

GENERAL DYNAMICS
SATCOM Technologies

4096-738
May 19, 2009

ASSEMBLY MANUAL
Revision B

SERIES 3120
ANTENNA SYSTEM

General Dynamics
SATCOM Technologies
1500 Prodelin Drive
Newton NC 28658

**SERIES 3120
ANTENNA SYSTEM**

B	Revised Logo and Name	5/19/09	RAH
A	UPDATE FIGURES	10/17/08	K.D.
-	ORIGINAL RELEASE	12/11/06	R.F.
REV.	DESCRIPTION	DATE	APPROVED

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SECTION I INTRODUCTION

1.0 GENERAL INFORMATION

This manual describes the assembly and installation of General Dynamics' Series 3120 antenna system. The General Dynamics Series 3120 antenna system is designed to operate at ku-band and ka-band frequencies with high efficiency and at the same time successfully withstand the effects of the environment.

These instructions, listed by sections, cover all areas of assembly and installation. Additional sections are included in the manual to provide information on maintenance.

1.1 UNPACKING AND INSPECTION

The system containers should be unpacked and inspected at the earliest date to insure that all material has been received and is in good condition.

1.2 FREIGHT DAMAGE

Any damage to materials while in transit should be immediately directed to the freight carrier. They will instruct you on matters regarding any freight damage claims.

1.3 MATERIAL – MISSING OR DAMAGED

Any questions regarding missing or damaged materials that are not due to the freight carrier should be directed to General Dynamics' Customer Service Department at:

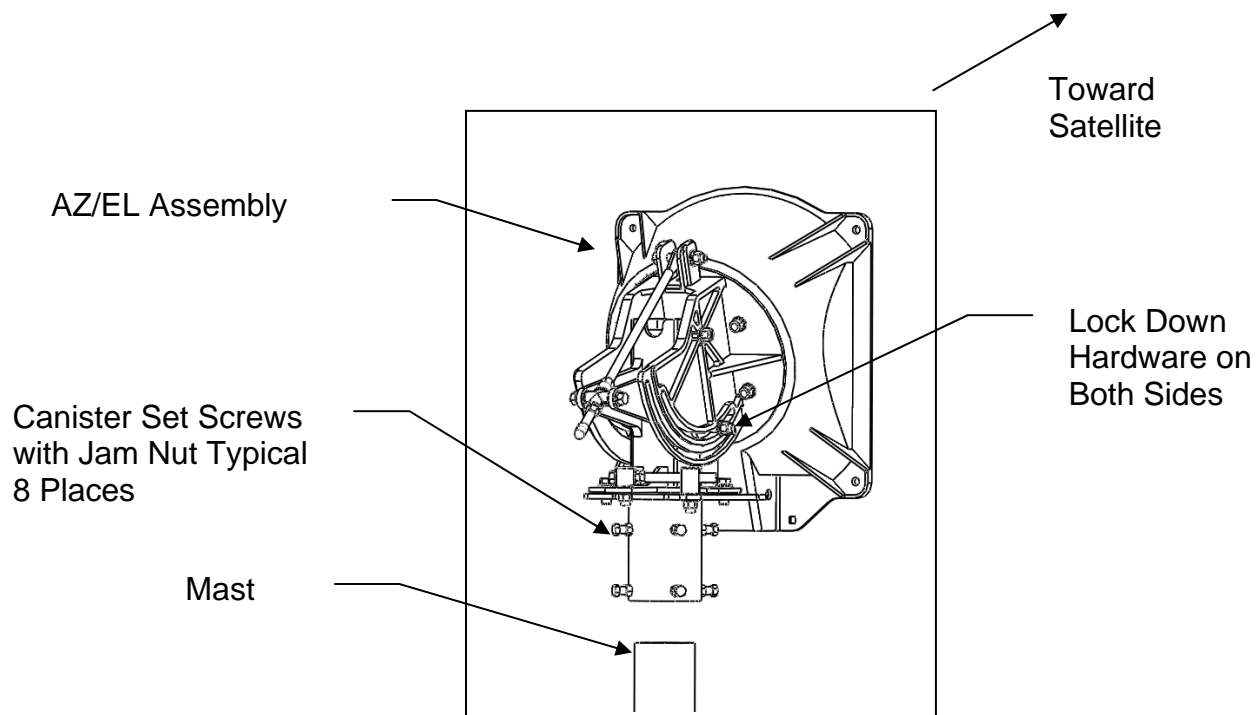
**General Dynamics SATCOM Technologies
1500 Prodelin Drive
Newton NC 28658
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(828) 464-4141**

SECTION II ANTENNA ASSEMBLY

Follow the steps below in the order shown to assemble the antenna. The site elevation, azimuth, and polarization values should be predetermined and known at this time. Do not tighten any hardware until instructed to do so.

