction. The supplied V-bolt is long enough to attach tubing to thick plates and is made with anti-corrosive properties. Designed for attachments that don't require resistance to torque. V-bolt made from high-strength 18-8 stainless steel. The V-saddle is cast from 535 aluminum with a rippled surface.

DXE-CAVS-11P	V-Bolt Saddle Clamp, 1/2 in. to 1-3/4 in. OD Applications
DXE-CAVS-2P	V-Bolt Saddle Clamp, 1 to 2 in. OD Applications



DXE-SSVC-2P - Stainless Steel V-Clamp for steel pipe, 2 inch V-bolt

This V-Clamp is made in one size that fits Steel tubing or pipe from 1 to 2" OD as used in antenna construction. The supplied V-bolt is long enough to attach tubing to thick plates and is made with anti-corrosive properties. The special Stainless Steel saddle has serrated teeth will clamp to the pipe securely by biting into the surface. For this reason, it is not recommended for softer aluminum tubing or pipe. Ideal for fastening a radial plate and antenna mounting to a steel pipe. Used to clamp 1 to 2" (OD) steel tubing or pipe. Designed for attachments that don't require resistance to torque. V-bolt and saddle made from high-strength 18-8 stainless steel



DXE-SSVC-3P - Stainless Steel V-Clamp for steel pipe, 3 inch V-bolt

This V-Clamp is made in one size that fits Steel tubing or pipe from 2 to 3" OD as used in antenna construction. The supplied V-bolt is long enough to attach tubing to thick plates and is made with anti-corrosive properties. The special Stainless Steel saddle has serrated teeth will clamp to the pipe securely by biting into the surface. For this reason, it is not recommended for softer aluminum tubing or pipe. Ideal for fastening a radial plate and antenna mounting to a steel pipe. Used to clamp 2 to 3" (OD) steel tubing or pipe. Designed for attachments that don't require resistance to torque. V-bolt and saddle made from high-strength 18-8 stainless steel



DXE-UHF-FDFB-KIT - Silver Plated Female SecureMount™ Bulkhead Connector - Dual SO-239

The DX Engineering Silver Plated Female SecureMount™ Bulkhead Connector is a high-quality silver-plated connector that provides a positive, permanently secure connection for your coaxial cable. The two-sided SO-239 female connector has a superior silver-plated body with silver contacts to ensure the best performance for any application. The SecureMount™ flange uses four mounting screws. Once mounted to any panel or bulkhead, the flanged bulkhead connector will provide the best possible connection and stay that way. Unlike many common nickel-plated bulkhead connectors, our silver-plated SecureMount bulkhead connectors have no air space within their midpoint. This area of solid and superior PTFE dielectric between the center conductor and body maintains constant impedance and ultimate performance.

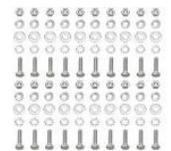
- Description: Bulkhead mount, UHF jack to UHF jack (SO-239)
- Body Material: Brass
- Body Plating: Silver
- Body Style: Flanged Dual Female SO-239
- Contact Plating: Silver
- Frequency Range: DC - 500 MHz
- Dielectric: PTFE
- Impedance: 50 ohms
- Includes Stainless Steel Hardware Kit for mounting



DXE-RADP-1HWK - Radial Plate Wire Attachment Hardware Kit - Stainless Steel

20 Sets of ALL Stainless Steel Radial Hardware for use with the DX Engineering Stainless Steel Radial Plate.

(20) 1/4" Bolts (20) 1/4" Nuts (20) 1/4" Flat Washers (20) 1/4" Split Washers (20) 1/4" Star Washers



SUM-900031 - Automatic Wire Stripper/Crimper/Cutter, 24-10 Ga.

The wire stripper uses a spring-loaded design to make quick work of wires ranging from 24 to 10 gauge. Just insert the wire, squeeze the handle, and listen for the click. That's the sound of another perfect wire stripping job performed in about 2 seconds- a fraction of the time it takes your pocket knife to do the same job. An adjustable wire length guide helps you make uniform strips, and a built-in wire cutter and crimper helps you complete your wiring job. Spring-loaded design. Strips wires ranging from 24 to 10 gauge, built-in wire cutter and crimper .



DXE-RADW - 500K or 1000K Radial Wire Kits and Components

DXE-RADW - 500KBD or 1000KBD - Bulk Radial Wire Kits and Components

To achieve optimal performance with a ground-mounted vertical, install as many radials as possible. These bulk radial wire kits use stranded copper wire with black insulation that is UV resistant, hard to see and lays down easily, unlike the wire that is commonly available at the big box stores. It will last much longer in contact with soil than bare wire.

The kits provide everything you will need to build the perfect radial system!

