

# Universal Radio Assembly

## *Installation Guide*

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# Understanding safety alert messages

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Safety alert messages call attention to potential safety hazards and tell you how to avoid them. These messages are identified by the signal words DANGER, WARNING, CAUTION, or NOTICE, as illustrated below. To avoid possible property damage, personal injury, or in some cases possible death, read and comply with all safety alert messages.

## Messages concerning personal injury

The signal words DANGER, WARNING, and CAUTION indicate hazards that could result in personal injury or in some cases death, as explained below. Each of these signal words indicates the severity of the potential hazard.



DANGER indicates a potentially hazardous situation which, if not avoided, *will* result in death or serious injury.

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WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

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CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

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## Messages concerning property damage

A NOTICE concerns property damage only. Do not add hazard symbols to notices.



NOTICE is used for advisory messages concerning possible property damage, product damage or malfunction, data loss, or other unwanted results – but *not* personal injury.

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## Safety symbols

The generic safety alert symbol



calls attention to a potential personal injury hazard. It appears next to the DANGER, WARNING, and CAUTION signal words as part of the signal word label. Other symbols may appear next to DANGER, WARNING, or CAUTION to indicate a specific type of hazard (for example, fire or electric shock). If other hazard symbols are used in this document they are identified in this section.

# Universal Radio Assembly installation

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## Scope and audience

This guide is written for qualified telecommunications personnel who plan and prepare for installation of Hughes satellite antennas and mounts. The tasks described in this guide should be performed by qualified personnel who are familiar with local codes and are capable of properly applying the information presented.

## Using these instructions

This guide is meant for the installation and assembly of the Hughes Universal Radio. The antenna assembly instructions you need depends on the antenna size. For detailed instructions on installation on each of the antennas, please refer to the latest revision of the appropriate antenna installation guide.



Read all safety information in the Hughes *Antenna Site Preparation and Mount Installation Guide* (1035678-0001) before installation.

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- Be careful not to damage the feed horn window. Do not touch the plastic film
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## Parts and tools

Table 1 and Table 2 list the parts, materials, and tools required to install a Universal Radio Assembly. For parts and materials required for the installation of the pure-type radio and cradle-type radio assemblies, please refer to the appropriate antenna installation manuals.

### *Parts and materials*

Table 1: Parts and materials needed to install a Universal Radio Assembly

Part description	Quantity
0.9 inch inside diameter O-ring	1
$\frac{5}{16}$ -18 UNC x 2.25 inch carriage bolts	2
$\frac{5}{16}$ inch flat washers	2
$\frac{5}{16}$ inch lock washers	2
#6 32 x $\frac{1}{2}$ inch socket head cap screws	6
#6 internal tooth lock washers	6
Silicone grease capsule	1



## Tools

Table 2 lists the recommended tools for installing the Universal Radio Assembly.

Table 2: Tools needed to install a Universal Radio Assembly

Tool	Need
Ladder	For access (if needed)
(2) $\frac{7}{16}$ inch combination wrenches	For $\frac{1}{4}$ inch bolts. Some nuts and bolts require a second wrench to prevent turning.
(2) $\frac{1}{2}$ inch combination wrenches	For $\frac{5}{16}$ inch bolts. Two of the canister nuts are not accessible with a socket wrench. Some nuts and bolts require a second wrench to prevent turning.
Torque wrench	With $\frac{1}{2}$ inch and $\frac{7}{16}$ inch socket capable of torquing to 15 ft-lb.
Long-shaft hexagonal ball driver, 3 mm	<p>For socket head cap screws (Allen screws) with a 3 mm hexagonal socket. Driver shaft should be at least 5 inches long. (Recommended for attaching or removing the Universal Radio Assembly to or from the waveguide transition. A short-arm hex key is provided with the screws, but the long shaft ball driver is much easier.)</p> <p>This tool can be purchased at:  <a href="http://www.mcmaster.com/#ball-point-allen-drivers/=iug87c">http://www.mcmaster.com/#ball-point-allen-drivers/=iug87c</a></p>



# Installing the cradle type Universal Radio Assembly

The section explains how to install the cradle-type Universal Radio Assembly. Figure 1 shows an assembled cradle-type Universal Radio Assembly with radio mounting bracket.

**Note:** The default shipping configuration of the cradle-type Universal Radio Assembly is in the vertical transmit polarization as shown in Figure 1.

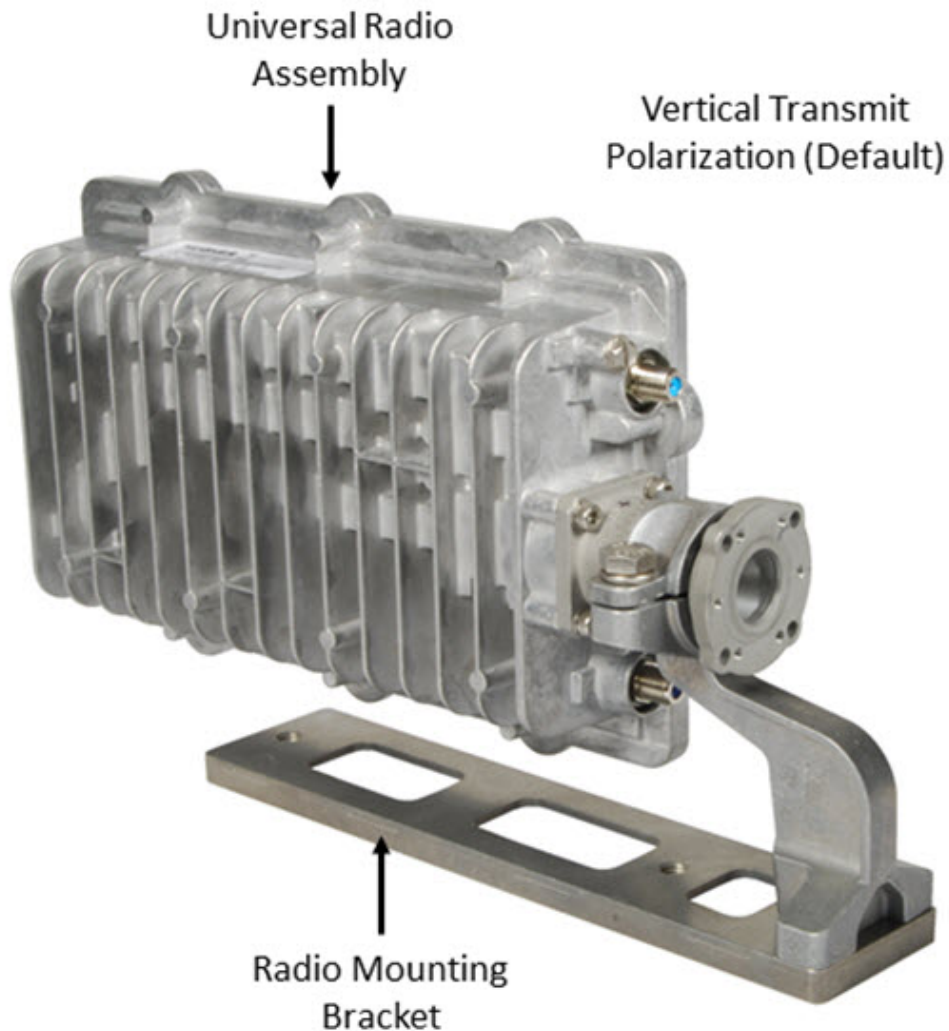


Figure 1: Cradle-type Universal Radio Assembly in the default shipping configuration

## Attaching the feed horn

Use the hardware kit with parts listed in Table 1 on page 8 for the Universal Radio Assembly. To attach the feed horn to the radio assembly, refer to Figure 3 and follow steps 1 through 4.

