

Libra Waveguide Combiner Ku-band Installation Guide

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Part number 14635R3

Release date 2005-05-12

Contents

Figures	iii
Tables	v
Libra Waveguide Combiner, Ku-band	1
1 Getting started	1
1.1 Unpacking the shipment	1
1.2 Technical support	2
1.3 Preinstallation	2
1.3.1 Parts list	2
1.3.2 Installation tools	3
2 Installation	3
2.1 Attach the SSPBs and flex/twist waveguide	4
2.2 Mount the assembly on the antenna feed support arm	6
2.3 Install the desiccator cartridge	10
3 Antenna alignment issues	11
4 Maintenance	11
Appendix A	
F/T Waveguide Specifications	13

Figures

- 2-1 SSPB ports. 4
- 2-2 Connect the flex/twist waveguide to the waveguide combiner. 6
- 2-3 Mount a 2-port waveguide combiner on the feed support arm. 7
- 2-4 Mount a 4-port waveguide combiner on the feed support arm. 8
- 2-5 Mount a waveguide combiner on a 4" x 4" feed support arm. 9
- 2-6 Install the desiccator cartridge (example for a 2" x 1" feed support arm). 10
- 2-7 Install the desiccator cartridge (example for a 4" x 4" feed support arm). 11
- A-1 Flex/twist waveguide planes 13

Tables

1-1	Waveguide combiner hardware kits	2
A-1	Mechanical specifications for 100cm WR75 flex/twist waveguide	13

Libra Waveguide Combiner, Ku-band

The Libra Waveguide Combiner, Ku-band, is used to connect multiple SSPBs to a hub antenna. This is a simple means of expanding the number of remotes that can be supported by the hub.

There are two models of Libra Waveguide Combiner, Ku-band (waveguide combiner):

- ♦ 2-port (14341)
- ♦ 4-port (14343)

The 4-port version can also be used as a 2- or 3-port version, if the unused ports have waveguide terminators installed.

This installation guide provides basic procedures for installing and maintaining the waveguide combiner.

1 Getting started



Caution Dirt or moisture buildup in the waveguide cavity will degrade performance. To protect the waveguide cavity from dirt and moisture, leave all parts protection (mylar tape, shipping bolt, flex/twist waveguide end caps) in place until ready to assemble.



Caution Exceeding the maximum bending and/or twisting rating for the flex/twist waveguide will damage the waveguide. Do not exceed these ratings (see Table A-1 on page 13).

1.1 Unpacking the shipment

Open the shipment and check the contents for completeness against the packing slip. Visually inspect the equipment for any damage that may have occurred in transit.

1.2 Technical support

If there are any problems with the shipment, please contact Nanometrics Support.

Email: support@nanometrics.ca

FAX: To: Support

+1 (613) 592-5929

1.3 Preinstallation

Ensure that you have the required parts and the recommended installation tools.

1.3.1 Parts list

- ◆ Waveguide combiner sub-assembly, either a 2 port or 4 port model:
 - 2 Port Waveguide Combiner Subassembly (14640)
 - 4 Port Waveguide Combiner Subassembly (14637)
- ◆ 1 m Flex Twist Waveguide (SAT0103)
- ◆ Desiccator cartridge (SAT0093, quantity 2)
- ◆ Hardware kit, for 2 port or 4 port, with options to mount the assembly on either a 2" x 1" (50mm x 25mm) or a 4" x 4" (100mm x 100mm) antenna feed support arm (see Table 1-1):
 - 2 Port Waveguide Combiner Hardware Kit (14524)
 - 4 Port Waveguide Combiner Hardware Kit (14439)