Installing the AZ/EL assembly onto the mast pipe

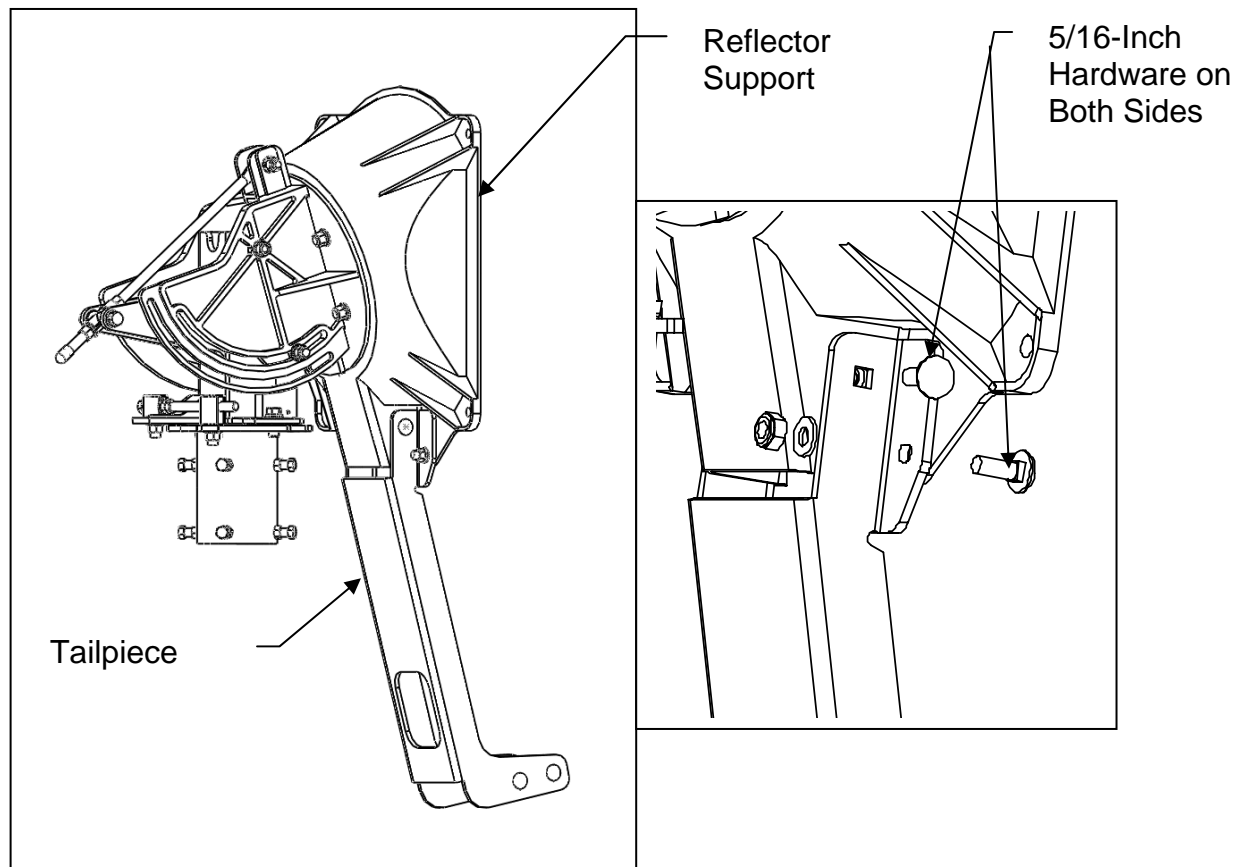
1. Loosen the elevation lock down hardware on both sides of the elevation bracket.
2. Read the elevation scale and rotate the elevation bracket to the predetermined elevation angle for the site. Snug down the elevation lock down hardware that was loosened in step #1.
3. Use a 9/16-inch open-end wrench to loosen the eight canister set screws until they are flush with the inside wall of the canister.
4. Place the canister of the AZ/EL assembly onto the mast pipe.
5. Rotate the AZ/EL assembly until the reflector side is oriented in the general direction of the satellite as shown.
6. Snug the eight canister set screws enough to prevent the assembly from rotating. Do not tighten until instructed to do so later in the assembly.



