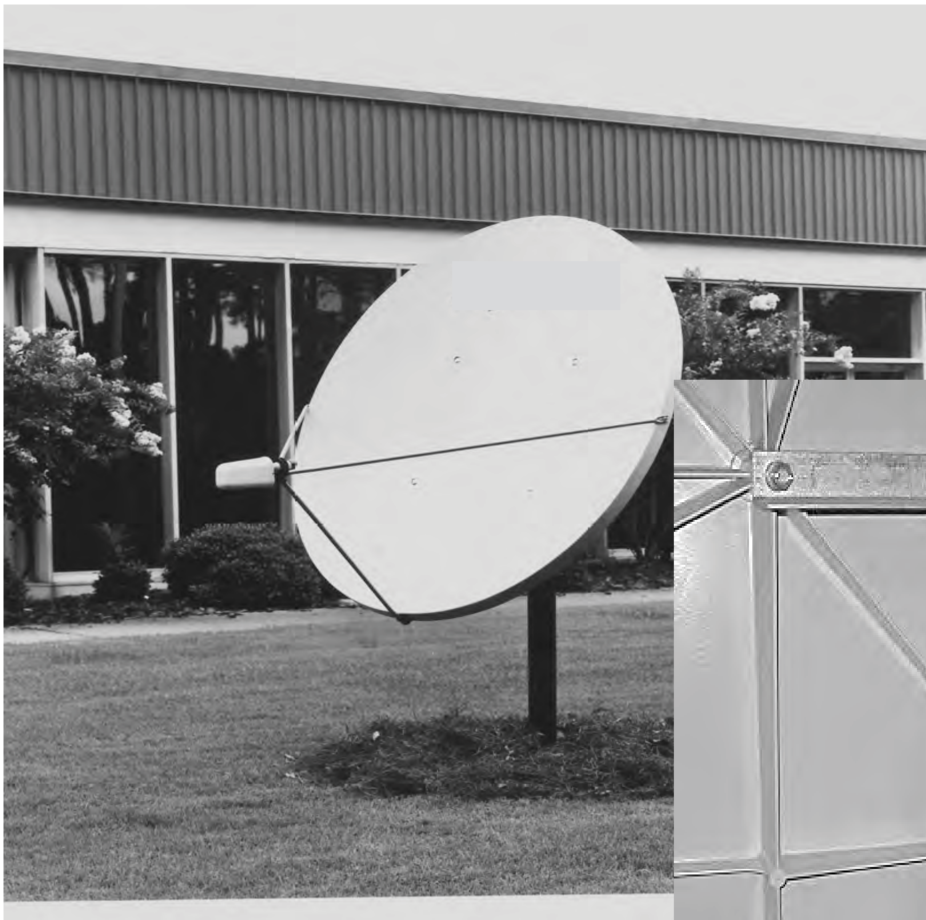
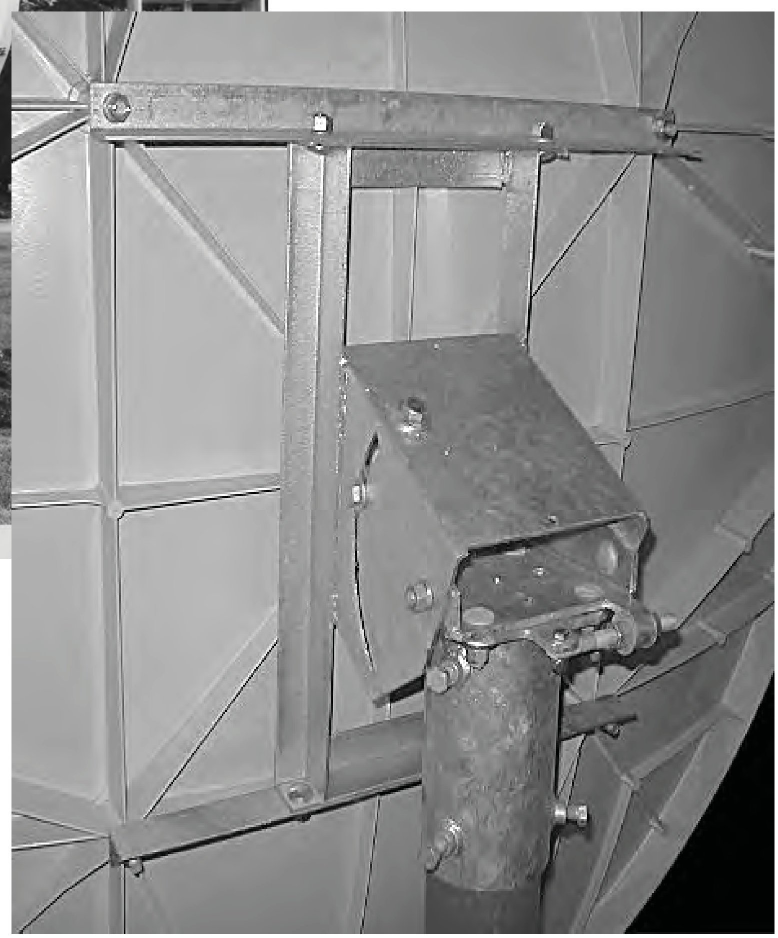
Assembly Instructions

8000352-03

Type 180 Antenna System

1.8 Meter Reflector with Az/El Cap Mount





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MANUAL REVISION HISTORY

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11/08	5079577	Rev A
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05/13	EC-01728	Rev D

WARRANTY

Skyware Global CORPORATION
VERY SMALL APERTURE TERMINAL (VSAT) PRODUCTS
TWELVE (12) MONTH LIMITED WARRANTY

Seller warrants that all Skyware Global manufactured VSAT products are transferred rightfully and with good title; that they are free from any lawful security interest or other lien or encumbrance unknown to Buyer. Seller also warrants that for a period of twelve (12) months from the date of shipment from Seller's factory, all its VSAT products shall be free from defects in material and workmanship which arise under proper and normal use and service. Buyer's exclusive remedy hereunder is limited to Seller's correction (either at its plant or at such other place as may be agreed upon between Seller and Buyer) of any such defects by repair or replacement at no cost to Buyer, except for the costs of any transportation in connection with the return of the defective VSAT products to be replaced or repaired, and the costs to remove and/or reinstall the products, which shall be borne by Buyer. The limited warranty period shall not be extended beyond its original term with respect to any part or parts repaired or replaced by seller hereunder.

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In some jurisdictions, Buyer may have other rights under certain statutes that may imply non-excludable warranties. No representative is authorized to assume for Seller any other liability in connection with the VSAT products.

DO NOT DISCARD CONTENTS
The product in this packaging was placed in the market after August 13, 2005. Its components must not be discarded with normal municipal or household waste.

Contact your local waste disposal agency for recovery, recycling, or disposal instructions.

INTRODUCTION

This manual covers the assembly and installation of the Skyware Global 1.8 m SMC offset antenna system. Read this manual thoroughly before beginning assembly. For best results in the assembly process, perform each step in the same sequence as listed in this manual.

UNPACKING AND INSPECTION

Shipping cartons should be unpacked and contents checked for damaged or missing parts. Should there be any parts that are damaged or missing, contact Skyware Global at the location on the front of this manual.

BOLT TORQUE

DIN Class 5.6

M6	**M8**	**M12**	**M16**	**M20**	**M22**
5 N-m	15 N-m	51 N-m	125 N-m	168 N-m	230 N-m
4 ft-lb	11 ft-lb	32 ft-lb	38 ft-lb	92 ft-lb	124 ft-lb

DIN Class 8.8

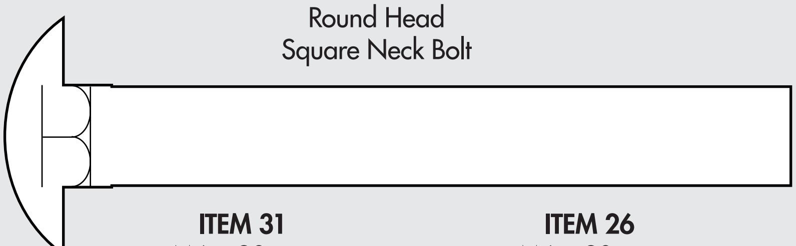
M8	**M12**	**M16**
24 N-m	90 N-m	203 N-m
18 ft-lb	66 ft-lb	150 ft-lb

Exceptions To The Chart Above:

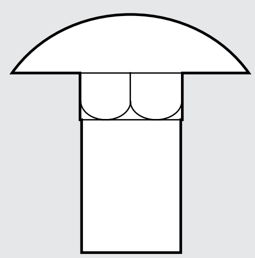
M12 x 100 Round Head Square Neck Bolt	(20 ft-lb)	(Securing Antenna to AZ/EL Cap)
M6 x 20 Hex Head Bolt	(4 ft-lb)	(Securing Clamp to Junction Block)
M6 x 30 Hex Head Bolt	(4 ft-lb)	(Securing Side Feed Legs to Junction Block and Antenna)

HARDWARE SORTER

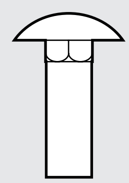
ITEM 2
M12 x 100 mm
Round Head
Square Neck Bolt



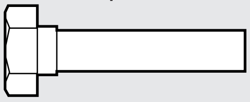
ITEM 17
M12 x 25 mm
Round Head
Square Neck Bolt



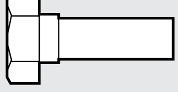
ITEM 38
M6 x 20 mm
Round Head
Square Neck Screw



ITEM 31
M6 x 30 mm
Hex Head
Cap Screw



ITEM 26
M6 x 20 mm
Hex Head
Cap Screw



Note: Hardware illustrations are actual size.
Place hardware on top of illustration to identify.