Table 1-1 Waveguide combiner hardware kits

Description	Item	Part #	Quantity	
			2-port	4-port
Waveguide Combiner to Antenna Mounting Hardware	2" x 1" Support Arm Clamp, Libra SSPB	14541	2	2
	4" x 4" Support Arm Clamp, Libra SSPB	14542	2	2
	M5 Flat Washer	HDW0247	8	8
	M5 Locknut	HDW1087	8	8
	Threaded Rod, M5 x 132mm	HDW1089	4	4
	Screw, M5 x 50, Hex Socket Cap	HDW1093	4	4
F/T Waveguide to OMT Mounting Hardware	Screw, M4 x 35, Hex Socket Cap	HDW1085	4	4
	M4 Flat Washer	HDW0239	8	8
	M4 Locknut	HDW0138	4	4
SSPB Mounting Hardware	Screw, M4 x 12, Hex Socket Cap	HDW1027	8	16
	M4 Flat Washer	HDW0239	8	16
	M4 Lock washer	HDW0237	8	16
O-ring: Pressure Adaptor to F/T WG	O-ring, Ku Waveguide, WR75 groove flange	SAT0104	1	1

Table 1-1 Waveguide combiner hardware kits (Continued)

Description	Item	Part #	Quantity	
			2-port	4-port
O-rings: F/T WG to OMT, Spares	O-ring, Ku Waveguide, WR75 groove flange	SAT0104	3	3
Miscellaneous Items and Spare Hardware Components	M4 Locknut	HDW0138	2	2
	M4 Lock washer	HDW0237	2	2
	M4 Flat Washer	HDW0239	2	2
	M5 Flat Washer	HDW0247	2	2
	Screw, M4 x 12, Hex Socket Cap	HDW1027	1	1
	Screw, M4 x 20, Hex Socket Cap	HDW1033	1	1
	Screw, M4 x 35, Hex Socket Cap	HDW1085	1	1
	M5 Locknut	HDW1087	2	2
	Screw, M5 x 50, Hex Socket Cap	HDW1093	2	2
	Silicone Grease	MFG0156	1	1
	3mm Short Arm Hex Key	TOO0086	1	1
4mm Short Arm Hex Key	TOO0088	1	1	

1.3.2 Installation tools

- ◆ Allen keys/hex screwdrivers:
 - 3mm (for M4 hex sockets)
 - 4mm (for M5 hex sockets)
- ◆ Wrenches:
 - 7mm (for M4 nuts)
 - 8mm (for M5 nuts)
- ◆ Teflon tape

2 Installation

Installation procedures for the 2-port and the 4-port waveguide combiners are essentially the same, with small variations depending on the dimensions of the antenna feed support arm. Installing the waveguide combiner requires these general steps:

1. Attach the SSPBs to the waveguide combiner ports (2-port or 4-port model).
 - ▶ Install waveguide terminators, if ordered, if you will not have SSPBs connected to all 4 of the ports.
2. Connect the flex/twist waveguide to the waveguide combiner.
3. Mount the waveguide combiner assembly on the antenna feed support arm (either above or below the feed support arm, depending on the feed support arm dimensions), and then connect the flex/twist waveguide to the OMT.