### NOTICE

- If there is protective material on the feed horn, do not remove it from the feed horn until installation of the radio assembly is complete.
- 

**Note:** The waveguide spacer has a polarization scale and the circular bracket holding the waveguide spacer has a marker to indicate the polarization offset.

1. Apply silicone grease to the O-ring groove in the feed horn.
2. Place the O-ring (0.9 inch inside diameter) in the groove as shown in Figure 2.

**Note:** The O-ring is shipped in a bag that contains seven socket-head cap screws for attaching the feed horn. Six screws are required; one is an extra part.

Make sure the O-ring remains in the O-ring groove.



Figure 2: O-ring in feed horn groove

3. Insert the six socket-head cap screws through the flange on the small end of the feed horn and into the matching flange on the radio assembly as shown in Figure 3.
4. Tighten the screws.

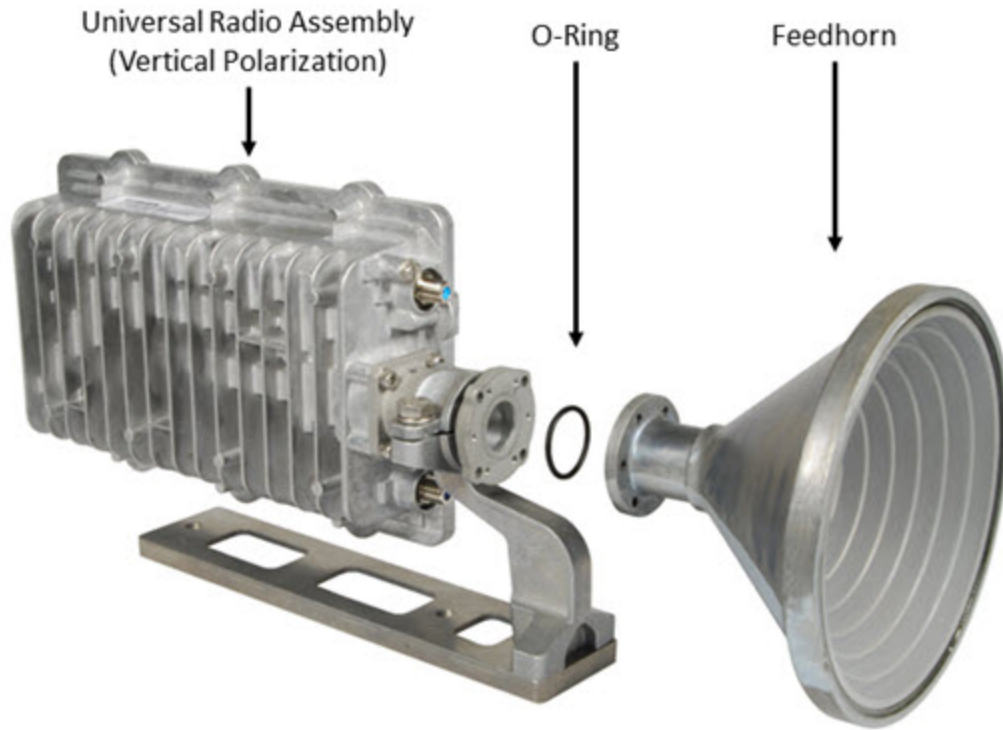


Figure 3: Attaching the feed horn and radio assembly

5. Once the feed horn has been assembled, the 0° mark should still be on the waveguide spacer at the top of the bracket as shown in Figure 4.

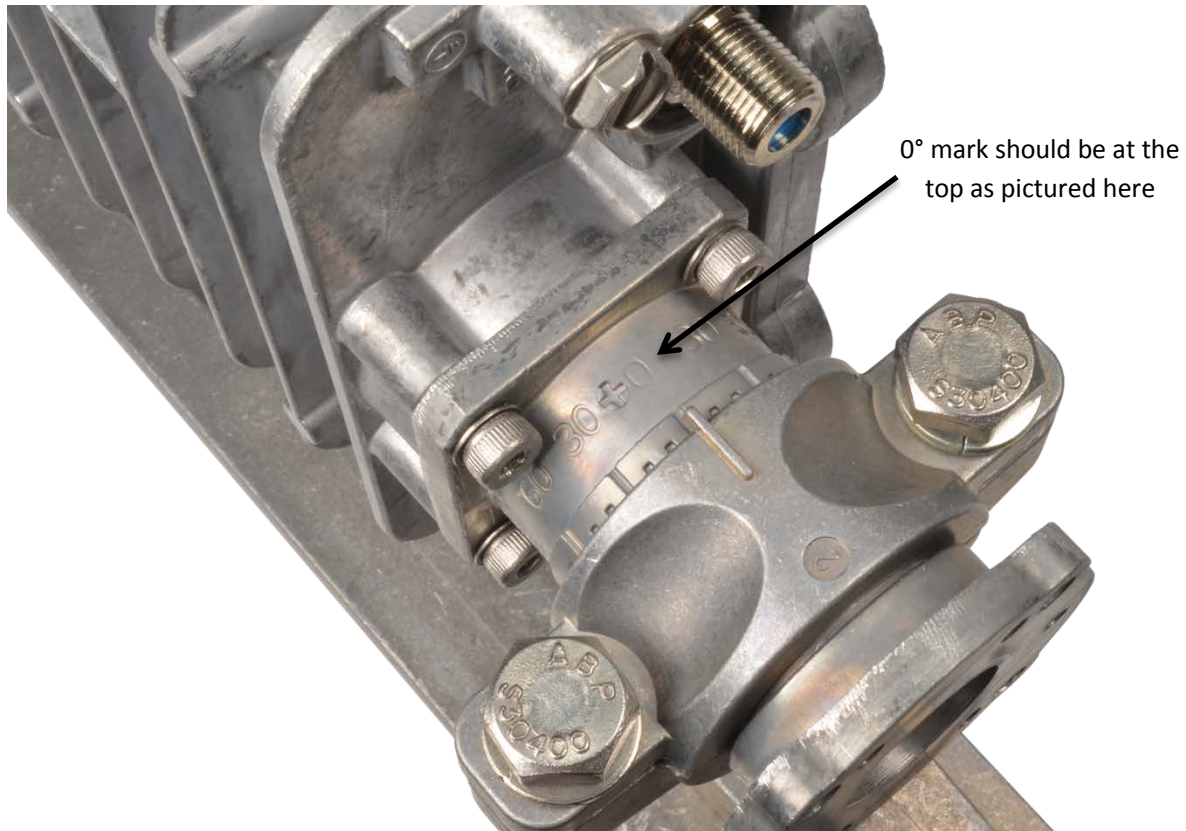


Figure 4: Polarization markings

## Setting the radio polarization

**Note:** The default shipping configuration of the cradle-type Universal Radio Assembly is in the vertical polarization as shown in Figure 1.