INTRODUCTION

Recommendations for Site Selection, Assembly Tools Required for assembly, a Pre-installation Checklist and a hardware sorter have been included in this section to help you prepare for installing the 1.8m Offset Antenna System.

Read this section to insure optimum antenna performance and to make the assembly and installation process as efficient as possible by having the tools and materials at hand.

SITE SELECTION

The main objective of conducting a site survey, utilizing a compass and clinometer, is to choose a mounting location on the roof or ground that will give you the greatest amount of swing for azimuth and elevation for present as well as future use.

A pre-installation site survey is strongly recommended because it can alert you to any "look angle", soil, or other problems.

The first and most important consideration when choosing a prospective antenna site is whether or not the area can provide an acceptable "look angle" at the satellite. A site with a clear, unobstructed view facing south, southeast or southwest is required. Your antenna site must be selected in advance so that you will be able to receive the strongest signal available. Also consider obstructions that may occur in the future such as the growth of trees. It is important to conduct an on-site survey with a portable antenna or with a compass and clinometer to avoid interference, obstructions, etc.

When selecting "look angle", be sure to observe and take readings approximately 10° to the left and right, above and below your selected "look angle". Before digging is done, information regarding the possibility of underground telephone lines, power lines, storm drains, etc., in the excavation area should be obtained from the appropriate agency.

Because soils vary widely in composition and load capacity, consult a local professional engineer to determine the appropriate foundation design and installation procedure. A suggested foundation design with conditions noted is included in this manual for reference purposes only (see page 4). To assist in the foundation design, refer to Antenna Wind loads in Appendix A on page 14.

Before Roof Mount installation, it must be determined that the roof used for mounting the antenna is structurally sound. If in doubt, have it checked by an architect or structural engineer. It is the customer's responsibility that proper construction techniques and applicable codes are adhered to. As with any other type of construction, a local building permit may be required before installing an antenna. It is the property owner's responsibility to obtain any and all permits.

ASSEMBLY TOOLS AND PRE-INSTALLATION CHECKLIST

REQUIRED ASSEMBLY TOOLS

1 - Compass
1 - Precision Clinometer
1 - 228 mm or 9" Magnetic Level
1 - Phillips Screwdriver

1 - Torque Wrench
1 - Ratchet Wrench (13 mm or 1/2" Drive)
1 - 19 mm or 3/4" Socket (1/2" Drive)
1 - 19 mm or 3/4" Deep Socket (1/2" Drive)
(For bottom two Round Head Square Neck Bolts securing Antenna to AZ/EL Cap)

1- 0 mm Nut Driver
1- 0 mm Box/Open End Wrench

PRE-INSTALLATION CHECKLIST

All Installations:
- o Grounding Rod Clamp and Grounding Block: As required by the National Electric Code or local electric code.
- o Ground Wire: #10 solid copper or as required by the National Electric Code or local electric code. (Length required)
- o Coaxial Cable: (Size and length required)

Ground Pole Installations:
- o Concrete: (See Ground Pole Section for quantity.)
- o #3 Rebar: (See Ground Pole Section for quantity.) Deformed steel per ASTM A615, Grade 40 or 60.

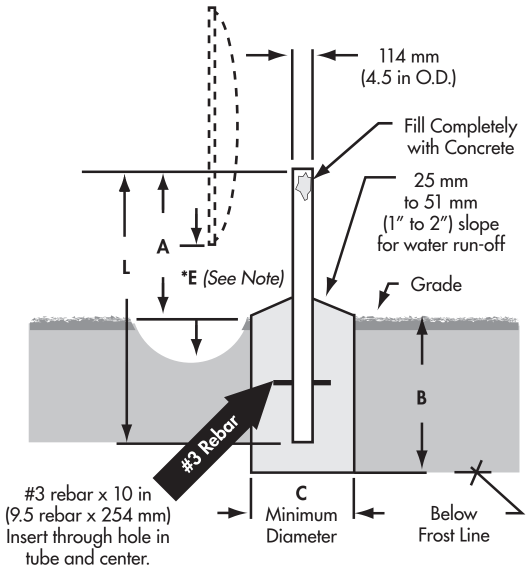
GROUND POLE INSTALLATION

Soil conditions vary and you should consult with a local professional engineer for modifications, if any, to suit local soil conditions and code requirements.

Designs based on allowable vertical soil bearing pressure of 2000 psf and 125 mph wind velocity. Minimum compressive Strength of concrete shall be 2500 psi at 28 days.

DESIGNS SHOWN BELOW DO NOT REPRESENT AN APPROPRIATE FOUNDATION FOR ANY SPECIFIC LOCALITY OR ANTENNA INSTALLATION. THEY ARE PROVIDED FOR REFERENCE PURPOSES ONLY.

Pier Foundations



Reflector Size: 1.8 m

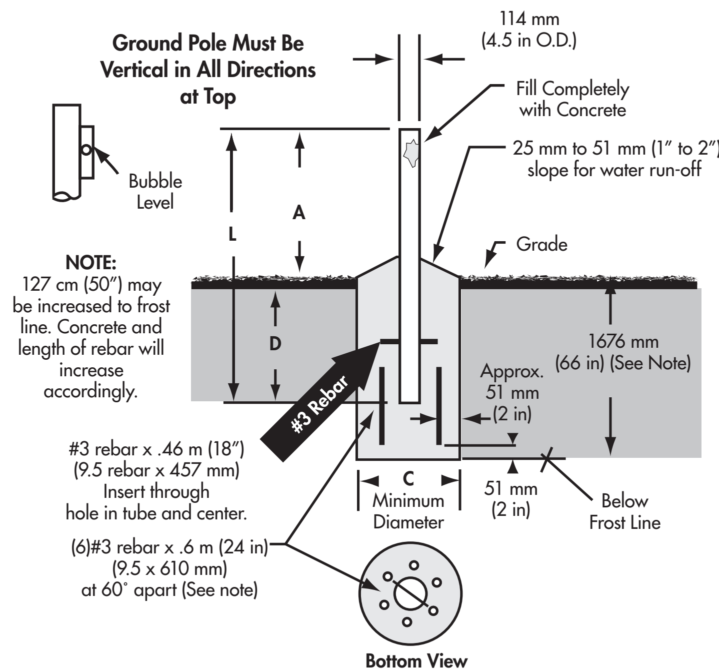
Concrete Dimension

L	A	B	C	E
2438 mm	1270 mm	1359 mm	914 mm	424 mm
(96 in)	(50 in)	(53 in)	(36 in)	16.7 in

Concrete Volume: .84 m^3 (1.1 yd^3)

NOTE: *Clearance increases at elevations greater than 23˚*

Deep Frost Line Foundations



Reflector Size: 1.8 m

Concrete Dimension

L	A	D	C
2438 mm	1359 mm	1092 mm	737 mm
(96 in)	(53 in)	(43 in)	(29 in)

Concrete Volume: .72 m^3 (.94 yd^3)

NOTE: *1676 mm (66 in) may be increased, concrete and length of rebar will increase accordingly.*

POLE SPECIFICATIONS
Ground Pole - 4.50 O.D. SCH 40 (4.026 I.D.) Steel - (Metric = 114.3 O.D. x 102.3 I.D. mm)

NOTE:
1. Poles are not supplied (purchased locally to ASTM A501) and must be field drilled 5/8″ Dia (15.9mm) for M10 #3 rebar, drilled .218 (5.55mm) for 1/4 - 20 self tapping grounding screw and galvanized or painted for protection.
2. Pole and foundation design based on the following criteria:
   - **a.** Uniform building code Exposure C and 1.5 stability factory.
   - **b.** Vertical soil pressure of 2000 pounds per square foot. (9765 Kilograms/meter square).
   - **c.** Lateral soil pressure of 300 pounds per square foot. (145 Kilograms/meter square).
   - **d.** Concrete compressive strength of 2500 pounds per square inch (176 Kg/Cm2) in 28 days.

CAUTION: The foundation design shown does not represent an appropriate design for any specific locality, since soil conditions vary and may not meet design criteria given in Note 2. You should consult a local professional engineer to determine you soil conditions and Appropriate foundation.

ASSEMBLY AND INSTALLATION

NOTE: 10mm tools fit M6 hardware. Recommendations for Site Selection, Assembly Tools Required for Assembly, a Pre-Installation Checklist and a Hardware Sorter are provided in this manual for your convenience.

The AZ/EL cap can be installed on a ground pole or roof mount support. Mount should be assembled and in place, or ground pole set, before installing the AZ/EL cap.

NOTE: For ground pole installations, allow concrete to cure before proceeding with installation.