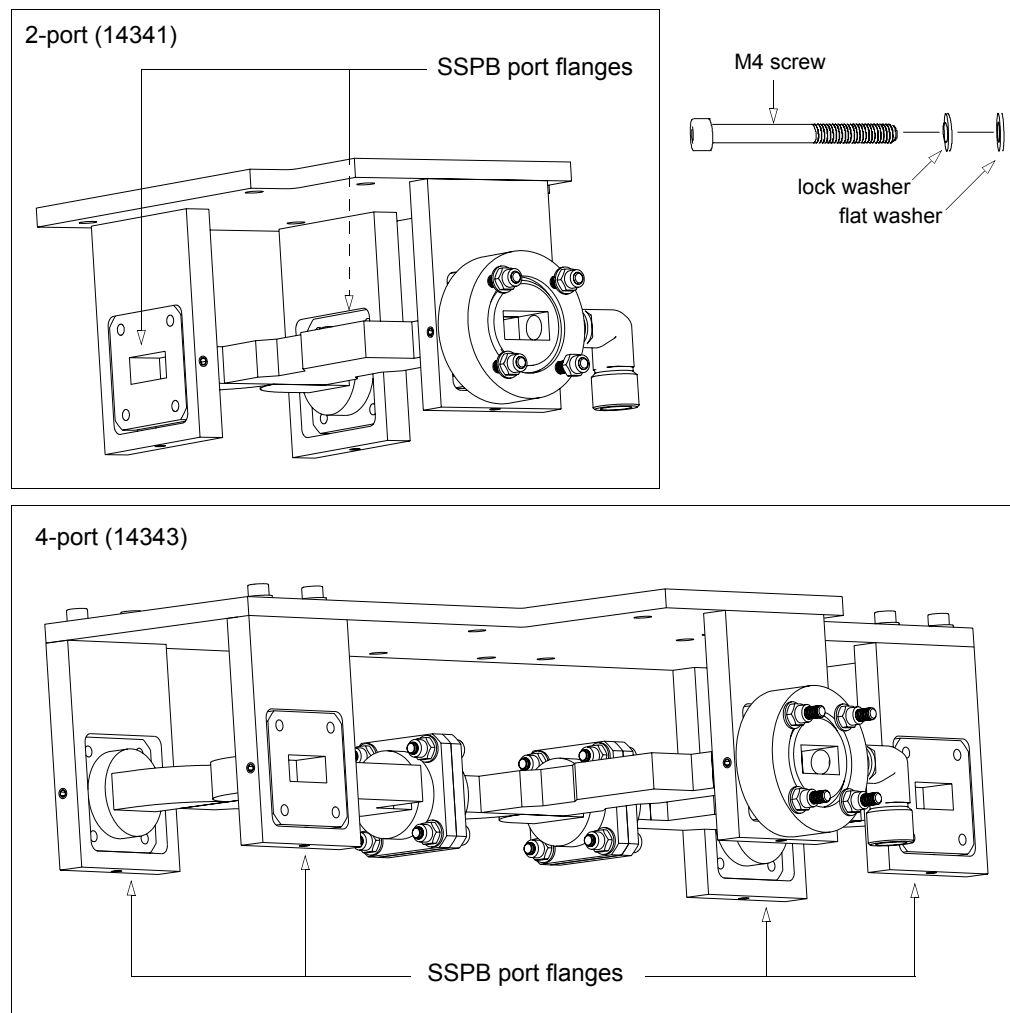
4. Install the desiccator cartridge, positioned as appropriate for the waveguide combiner mounting location.

2.1 Attach the SSPBs and flex/twist waveguide

To protect the parts from moisture and dirt, attach the SSPBs and flex/twist waveguide to the waveguide subassembly while in a clean environment indoors.

1. Attach the SSPBs:
 - a) Remove the mylar tape from a waveguide combiner SSPB port.
 - b) Apply a thin layer of silicone grease to the O-ring from the SSPB kit.
 - c) Place the O-ring into the groove in the waveguide combiner SSPB port flange.
 - d) Attach the SSPB to the flange using 4 sets of M4 screws and washers from the SSPB Mounting Hardware Kit (Table 1-1), in the order shown in Figure 2-1.