- 500/1000 ft. spool of 14 AWG, stranded copper wire with vinyl insulation
- 20/40 lugs
- 100/200 radial wire or biodegradable anchor pins - Eliminating the need to bury your radials!
- Build up to 20/40 radials, 25 feet long

DXE-RADW-500K	Bulk Radial Wire Kit, 500 ft Spool of Wire, 20 Lugs, 100 Staples
DXE-RADW-1000K	Bulk Radial Wire Kit, 1000 ft Spool of Wire, 40 Lugs, 200 Staples
DXE-RADW-500KBD	Bulk Radial Wire Kit, 500 ft Spool of Wire, 20 Lugs, 100 Biodegradable Staples
DXE-RADW-1000KBD	Bulk Radial Wire Kit, 1000 ft Spool of Wire, 40 Lugs, 200 Biodegradable Staples



DXE-STPL - Radial Wire Anchor Pins, 100/pack - No need to bury your radials!

DX Engineering Radial Wire Anchor Pins are perfect for fastening radials below the grass line to eliminate the risk of damaging your radials during lawn maintenance. 100 count - 6" Pins 11-Gauge

DXE-STPL-100P	Radial Wire Anchor Pins, 100/pack
DXE-STPL-300P	Radial Wire Anchor Pins, 300/pack



DXE-RADW - Radial Wire Kits

DXE-RADW-1K	Resonant Radial Wire Set for 10, 15, and 20m. Includes 1/4 in. Ring Terminals
DXE-RADW-40MK	Resonant Radial Wire Set for 40m. Includes 1/4 in. Ring Terminals
DXE-RADW-80MK	Resonant Radial Wire Set for 80m. Includes 1/4 in. Ring Terminals



DXE-RADW-20RT/-32RT/-65RT Pre-Assembled, Radial Wire, w/ 1/4" ring Terminals, 20 Pack

The DXE-RADW Radial Wire Kits include the highest quality 14 gauge stranded copper wire with a relaxed black PVC insulation for easy installation of your radial system. They allow fast and easy installation of your radial ground system, and permit you to mix and match different length to fit the available space. The stranded wire and relaxed insulation mean that the wire will lay flat as you place it on the ground - easy to install! The twenty pre-cut radial wires include 1/4" ring terminals professionally crimped on one end for quick and easy attachment to the radial plate. These Radial Wire Kits are designed for users of vertical antenna systems which have the need for a high quality radial system for optimum antenna performance. The 1/4" ring terminals are machine crimped for maximum grip. Soldering is not required for strength, but is recommended if installed in corrosive environments such as salt spray.



- Packed 20 Radial Wires per package
- 14 gage, stranded copper wire
- Black relaxed PVC insulation
- 1/4" Ring Terminal professionally crimped on each Radial Wire
- 3 lengths to choose from: 20 Ft (-20RT), 32 Ft (-32RT), 65 Ft (-65RT)

DXE-RADW-20RT	Package of 20 each 20 Ft Radials with 1/4" Ring Terminals
DXE-RADW-32RT	Package of 20 each 32 Ft Radials with 1/4" Ring Terminals
DXE-RADW-65RT	Package of 20 each 65 Ft Radials with 1/4" Ring Terminals

Technical Support

If you have questions about this product, or if you experience difficulties during the installation, contact DX Engineering at (330) 572-3200. You can also e-mail us at:

DXEngineering@DXEngineering.com

For best service, please take a few minutes to review this manual before you call.

Warranty

All products manufactured by DX Engineering are warranted to be free from defects in material and workmanship for a period of one (1) year from date of shipment. DX Engineering's sole obligation under these warranties shall be to issue credit, repair or replace any item or part thereof which is proved to be other than as warranted; no allowance shall be made for any labor charges of Buyer for replacement of parts, adjustment or repairs, or any other work, unless such charges are authorized in advance by DX Engineering. If DX Engineering's products are claimed to be defective in material or workmanship, DX Engineering shall, upon prompt notice thereof, issue shipping instructions for return to DX Engineering (transportation-charges prepaid by Buyer). Every such claim for breach of these warranties shall be deemed to be waived by Buyer unless made in writing. The above warranties shall not extend to any products or parts thereof which have been subjected to any misuse or neglect, damaged by accident, rendered defective by reason of improper installation, damaged from severe weather including floods, or abnormal environmental conditions such as prolonged exposure to corrosives or power surges, or by the performance of repairs or alterations outside of our plant, and shall not apply to any goods or parts thereof furnished by Buyer or acquired from others at Buyer's specifications. In addition, DX Engineering's warranties do not extend to other equipment and parts manufactured by others except to the extent of the original manufacturer's warranty to DX Engineering. The obligations under the foregoing warranties are limited to the precise terms thereof. These warranties provide exclusive remedies, expressly in lieu of all other remedies including claims for special or consequential damages. SELLER NEITHER MAKES NOR ASSUMES ANY OTHER WARRANTY WHATSOEVER, WHETHER EXPRESS, STATUTORY, OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS, AND NO PERSON IS AUTHORIZED TO ASSUME FOR DX ENGINEERING ANY OBLIGATION OR LIABILITY NOT STRICTLY IN ACCORDANCE WITH THE FOREGOING.

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DXE-RADP-3-INS