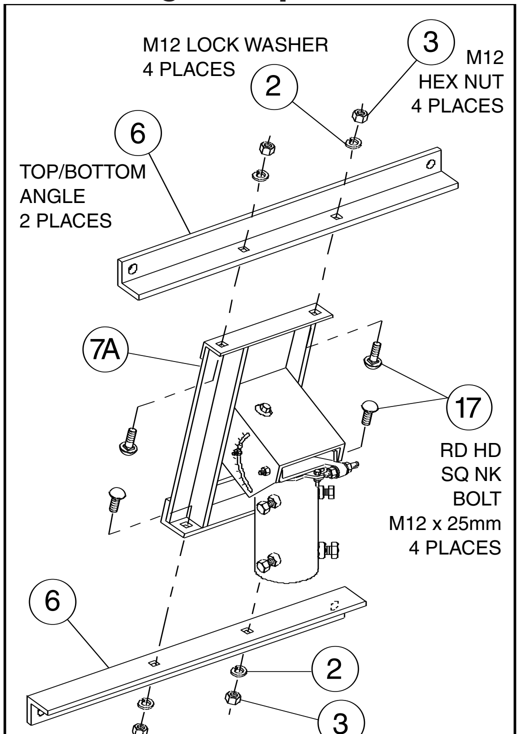


FIGURE 1.0

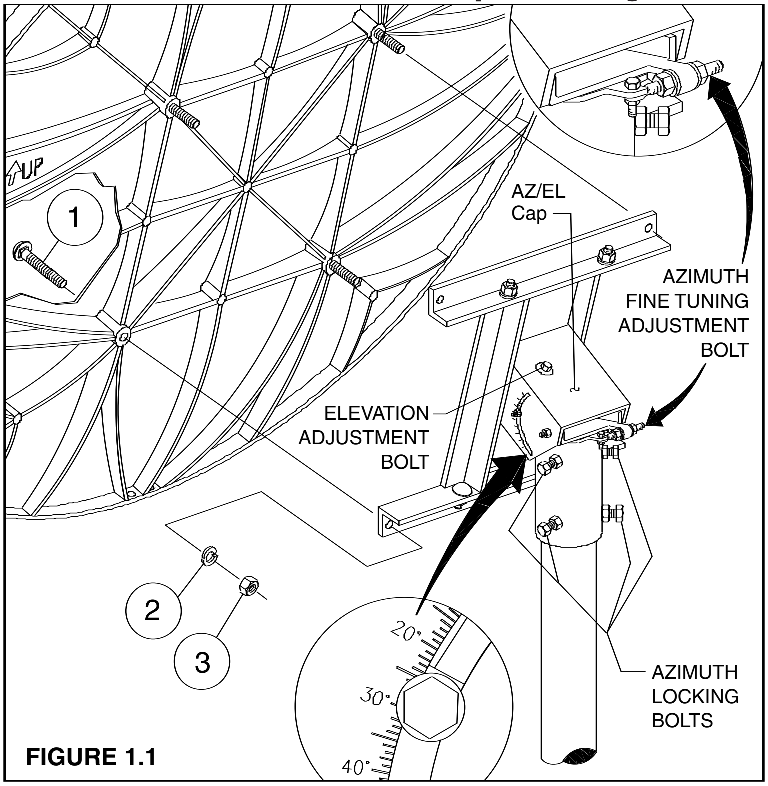


FIGURE 1.1

AZ/EL FRAME ASSEMBLY (FIGURE 1.0)

Assemble top/bottom angles (6), to housing frame (7A) with M12 x 25mm round head square neck bolts (17), lock washers (2), and hex nut (3), as shown in Figure 1.0. M12 hex nuts (3), must be finger tight.

INSTALLING AZ/EL CAP ON GROUND POLE

Back out (do not remove) the four azimuth locking bolts from AZ/EL cap. Install cap onto top of ground pole or base tube. To hold the AZ/EL cap in place while installing antenna, temporarily tighten one of the azimuth locking bolts.

INSTALLING REFLECTOR TO AZ/EL CAP

Insert M12 x 100mm round head bolts (1) into Reflector mounting holes, as shown in Figure 1.1. Lift Reflector and align mounting bolts with holes in AZ/EL cap. Secure with M12 lock washers (2) and hex nuts (3).Torque to 20 ft-lbs(27 N-m).

IMPORTANT: For correct orientation of Reflector, the"UP"arrow must be as shown in Figure 1.1 and Figure 1.2.

After M12 x 100mm Reflector bolts are torqued, then torque top/bottom angle bolts (17) and hex nuts (3) to 38ft-lbs (51 N-m).

FEED & FEED LEGS INSTALLATION

Refer to Manufacturer's Instructions packed with feed to assemble and install feed assembly.

Insert bottom feed leg (33) into clamp (39) and align hole in feed leg with alignment pin inside clamp. Install bottom feed leg (33) with clamp (39) onto bottom edge of antenna, securing with two M6 x 20mm round head square neck bolts, lock washers and hex nuts (35, 36 and 38). Do not tighten.

NOTE: Bottom feed leg is the one with open round ends on both ends and a lance on one end and alignment hole in opposite end. Insert end with hole into bottom feed leg clamp (39).

Install side feed legs (30) to sides of antenna (37) as shown in Figure 1.2. Secure with M6 x 20mm hex bolt, lock washer and hex nut (34, 35 and 36). Do not tighten.

Insert one side feed leg (30) into junction block (29) and secure with M6 x 30mm hex bolt and flat washer (31 and 32). Do not tighten.

Insert bottom feed leg (33) into junction block (29) until lance on leg is engaged.

Insert opposite side feed leg (30) into junction block (29) and secure with M6 x 30mm hex bolt and flat washer (31 and 32).

IMPORTANT: Tighten and torque hardware securing side feed legs and bottom feed leg to junction block and antenna to 4 ft-lbs (5.4 N-m).

Refer to Manufacturer's Instructions to assemble and install feed assembly.

Use bottom feed leg as conduit and route coaxial cable up thru leg. Leave approximately 12" of length beyond junction block. Install "F" connector onto cable for assembly to LNB.

NOTE: OTHER FEED ASSEMBLIES MAY USE DIFFERENT FEED LEGS. REFER TO SUPPLEMENTAL INSTRUCTIONS PACKED WITH THE FEED LEGS.

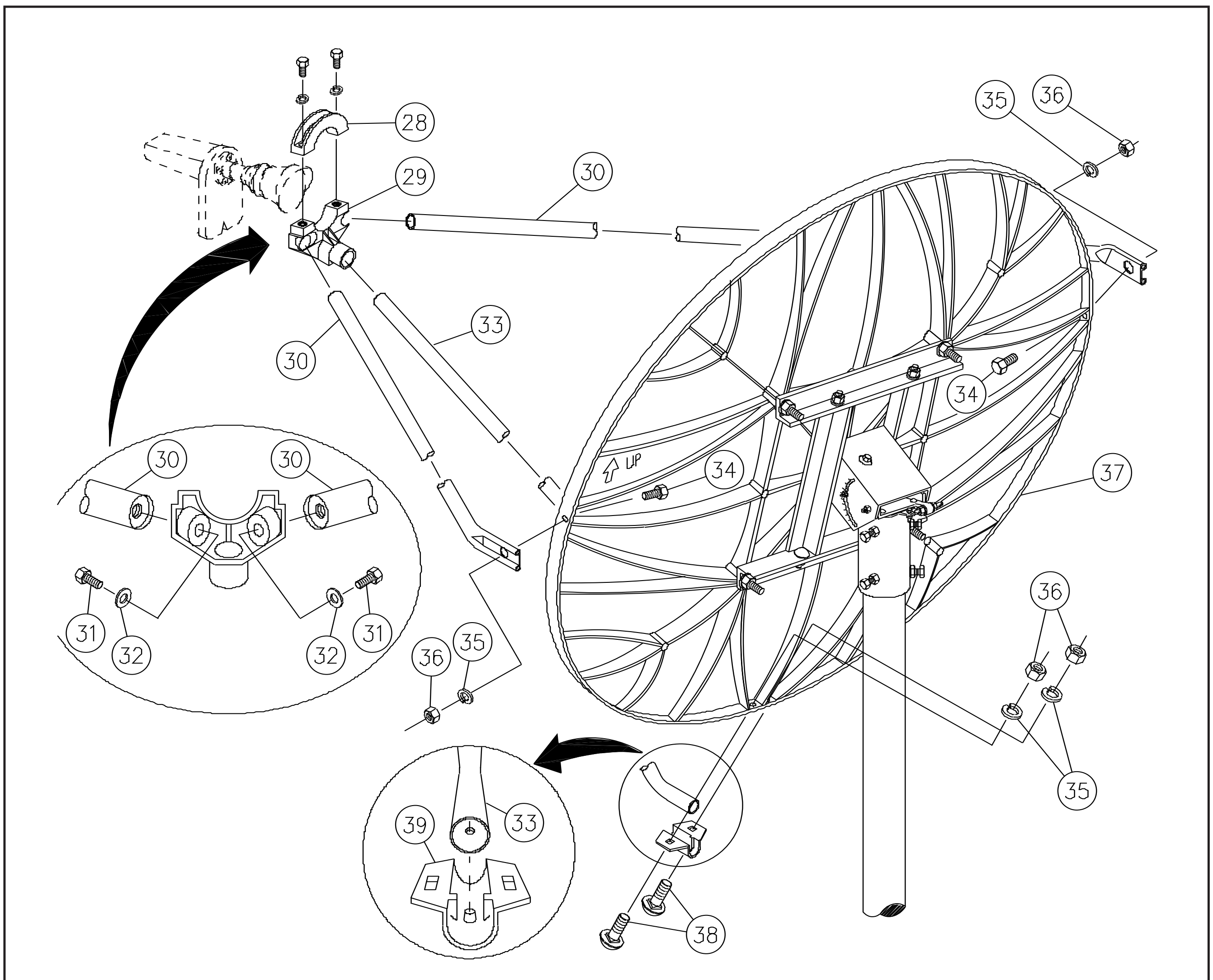


FIG. 1.2 - INSTALLING FEED AND FEED SUPPORT LEGS TO ANTENNA

Alignment with the satellite is obtained by setting polarization, elevation, and azimuth. Charts 1, 2 and 3 are to determine the values for your earth station antenna site. "ΔL" is the difference between the earth station antenna site longitude and the satellite longitude. Use "ΔL" and your earth station latitude to obtain polarization, elevation or azimuth setting.