Attaching the tailpiece

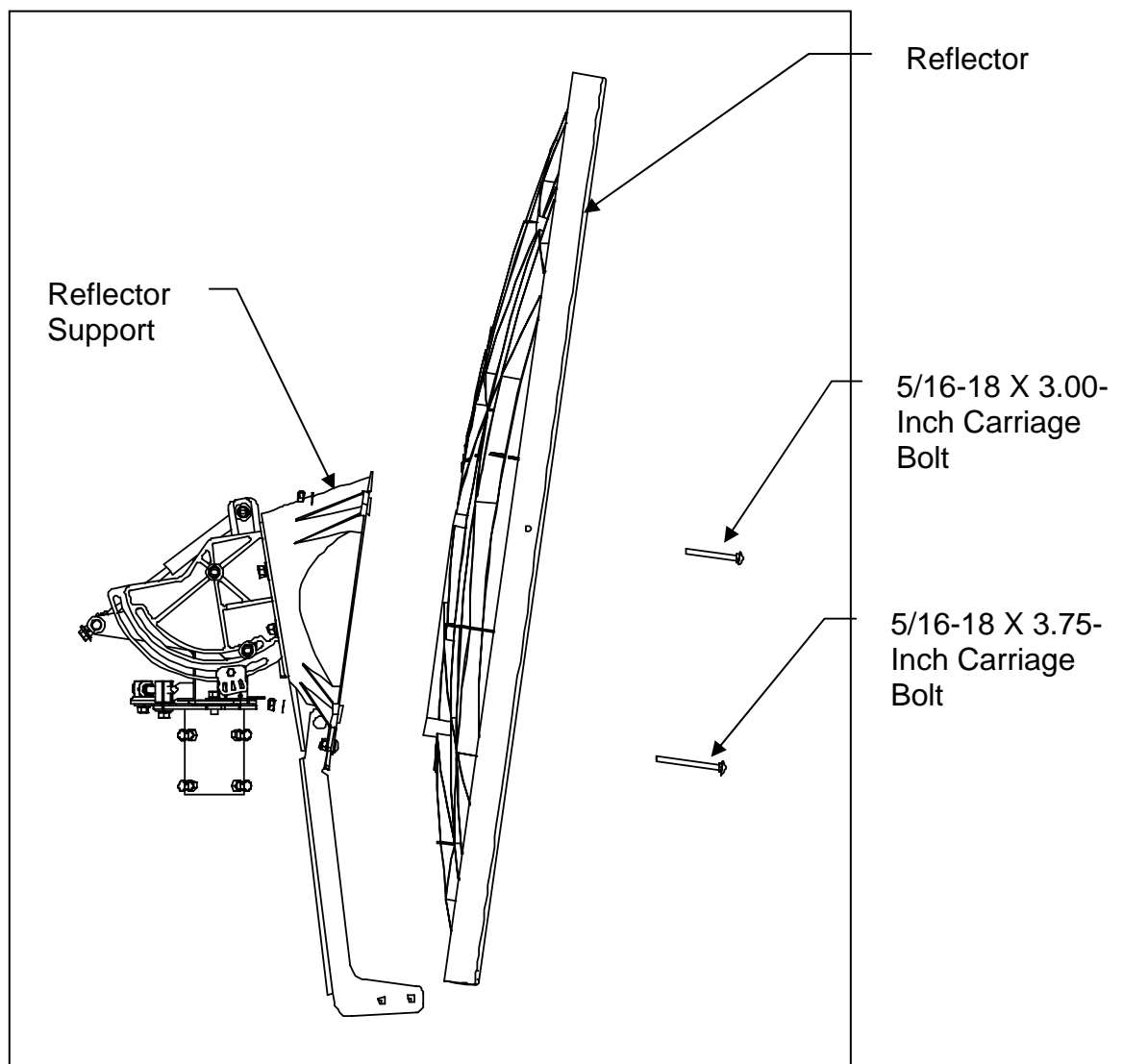
Note: The tailpiece is only required and supplied with ka-band receive/transmit antenna systems. It is not required for ku-band or ka-band receive-only antennas. For these antennas, proceed to the next step.

1. Position the tailpiece at the bottom of the reflector support.
2. Align the holes in the tailpiece with the mating holes in the reflector support. Install a 5/16-18 x 1.00-inch carriage bolt, flat washer and nylon insert hex nut at each of four locations.
3. Tighten securely the four 5/16-inch bolts that attach the tailpiece to the reflector support.



Attaching the reflector

1. Orient the reflector so that the feed support attachment interface (3-hole pattern) is at the bottom.
2. Lift the reflector and align the four mounting holes in the reflector with the four mounting holes of the reflector support.
3. Attach by inserting a 5/16-18 x 3.00-inch carriage bolt through each of the two upper reflector holes and a 5/16-18 x 3.75-inch carriage bolt through each of the lower reflector holes from the front to the back and through the mounting holes of the reflector support.
4. Secure with a flat washer, lock washer, and hex nut on each of the four carriage bolts.
5. Tighten securely.



