

## Types MACX350A Rigid Coaxial Transmission Line



### Direction of Installation

for MACX350A-(1, 2, 3, 5, 6, 10, 20, 24, 25, 26, 39, 41, 42)

Transmission line installation may begin at either end of the proposed vertical run. MACXLine Rigid Coaxial Transmission Line must be installed with the connector/bellows end toward the antenna. The outer conductor is identified with a red arrow and "THIS END UP" label (Figure 1).

Installations originating at the top (antenna end) of the vertical run require at least one rigid hanger at the top (depending on the length) and require proper positioning of the bottom miter elbow to allow for both expansion and contraction of the rigid line over the anticipated operational temperature range.

Installations originating at the bottom (transmitter end) of the vertical run must use one or more rigid hangers for support. Refer to the installation instructions and install the appropriate hangers (rigid or spring types) as line sections are installed, using the proper number and type of hangers, correctly spaced.

**CAUTION:** Do not support more than one section of line on the flange joint without using hangers. Ensure that all exposed horizontal runs are well protected from accumulated or falling ice and possible damage from other falling objects. Additional miter elbows and field flanged sections may be required to ensure alignment with the antenna input flange.

**Note:** Rigid hangers used at the bottom portion of the vertical run for increased support during installation must be removed after installing the top rigid hangers to prevent serious damage to the antenna and/or transmission line.

### Hardware (included with each line section)

for MACX350A-(1, 2, 3, 5, 6, 10, 20, 24, 25, 26, 39, 41, 42)

- (6) Bolts, 3/8" x 1-1/2"
- (6) Lock washers, 3/8"
- (6) Nuts, 3/8"
- (1) O-ring
- (1) Silicone grease packet

### Line and Flange Information

for MACX350A-(1, 2, 3, 5, 6, 10, 20, 24, 25, 26, 39, 41, 42)

Line Diameter	3-1/8"
Flange Diameter, in	5-3/16"
Bolt Circle Diameter, in	4-3/8"

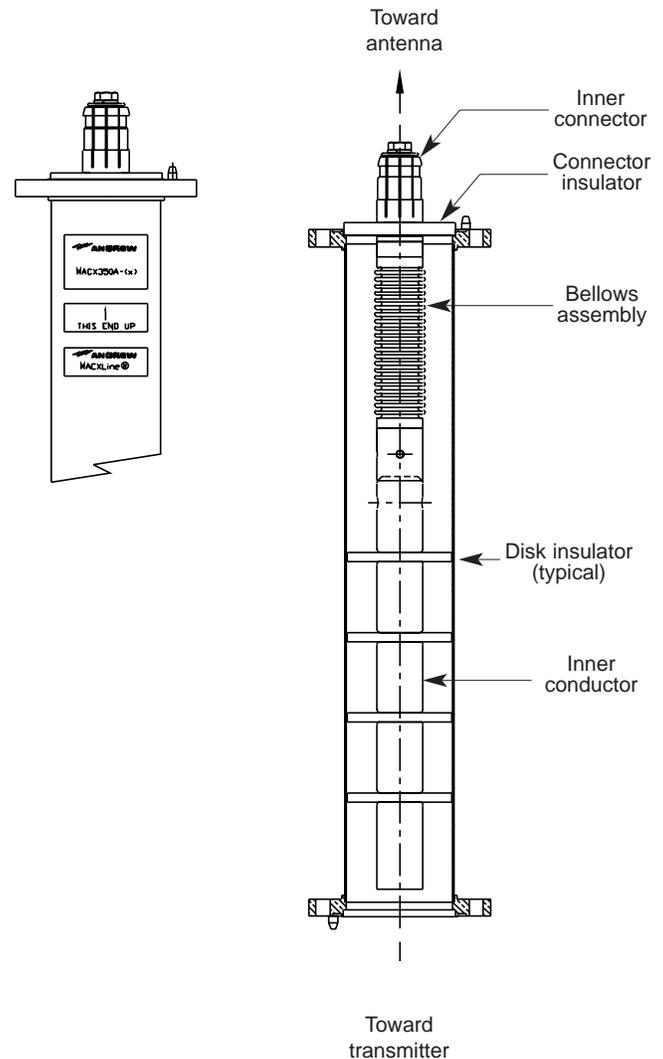


Figure 1

### Notice

The installation, maintenance, or removal of antenna systems requires qualified, experienced personnel. ERI installation instructions have been written for such personnel. Antenna systems should be inspected once a year by qualified personnel to verify proper installation, maintenance, and condition of equipment.

