

**GENERAL DYNAMICS**

C4 Systems

**ASSEMBLY, OPERATION  
AND  
MAINTENANCE MANUAL  
FOR  
VERTEXRSI MODEL 1.2 METER SERIES 1138  
QUICK DEPLOY ANTENNA (QDA)**

**600-1150**

**Revision B  
January 28, 2005**



2600 N. Longview St., Kilgore, TX USA 75662-6842  
Phone (903) 984-0555 • FAX (903) 984-1826

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B	EC 05-0110	1/28/05	MOH	JRM	JTB
A	Original release	7/16/04	JDT	MOH	KRK
<b>REV.</b>	<b>DESCRIPTION</b>	<b>DATE</b>	<b>WRITER</b>	<b>CHK.</b>	<b>APPR.</b>

## Use of **WARNINGS, CAUTIONS, etc.**

Warnings, Cautions and other notes are included throughout this document to provide necessary information. **IGNORING WARNINGS, CAUTIONS AND OTHER NOTES MAY RESULT IN DAMAGE TO THE PRODUCT, INJURY, OR IN EXTREME CASES, DEATH.** You should know the use of Warnings, Cautions and other markings.

Definitions are:

**WARNING!** **HIGHLIGHTS AN INSTALLATION, OPERATING OR MAINTENANCE PROCEDURE, PRACTICE, CONDITION, STATEMENT, ETC., WHICH, IF NOT STRICTLY OBSERVED, COULD RESULT IN INJURY TO OR DEATH OF PERSONNEL.**

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**Important:** **Highlights an essential installation, operating or maintenance procedure, practice, condition or statement, which, if heeded, will ensure efficiency and/or safety of said procedures.**

*Note:* *Highlights an installation, operating or maintenance procedure, practice, condition or statement, which, if heeded, could enhance efficiency and/or safety of said procedures.*

**ESD:** **The Electrostatic Sensitive Device (ESD) appears at the beginning of any procedure or procedural step that includes the handling of equipment sensitive to damage from electrostatic discharge.**

General Warnings and Cautions are also provided at the front of the document. These Warnings and Cautions should be read by anyone who is involved with installation, has access to the equipment or is assigned to perform maintenance on the equipment.

## CAUTIONARY NOTICE

Although VertexRSI has attempted to detail in this document all areas of possible danger to personnel in connection with the use of this equipment, personnel should use caution when installing, operating and servicing this equipment. Care should be taken to avoid electrical shock, whether the hazard is caused by design or malfunction. VertexRSI is specifically not liable for any damage or injury arising from a technician's failure to follow the instructions contained in this document or his failure to exercise due care and caution in the installation, operation and service of this equipment. VertexRSI shall not be responsible for injury or damage resulting from improper procedures or from the use of improperly trained or inexperienced personnel performing such tasks.

This document is intended as a general guide for trained and qualified personnel who are aware of the dangers of handling potentially hazardous electrical and electronic circuits. This document is not intended to contain a complete statement of all safety precautions that should be observed by personnel in using this or other electronic equipment.

## ELECTRICAL HAZARDS

The antenna and feed system supplied by VertexRSI is designed to be integrated with various types of electronic equipment. This system, if integrated with high power amplifiers or traveling wave tubes, will be capable of transmitting microwave energy at varying power levels. If transmitting microwave power, VertexRSI cautions the end-user to review all applicable local, federal and international regulations and to comply with all such regulations in the operation and maintenance of the integrated system.

The electrical currents and voltages associated with this equipment, whether supplied by VertexRSI or others, are dangerous. Personnel must at all times observe safety regulations.

- It is recommended that a lockout/tagout process be utilized while servicing the antenna system. In the United States, see OSHA 1910.147.
- Always disconnect power before opening covers, doors, enclosures, gates, panels or shields.
- Always use grounding sticks and short out high voltage points before servicing.
- Do not remove, short-circuit or tamper with interlock switches on access covers, doors, enclosures, gates, panels or shields.
- Keep away from live circuits.
- Know your equipment and do not take risks.
- Always remove all power to the system prior to working on the antenna, the reflector assembly, the reflector backup assembly or the feed assembly.
- Always tag all circuits noting that the power is OFF, the date and your name, prior to commencing any work on that system.

**In case of emergency, be sure that power is disconnected.**

### **POTENTIAL DAMAGE TO ANTENNA**

The antenna limit switches and resolvers have been pre-set to allow maximum antenna performance. Any subsequent adjustment may jeopardize antenna performance and/or result in damage to the antenna.

### **SAFETY NOTICE**

The following safety procedures are listed to remind those performing any work on the antenna system that safety rules must be observed. Failure to observe safety rules may result in serious injury or death. Always work safely and in accordance with established procedures.

- It is recommended that a lockout/tagout process be utilized while servicing the antenna system. In the United States, see OSHA 1910.147.
- Care shall be taken in all operations to safeguard other people as well as property and to comply with all local safety procedures as established by the customer's site representative, as well as local building codes and fire protection standards.
- All persons performing work on the antenna system shall also comply with the Occupational Safety and Health Act (OSHA) standards and all other federal state and local laws, ordinances, regulations and codes relating to designated work.
- Unless the customer's representative on site specifically designates an individual responsible for site safety, the VertexRSI Site Supervisor shall be responsible for and establish a site safety program for the VertexRSI installation work. The site safety program shall incorporate all VertexRSI safety procedures and requirements
- Never make internal adjustments or perform maintenance or service when alone or fatigued.