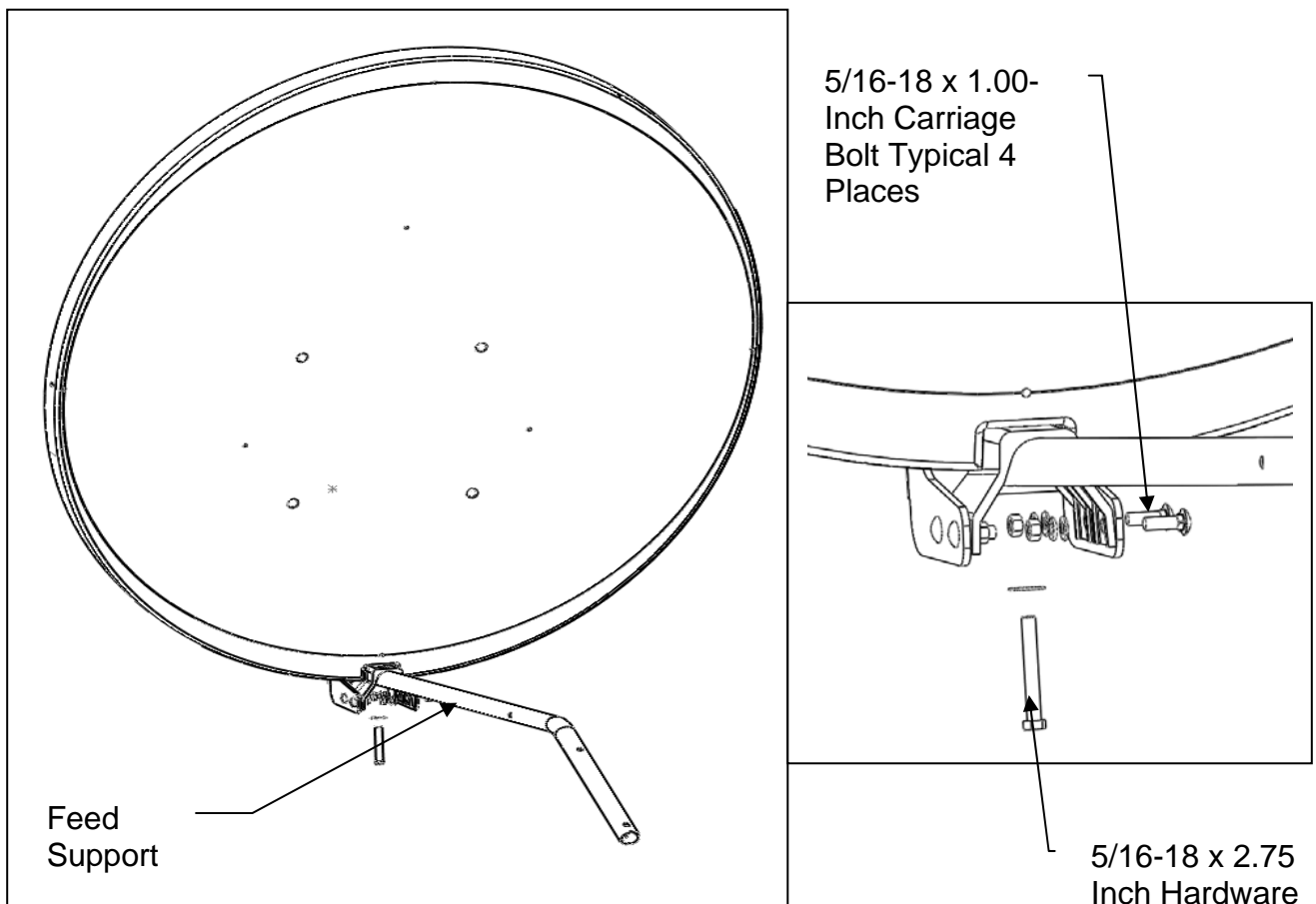
Installing the feed support

The feed support supplied with the antenna system will vary based on frequency of operation and ODU interface. The following is supplied as a general guideline only. Follow the specific instructions supplied with the feed support with your particular antenna (if any) for more specific instructions.

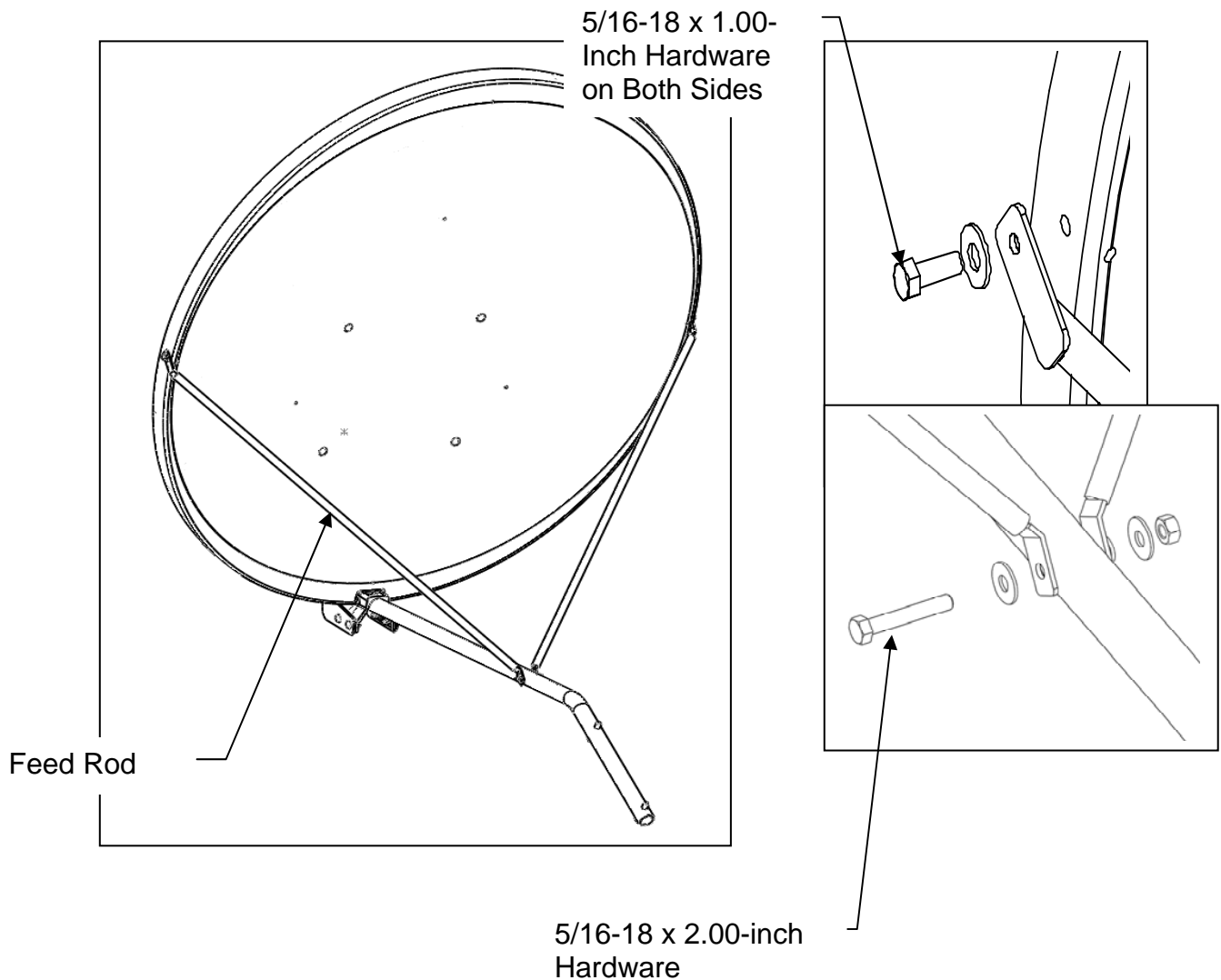
1. Place the feed support adapter casting into the notch at the base of the reflector and between the mounting ears of the tailpiece (ka-band rx/tx only).
2. Insert a 5/16-18 x 2.75-inch bolt and flat washer through the hole in the feed support, feed support adapter casting, and the center hole in the bottom of the reflector.
3. Secure with a flat washer and nylon insert hex nut on the back of the reflector.