If a change to horizontal polarization is not required, skip to step 3.

To change the polarization on the Universal Radio to horizontal polarization, follow the steps below:

1. Remove the four M4-0.7 X 12mm hex-head screws.
2. Rotate the Universal Radio so that it is horizontal to the mounting bracket as shown in Figure 5.

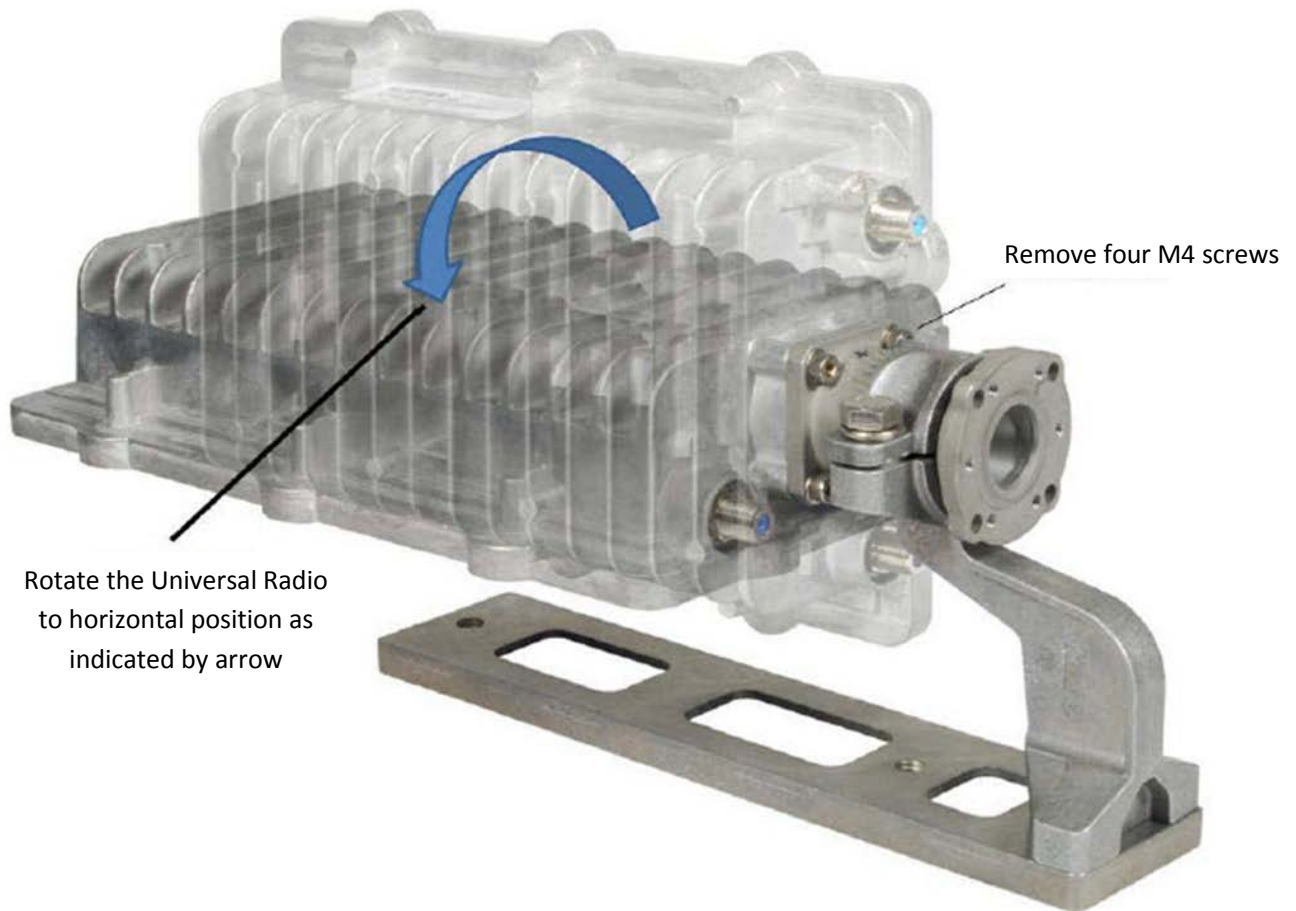


Figure 5: Rotating the radio to horizontal polarization

3. Tighten the screws.

**Note:** The waveguide spacer has a polarization scale and the circular bracket holding the waveguide spacer has a marker to indicate the polarization offset.

**Note:** The 0° mark on the waveguide spacer should still be at the top as shown in Figure 6.

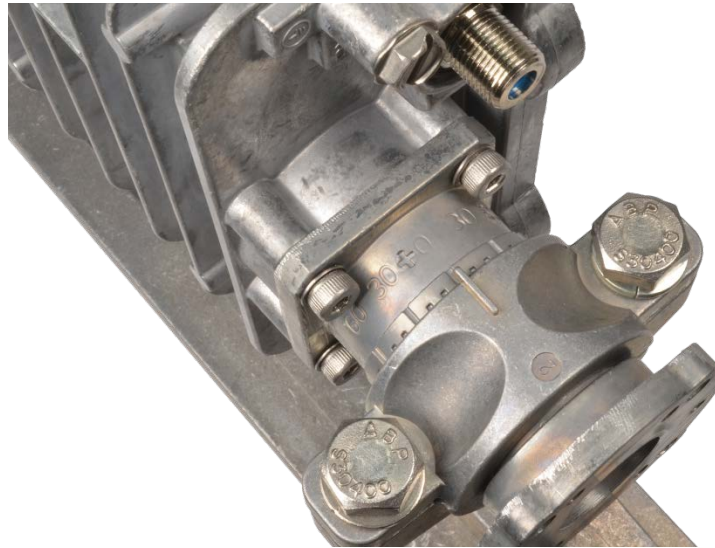


Figure 6: Universal Radio with polarization scale

**Note:** Refer to User installation screen on page 19 to get the radio polarization offset.

To set the polarization on the Universal Radio, follow steps 4-6:

4. On the radio assembly, loosen the two bolts at the top of the circular bracket (Figure 7 on page 17).
5. Rotate the radio assembly as shown in Figure 7 on page 17.  
For example, to set the radio polarization to +30°, rotate the radio assembly in the direction of the + sign on the waveguide spacer until the +30° mark aligns with the marker on the circular bracket.
6. Tighten the screws.