Figure 2-1 SSPB ports



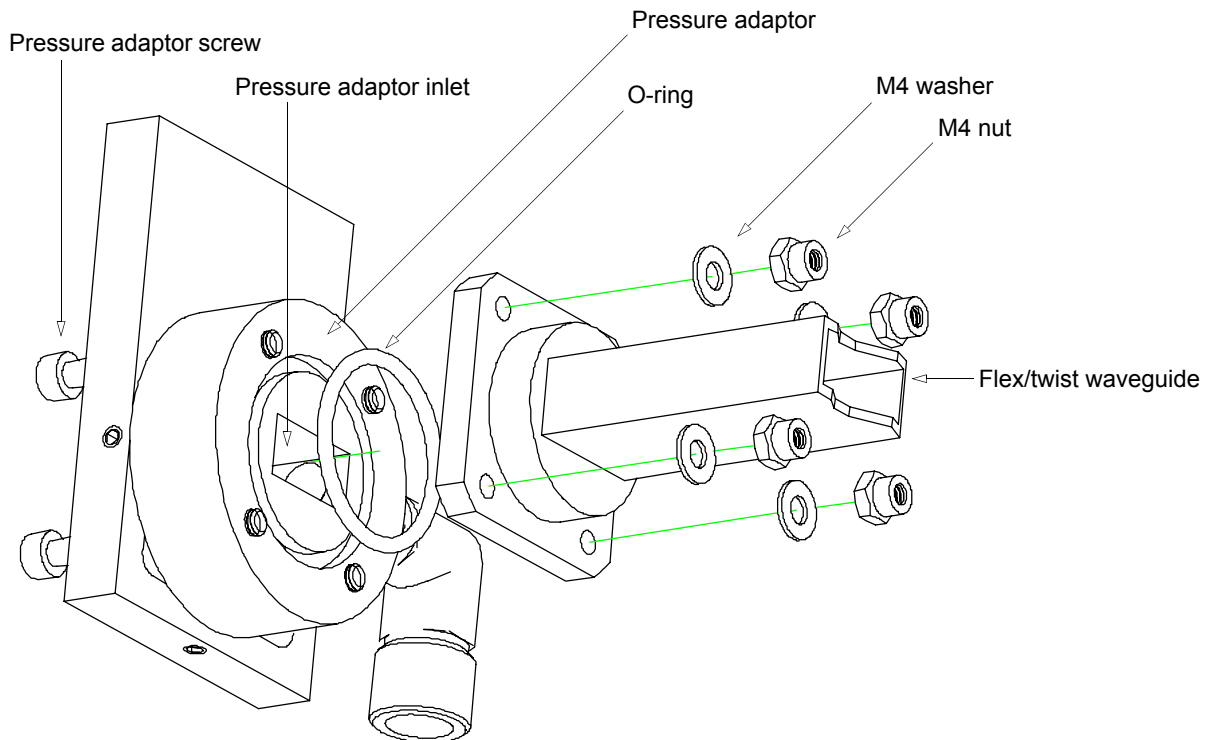
2. If waveguide terminators (part number 14598) have been ordered to protect unused ports on the 4-port waveguide combiner, install them on the unused ports:
 - a) Remove the mylar tape from the waveguide combiner SSPB port.
 - b) Apply a thin layer of silicone grease to the O-ring from the waveguide terminator kit.
 - c) Place the O-ring into the groove in the Waveguide Combiner SSPB port flange.
 - d) Attach the waveguide terminator using 4 screws included with the waveguide terminator.
3. Connect the flex/twist waveguide to the waveguide combiner (Figure 2-2):



Caution Exceeding the maximum bending and/or twisting rating for the flex/twist waveguide will damage the waveguide. Do not exceed these ratings (see Table A-1 on page 13).

- a) Remove the plastic cap from the flat end of the flex/twist waveguide (leave the plastic cap on the end with the O-ring groove).
- b) Remove the mylar tape from the waveguide combiner pressure adaptor inlet.
- c) Remove the nuts and washers from the waveguide combiner pressure adaptor screws. Keep this hardware to attach the flex/twist waveguide.
- d) Pull the screws partially back, leaving the threaded end flush with the exposed surface of the pressure adaptor.
- e) Apply a thin layer of silicone grease to the O-ring from the waveguide combiner hardware kit.
- f) Place the O-ring in the groove in the pressure adaptor.
- g) Firmly attach the flex/twist waveguide to the pressure adaptor using the screws, washers, and nuts.