Elevation Alignment

Refer to Chart 1 to determine your elevation setting.
IMPORTANT: Before adjustment, loosen the two bolts (13) (18) on each side of this housing (1/2 turn). Re-tighten all four bolts after adjustment is completed.
Turn elevation adjustment bolt, Item 9, clock-wise, to decrease elevation, and counterclockwise to increase elevation. Align the edge of bracket with the appropriate mark at the desired elevation reading (See Figure 2.0).This will be an approximate setting. Optimum setting will be achieved when Fine Tuning. Refer to Figure 2.3.
NOTE: When the reflector face is vertical,while the beam elevation (beam) axis is 22.62°,the offset angleof the antenna.(See Appendix,Outline Drawing,Page 14).

Azimuth Alignment

Use Chart 3 and determine your azimuth setting. **Values in chart must be adjusted for magnetic deviation for your location for correct compass reading.** Equally tighten the four azimuth locking bolts (15) until snug, and back off 1/8 turn. This will allow azimuth rotation with slight resistance, without AZ/EL cap tilting on pole. Rotate the reflector and AZ/EL cap, pointing it to the correct compass reading for your location and satellite. Refer to Figure 2.1. If desired signal is not found, increase or decrease elevation setting and repeat the azimuth sweep until desired signal is found. Tighten progressively (1/8 turn each) all four azimuth bolts (15).Repeat until 70-80 ft-lbs (95-108 N-m) torque is reached.

Fine Tuning

Snug tighten hex bolt/nut in curved slots (13) and pivot bolts (18) (refer to Figure 2.0). Use a signal strength measuring device for final adjustments to obtain maximum antenna performance. Alternate between elevation and azimuth fine tuning to reach maximum signal strength, until no improvement can be detected. Top plate locking bolts (18), 4 places, should be torqued to 6-8 ft-lbs (8-11 N-m). See Figure 2.3. Turn the azimuth adjusting nuts (3) clockwise or counter clockwise for azimuth fine tuning. Tighten and torque all hardware(refer to Torque Chart on Page 2).

Polarization of Feed

Loosen two feed horn clamp bolts (26) and turn feed clockwise or counterclockwise, depending on being east or west of the satellite as shown on Chart 3. Align marks on the horn clamp and appropriate mark on the horn scale. Polarization chart assumes antenna system polarization is Tx vertical and satellite vertical Pol is perpendicular to plane of geostationary arc. For horizontal Tx of antenna, feed must be rotated 90° from values shown. Starting point for polarization adjustment is 0°, as shown in figure 2.0. Tighten and torque clamp bolts to 4 ft-lbs (5.4 N-m), after setting.

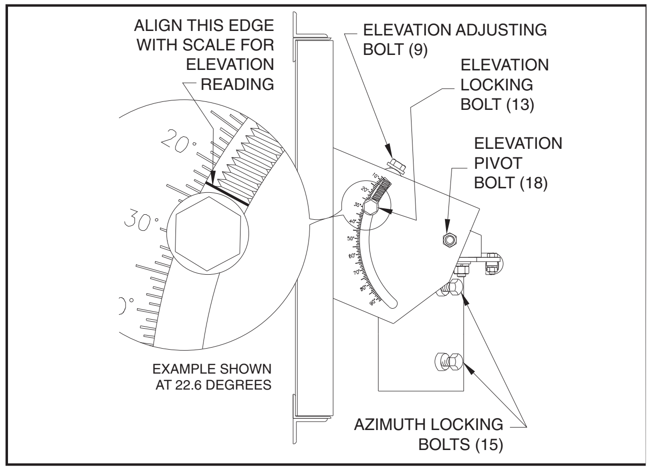


FIG. 2.0 - SETTING ANTENNA ELEVATION

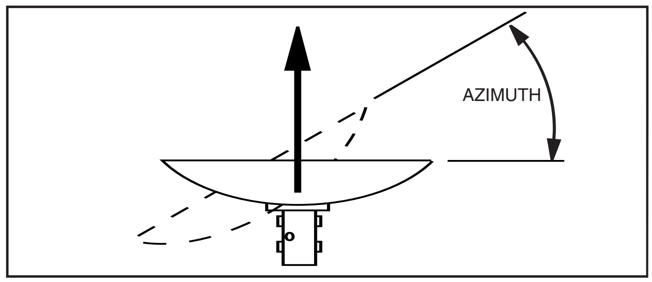


FIG. 2.1 - ROTATING ANTENNA FOR AZIMUTH

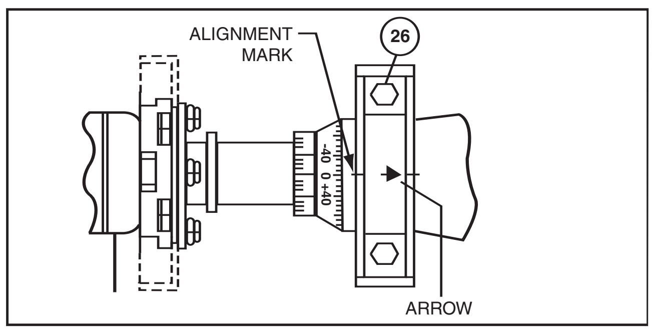


FIG. 2.2 - POLARIZATION OF FEED

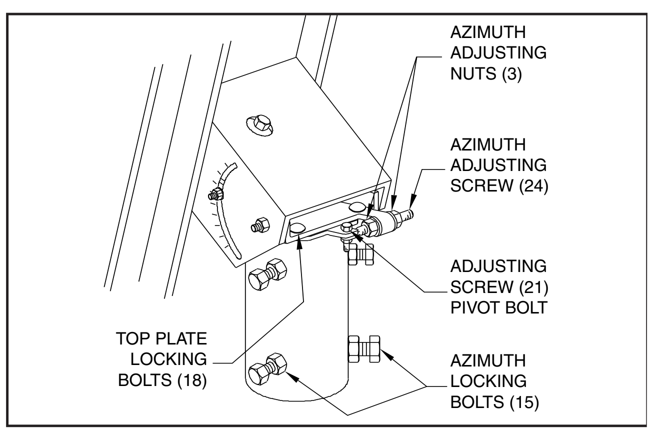


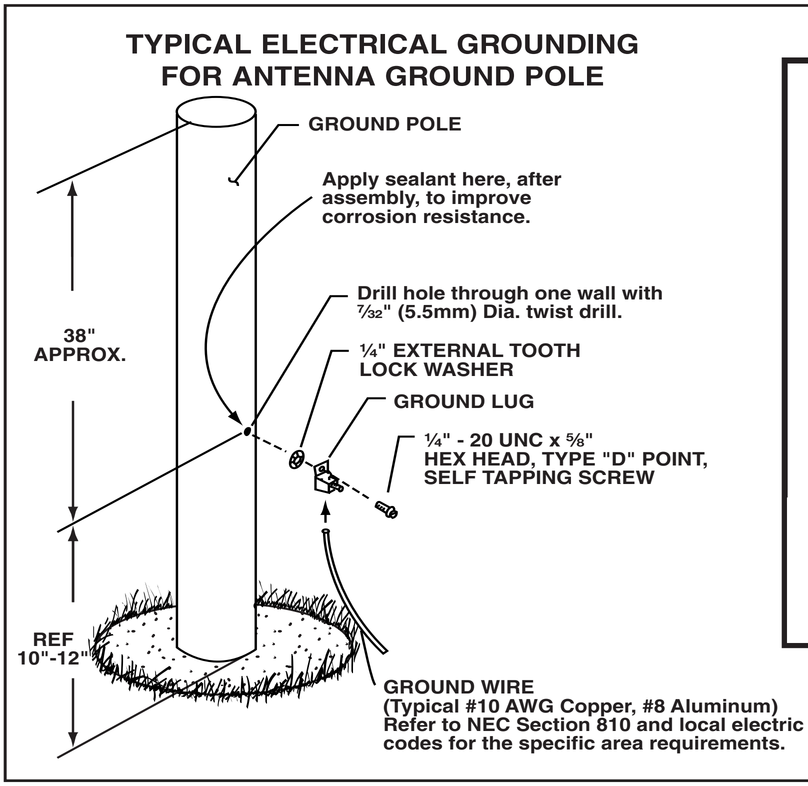
FIG. 2.3 - AZ/EL CAP MOUNT w/AZ FINE TUNE