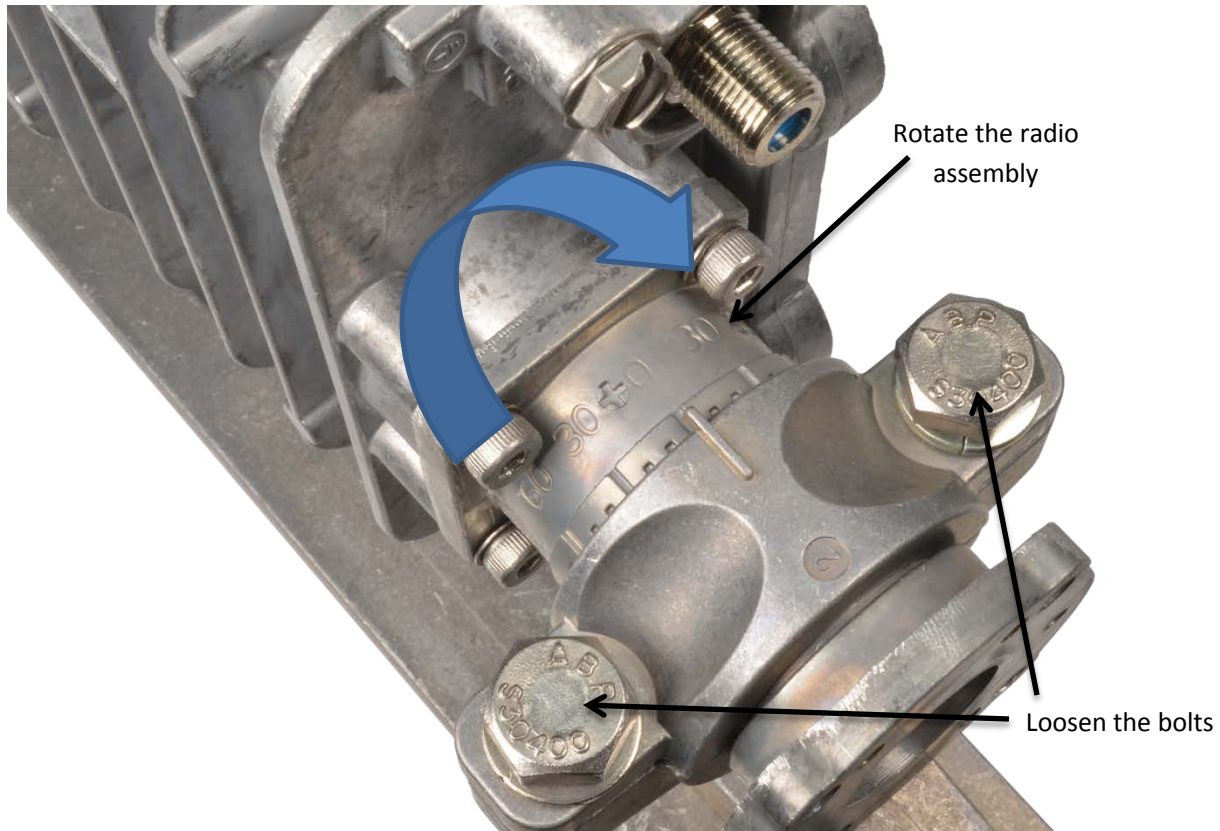


Figure 7: Rotate the radio assembly

## Mounting the cradle-type radio assembly on the feed support arm

Use the mounting adapter to attach the radio assembly to the feed support arm.

1. Place the mounting adapter and radio assembly onto the feed support arm, as shown in Figure 8.
2. Align the mounting holes in the base of the radio assembly, mounting adapter, and feed support arm.  
There are six holes on the top surface of the feed support arm. Use the oval slot at the end of the arm and the second hole from the bend in the arm, as shown in Figure 8 on page 18.
3. From below, insert two  $\frac{5}{16} - \frac{5}{18}$  UNC  $\times$  2.25 inch hex bolts (using a  $\frac{5}{16}$  inch lock washer and flat washer on each bolt) through the feed support arm, adapter, and base.
4. Tighten the bolts.
5. Remove the protective packing material from the feed horn.

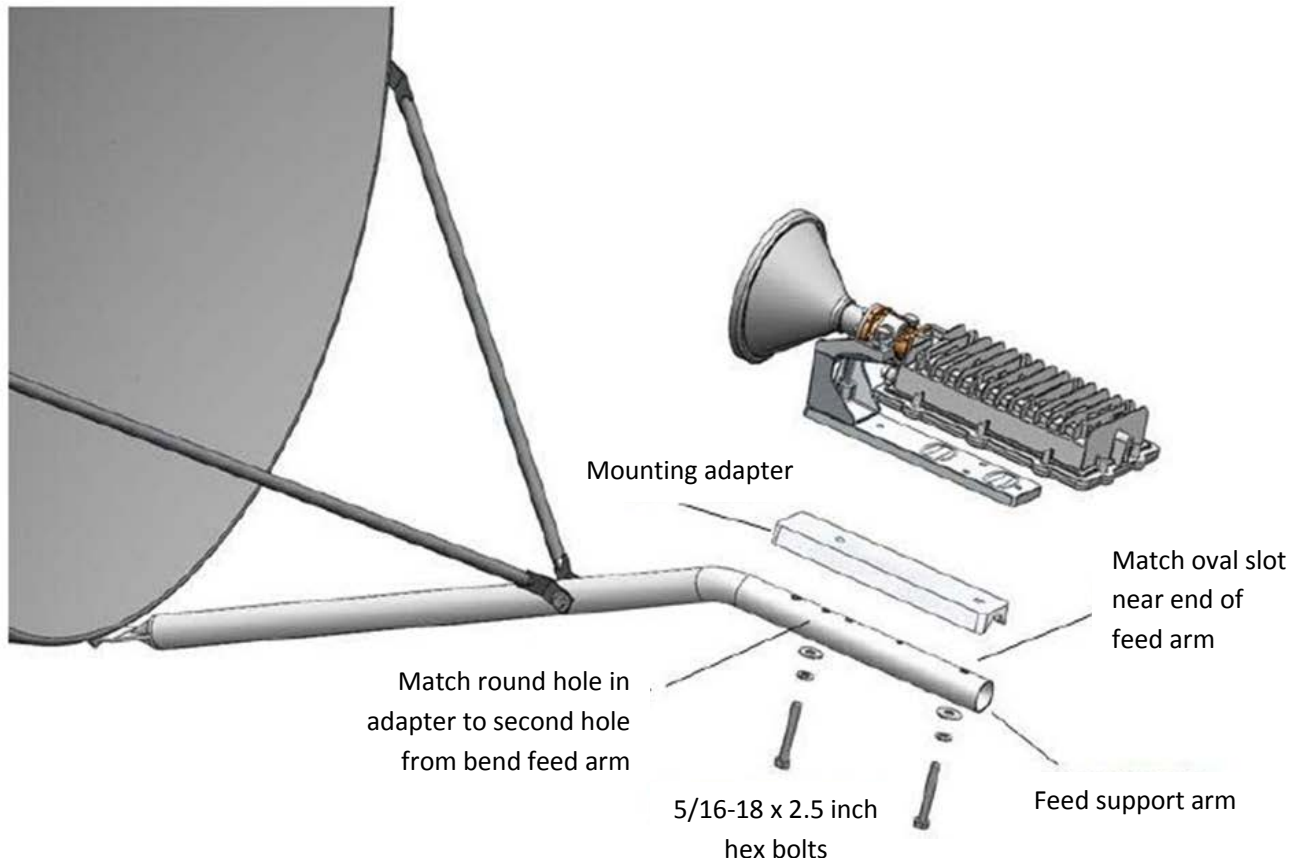


Figure 8: Mounting the cradle-type Universal Radio on the feed support arm

## User installation screen

The Receive LNB Selection screen displays during the commissioning process. Select Invacom on the Receive LNB Installation drop down menu on the User Installation screen as shown in Figure 9.