Figure 2-2 Connect the flex/twist waveguide to the waveguide combiner



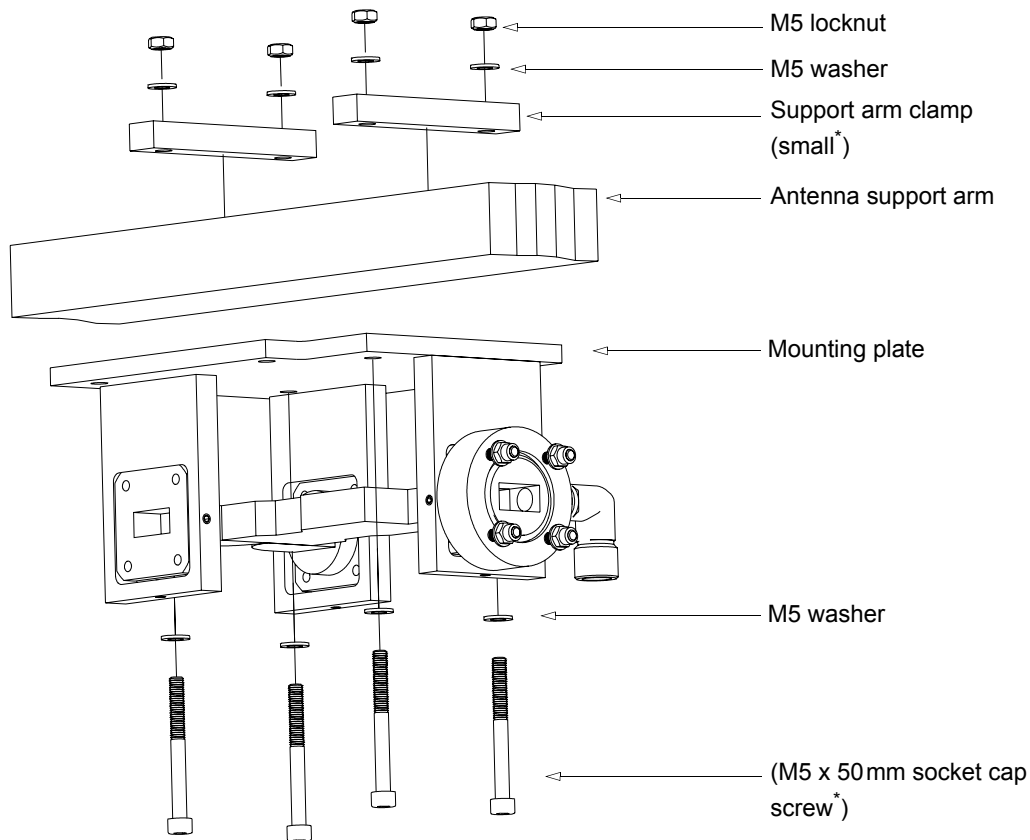
2.2 Mount the assembly on the antenna feed support arm

Two people are required to support the waveguide combiner assembly properly while mounting it on the antenna feed support arm.

1. Select the appropriate location on the antenna feed support arm to mount the waveguide combiner assembly:
 - ▶ For antennas with 2" x 1" (50mm x 25mm) antenna feed support arms, mount the waveguide combiner assembly underneath the feed support arm (for example, Figure 2-3 on page 7).
 - ▶ For antennas with 4" x 4" (100mm x 100mm) antenna feed support arms, mount the waveguide combiner assembly on top of the feed support arm (for example, Figure 2-5 on page 9).
2. Mount the waveguide combiner assembly on the antenna feed support arm using the appropriate hardware from the Waveguide Combiner to Antenna Mounting Hardware kit:
 - ▶ For antennas with 2" x 1" (50mm x 25mm) antenna feed support arms, use the socket cap screws, small clamping arms, and inner mounting plate holes.
 - ▶ For antennas with 4" x 4" (100mm x 100mm) antenna feed support arms, use the threaded rods with two locknuts and washers per rod, large clamping arms, and outer mounting plate holes.