(Steps 4 thru 6: Ka-band rx/tx only)

4. Insert a 5/16-18 x 1.00-inch carriage bolt through each of the four holes in the end of the feed support and tailpiece.
5. Secure with a flat washer and nylon insert hex nut on each bolt.
6. Securely tighten these four bolts at this time.



7. Attach a feed rod to each side of the reflector with a 5/16-18 x 1.00-inch bolt and flat washer. Secure with a flat washer and nylon insert lock nut on the back side of the rim of the reflector.
8. Attach the opposite end of the two feed rods to the feed support with a 5/16-18 x 2.00-inch bolt and flat washer through one feed rod, the feed support and the other feed rod. Secure with a flat washer and nylon insert lock nut.
9. At this time, tighten the hardware at the bottom of the feed support to the reflector. Next tighten the hardware connecting the ends of the feed rods to the reflector followed by the hardware attaching the feed rods to the feed support.
10. Finally, tighten the four 5/16-inch bolts attaching the feed support to the tailpiece. (if applicable)



2.1 ANTENNA POINTING

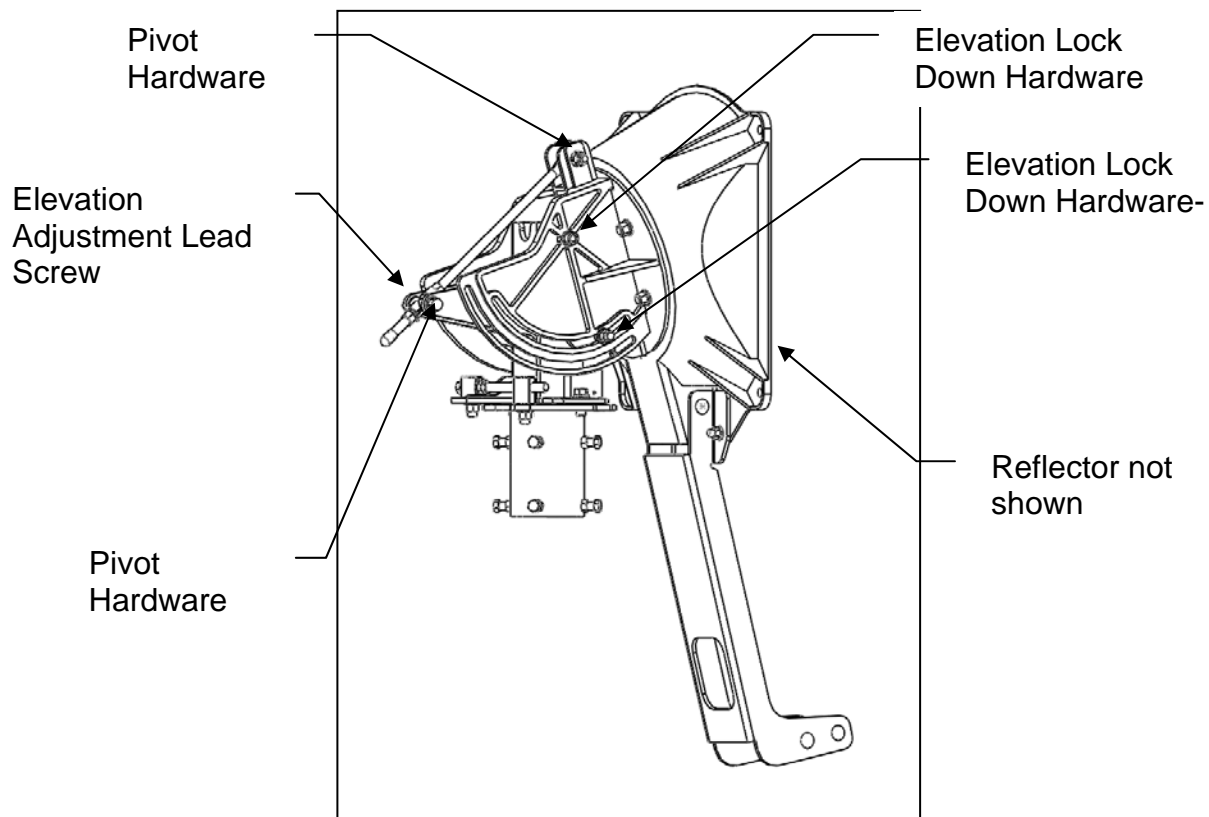
This section describes how to point the antenna at the satellite. Correct alignment is critical to the operation of the system. When the antenna is pointed directly at the satellite, it receives a strong signal. If it is not positioned properly, the signal may be weak, and errors may result during data transfers. The signal quality would also deteriorate on cloudy, windy, or rainy days.

The predetermined elevation angle, azimuth heading and polarization angle should be accurate enough to allow the antenna to acquire the satellite signal. After acquiring the signal, an iterative process of peaking the antenna is used to obtain the strongest signal possible.