### **ELECTROMAGNETIC RADIATION**

- It is recommended that a lockout/tagout process be utilized while servicing the antenna system. In the United States, see OSHA 1910.147.
- Do not stand in the direct path of the feed system when the system is transmitting!
- Do not work on the feed system when the system is on!

**ALWAYS WORK SAFELY!**

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## 1.0 INTRODUCTION

### 1.1 General Information

This manual describes the assembly of VertexRSI's 1.2m Quick Deploy Antenna (QDA) Series 1138. The QDA is easily and quickly deployed and is a reliable antenna system that operates efficiently in the Ku, C and X frequency bands.



**Figure 1. 1.2M QDA, Series 1138**

### 1.2 Freight Damage

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

### 1.3 Unpacking and Inspection

The antenna containers should be unpacked and inspected at the earliest date to insure that all material has been received and is in good condition. The parts list contained in this manual can be used to identify components.

### 1.4 Material Missing or Damaged

Any questions regarding missing or damaged materials that is not due to the freight carrier should be directed to VertexRSI's Customer Service Department at:

2600 N. Longview Street  
Kilgore, Texas 75662  
903-984-0555

### 1.5 Mechanical Assembly Tools

No tools are required for antenna assembly. All hardware and fasteners are captive to allow for quick deployment of the antenna system. An inclinometer and a compass are recommended to facilitate the installation; however, they are not supplied by VertexRSI.

## **2.0 BEFORE ASSEMBLY**

### **2.1 General**

VertexRSI strongly suggests the antenna user follow the assembly steps precisely to avoid any mistakes that could result in permanent damage to the antenna and/or personal injury. VertexRSI disclaims any liability and responsibility for the results of improper or unsafe assembly, operation and maintenance practices. If technical assistance is required during assembly, please contact VertexRSI's product engineer by calling (903) 984-0555.

### **2.2 Initial Verification**

Upon receipt, the antenna should be inspected for damage and inventoried to verify that all parts were received. The packing instructions in the back of this manual show what parts go in each case. If discrepancies are found, please contact VertexRSI at the above phone number.

### **2.3 Preparation and Site Selection**

Before the actual assembly of the antenna, the user should have the antenna site selected. The user should have the required ballast package or anchor bolts ready before the antenna is assembled, as ballast or anchors are required for the antenna to perform at its rated wind speeds. The recommended anchor bolt lengths are presented below:

When choosing a site on which to erect the antenna, there are some general requirements that need to be followed:

- The antenna should have a clear line of sight to the satellite arc, clear of any trees, buildings or other structures.
- If a ground mount is chosen, the site should be relatively level, free of underground obstructions and not subject to excessive rainfall runoff.
- If a roof mount is selected, a certified professional must verify that the roof will withstand the antenna deadweight load and the additional forces imposed by the wind.
- Other mounting arrangements, such as wall mounts and extended height pole mounts, must be designed or verified by certified professionals to insure performance and prevent hazards to personnel.

**Operation (wind speed up to 18 mph [29 km/h] without ballast or anchors and wind speed of 45 mph [72 km/h] gusting to 58 mph [93 km/h] with ballast or anchors.)**

**Survival (wind speed up to 120 mph [193 km/h] with ballast or anchors and reflector removed.)**

**Anchors:** Anchoring may be accomplished by staking through the holes in the footpad. Minimum recommended anchor diameter is ½" (12.7mm). In concrete the minimum recommended anchor length is 5" (125mm).

**Ballast:** Ballast may be accomplished by applying 110 lb on each footpad or the end of each pedestal leg.

Since soil conditions vary from different types and locations, the antenna user may need to consult local civil engineers or certified professionals to verify the soil conditions for equivalent strength capacity to hold the required anchoring loads.

### 3.0 ANTENNA ASSEMBLY

#### 3.1 Antenna Assembly Overview

VertexRSI's 1.2-meter QDA is quick and easy to assemble. The QDA is designed for deployment by one or two people in less than 6 minutes. During installation please refer to the parts list (Table 1) for identification of the pieces of the antenna.

**Table 1. Parts List**

<b>Part#</b>	<b>Description</b>	<b>Quantity</b>
034127-01	Pedestal Assembly	1
033631-01	Turnbuckle Assembly	3
034014-01	Reflector Assembly (two pieces)	1
034034-01	Feed Boom Assembly	1
035535-01	Feed Boom Struts	2

### 3.2 Pedestal

1. Locate a suitable site (maximum 5° slope preferred).
2. Release pedestal strap and unfold legs.
3. Slide footpads out from center post approximately 2 ft, lifting the center post only enough to slide footpads.
4. Lift straight up on center post until all three legs are fully extended.
5. Lower center post until tension cables carry the pedestal's weight. The pedestal will sit upright, but be very unstable until turnbuckles are in place and tightened down.