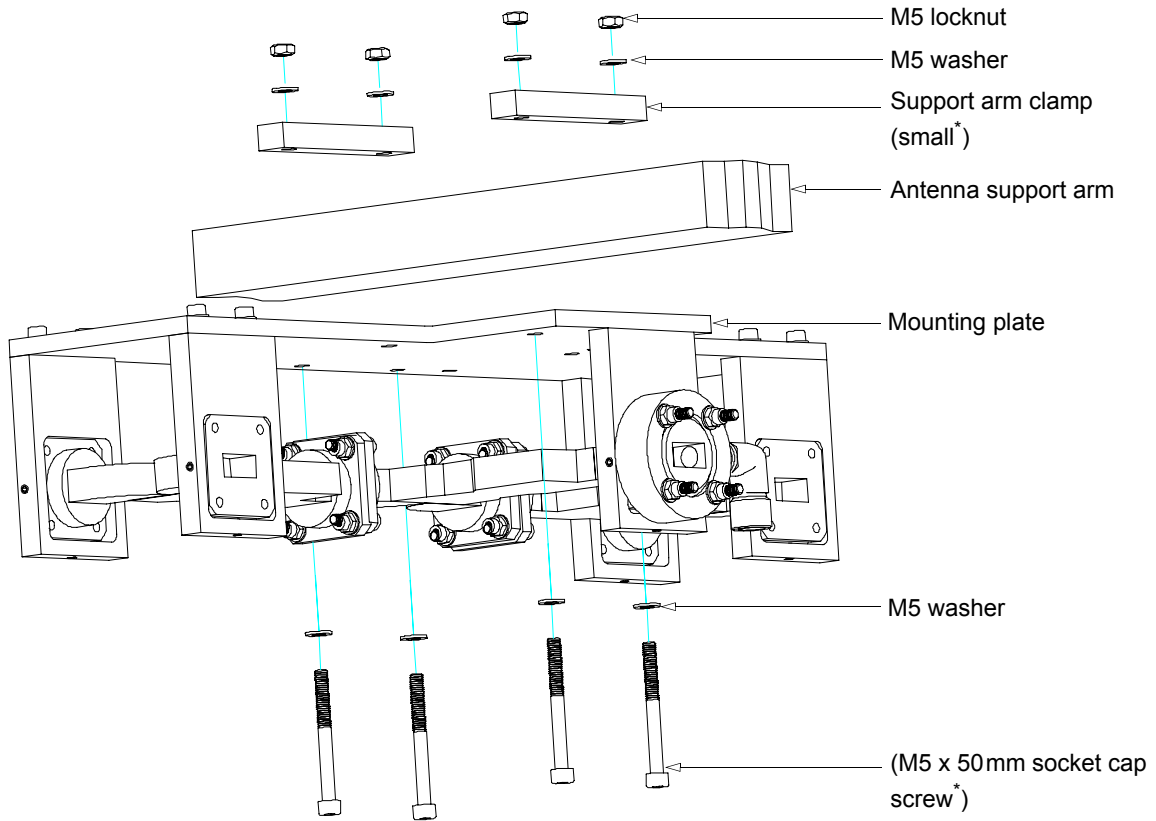
- a) Loosely attach 2 support arm clamps to the waveguide combiner mounting plate, using 2 M5 socket cap screws (or threaded rods) and locknuts with washers.
 - ▶ You may need to hold the end of the threaded rod with pliers to prevent it from rotating while installing the locknuts. Ensure that you do this carefully, to avoid damaging the rod threads.
- b) Position the waveguide combiner on or under the antenna feed arm as appropriate, and then rotate the support arm clamps to align with the remaining mounting plate holes.
- c) Insert the remaining 2 socket cap screws (or threaded rods) with washers through the mounting plate and support arm clamps.
- d) Tighten the mounting locknuts only enough to clamp the waveguide combiner loosely in place, to allow final positioning after the flex/twist waveguide is fully installed.