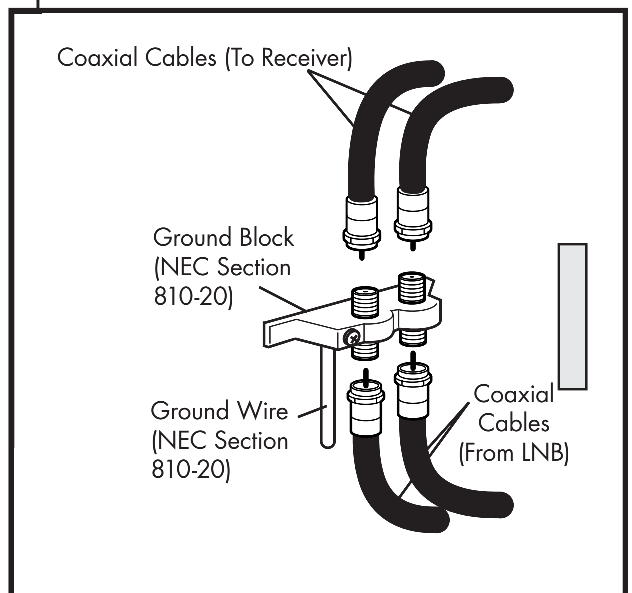
GROUNDING

ALL INSTALLATIONS TO CONFORM TO THE LATEST ISSUE OF THE NATIONAL ELECTRIC CODE.

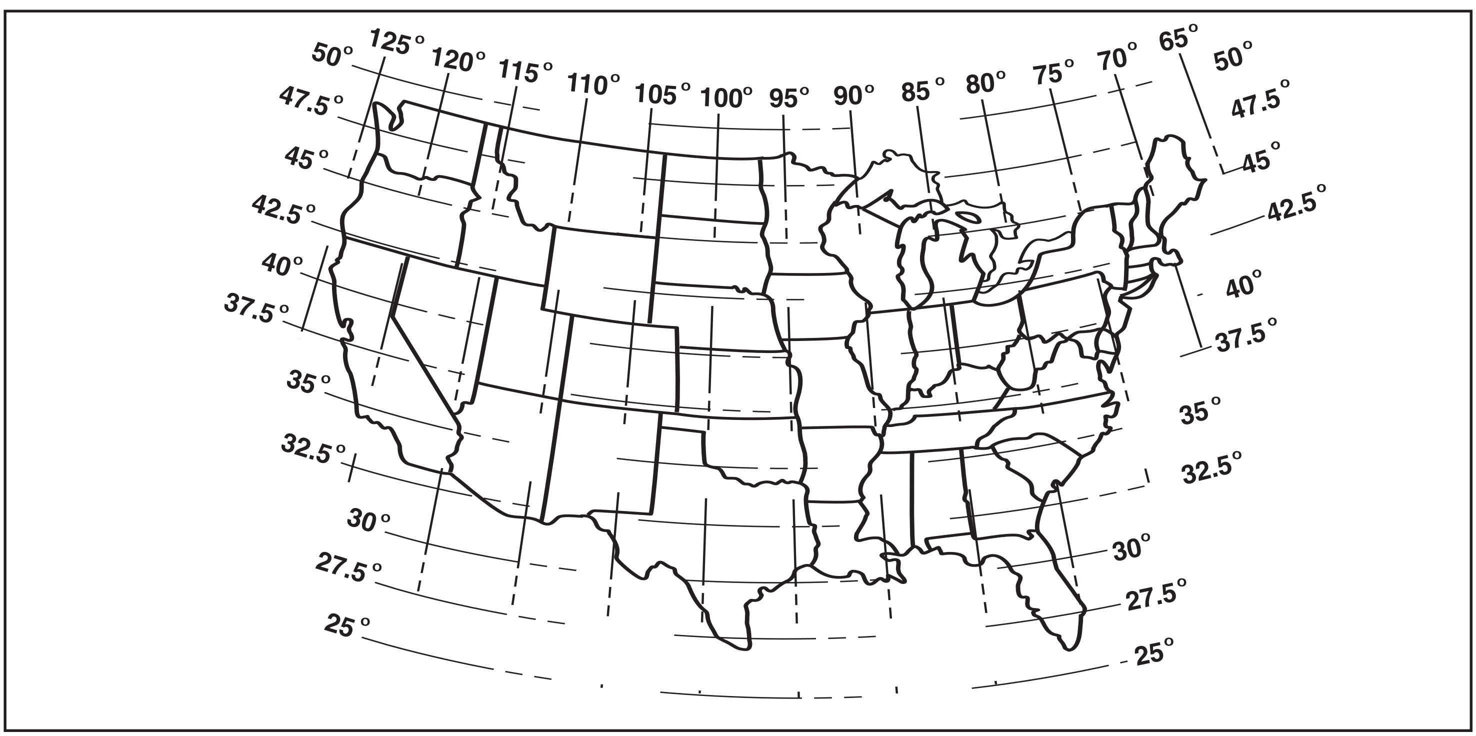
Ground pole, antenna mount assembly and feed cables must be grounded in accordance with current National Electric Code and local electric codes to protect from surges due to nearby lightning strikes.

Clamps that provide a solid connection between ground wire and ground source should be used.





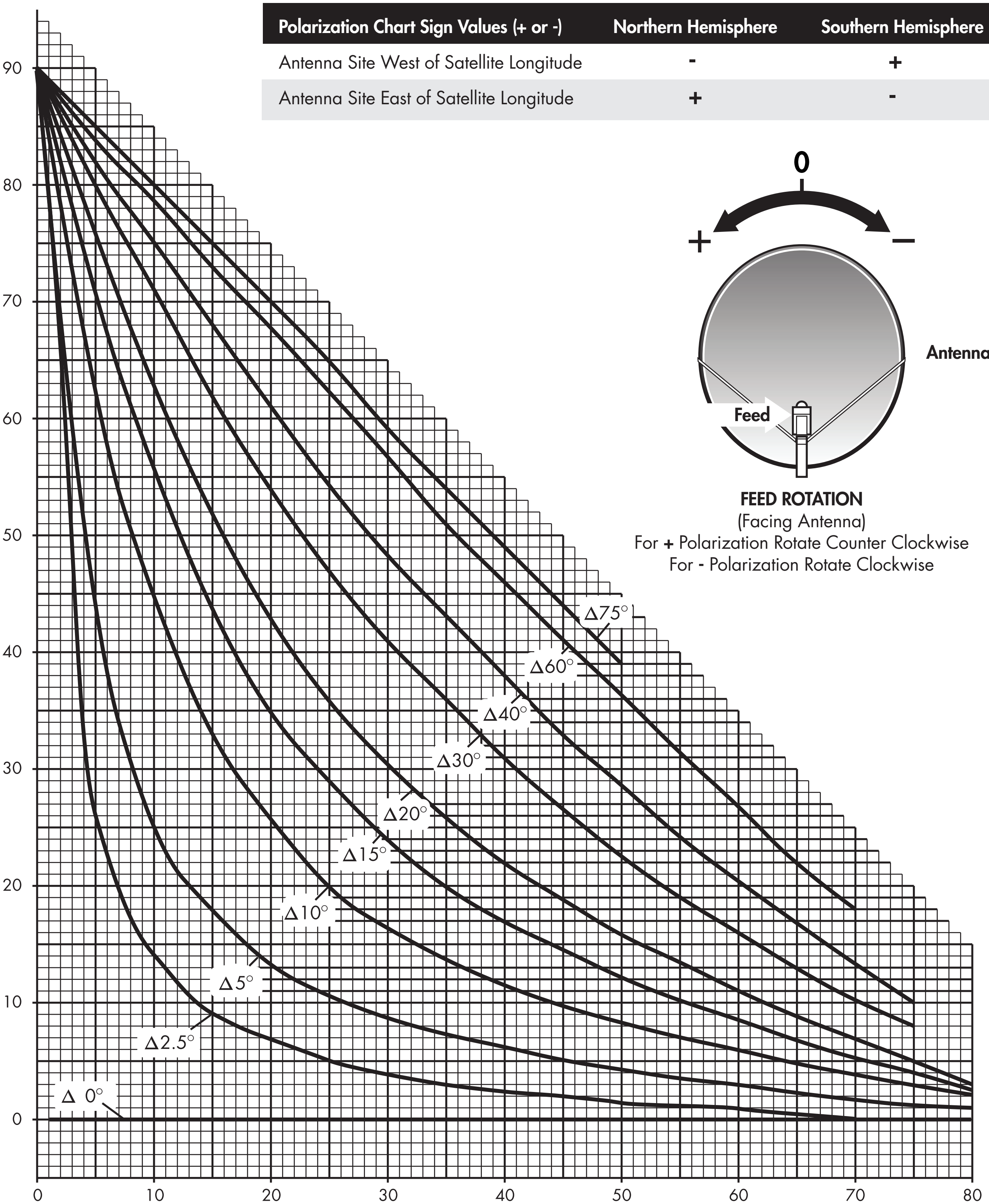
GROUNDING FEED CABLES



LATITUDE/LONGITUDE CHART

POLARIZATION CHART

Polarization Chart Sign Values (+ or -)	Northern Hemisphere	Southern Hemisphere
Antenna Site West of Satellite Longitude	-	+
Antenna Site East of Satellite Longitude	+	-