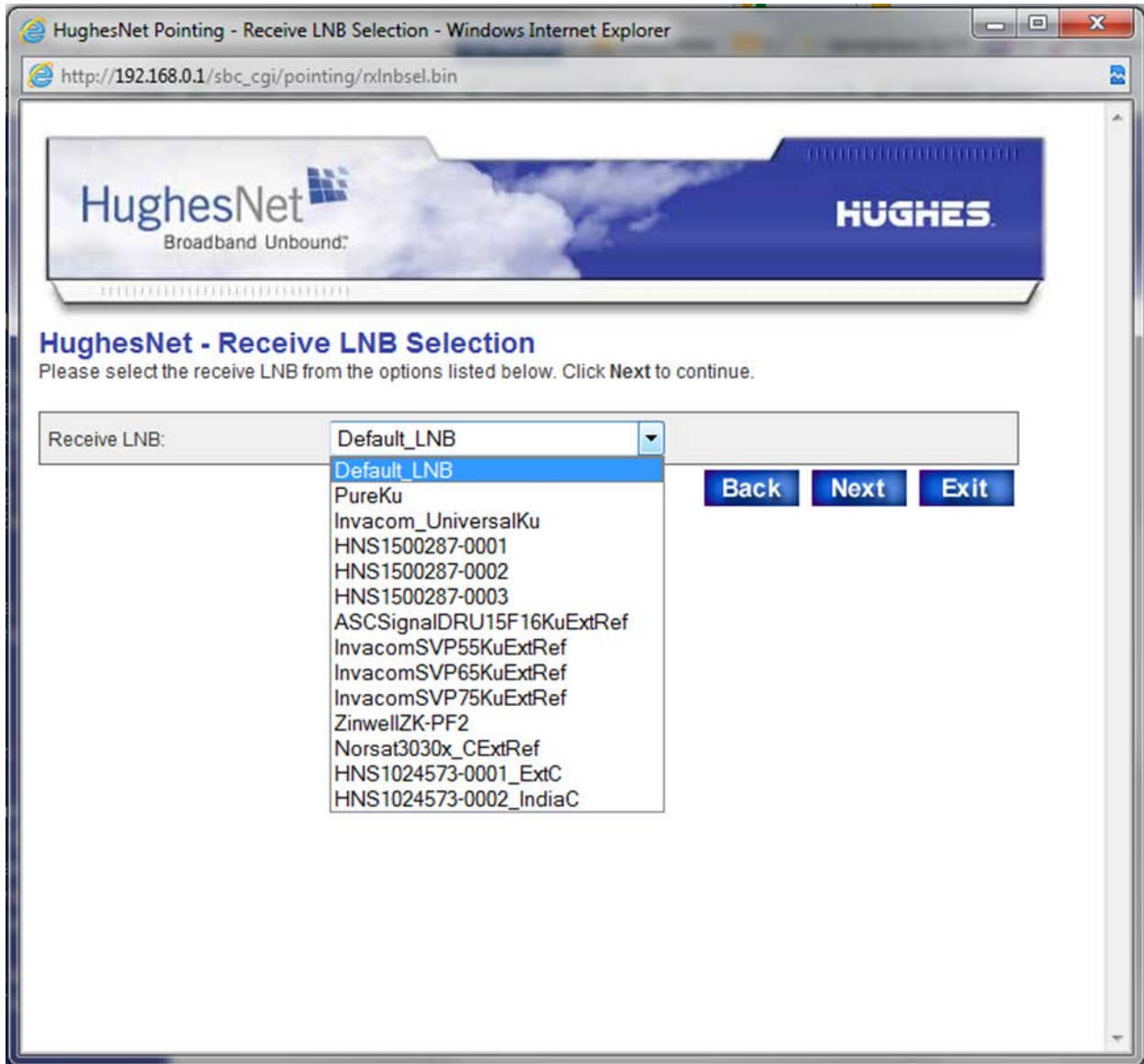


Figure 9: User installation screen



# Installing the pure-type Universal Radio Assembly

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This section explains how to install the pure-type Universal Radio Assembly. Figure 10 shows an assembled Universal Radio Assembly with radio mounting bracket.

**Note:** The default shipping configuration of the pure-type Universal Radio Assembly is configured for the vertical transmit polarization position as shown in Figure 10.



Figure 10: Pure-type Universal Radio Assembly in the default shipping configuration

## Attaching the feed horn

You must use the hardware kit indicated in Table 1 on page 8 for the Universal Radio Assembly. To attach the feed horn to the radio assembly, refer to Figure 12 and follow steps 1 through 4 in this section.

### NOTICE

- Do not remove the transparent moisture seal on the small end of the feed horn. However, if the seal is damaged, wrinkled, or loose, remove it.
  - Do not remove the protective packing material from the feed horn until you finish installation of the radio assembly.
- 

6. Apply silicone grease to the O-ring groove in the feed horn.
7. Place the O-ring (0.9 inch inside diameter) in the groove as shown in Figure 11.

**Note:** The O-ring is shipped in a bag that contains seven socket-head cap screws for attaching the feed horn. Six screws are required; one is an extra part. Make sure the O-ring remains in the O-ring groove.



Figure 11: O-ring in feed horn groove

8. Insert the six socket-head cap screws through the flange on the small end of the feed horn and into the matching flange on the radio assembly as shown in Figure 11.
9. Tighten the screws.

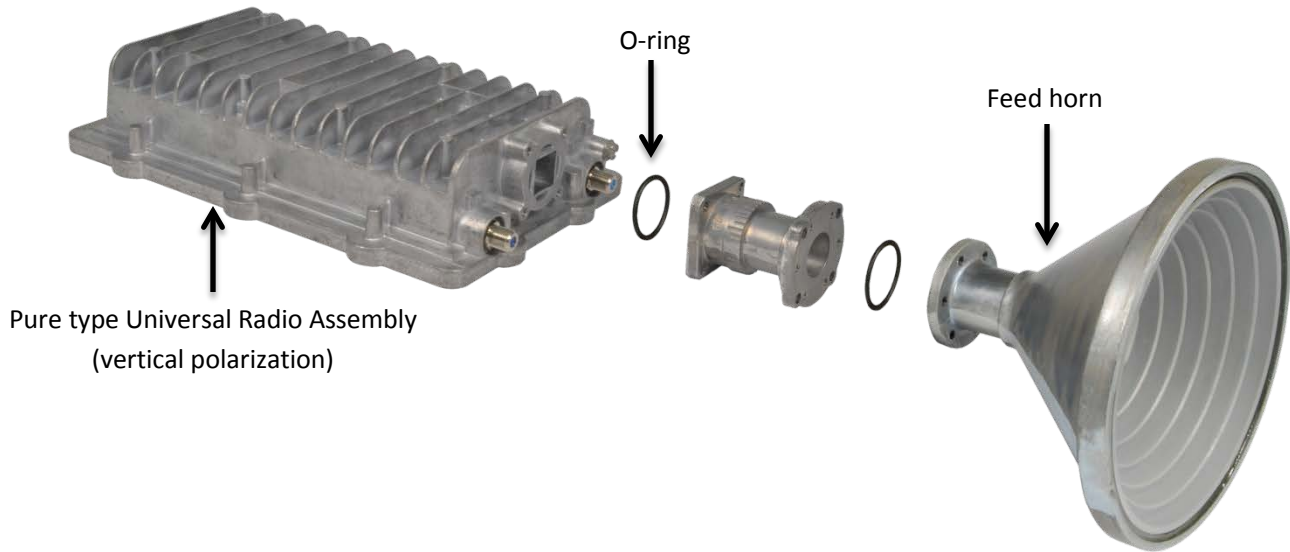


Figure 12: Attaching the feed horn and radio assembly

10. Once the feed horn has been assembled, the 0° degree mark on the waveguide spacer should be at the top of the bracket as shown in Figure 13.