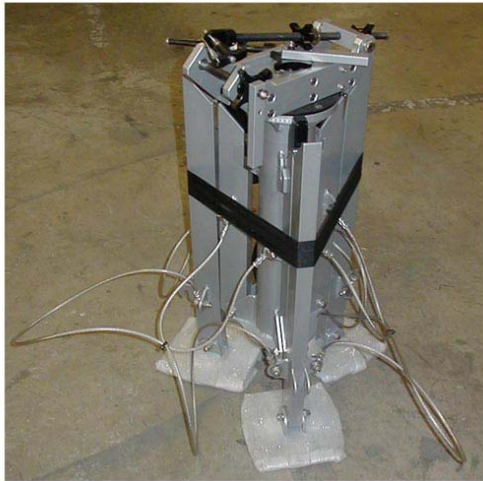
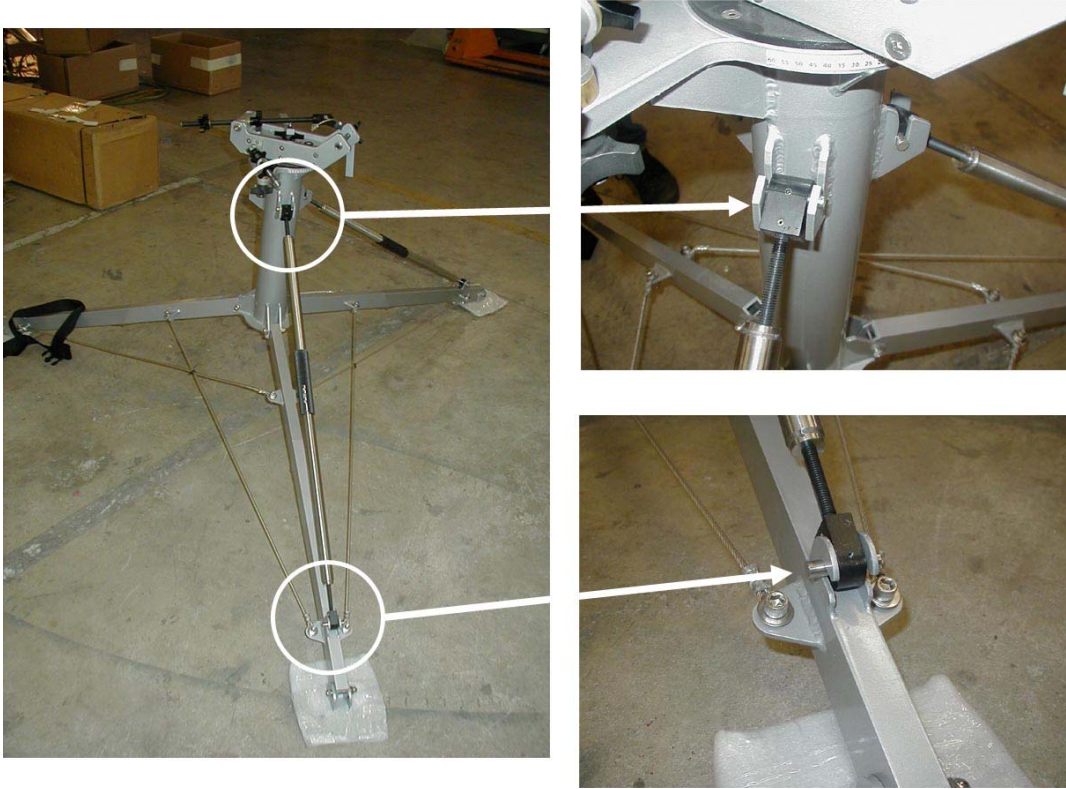


Figure 2. Pedestal Set-Up

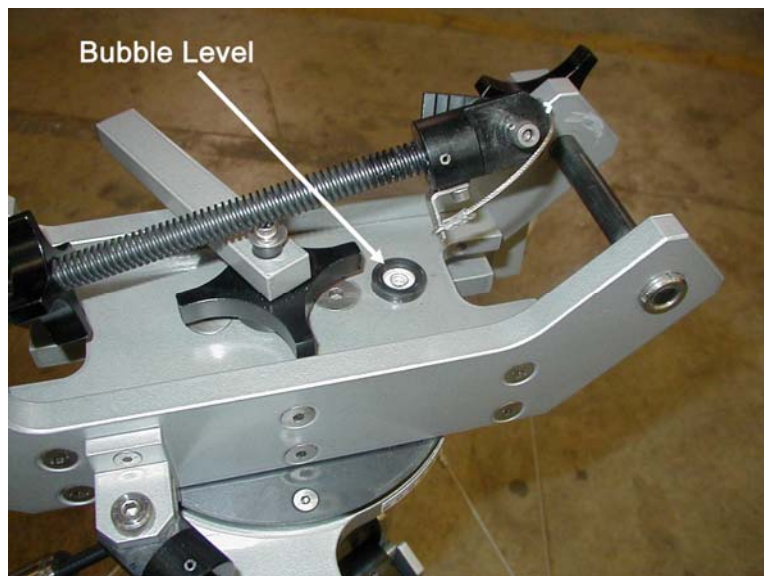


6. Attach turnbuckles to the clevises on the kingpost and each leg. Rotate turnbuckles to level the pedestal (using bubble level) and bring it into tension.