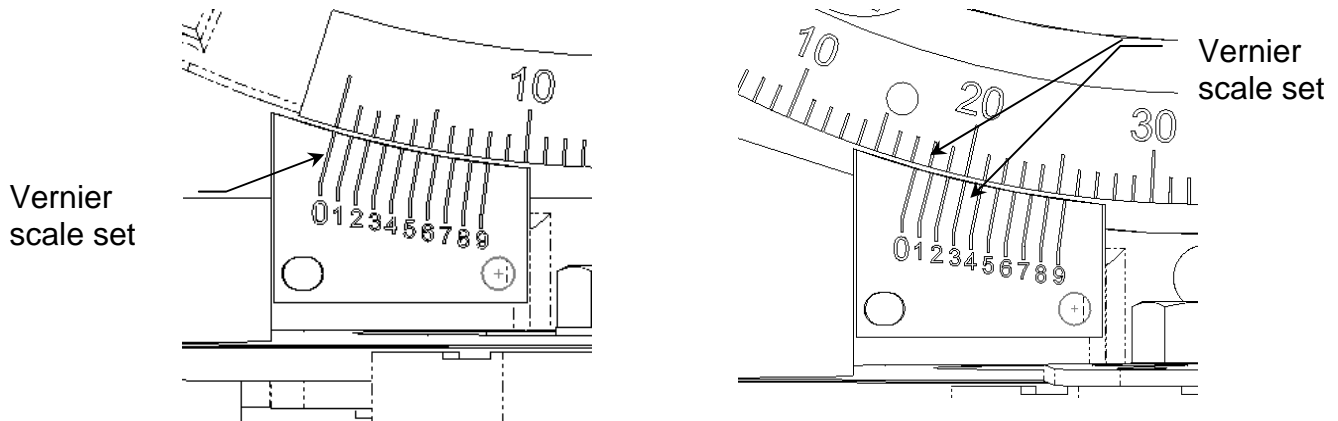
Pre-setting elevation, azimuth, and polarization:

Loosen the elevation lockdown hardware on the AZ/EL assembly. Three 3/8-inch bolts in the elevation bracket and pivot hardware at the top and bottom of the elevation adjustment.

Using the predetermined elevation angle, which was roughly preset during antenna assembly, raise or lower the antenna until the angle is read on the elevation scale. Raising the antenna increases elevation. Lowering it decreases elevation. Raise or lower the antenna by turning the adjustment lead screw.



Use the vernier scale to accurately set the elevation within 0.1°. For example, to set the elevation at 17.3°, align the “17” degree tick mark of the scale (seven tick marks past the 10° mark) with the “0” mark of the vernier. Continue to slowly raise the antenna until the “3” tick mark on the vernier scale aligns with the next closest mark of the elevation scale. The elevation is now set at 17.3° elevation.



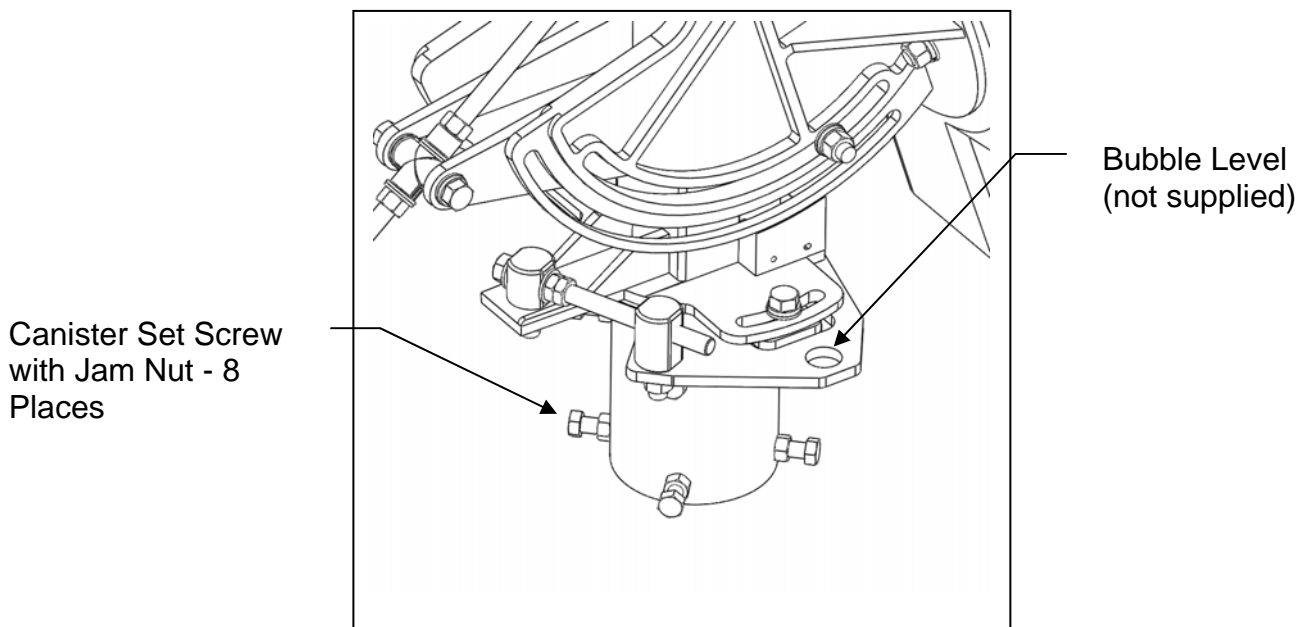
Use a compass to locate and line up the predetermined azimuth bearing.