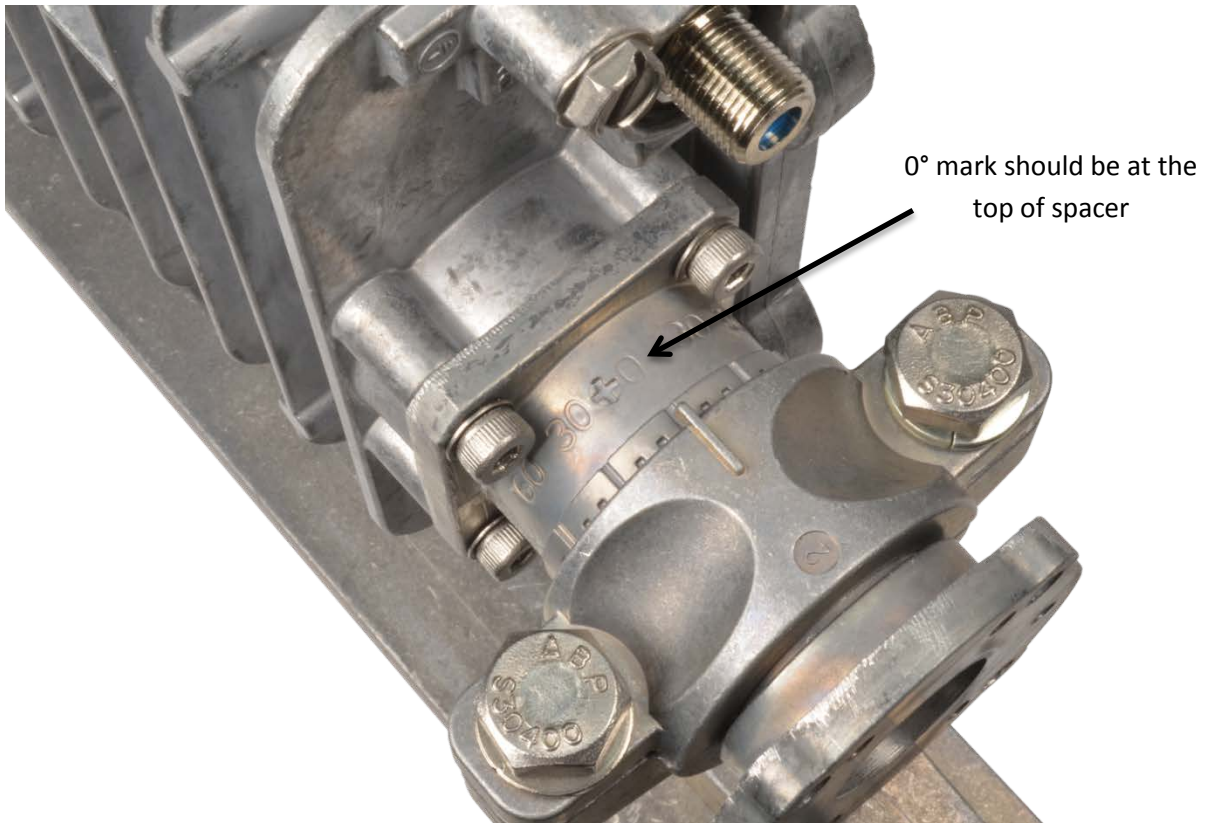


Figure 13: Polarization markings on the waveguide spacer

## Setting the radio polarization

**Note:** The default shipping configuration of the pure-type Universal Radio Assembly is in the vertical polarization as shown in Figure 10.

If a change to horizontal polarization is not required, skip to step 3.

To change the polarization on the Universal radio to Horizontal polarization, follow the steps below:

11. Remove the four M4-0.7 X 12mm hex-head screws
12. Rotate the Universal radio until it is horizontal as shown in Figure 14.

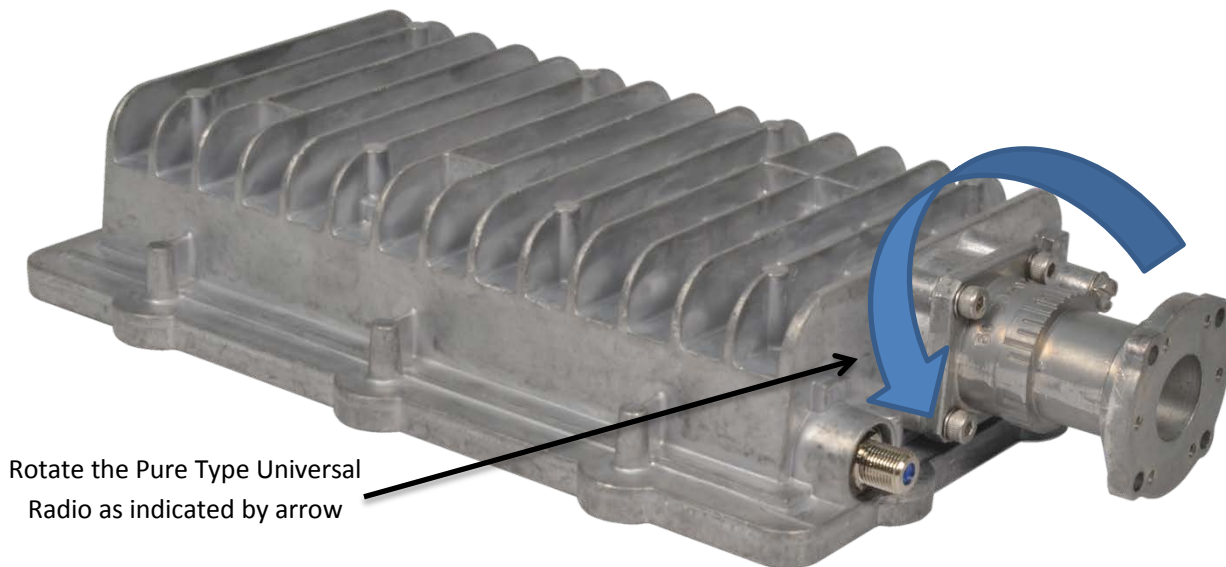


Figure 14: Rotating the radio to Horizontal Polarization



**Note:** The waveguide spacer has a polarization scale and the circular bracket holding the waveguide spacer has a marker to indicate the polarization offset.