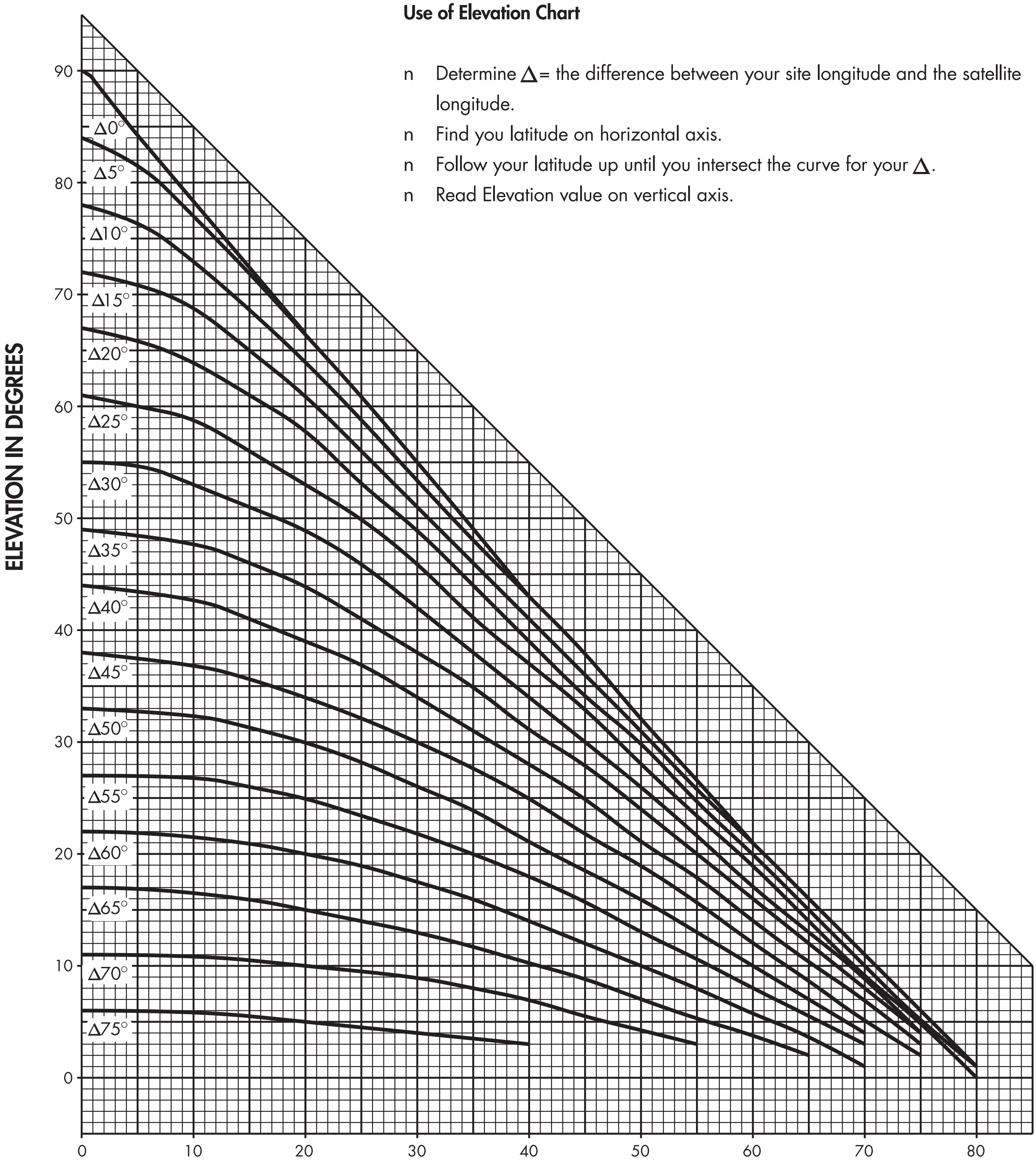


FEED ROTATION
(Facing Antenna)
For **+** Polarization Rotate Counter Clockwise
For **-** Polarization Rotate Clockwise

EARTH STATION LATITUDE IN DEGREES NORTH OR SOUTH OF EQUATOR

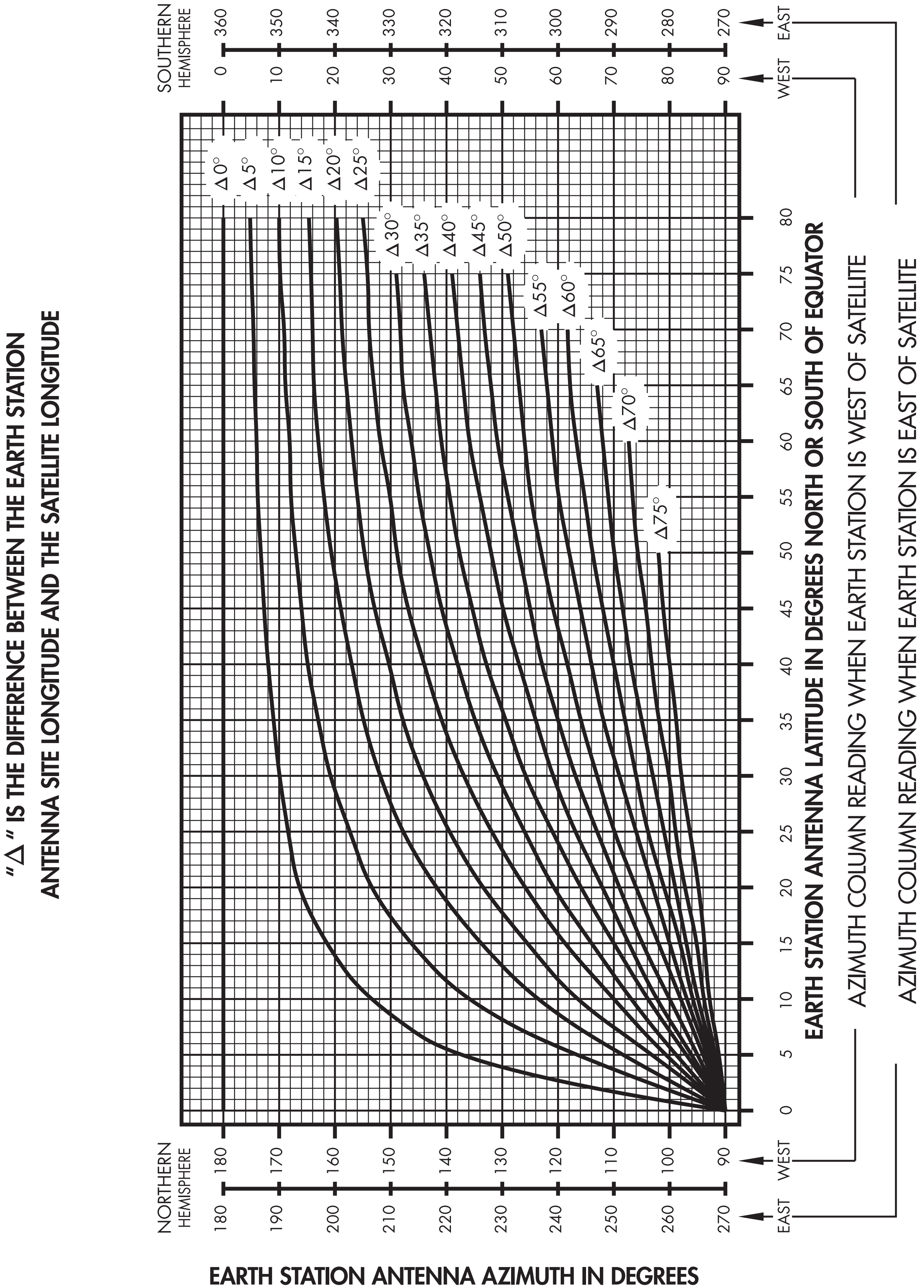
Use of Elevation Chart

- Determine Δ= the difference between your site longitude and the satellite longitude.
- Find you latitude on horizontal axis.
- Follow your latitude up until you intersect the curve for your Δ.
- Read Elevation value on vertical axis.