Figure 2-3 Mount a 2-port waveguide combiner on the feed support arm*



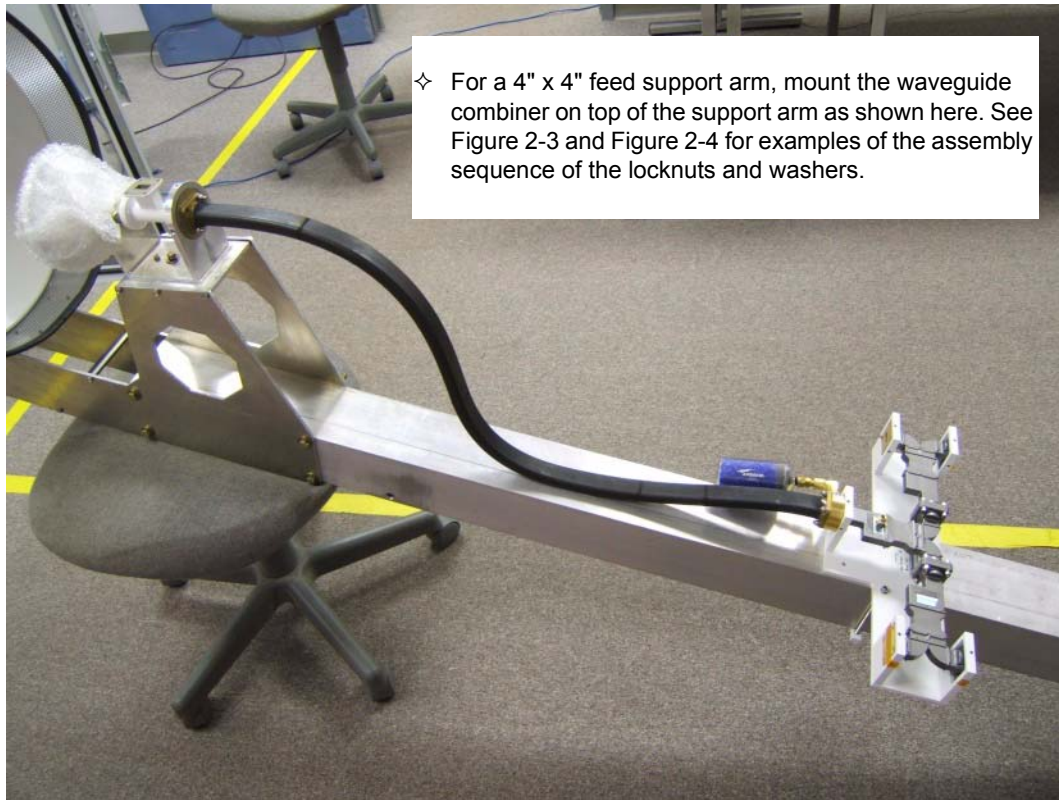
* This figure shows a 2" x 1" (50mm x 25mm) antenna support arm and associated hardware. For antennas with 4" x 4" (100mm x 100mm) antenna support arms, substitute large clamping arms, and M5 x 132mm threaded rods with two locknuts and washers per threaded rod. See also Figure 2-5 on page 9.

Figure 2-4 Mount a 4-port waveguide combiner on the feed support arm*



* This figure shows a 2" x 1" (50 mm x 25 mm) antenna support arm and associated hardware. For antennas with 4" x 4" (100 mm x 100 mm) antenna support arms, substitute large clamping arms, and M5 x 132mm threaded rods with two locknuts and washers per threaded rod. See also Figure 2-5 on page 9.

Figure 2-5 Mount a waveguide combiner on a 4" x 4" feed support arm



3. Connect the free end of the flex/twist waveguide to the ortho mode transducer (OMT):
 - a) Position the waveguide combiner on the antenna feed support arm as appropriate for the assembly mounting location:
 - ▶ For a 2" x 1" (50mm x 25mm) support arm, run the flex/twist waveguide along the underside of the support arm and up to the OMT without exceeding the waveguide bending ratings (see Table A-1 on page 13).
 - ▶ For a 4" x 4" (100mm x 100mm) support arm, run the flex/twist waveguide along the top of the support arm (for example, Figure 2-5).
 - a) Remove the plastic cap from the end of the flex/twist waveguide.
 - a) Apply a thin layer of silicone grease to the O-ring that comes with the OMT (or use a spare from the waveguide combiner hardware kit).
 - b) Place the O-ring in the groove of the flex/twist waveguide flange.
 - c) Firmly attach the flex/twist waveguide to the OMT using the screws, washers, and nuts included in the F/T Waveguide to OMT Mounting Hardware kit.
4. Firmly tighten all of the mounting locknuts.

2.3 Install the desiccator cartridge



Caution Moisture buildup in the waveguide assemblies will degrade performance. To prevent moisture buildup in the waveguide assemblies, replace the desiccator cartridge when the desiccant becomes saturated. Saturation is indicated by the desiccant turning pink or white; this occurs typically after about 1 year of use.

To install the desiccator cartridge (for example, Figure 2-6):

1. Uncap the desiccator cartridge and wrap the brass connector of the bottle with teflon tape: Looking down at the male thread of the fitting, wrap the tape in a clockwise direction 3 or 4 times, to cover the threads.
2. Remove the shipping bolt from the desiccator fitting.
3. Screw the desiccator cartridge firmly into the fitting.
 - ▶ For an assembly mounted on a 2" x 1" (50 mm x 25 mm) antenna feed support arm, the desiccator cartridge is connected below the assembly, approximately perpendicular to the support arm (for example, Figure 2-6).
 - ▶ For an assembly mounted on a 4" x 4" (100 mm x 100 mm) antenna feed support arm, the desiccator cartridge is connected alongside the assembly, approximately parallel to the feed support arm (for example, Figure 2-7).
4. Remove the sticker from the bottom of the desiccator cartridge.