**Note:** The 0° degree mark on the waveguide spacer should still be at the top as shown in Figure 15.

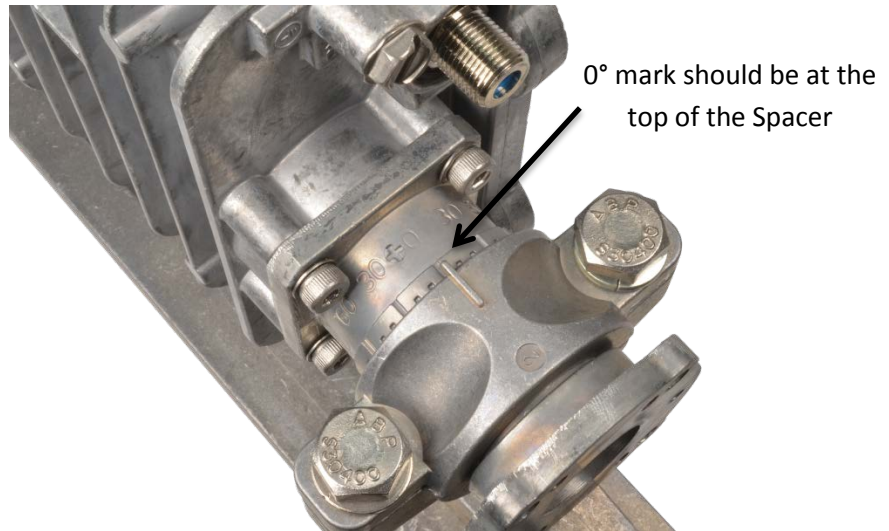


Figure 15: Universal radio in horizontal polarization with polarization scale

**Note:** Refer to User installation screen on page 28 to get the radio polarization offset.

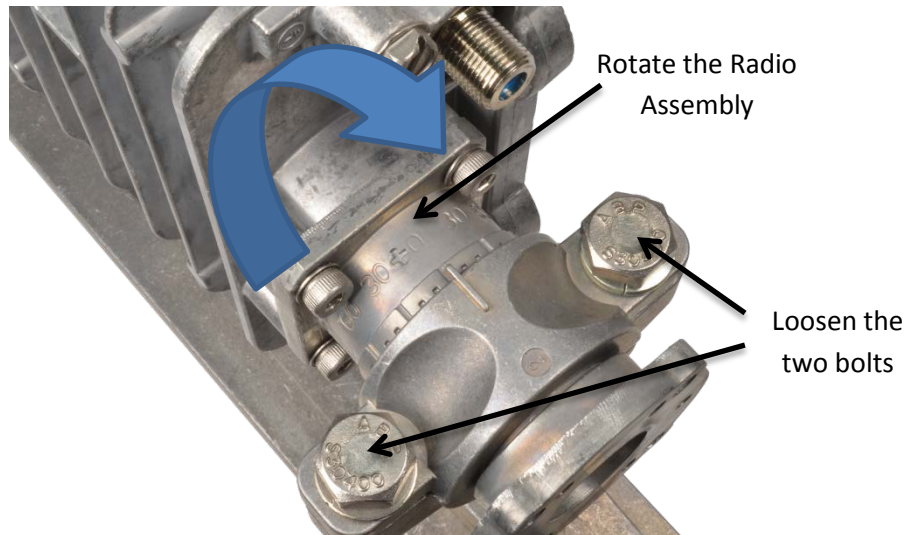


Figure 16: Rotate the radio assembly

## Mounting the Pure-type radio assembly on the feed support arm

Use the mounting adapter to attach the pure-type radio assembly to the feed support arm.

Place the feed horn into the cradle of the top bracket, as shown in Figure 17.

13. Align the top bracket and install the two  $\frac{1}{4}$ " hex bolts, as shown in Figure 17.
14. Tighten the bolts.

To set the Polarization on the pure-type Universal Radio, follow the steps 9-11:

15. On the radio assembly, loosen the two bolts at the top of the circular bracket.
16. Rotate the radio assembly as shown in Figure 16. To set the radio polarization at  $+30^\circ$ , rotate the radio assembly in the direction of the + sign on the waveguide spacer till the  $+30^\circ$  mark coincides with the marker on the circular bracket.
17. Tighten the screws.

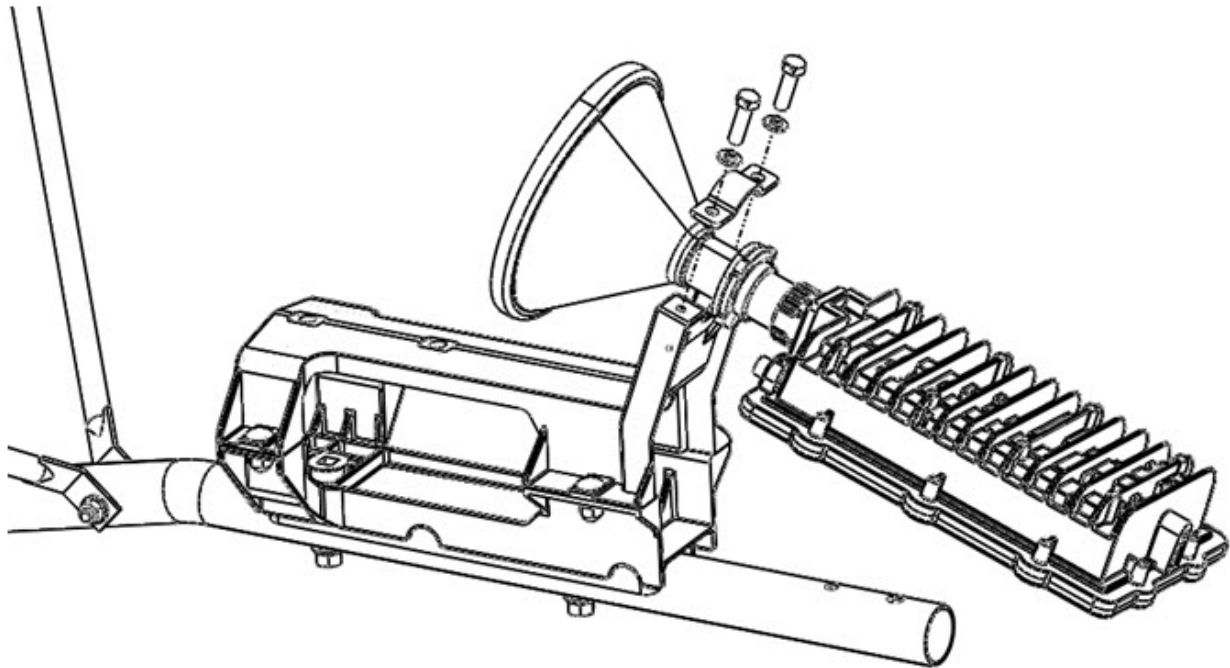


Figure 17: Mounting the pure-type universal radio on the feed support arm

Install the feed into the cradle of the top bracket and replace the clamp and two  $\frac{1}{4}$ " bolts.