ERI disclaims any liability or responsibility for the results of improper or unsafe installation practices.

## Inners Only™ Replacement Preparations

The steps in this section describe the procedure used to replace the inner conductor of a line section that is part of an existing rigid line system. If you are installing a new rigid line system, disregard these steps and continue with the next section, "Attaching the Line Section".

**NOTE:** For optimum performance of the transmission line, complete the steps below using clean hands or wear clean cotton gloves. Dirt can degrade performance.

1 If you are reusing the existing hangers, inspect them for damage or missing hardware and repair or replace them as required.

2 Inspect the outer conductors for damage such as dents or damaged flanges. Prior to disassembly of the line, have replacement components on hand to minimize reassembly time.

**CAUTION:** Prior to disassembly, be sure that each section of line is adequately supported to the tower. Removal of the rigid hanger, spring hangers, and/or flange hardware may allow the line sections to drop causing damage to the line or injury to workers.

3 Disassemble the existing line by removing the flange hardware on each section. Discard the old hardware.

4 Remove and discard the existing inner conductors and connectors.

5 Inspect the flange contact surfaces for damage. If significant damage (for example, warped flanges or nicks in the contact surface) is present, replace or repair the damaged part.

6 Clean out the inside of the outer conductor by using a clean cloth dipped in alcohol. It is important to remove all dust and cleaning residue to prevent contamination of the new inner conductors during installation.

### MACX350A-25:

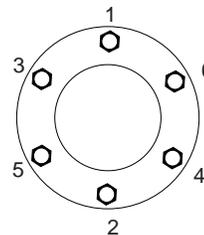
7 Remove packing material from the new inner conductor. Fan insulator and push into groove on inner conductor. Fan insulator in opposite direction and release until insulator returns to original flat condition. Insert the new inner conductor into the outer conductor.

The procedure for MACX350A-24 & -26 can be found later in this Bulletin.

8 Continue with the next section, "Installing Full Sections". Repeat the steps in this section for each Inners Only replacement.

## Installing Full Sections for MACX350A-(1, 2, 3, 5, 6, 10, 20, 39, 41, 42)

1. Remove the protective cover from the end of the line section.
2. Apply a thin coating of silicone grease to the supplied O-ring to secure the O-ring in position during assembly. Ensure both the seal and flange groove are free of dirt before installing the O-ring into groove on flange face.
3. Remove excess silicone grease from flange contact surface to ensure a pressure tight seal.
4. Align flange pins with corresponding flange alignment holes and join mating sections. Firmly push line sections together ensuring the O-ring seal remains in place, inner connector slides into inner conductor and inner connector insulator seats properly in mating flanges.
5. Install and alternately snug mounting hardware at 180 degree interval (Figure 2) while maintaining a uniform gap between flanges. Perform final torquing sequence in a circular pattern to a torque value of 21 lb-ft (Figure 3). When properly installed, a small uniform gap should be noted around the flange circumference.



Tighten bolts uniformly to prevent flange distortion.

Figure 2

**Note:** Use anti-seize compound on all stainless steel hardware to prevent galling. If hardware becomes galled during the tightening procedure, remove the damaged hardware and install replacement hardware to ensure proper electrical contact between mating surfaces.