Figure 2-6 Install the desiccator cartridge (example for a 2" x 1" feed support arm)

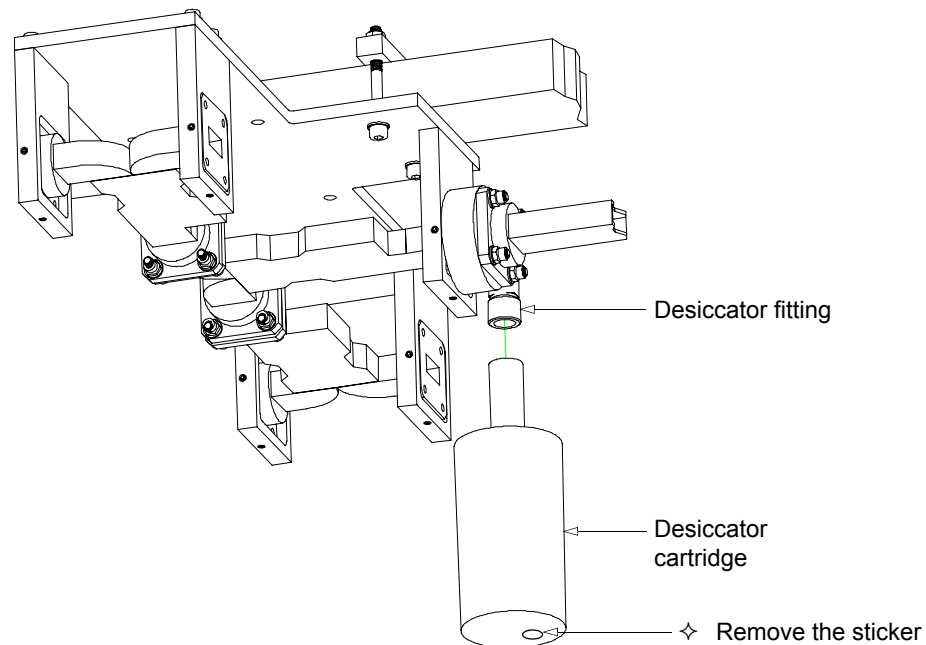


Figure 2-7 Install the desiccator cartridge (example for a 4" x 4" feed support arm)



✧ The desiccator cartridge lies on top of and roughly parallel to a 4" x 4" feed support arm.

✧ Remove the sticker

3 Antenna alignment issues

The maximum repeatable twist angle for the flex/twist waveguide is $\pm 90^\circ$. Therefore, when adjusting antenna polarization remain within the range $\pm 90^\circ$.

4 Maintenance

The only maintenance required for the Libra Waveguide Combiner is replacing the desiccator cartridge (for example, Figure 2-6 and Figure 2-7) when the desiccant becomes saturated. Saturation is indicated by the desiccant turning pink or white; this occurs typically after 1 year of use.

1. Unscrew the desiccator cartridge from the fitting (for the part number, see Section 1.3.1, "Parts list," on page 2).
2. Uncap the replacement desiccator cartridge and wrap the brass connector of the bottle with teflon tape: Looking down at the male thread of the fitting, wrap the tape in a clockwise direction 3 or 4 times, to cover the threads.
3. Screw the desiccator cartridge firmly into the fitting.
4. Remove the sticker from the bottom of the new desiccator cartridge.

Appendix A F/T Waveguide Specifications

The flex/twist waveguide shipped with the Libra Waveguide Combiner, Ku-band, is a 100cm WR75 waveguide with tolerances for bending and twisting listed in Table A-1. Figure A-1 shows the waveguide planes that are relevant to the bending radius.

Table A-1 Mechanical specifications for 100cm WR75 flex/twist waveguide

Bending radius (cm)				Twisting (\pm degrees)	
Static		Repeated		Static	Repeated
E-plane	H-plane	E-plane	H-plane		
7	12	26	51	330	90

Figure A-1 Flex/twist waveguide planes