*Note: The turnbuckle assemblies have a low-friction coating to prevent galling that would make it easy to over-tighten. Tension cables should deflect ¼” with the application of 10 pounds force at the cable tie when set to proper tension.*



**Figure 3. Turnbuckle Installation**



**Figure 4. Bubble Level**

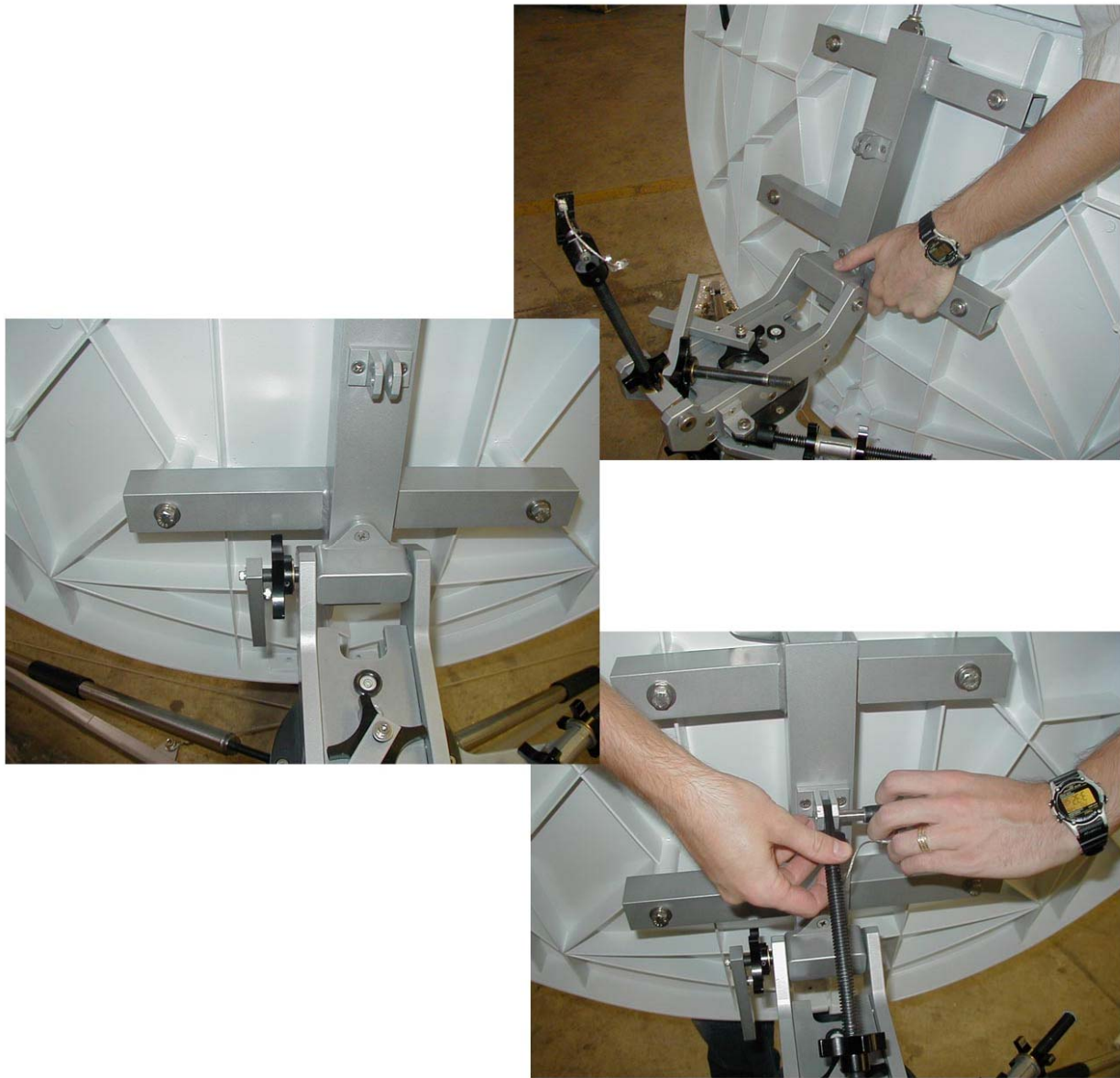
7. Point the side of the tripod interface in the general direction of the intended satellite.

### 3.3 Reflector

The reflector consists of a two-piece (upper and lower halves) offset design with a 17.35° offset angle.

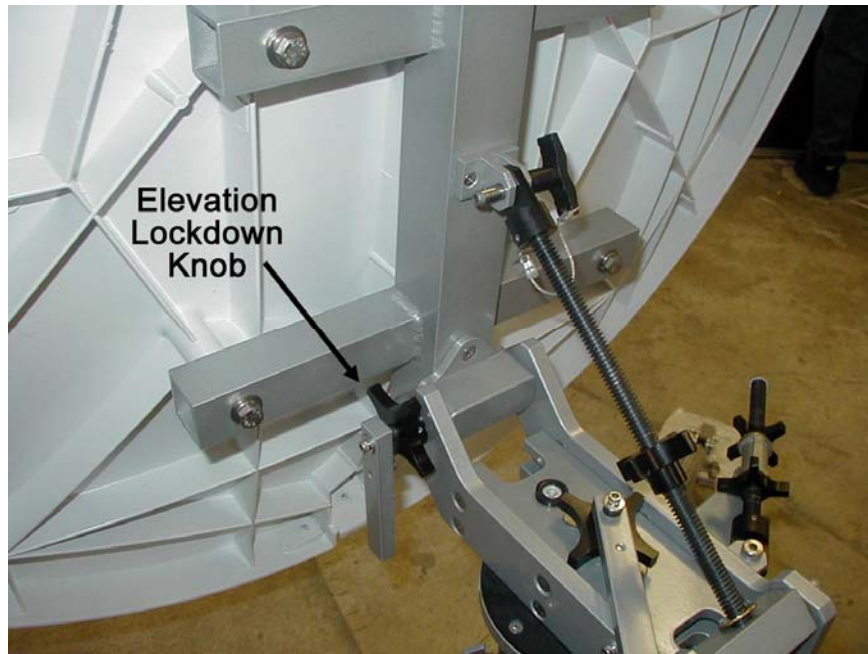
*Note: For ease of installation, mount the lower reflector half to the pedestal before assembling the two reflector halves together. Stand in front of the reflector to connect the lower reflector half to the pedestal.*