AZIMUTH CHART

EARTH STATION ANTENNA AZIMUTH IN DEGREES



EARTH STATION ANTENNA AZIMUTH IN DEGREES

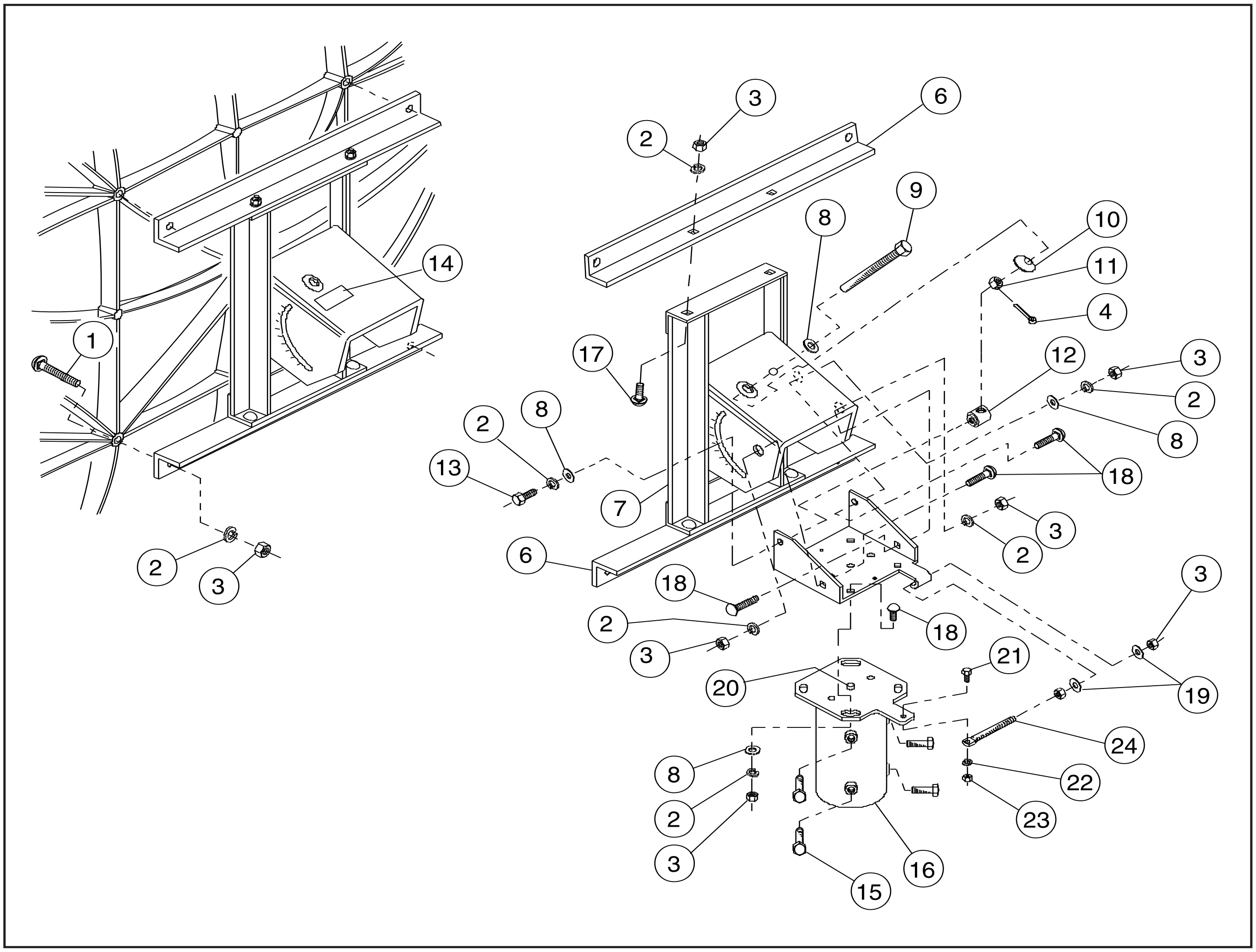


FIG. 3.0 - AZ/EL CAP

NO.	DESCRIPTION	QTY.
1	RD HD SQ NK BOLT, M12 x 100mm, GALV.	4
2	LOCK WASHER, M12	16
3	HEX NUT, 1/2" , GALV., M12	17
4	SPLIT PIN, M3.2 x 25mm	1
6	TOP/BOTTOM ANGLE	2
7	BACKFRAME HOUSING ASSEMBLY	1
8	FLAT WASHER - M12	7
9	HEX HD SCREW, SPCL, M12 x 210mm	1
10	SPHERICAL WASHER	1
11	CASTLE NUT, M12	1
12	SWIVEL NUT, M12	1

NO.	DESCRIPTION	QTY.
13	HEX HD BOLT, M12 x 25mm	1
14	LABEL, ELEVATION	1
15	HEX HD BOLT, M12 x 30mm	4
16	CANISTER WELDMENT	1
17	RD HD SQ NK BOLT, M12 x 25mm	4
18	RD HD SQ NK BOLT, M12 x 35mm	7
19	FLAT WASHER - LARGE	2
20	SPRING PIN, M8 X 20mm	1
21	HEX HD BOLT, M8 X 25mm	1
22	LOCK WASHER M8	1
23	HEX NUT M8	1
24	BOLT, SPADE M12 x 135mm	1

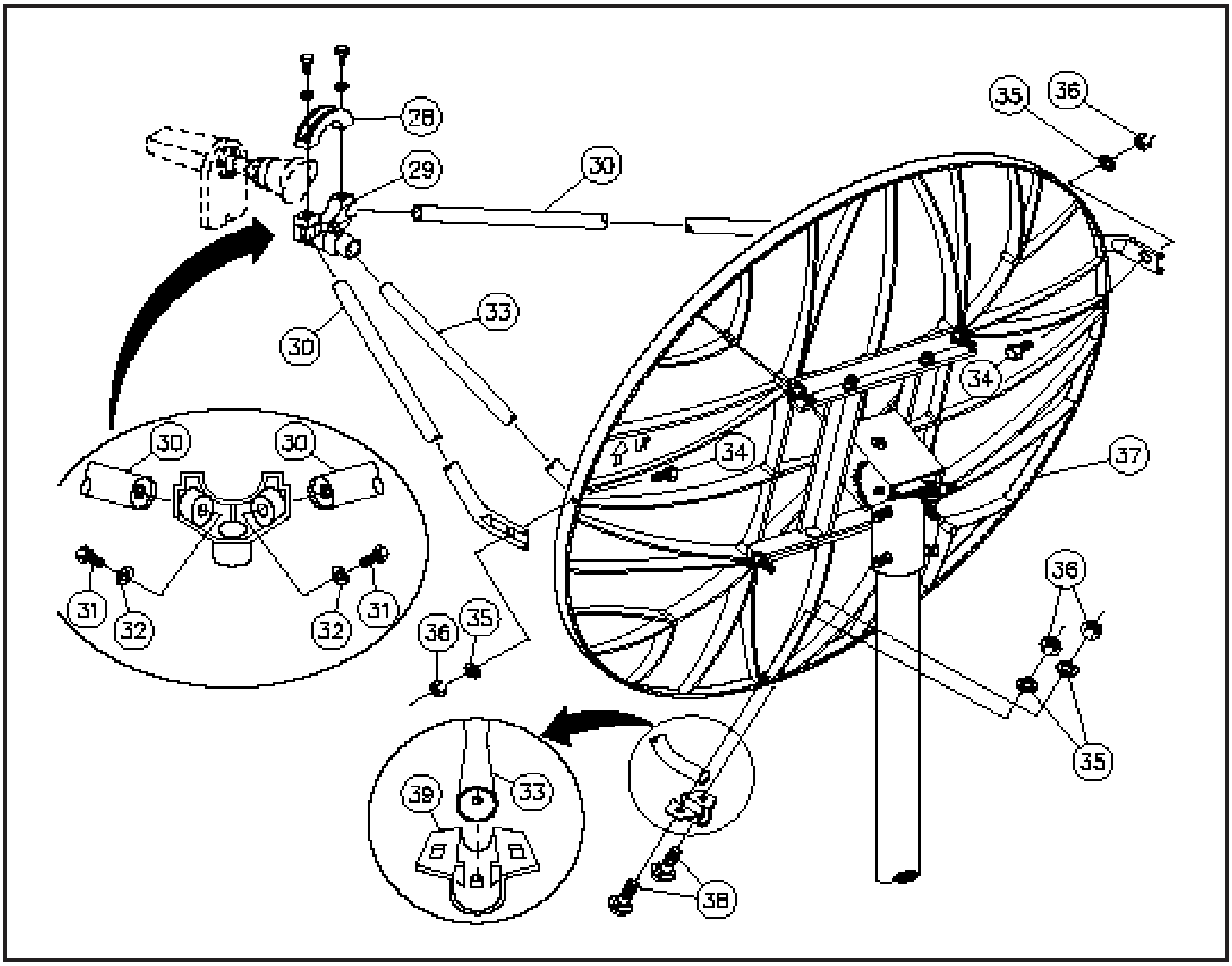


FIG. 3.2 - KU FEED SUPPORT LEGS

NO.	DESCRIPTION	QTY.
* 28	CLAMP	1
* 29	JUNCTION BLOCK	1
30	SIDE FEED LEG	2
31	HEX HD BOLT M6 X 20mm	2
32	FLAT WASHER, 1/4" x 3/4" O.D., S.B.	2
33	BOTTOM FEED LEG	1
34	HEX BOLT M6 x 20mm	2
35	LOCK WASHER, M6, B.S.	4
36	HEX NUT, M6, B.S.	4