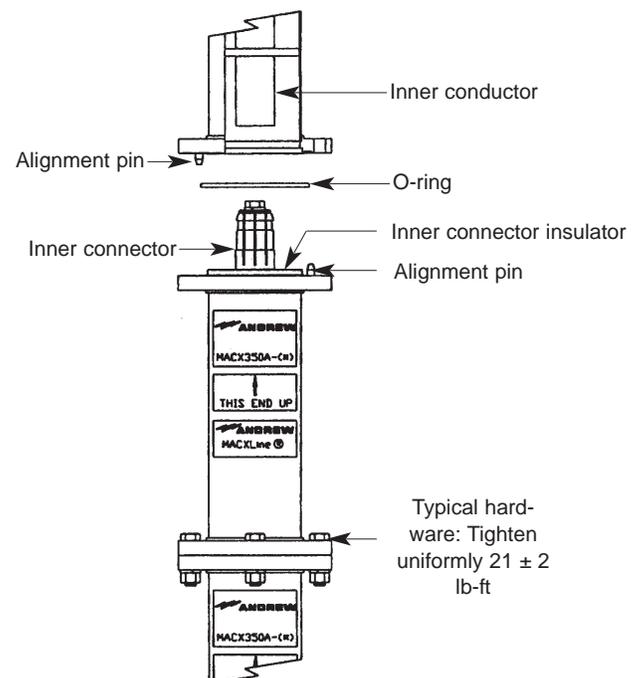


Figure 3

**Installing Full Section Field - Cuts  
(Inner and Outer)**

for MACX350A-39, 60" through 240"

for MACX350A-41 (Less than 60")

**(Inner Only Field - Cuts)**

for MACX350A-26, 60" through 240"

for MACX350A-24 (Less than 60")

**Description**

Field kits are used for field trimming to a nonstandard length. Full section kits are supplied with inner and outer conductor. Both field kits come with attaching hardware, one fixed flange attached and one solder flange for attachment. The inner and outer conductors must be trimmed to fit into the rigid line installation. The outer conductor must be trimmed and the fixed flange soldered to it. Inner only field kits come with the inner conductor and attaching hardware.

**Outer Conductor Procedure**

for MACX350A-39 and MACX350A-41

1. Remove inner conductor assembly from the outer conductor. Use extreme care in removing the inner conductor to prevent damage to the bellows assembly.  
**Note:** MACX350A-41 does not have a bellows assembly due to length limitations.
2. Determine exact flange-to-flange length of transmission line required and deduct 17/64" to get the outer conductor length.
3. Wrap a piece of straight-edged paper around the outside of the outer conductor at the length found in step 2 above. Using the paper as a cutting guide, scribe a line along the edge of the paper all the way around the outer conductor (Figure 4).

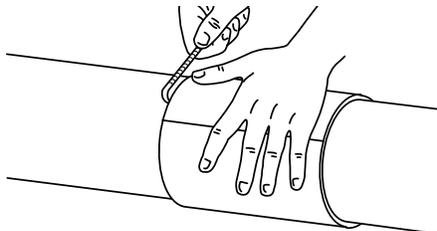


Figure 4

4. Carefully cut the outer conductor with a hacksaw. Make sure the cut is square or the flange will not seat properly on the outer conductor (Figure 5).

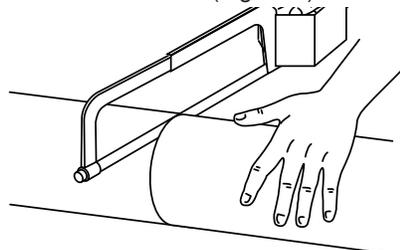


Figure 5

5. Remove burrs with a file and clean outer conductor end until bright clean. Remove any debris from the interior of the conductor (Figure 6).

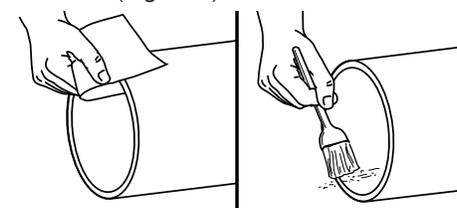


Figure 6

6. Apply solder flux to the solder groove within the flange and insert solder ring into the groove (Figure 7).

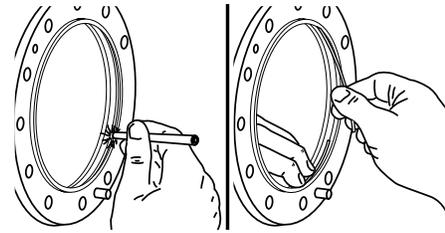


Figure 7

7. Apply solder flux to the outer end of the outer conductor and seat the flange onto the outer conductor (Figure 8).

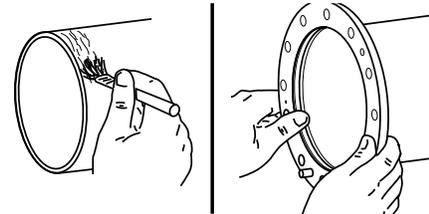


Figure 8

8. Heat the joint to a temperature of 1205° F (626° C) with a torch, using gas and air, keeping the torch tip 2" to 3" from the joint. Move the torch evenly around the joint so the solder flows uniformly. When the solder flows onto the outer surfaces of the conductor and flange, remove the heat (Figure 9).