1. The lower reflector half has a permanently mounted back frame that interfaces with the positioner in two locations. Connect the back frame to the positioner by inserting the elevation lockdown knob (see Figure 6), but do not fully tighten the knob until the antenna is in position for data transfer to the desired satellite.
2. Connect the back frame to the elevation adjustment rod using the provided ball lock pin.



**Figure 5. Reflector Mounting**





**Figure 6. Installed Lower Reflector Half**

3. Install the upper half of the reflector by placing it on top of the lower half. Push the cam lock handles through the slots on the upper reflector half. Only after all three handles have been inserted through the slots, tighten the handles.



**Figure 7. Cam Lock Handles on Reflector**



### 3.4 Feed Support

The feed support consists of a feedboom and two feedboom support struts. The feedboom mounts directly to the reflector via three thumbscrews on one end, and the other end is supported by the two feedboom struts.

1. Attach the two feed support struts to the reflector ball studs as shown. Push ball sockets firmly on to ball studs until they snap into place.



**Figure 8. Feed Boom Strut Installation**

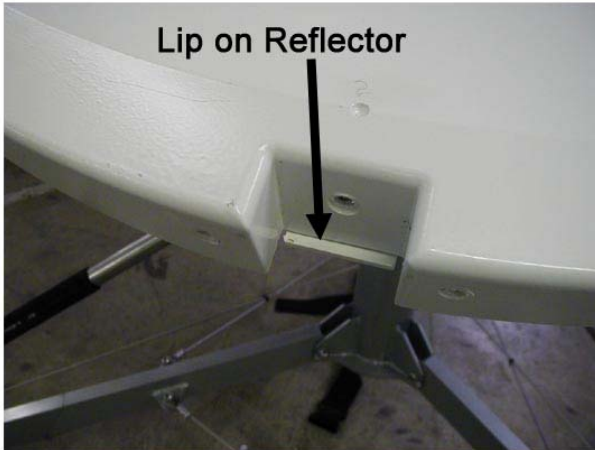
2. Snap the loose ends of the feedboom struts onto the feedboom ball studs.



**Figure 9. Feed Boom Struts Attached to Feed Boom**

3. Hold feedboom in place as shown and thread in all three thumbscrews until there is thread engagement. Tighten the middle thumbscrew first, and then tighten the outer two thumbscrews.

*Note: There is a lip at the back of the reflector to locate the feedboom in the direction of the RF axis. Make sure feedboom is pushed back until it stops up against this lip to ensure proper feed alignment.*



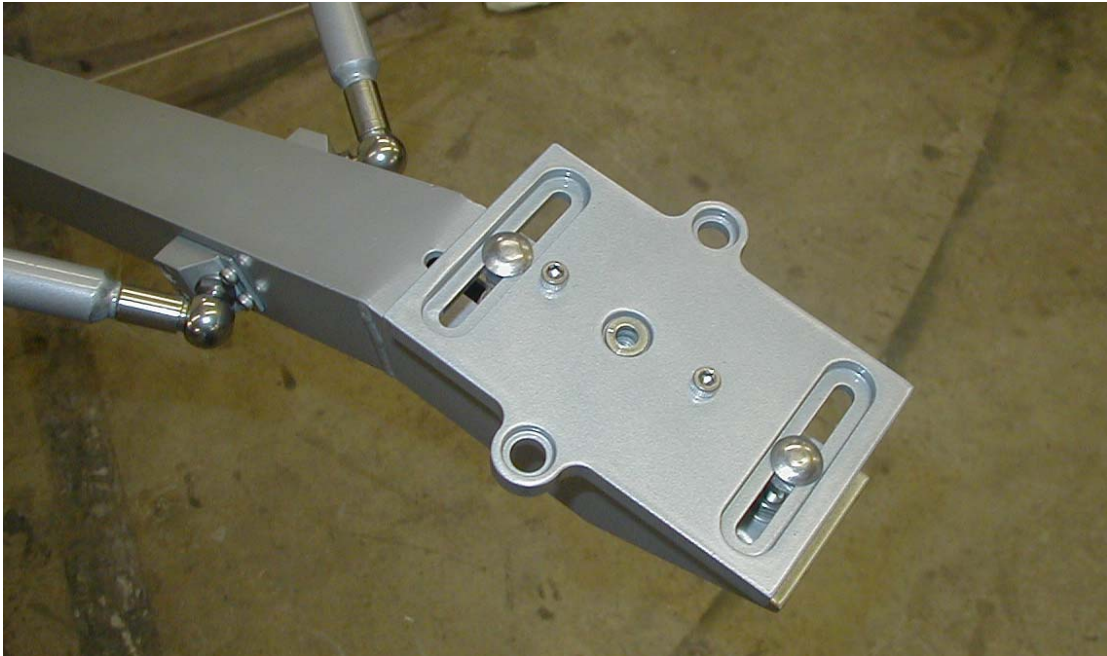
**Figure 10. Feed Boom Installation**



**Figure 11. Feed Boom Installed**

4. Mount the feed onto the feed interface plate.

*Note: The feed, as required per specific system requirements, is installed at the end of the feed boom. Its position is determined by the locating pin and it is secured using the captive thumb screw.*