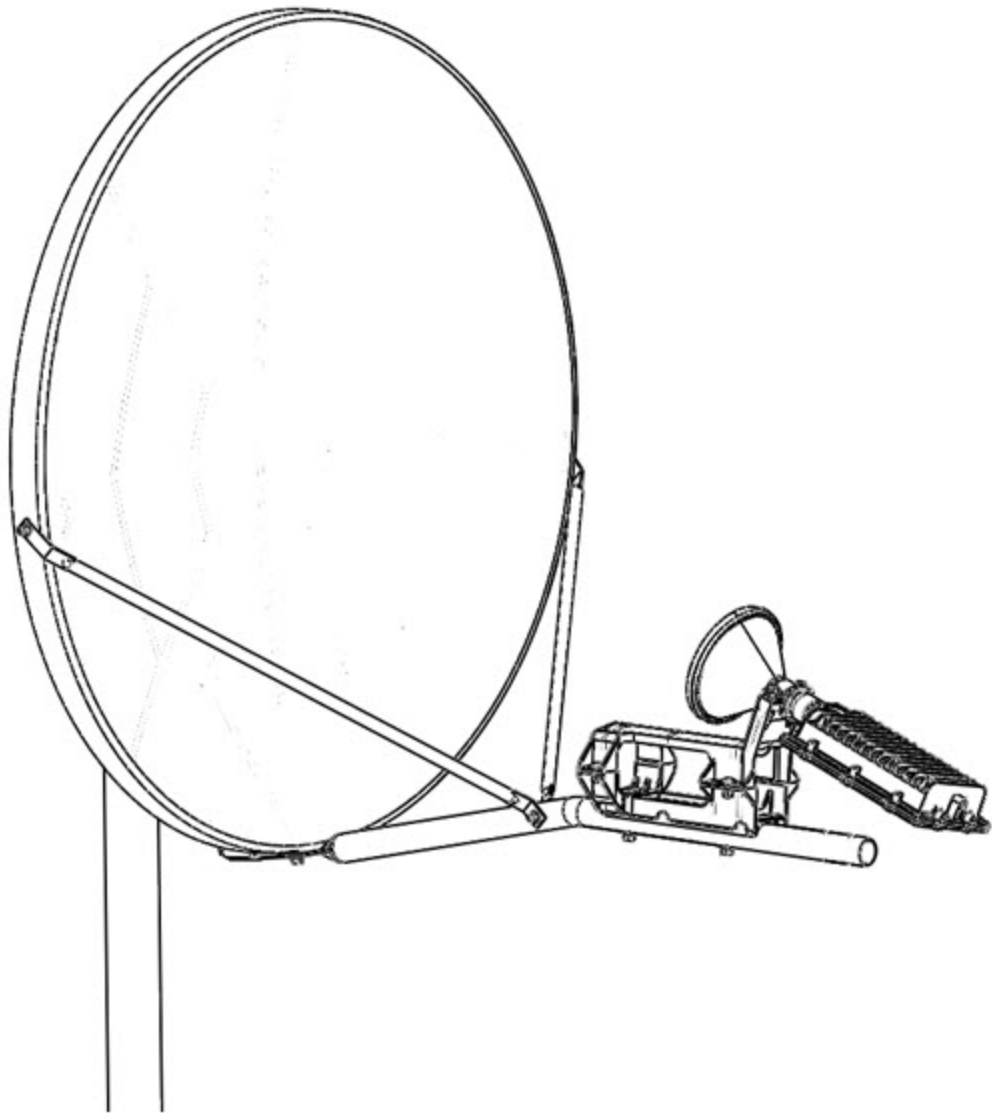


Figure 18: Assembled pure-type universal radio

## User installation screen

During the commissioning process, the Receive LNB Selection screen will display. Select Invacom on the Receive LNB Installation drop down menu on the User Installation screen as shown in Figure 19.

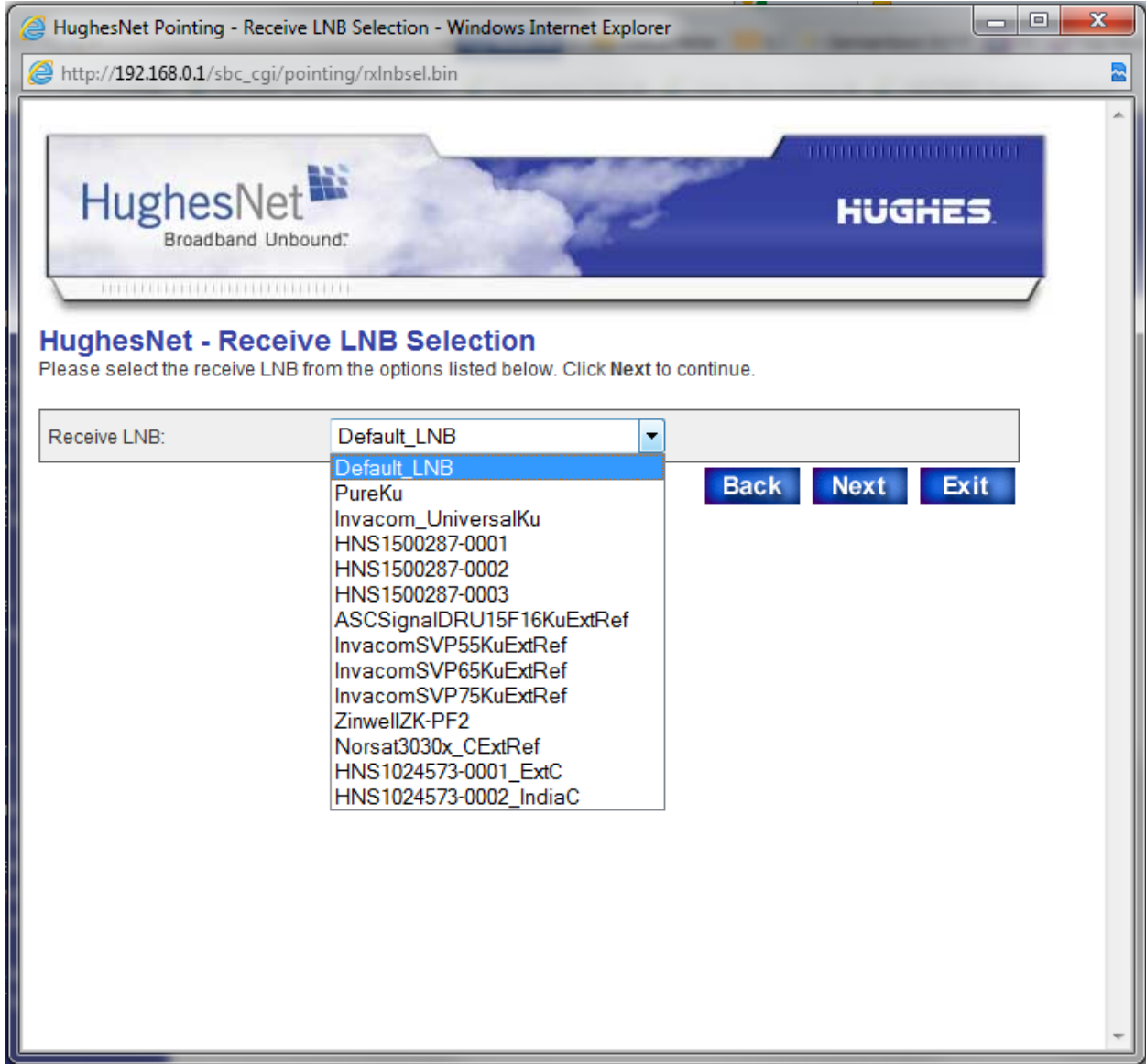


Figure 19: Receive LNB Selection screen