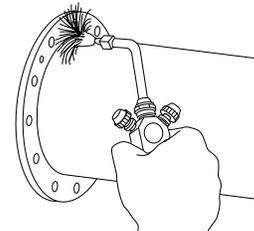


Figure 9

**Inner Conductor Procedure**

for Field Kit Less than 60"

MACX350A-24 and MACX350A-41

1. Determine the required length of the outer conductor flange to flange (Figure 10).

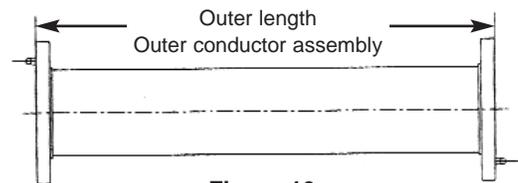


Figure 10

2. Subtract 1-25/32" from the outer conductor length to obtain the inner conductor length (Figure 11).

**Example:** Outer conductor length  
flange-to-flange = 56"  
Inner conductor length:  
56" minus 1-25/32" = 54-7/32"

3. Wrap a piece of straight-edged paper around the inner conductor as a cutting guide. Scribe a line along the paper edge all the way around the inner conductor (see Figure 4).

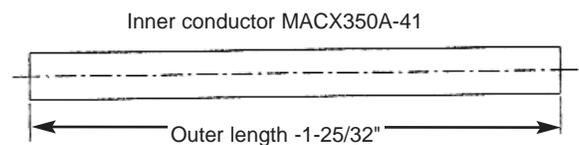
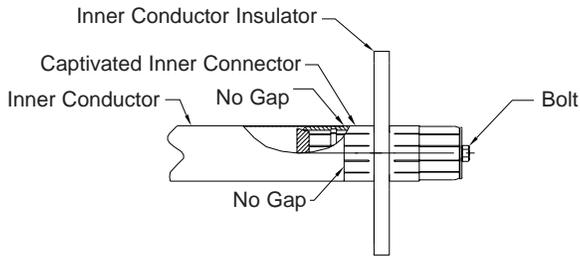


Figure 11

4. Cut the inner conductor at the marked position using a miter box and hacksaw. Make sure the cut is square (Figure 5).
5. Remove burrs with a file and clean thoroughly inner conductor end. Remove any debris from the interior of the inner conductor (see Figure 6).
6. Refer to Figure 12. Fully insert the inner connector into one end of the inner conductor as shown. Use a small wrench to tighten the bolt. Do not over tighten the bolt. *The inner connector fingers should not bulge the inner conductor tube.* The bolt torque should be 3 lb-in or less. If the inner conductor tube is held in one hand and the exposed inner connector is held in the other hand, it should be extremely difficult, if not impossible, to pull them apart.



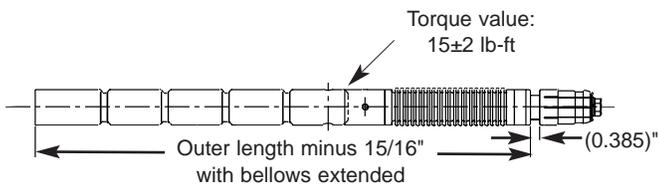
**Figure 12**

7. Insert conductor and connector assembly into outer conductor assembly until connector insulator is fully seated in flange and install complete assembly.

### Inner Conductor Procedure for Field Kit 60" to 240" MACX350A-26 and MACX350A-39

1. Determine the required length of the outer conductor flange to flange (see Figure 10).
2. Subtract 15/16" from the outer conductor length to obtain the inner conductor length (see Figure 11).
3. With the inner conductor assembly removed from the outer, remove insulators for an accurate measurement.

Mark the inner conductor where it should be cut with the BELLOWS FULLY EXTENDED to its mechanical stop position. Refer to Figure 13. If the mark falls within the "DO NOT CUT..." area, refer to Special Cut (below) before proceeding with Step 4.

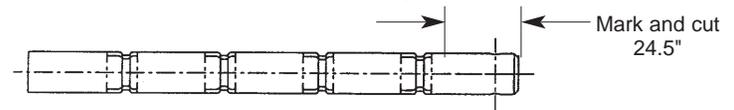


**Figure 13**

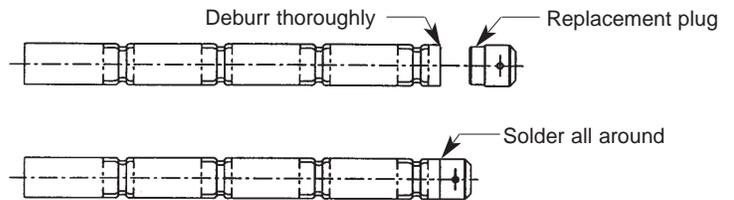
**Note:** If the outer conductor length is between: 188-181, 142-135, or 101-94, use the Special Cut Procedure (below) for inner conductor. For all outer conductor lengths not in the above ranges, proceed to Step 4.

### Special Cut Procedure

- a. Remove the inner conductor tube from the bellows assembly using spanner wrench and adjustable jaw pliers.
- b. With inner conductor tube removed, measure and mark 24-1/2" from brass plug end of inner conductor.



- c. Cut the inner conductor at the marked position using a miter box and hacksaw. Remove all burrs where the inner conductor has been cut.
- d. Install copper replacement stub plug in inner conductor tube and solder all around.



- e. Attach modified inner conductor to the bellows and torque connection to  $15 \pm 2$  lb-ft ( $180 \pm 24$  lb-in).
  - f. Return to Step 3 in the Inner Conductor Procedure for MACX350A-39, above, and continue.
4. Cut the inner conductor at the marked position using a miter box and hacksaw. Remove all burrs where the inner has been cut. Remove any debris from the interior of the inner conductor.
  5. Install insulators.
  6. Carefully insert the trimmed inner conductor into the outer conductor with the bellows toward the antenna end of the outer conductor. Push the inner conductor back into the outer so the connector insulator is fully seated in the flange. Install the completed assembly.

### Tool Kits

#### MACX350A-TK-2:

- (1) Replacement plug for special cut
- (1) Rosin core solder
- (2) Emery cloth

#### MACX350A-TK:

- (1) MACX350A-TK-2
- (1) Tool box
- (1) Adjustable pliers
- (1) Torque wrench
- (1) Hacksaw
- (1) Set of hacksaw blades
- (1) Utility knife
- (1) Steel rule
- (1) Power tape rule, 25 ft
- (2) Spanner wrenches
- (1) File
- (1) Instructions
- (2) 9/16" combination wrench
- (1) 9/16", 3/8" drive socket
- (1) Scribe

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## Pressurization

Maximum pressurization values ((normally less than 10 psi (70 kPa)) are determined by the lowest rated system component and should not be exceeded.

The transmission line is rated at 10 psi maximum. Consult applicable pressurization specifications on the other system components (usually much lower) to determine maximum system pressurization limit (generally 3 psi with antenna, 1/2 psi with rectangular wave guide).

After installation is complete, pressurize the line and check the flange connections for leakage. Use a commercial leak detector or liquid detergent over joints and check for evidence of bubbles. Unbroken soap film over the entire joint for several minutes indicates absence of noticeable leaks.

The transmission line must be pressurized at all times to prevent changes in ambient temperature from causing condensation to occur and seriously impair system efficiency. If moist air has entered the system, it must be purged by removing the gas port plug located on the gas barrier or behind the antenna input flange.

An alternative method is to pressurize and let air escape at the transmitter end of the line for one hour. Repeat the procedure several times allowing one hour each time for air to mix.

After purging, replace the gas port plug and pressurize the line. Pressurization can be accomplished by manual or automatic means depending upon the quantity of line in use at the station and whether or not the site is attended.

A dry air hand pump is satisfactory for attended sites using relatively small quantities of line. Automatic electric dehydrators are recommended for unattended sites or where large quantities of line are used. A compressed air cylinder can also be used. A regulating tank in the pressurization system can be used to provide low pressure outputs.

**Note:** Line assemblies are not hermetically sealed and may exhibit a low leakage rate; consequently, line installations not using an automatic air supply must be periodically inspected. Dry air or nitrogen is normally used for pressurizing. When pressurization equipment is connected to the gas port on a gas barrier, or whenever pipe fittings are reassembled, threads must be covered with PTFE tape to ensure a leakproof connection.



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