**Figure 12. Feed Interface Plate**



**Figure 13. Mounted Feed**

*Note: This feed is shown for illustration purposes only. Actual feed may differ in appearance.*



#### 4.0 ANTENNA ANCHORING (NOT PROVIDED BY VERTEXRSI)

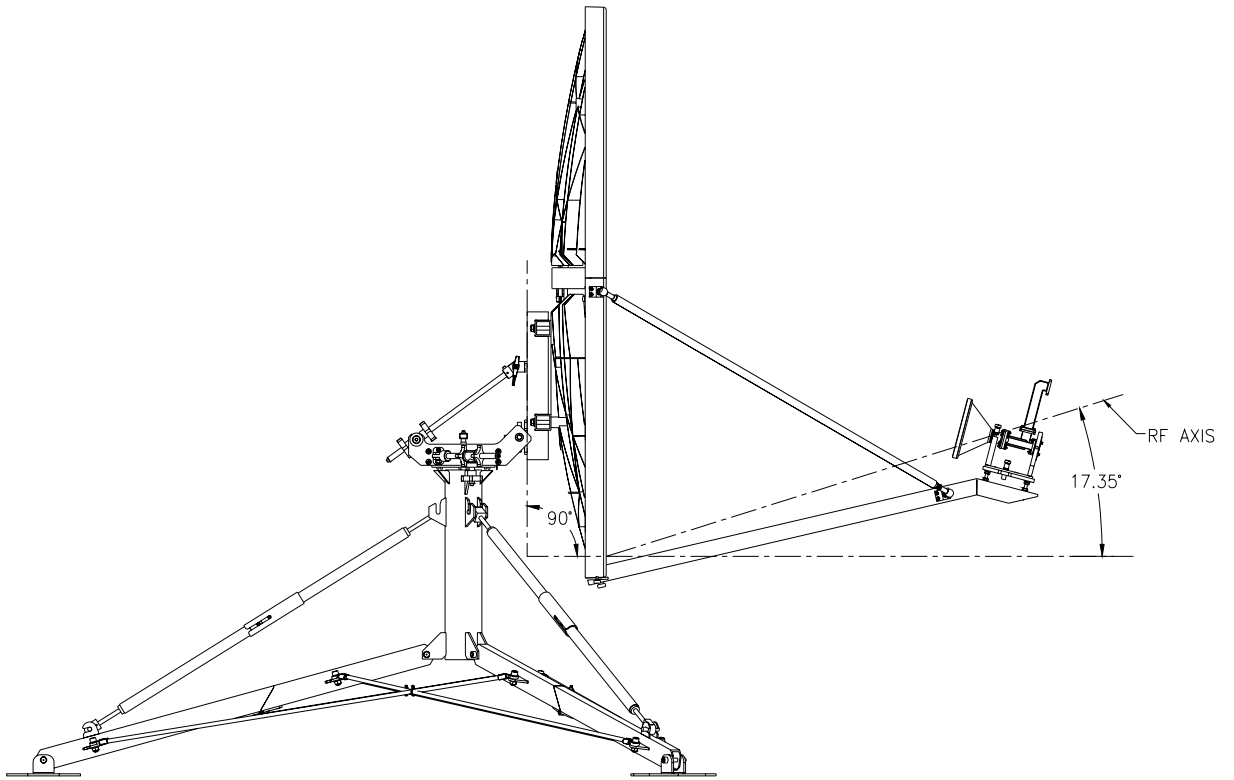
*Note: Since it is impossible to predict every possible antenna site ground condition, the antenna operator has the responsibility to use discretion when choosing an anchoring method. The objective is to provide a solid surface in an area that will not obstruct the pointing of the satellite. In addition, an area shielded from direct wind (and flying debris) will enhance performance. Antenna tie down connections can be made anywhere on the pedestal or outriggers except the foot assemblies. Do not connect tie downs above the elevation axis. Doing so would restrict azimuth motion.*

The following are provided as guidelines for the operator:

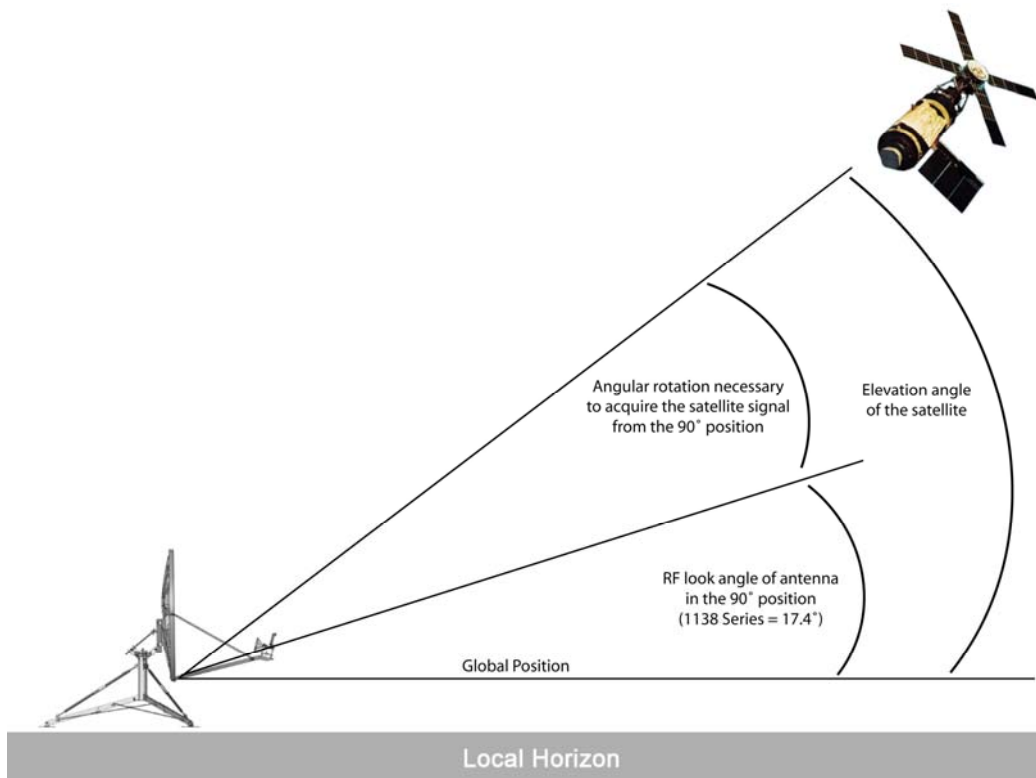
- **General:** Regardless of the anchor used, fastening the antenna to the anchors can be done using a rope or cable tightened with turnbuckles or other tensioners. A minimum of three (3) tie-downs should be used. Sandbagging the pedestal/outriggers will also improve stability. Sandbags may be laid right over the legs and may be used as an alternative to ground anchors.
- **Soft Ground:** In very soft ground, a large (such as 16" x 16" [406mm x 406mm]) wooden or metal pressure pad under the square footpads will be necessary to keep the footpads from sinking into the ground. For anchors consider using deep ground stakes or screw-in type anchors.
- **Concrete and asphalt:** Use sandbags or weights at each outrigger. The pedestal column can also be weighted internally.
- **Building Roof:** Roof surfaces and conditions vary. Choose an area that is firm and not covered by loose material such as gravel.
- **Wooden Platform:** Be sure the decking will not deflect under variable load as this will degrade performance due to pointing inaccuracies. If the surface can be penetrated, use lag or through bolts in the outrigger footpad jack-shaft holes. If the platform cannot be penetrated, use the same method as for concrete.

## 5.0 ANTENNA POINTING TO SATELLITE

1. Begin by leveling the positioner using the bubble level shown in Figure 4. Using the compass (not provided), determine the general direction that the antenna needs to point to acquire the satellite signal. Aim the antenna in that direction such that the reflector is positioned between two of the legs on the pedestal to allow for maximum adjustment in the azimuth plane.
2. The operator is now ready to position the antenna to the elevation of the desired satellite. The operator must know the elevation angle of the desired satellite relative to the global position of the antenna (satellite dish) as shown in Figure 15.
3. Position the antenna so that the face of the reflector (as measured from the reflector back frame) is at  $90^\circ$  with respect to the local horizon (the ground) as shown in Figure 14. In this position the antenna RF angle is equal to the offset angle of the parabolic dish as shown in Figure 15. In the case of the 1.2 QDA (Series 1138) the offset is  $17.4^\circ$ . [If an inclinometer (not provided) is being used, rotate the reflector forward another  $17.4^\circ$  (until the inclinometer reads  $72.6^\circ$ ), so that the RF look angle is  $0^\circ$ . Zero the inclinometer, and then it will read the RF angle.]
4. Using the inclinometer, raise the antenna to the elevation angle of the satellite.
5. At this point the antenna should be pointed in the general direction of the satellite in both the azimuth and elevation planes. Next, loosen the azimuth hardware and begin panning the azimuth plane to locate the satellite. Once it has been located, tighten the hardware and use the fine adjustment hardware to achieve peak signal. Additional adjustment of the elevation may be necessary to locate the satellite. Fine adjustments may also be necessary in the elevation plane to achieve peak signal.
6. The operator must now verify that the antenna is pointed at the correct satellite. This can be accomplished by receiving a signal with a receiver or using a spectrum analyzer to look at the footprint of the satellite; however, this verification process is not part of this procedure.
7. Tighten all hardware used for adjustment.



**Figure 14. RF Axis Angle**



**Figure 15. Determination of Elevation Angle**

## 6.0 ANTENNA DISASSEMBLY AND PACKING

The antenna is shipped in two lightweight, weather resistant cases.

### 6.1 Disassembly

Disassembly of the antenna is the reverse procedure of the assembly. The following caution and general procedures apply during disassembly.

**CAUTION! CARE SHOULD BE EXERCISED WHEN DISMANTLING AND STORING ALL COMPONENTS, ESPECIALLY THE FEED AND REFLECTOR COMPONENTS, SINCE THESE PARTS ARE SELF-ALIGNING AND DAMAGE MAY DEGRADE PERFORMANCE.**

- Store lock pins and hand knob fasteners in their respective pinholes or lugs wherever possible.
- Remove the reflector panels.
- All components should be clean and dry when packed. Lubricate hardware with a spray lubricating oil, such as WD-40™ or Lubrisil™, as needed to prevent seizure and galling.
- Inventory the parts using packing instructions to ensure that all components are packed.
- Be sure the containers are closed and latched securely.