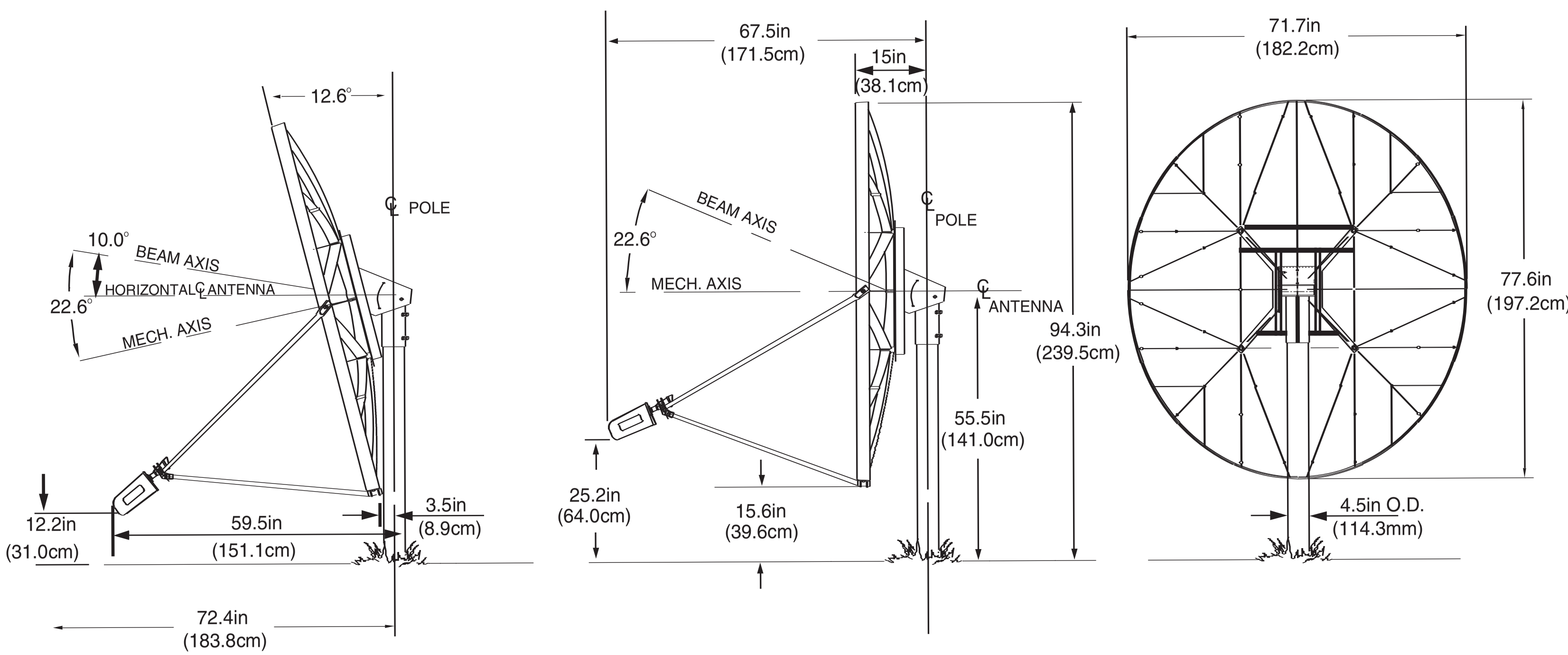
*Supplied with Feed Assembly

NO.	DESCRIPTION	QTY.
[illegible]	RD HD-SQ NK BOLT, M6 x 20mm, B.S.	2
[illegible]	CLAMP, BOTTOM FEED LEG	1

APPENDIX A

Outline Drawing

Type 180 1.8m Offset SMC Reflector with Rx Mount



Type 180 1.8m Antenna System with AZ/EL Cap Mount

NOTES: Dimensions shown are for ground pole (4.50" D.D. Schedule 40, Fy = 50KSI) or 4", Pipe SCH 80, Fy = 36KSI (4.5" O.D. x 3.83 I. D.) Purchased locally
METRIC GROUND POLE DIMENSIONS
114.3mm O.D. x 97.3mm I.D. Fy = 248 Mpa

APPENDIX B

1.8m ANTENNA SURVIVAL WINDLOADS AT 125 MPH VELOCITY

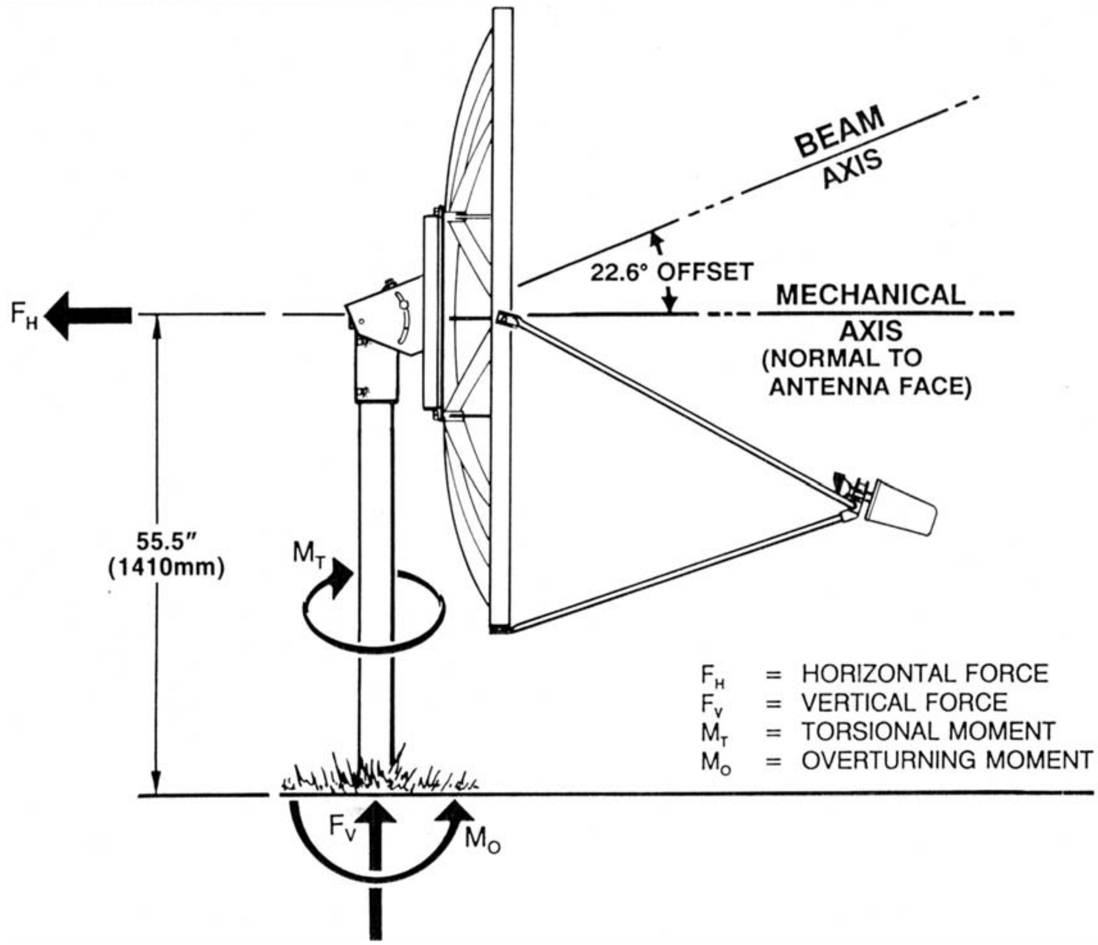


FIG. 4.0

ELEVATION DEGREES		FORCE (POUNDS)*		MOMENTS (FOOT-POUNDS)**	
MECH.	BEAM	F_H	F_V	M_T	M_O
0	23	1824	-47	1073	8,436
10	33	1726	-365	1035	7,983
20	43	1677	-710	984	7,756
30	53	1519	-1008	892	7,025
40	63	1337	-1215	756	6,184
50	73	1166	-1337	635	5,393
60	83	972	-1398	491	4,496
70	93	729	-1082	378	3,372

M_O BASED ON 55.5" FROM MOUNTING SURFACE TO ℄ OF ANTENNA.

***kg = Pounds x .45359**
**** N.m = Foot-Lbs. x 1.35582**

Values shown above represent maximum forces for any wind direction.
Height and exposure factors from the uniform building code are NOT included.

PERIODIC INSPECTION & MAINTENANCE

To ensure peak performance of the antenna system and to maintain validity of the warranty, the user should perform a periodic inspection every 6 months or following any severe weather event, As a minimum the following items should be inspected.

1. INSTALLATION MOUNT

Check for loose hardware - tighten if necessary.
Check integrity of anchor bolts or hardware securing mount to the building or foundations
Check ballast of Non-Penetrating Roof Mounts - cracked or broken blocks must be replaced.
Check hardware and structural members for signs of corrosion - repair or replace as needed

2. ANTENNA BACK STRUCTURE OR AZ/EL MOUNT

Check for loose hardware - tighten if necessary.
Check for signs of structural damage such as bending or cracking
Check hardware and stuctural members for signs of corrosion - repair or replace as needed

3. REFLECTOR

Check intergrity of bolts securing reflector to back structure or az/el mount. Tighten any loose hardware.
Check for signs of damage such as cracking. Inspect reflector face for impact damage.
Check hardware for signs of corrosion - repair or replace as needed.

4. FEED SUPPORT STRUCTURE

Check for loose hardware - tighten if necessary.
Check for signs of structural damage such as bending.Check hardware and stuctural members for signs of corrosion - repair or replace as needed

5. FEED & RF COMPONENTS

Check for loose hardware - tighten if necessary.
Check hardware for signs of corrosion - repair or replace as needed.
Check feed lens or window for damage or signs of leaking.Check waveguide connections between feed and RF electronics

6. ELECTRICAL

Check for loose cables and connectors - tighten if necessary
Check for tight grounding connections
Check cables for weathering or cracks