Loosen the eight canister set screws enough to allow the antenna to rotate about the mast pipe.

Rotate the antenna in azimuth until pointed in the direction determined above.

Place a bubble level (not supplied) on the top surface of the AZ/EL assembly.

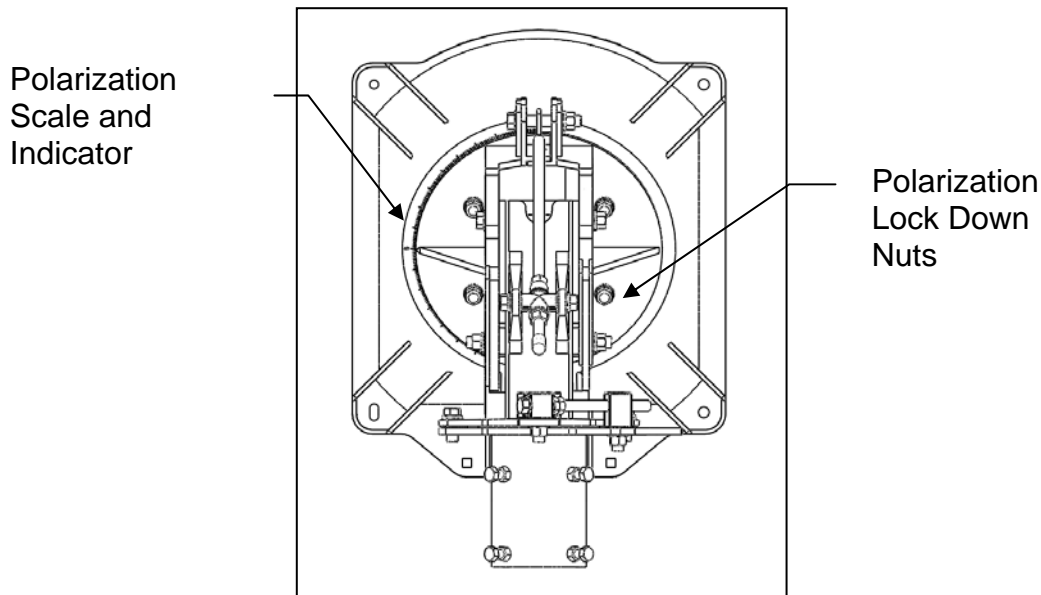
Alternately tighten the eight canister set screws until all are tight and the bubble is in the center circle of the level.



Tighten the jam nuts against the canister at each of the eight locations.

Loosen the four 3/8-inch polarization lockdown nuts on the reflector support.

Rotate the reflector in polarization until the correct polarization setting is read on the scale. From behind the antenna, rotate the reflector clockwise for positive polarization angles and counter-clockwise for negative angles. Securely tighten the four bolts after the correct angle is set.

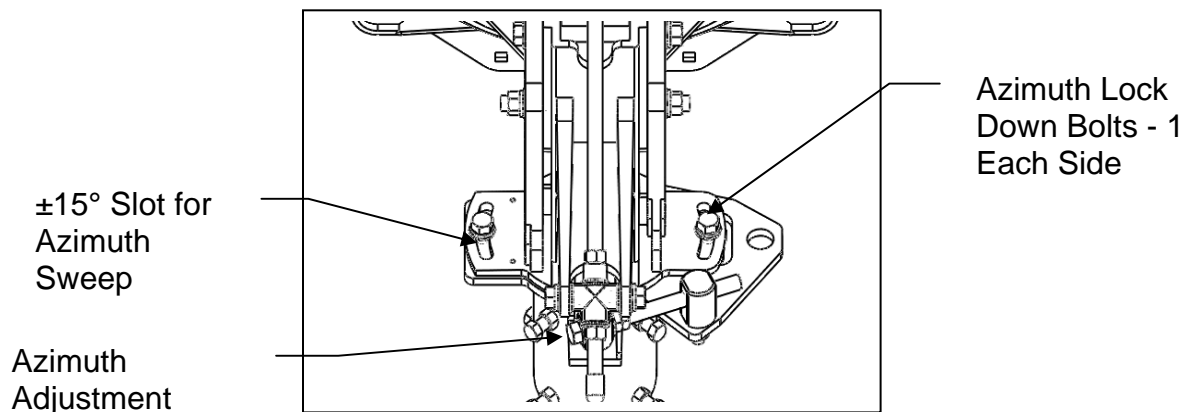


Locating the satellite:

With elevation and polarization set and the antenna leveled and pointed in the correct general direction, locate the satellite by sweeping azimuth.

To sweep azimuth, loosen the two azimuth lockdown bolts in the AZ/EL assembly.

Turn the hex head on the azimuth adjustment lead screw to slowly sweep the antenna left and right in azimuth until signal is detected. The adjustment will allow $\pm 15^\circ$ of azimuth sweep. This amount should be sufficient to locate the satellite from the coarse azimuth heading.



If no signal is detected, raise or lower the elevation setting in small increments and repeat the azimuth sweep until the signal is found.

After the satellite is located, turn the hex head of the elevation adjustment lead screw to slowly raise and lower the antenna until maximum signal is achieved.

Use the azimuth adjustment to adjust left and right until maximum signal is achieved.

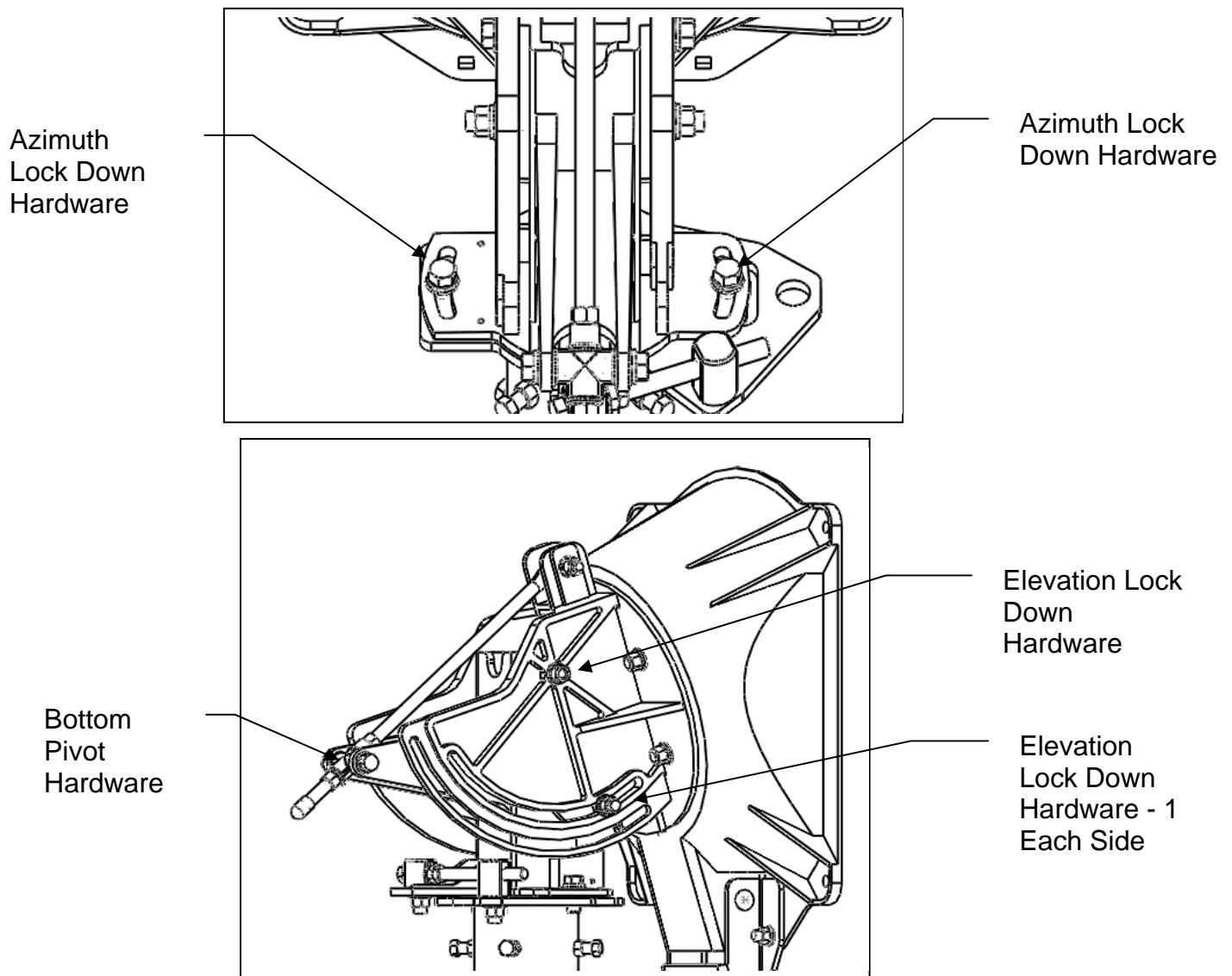
Azimuth and elevation lock down:

After the antenna is peaked, lock down the azimuth hardware by tightening the two 3/8-inch bolts in the AZ/EL assembly.

Tighten the hex nuts on the bottom of the azimuth adjustment assembly.

Lock down the elevation hardware by tightening the three 3/8-inch bolts in the elevation bracket.

Tighten the pivot hardware at the top and bottom of the elevation adjustment assembly.



SECTION III MAINTENANCE

3.0 MAINTENANCE OVERVIEW

After installation, the antenna requires only periodic inspection. It is anticipated that maintenance, if required, will be minimal and easily handled by a local or in-house maintenance staff.

3.1 REFLECTOR

General Dynamics' reflector does not require any maintenance. The composite construction of the reflector is virtually impervious to any damages that could be caused by weather or atmospheric conditions. It is only necessary to inspect for any physical damage done by vandalism or very severe weather conditions.

Should any damage be detected to a portion of the reflector, contact the Customer Service Department at General Dynamics for recommendations involving reflector repair.

3.2 MOUNT AND REFLECTOR SUPPORT STRUCTURE

The mount and reflector support structure supplied with this antenna is of steel and aluminum construction and has a galvanized or chromate finish. If there are any signs of structural failure, the mount members that are damaged should be repaired or replaced.

3.3 FEED AND FEED SUPPORT

The feed support and feed rods should be inspected to insure that all hardware is secure. The feed/radio mounting bolts should be tight.

The feed horn window should be inspected to insure that it is intact so that no moisture can collect inside the feed horn.