### 6.2 Packing

Once you have disassembled and cleaned the components, follow these packing instructions.

1. Place the three turnbuckle assemblies into case #1 (see Figure 23) under the false floor, as shown in Figure 16.

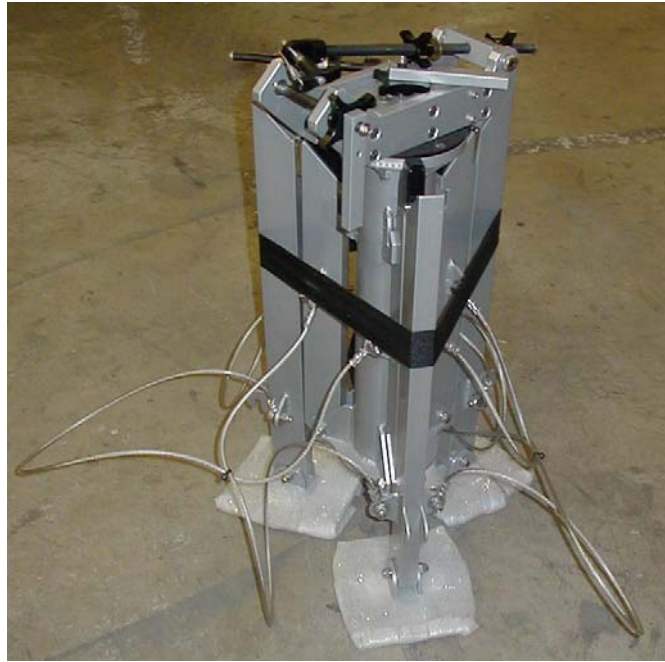


Figure 16. Turnbuckles Packed in Case #1



2. Close the false floor and place the pedestal assembly into the case as shown in Figure 18.

*Note: Make sure the strap is securely fastened around the pedestal legs (see Figure 17).*



**Figure 17. Pedestal Prepared for Shipping**



**Figure 18. Pedestal Packed in Case #1**

3. Pack the feed boom struts into the lid of case #2 (see Figure 23). Snap the ends of the struts into the appropriate brackets and then secure with the Velcro® strap on each end.



**Figure 19. Feed Boom Struts in Shipping Clips**



**Figure 20. Feed Boom Struts Packed in Case #2**

4. Pack the feed boom in the bottom of case #2 and secure it with the Velcro® straps.



**Figure 21. Feed Boom Packed in Case #2**

5. Place the top reflector panel in the front storage area of case #2 and the bottom reflector panel in the rear storage area as shown in Figure 22.



**Figure 22. Reflector Panels Packed in Case #2**





Figure 23. Case #1 (left) and Case #2 (right)

## 7.0 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.

### 7.1 Periodic Inspection

It is suggested that a periodic inspection be performed at least once a month. More frequent inspections should be performed if your antenna is deployed in a harsh environment, such as near saltwater.

*Note: After any severe weather conditions, inspection of the antenna should be performed to determine if foreign objects have caused damage or if survival specifications have been exceeded.*

This inspection should include the following:

1. Check all fastening locations - all bolts and latches should be tight.
2. Check all structural members - repair or replace if damaged.
3. Check for corrosion - on the reflector support structure, tripod, feed support and positioner.

If corrosion is detected, clean the area using a mild detergent and a brush to remove the corrosion. Then dry the area thoroughly and treat it with lubricating oil, such as WD-40™ or Lubrisil™.

### 7.2 Reflector

Occasional cleaning of the reflector (using a simple soap and water mixture) is recommended. The composite construction of the reflector is virtually impervious to any damages that could be caused by weather or atmospheric conditions. It is necessary to inspect for any physical damage done by harsh handling or very severe weather conditions, such as damaged or peeling paint.

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

### 7.3 Feed and Feed Support

The feed support should be inspected to insure that all hardware is secure. The feed horn window should be inspected to insure that it is intact. Replace if damaged.

## 8.0 WARRANTY

VertexRSI warrants the items ordered hereunder at the same time of shipment to be free from defects in material, workmanship, and to conform to the contract specification. VertexRSI's liability under this Warranty shall terminate one (1) year after date of antenna acceptance or eighteen (18) months from the date of shipment, whichever comes first. Written notice of any defects shall be given VertexRSI upon discovery and VertexRSI shall promptly correct such defects by repair or replacement, at its option, without charge either FCA VertexRSI's plant or service in the field. In no event, shall VertexRSI's liability under this Warranty exceed the cost of repair or replacing such defective items and under no circumstances shall VertexRSI be liable for special or consequential damages.

Specifically excluded from the terms of this Warranty are:

1. Defects or non-conformance caused by and resulting from improper operation, maintenance or storage of the equipment.
2. Items of characteristically indeterminate life such as bulbs, fuses, etc.

THIS WARRANTY CONSTITUTES VertexRSI'S SOLE AND EXCLUSIVE LIABILITY HEREUNDER AND BUYER'S SOLE AND EXCLUSIVE REMEDY FOR DEFECTIVE OR NONCONFORMING ITEMS AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS, IMPLIED, OR STATUTORY (INCLUDING THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE).