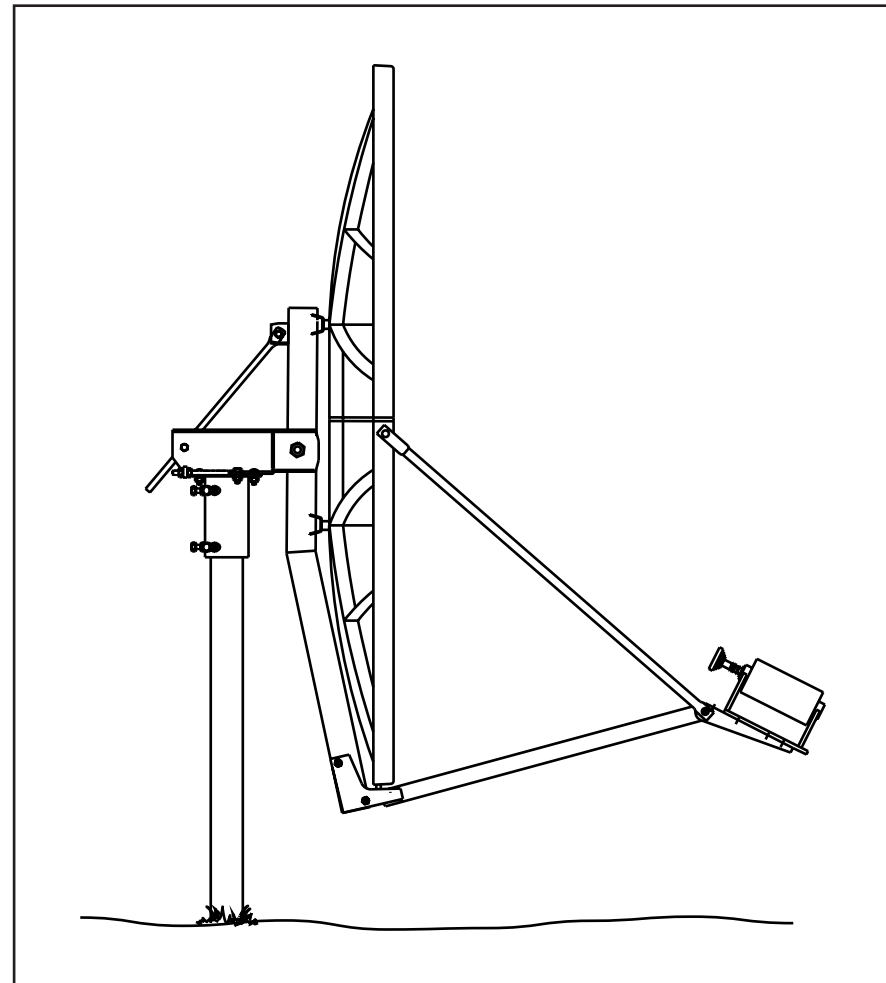


Instruction and Assembly Manual



Type 243

2.4m Offset Tx/Rx Antenna System

Channel Master® (UK) Limited
Premier Business Park, Crofthead Road,
Off Philips Road, Whitebirk Industrial Estate
Blackburn, Lancashire England BB1 5UE
(0254) 680444 ■ Fax (0254) 672299

Channel Master®
1315 Industrial Park Drive, P.O. Box 1416
Smithfield, N.C. 27577 U.S.A.
Fax (919) 989-2200
Phone (919) 989-2205 (Customer Service)

ASSEMBLY TOOLS REQUIRED

- | | | |
|---|--------------------------------------|--------------------------------------|
| 1 - Compass | 1 - 1 5/16" Deep Socket (1/2" Drive) | 1 - 7/16" Box/Open End Wrench |
| 1 - Clinometer | 1 - 1 5/16" Deep Socket (1/2" Drive) | 1 - 1 1/8" Open End Wrench |
| 1 - 9" Magnetic Bubble Level | 1 - 3/4" Socket (1/2" Drive) | 1 - 12" Crescent Wrench (Adjustable) |
| 1 - Torque Wrench
(Capacity 4 Ft-lbs - 175 Ft-lbs) | 1 - Ratchet Wrench (1/2" Drive) | 1 - 7/16" Socket (For Torque Wrench) |
| | 1 - 7/16" Nutdriver | |

PREINSTALLATION CHECKLIST

- | | |
|---|--|
| <input type="checkbox"/> Grounding Rod Clamp & Grounding Block: As required by National Electric Code or local codes. | <input type="checkbox"/> Concrete: See "Ground Pole" section for quantity. |
| <input type="checkbox"/> Ground Wire: As required by National Electric Code or local codes (length required). | <input type="checkbox"/> #3 Rebar: See "Ground Pole" section for quantity. Deformed steel per ASTM A615, Grade 40 or 60. |
| <input type="checkbox"/> Coaxial Cable: Size and length required. | |

SITE SELECTION

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 satellites. A site with a clear, unobstructed view is preferred. Also consider obstruction that may occur in the future such as the growth of trees. Your antenna site must be selected in advance so that you will be able to receive the strongest signal available. To avoid obstructions, etc., conduct an on-site survey with a portable antenna.

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.

Before any 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.

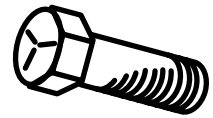
Because soils vary widely in composition and load capacity, consult a local professional engineer to determine the appropriate foundation design and installation procedure. A suggested foundation design with conditions noted is included in this manual for reference purposes only (see page 4). To assist in the foundation design, refer to "Outline Drawing" in the Appendix "A" on page 16.

BOLT TORQUE

GRADE 5						GRADE 2							
5/16 IN.	3/8 IN.	1/2 IN.	5/8 IN.	3/4 IN.	7/8 IN.	10	1/4 IN.	5/16 IN.	3/8 IN.	1/2 IN.	5/8 IN.	3/4 IN.	7/8 IN.
18 FT-LBS	31 FT-LBS	75 FT-LBS	150 FT-LBS	250 FT-LBS	350 FT-LBS	32 FT-LBS	6 FT-LBS	11 FT-LBS	20 FT-LBS	43 FT-LBS	92 FT-LBS	124 FT-LBS	175 FT-LBS
24 N-m	42 N-m	102 N-m	203 N-m	339 N-m	474 N-m	3.6 N-m	8 N-m	15 N-m	27 N-m	58 N-m	125 N-m	168 N-m	237 N-m

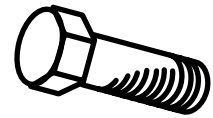
EXAMPLES:

GRADE 5



APPLY 18 FT-LBS (24 N-m)
OF TORQUE TO 5/16 BOLT

GRADE 2

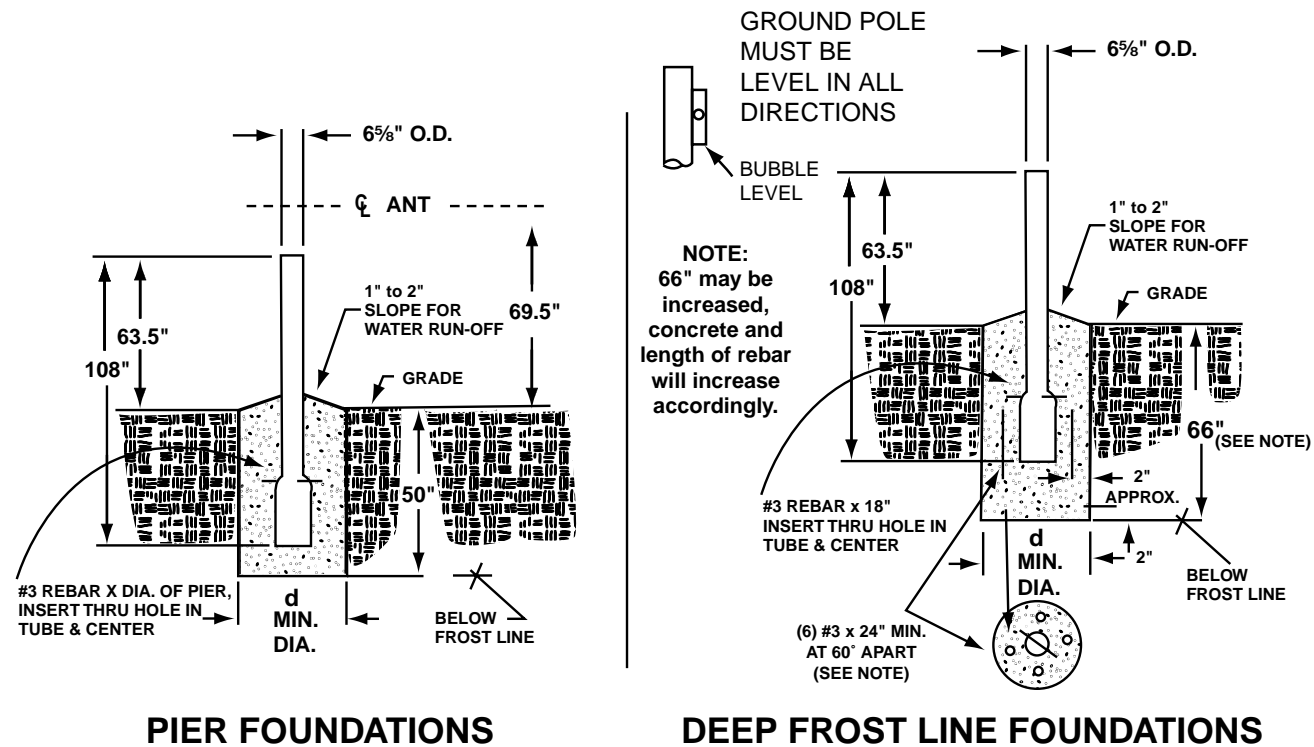


APPLY 11 FT-LBS (15 N-m)
OF TORQUE TO 5/16 BOLT

EXCEPTION TO CHART ABOVE:

- 5/8" x 5 1/2" Round Head Square Neck Bolt (Item #2), securing antenna to mount. Torque to 35 Ft-lbs (47 N-m).
- 1/2" x 1 1/2" Hex Head Bolt, securing antenna halves. Torque to 35 Ft-lbs (47 N-m).

GROUND POLE INSTALLATION - 6⁵/₈" O.D.



PIER FOUNDATIONS

DEEP FROST LINE FOUNDATIONS

ANT SIZE	WIND VEL (MPH)	EXPOSURE "C"		EXPOSURE "C"		GROUND POLE
		DIM "d"	CONC VOL (CU YD)	DIM "d"	CONC VOL (CU YD)	
2.4m SMC OFFSET	100	44"	1.7	37"	1.6	"A"
	125	53"	2.4	45.25"	2.6	"B"

POLE SPECIFICATIONS:

Ground Pole "A" = 6.62 OD SCH 40 (6.06 I.D.) Steel
Ground Pole "B" = 6.62 OD SCH 80 (5.76 I.D.) Steel

NOTE:

- Poles "A" and "B" are not supplied (purchased locally to ASTM A501) and must be field drilled 5/8 Dia. for #3 rebar, drilled .218 for 1/4-20 self tapping grounding screw and galvanized or painted for protection.
- Pole and foundation design based on the following criteria:
 - Uniform building code Exposure C and 1.5 stability factor.
 - Vertical soil pressure of 2000 pounds per square foot.
 - Lateral soil pressure of 300 pounds per square foot.
 - Concrete compressive strength of 2500 pounds per square inch 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 your soil conditions and appropriate foundation.

ASSEMBLY

REFLECTOR ASSEMBLY

1 - Place reflector halves on a flat surface, face down. (Ref. Figure 1.0). Install 1/2" x 1 1/2" hex bolts with flat washer into the two outer bolt holes at reflector rim. Secure with 1/2" flat washer, lock washer and hex nut as shown in Figure 1.1. Repeat on opposite side of reflector. Leave loose.

2 - Install remaining seam bolts, working toward center of reflector as noted above. Repeat on opposite side of reflector. Leave finger tight. (Ref. Figure 1.2)

NOTE: All seam bolts to be finger tight only.

MOUNT AND BACKFRAME ASSEMBLY

3 - Place yoke cap assembly onto ground pole, and loosen two 1/2" carriage bolts (16) securing R.H. channel to yoke cap (non-welded). Reference Figure 1.3.

4 - Install backframe (1) onto yoke cap assembly and secure with 7/8" x 6" hex bolt, lock washer and hex nut (24, 15 & 14). Do not tighten. Remove two 1/2" bolts from Trunnion, swing backframe down and secure elevation screw and trunnion (25 & 26) to AZ/EL cap with 1/2" x 1 1/4" hex bolt and lock washer (17 & 3). Leave loose. Reference Figure 1.3.

5 - Loosen 7/8" elevation nuts (14) on elevation screw (25) and run up to place backframe in birdbath position (see Figures 1.3 & 1.4).

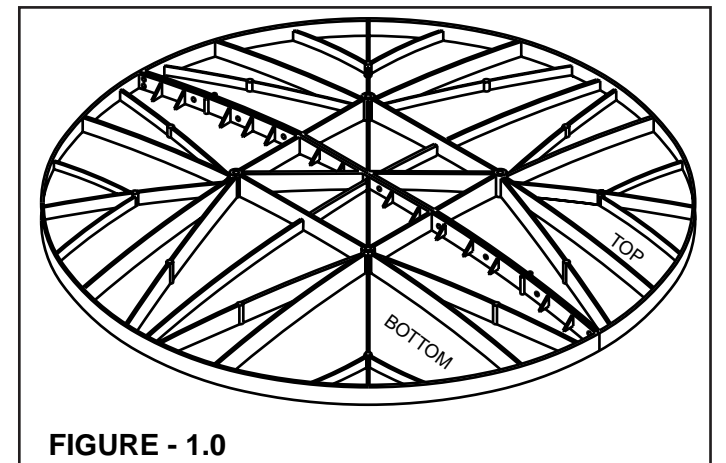


FIGURE - 1.0

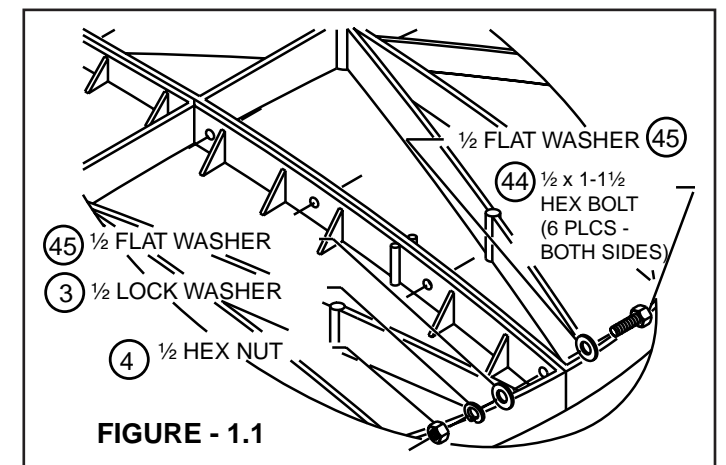


FIGURE - 1.1

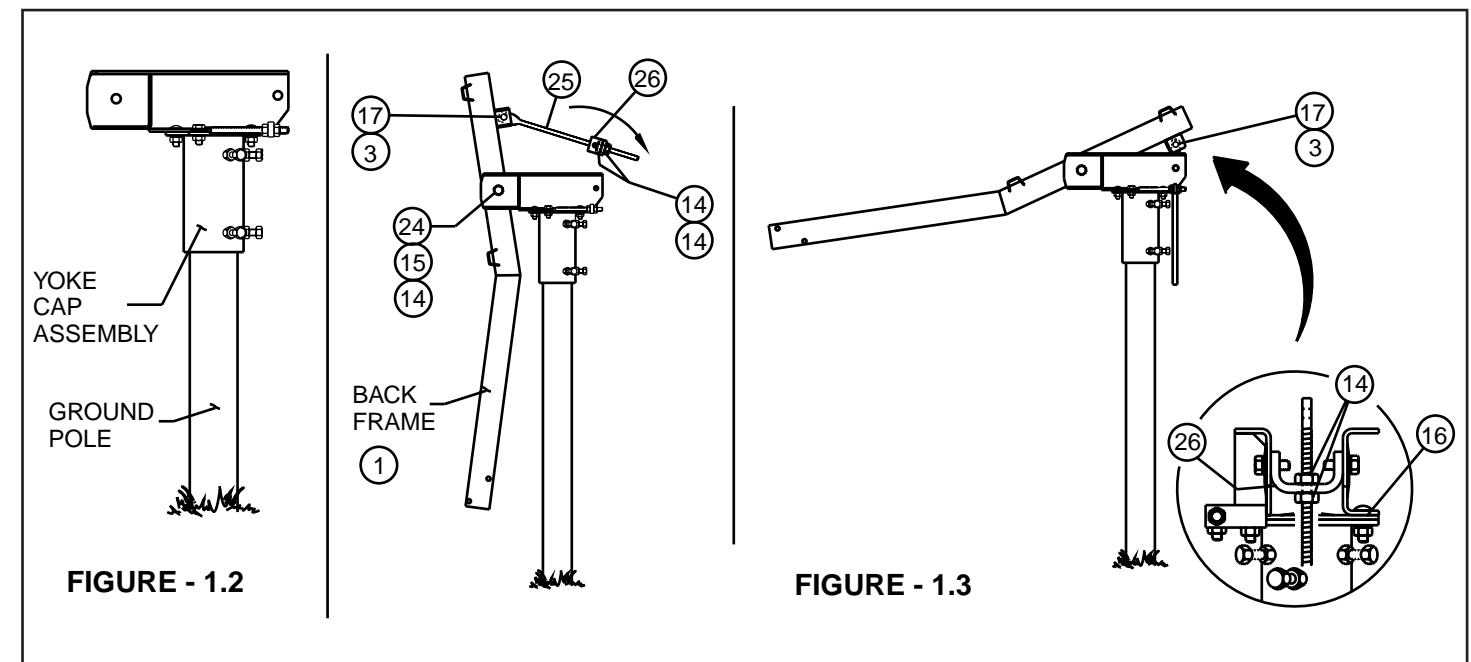


FIGURE - 1.2

FIGURE - 1.3

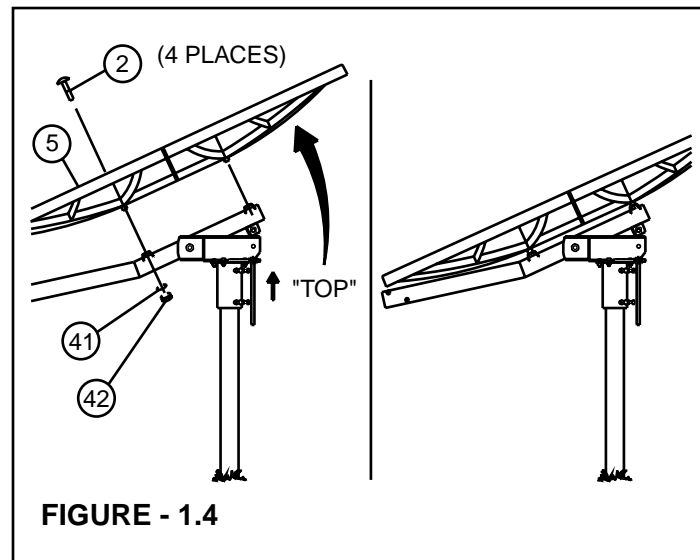


FIGURE - 1.4

ANTENNA INSTALLATION

6 - Insert four $\frac{5}{8}$ " x $5\frac{1}{2}$ " round head square neck bolts (2) into reflector assembly (5) and affix on to backframe. Reflector section marked "TOP" must be located at the top end of backframe. Make sure round head square neck bolts are seated correctly before securing reflector to backframe. Secure reflector to backframe with $\frac{5}{8}$ " lock washers and hex nuts. **Leave these bolts loose.** Reference Figure 1.4.

SEAM ALIGNMENT

7 - Lower reflector to vertical position by running down two elevation nuts (14).

8 - Check the horizontal seam match as shown in Figure 1.5. If alignment is required, begin at the outer rim by pushing or pulling on the bottom reflector rim, while another tightens their seam bolts at this location. Continue this process, working toward the center, and alternating from one side to the other.

9 - After all seam bolts are tightened, torque bolts, using the same sequences as above, to 35 ft-lbs. Now tighten and torque (4) reflector mounting bolts to 35 ft-lbs.

NOTE: Certain models require additional alignment instructions. Refer to supplement for detailed instructions.

FEED SUPPORT TUBE INSTALLATION

10 - Install $\frac{1}{4}$ " x $1\frac{1}{2}$ " hex bolt with flat washer (46 & 7) into bottom hole in reflector and secure with $\frac{1}{4}$ " flat washer and hex nut (7 & 6). Reference Figure 1.6

11 - Install feed support tube (10) onto backframe and secure with two $\frac{1}{2}$ " x $5\frac{1}{2}$ " hex bolts, four external tooth lock washers and hex nuts (12, 11 & 4).

Reference Figure 1.7.

IMPORTANT: $\frac{1}{4}$ " x $1\frac{1}{2}$ " hex gage bolt (Item 46) in bottom of reflector fits into hole on top of support tube end (Item 10). Reference Figure 1.7.

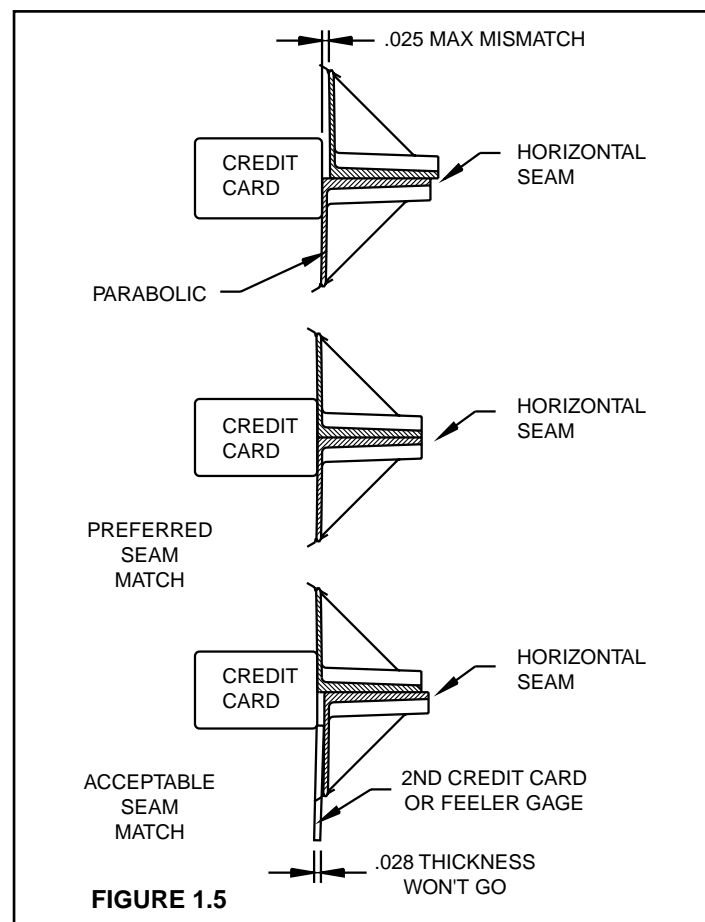


FIGURE 1.5

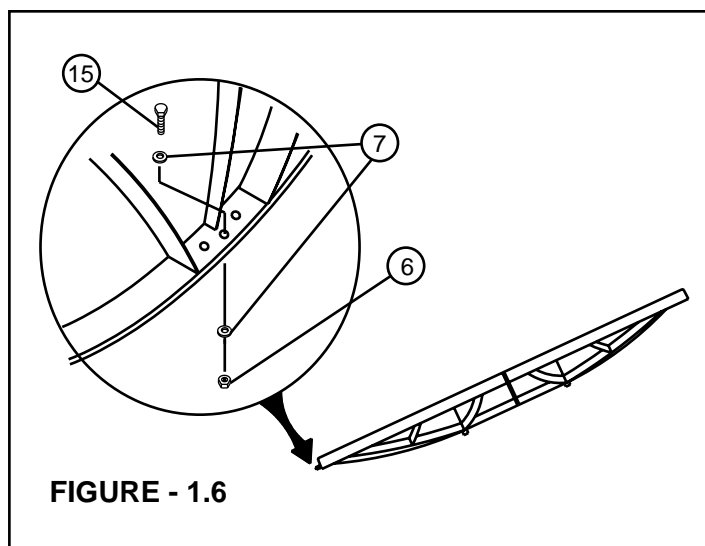


FIGURE - 1.6

NOTE: $\frac{1}{2}$ " external tooth washers (11) must be assembled on bolts, with one under head of bolts and one under hex nuts (4), refer to Figure 1.7. **Leave these bolts loose.**

12 - Install left and right side struts onto reflector as shown in Figure 1.8.

Attach long formed end of side struts (27) to reflector rim by inserting $\frac{1}{4}$ " x $\frac{3}{4}$ " hex head bolt (28) through inside of reflector rim and secure snug, but free to pivot with $\frac{1}{4}$ " lock washer and hex nut (6 & 8).

Attach short formed end of side struts (27) to feed support tube with $\frac{1}{4}$ " x $\frac{3}{4}$ " hex bolt, lock washer and hex nut (28, 8 & 6). Tighten and torque hardware securing side struts to feed support tube only to 6 Ft-lbs (8 N-m).

13 - Without using excessive pressure, lift feed support tube vertically just enough to relieve load off side struts and bottom rim gage bolt (Item 46). While another person tightens and torque's $\frac{1}{2}$ " hex head bolts (*) securing feed support tube to backframe to 35 Ft-lbs (47 N-m). Tighten and torque $\frac{1}{4}$ " hex head bolts (**) securing side struts to reflector to 4 Ft-lbs (5.4 N-m). Reference Figure 1.9.

14 - To install ODU or Feeds, see instructions supplied with these kits.

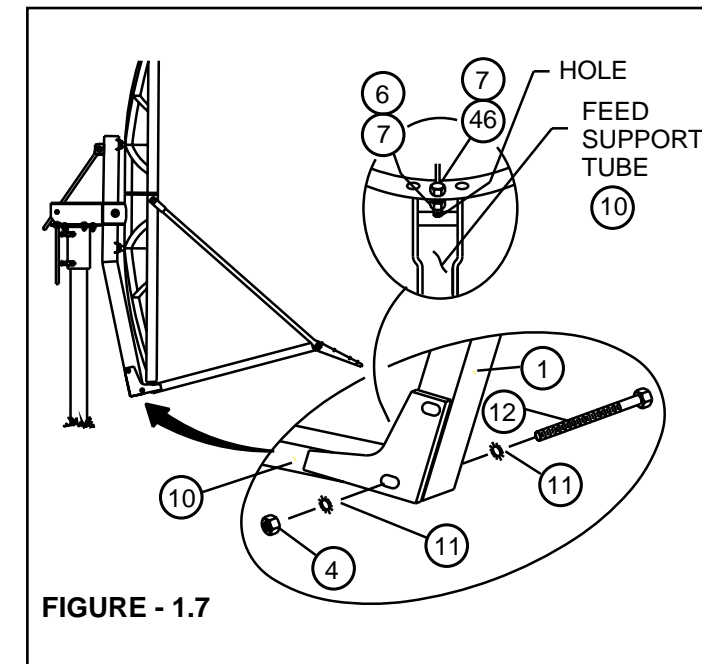


FIGURE - 1.7

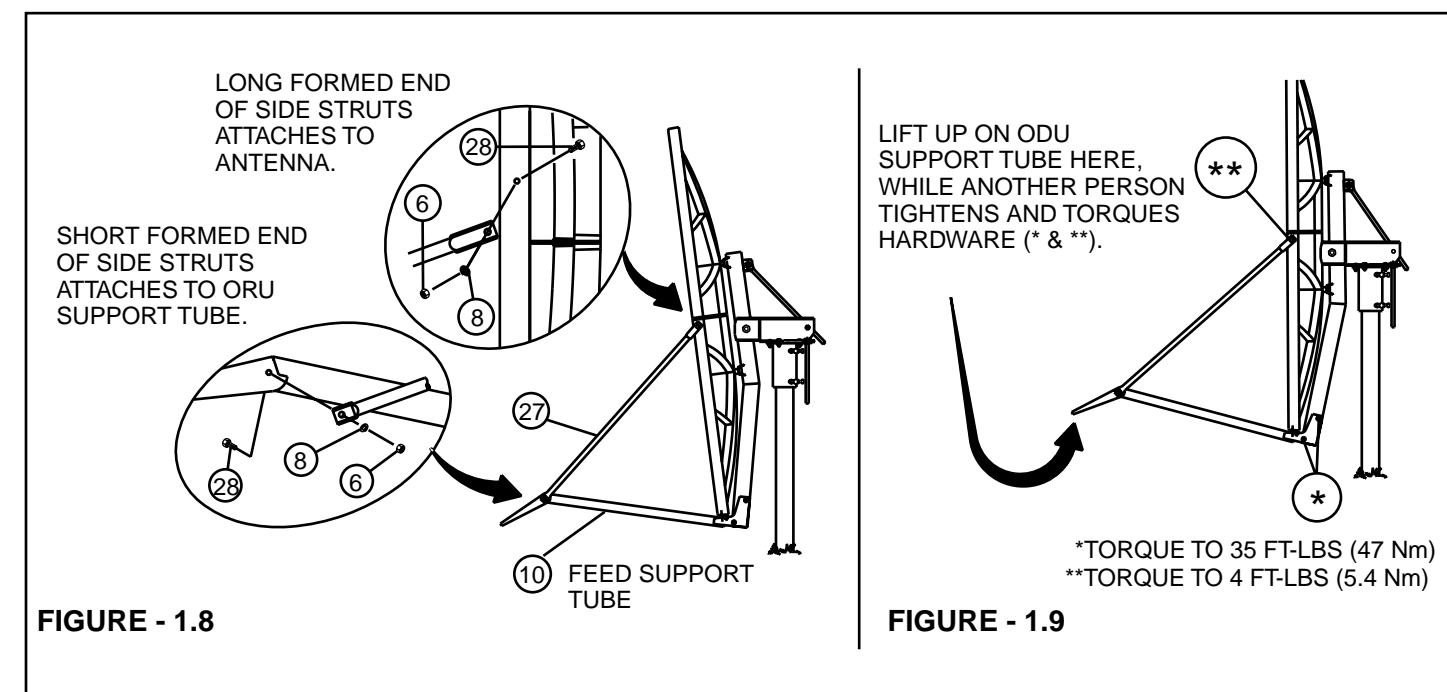


FIGURE - 1.8

FIGURE - 1.9

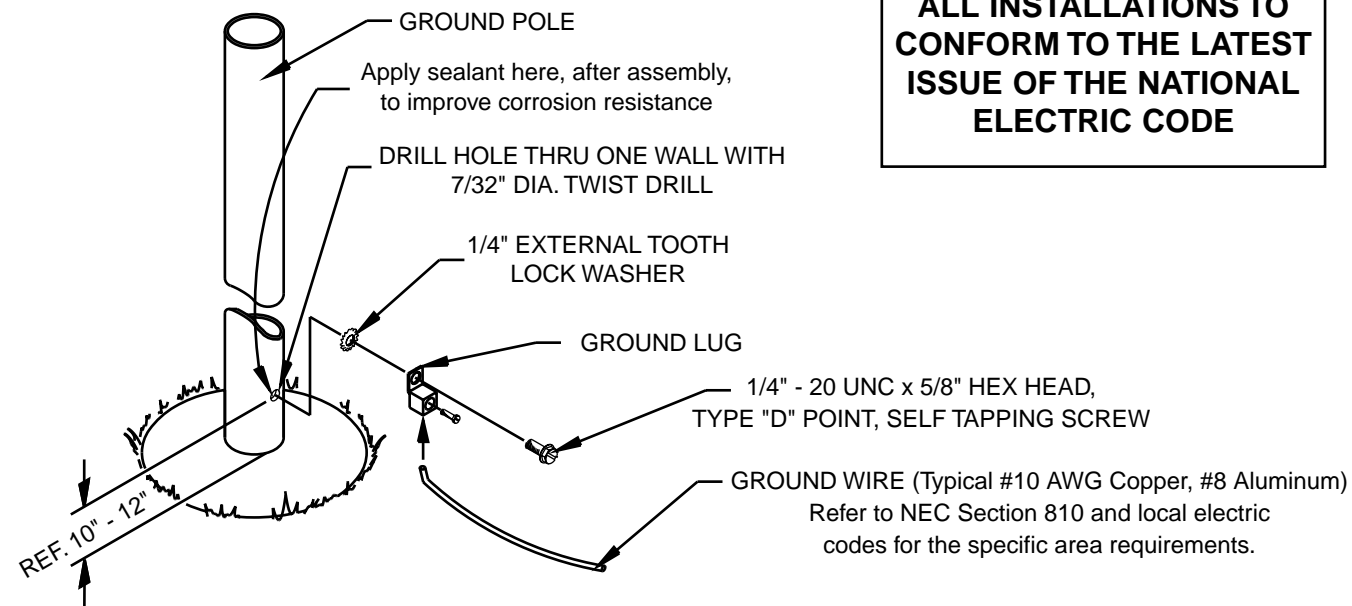
LIFT UP ON ODU SUPPORT TUBE HERE, WHILE ANOTHER PERSON TIGHTENS AND TORQUES HARDWARE (* & **).

*TORQUE TO 35 FT-LBS (47 Nm)
**TORQUE TO 4 FT-LBS (5.4 Nm)

GROUNDING

TYPICAL ELECTRICAL GROUNDING FOR ANTENNA GROUND POLE

NOTE: ALL INSTALLATIONS TO CONFORM TO THE LATEST ISSUE OF THE NATIONAL ELECTRIC CODE



**NOTE:
ALL INSTALLATIONS TO
CONFORM TO THE LATEST
ISSUE OF THE NATIONAL
ELECTRIC CODE**

FIGURE - 2.0

NOTE: All installations to conform to latest issue of National Electrical Code.

Ground antenna mount assembly and feed cables in accordance with current National Electrical Code and local electrical codes. Figure 2.0 and 2.1 illustrates typical grounding methods for the ground pole and feed cables.

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

Tighten and torque all hardware.

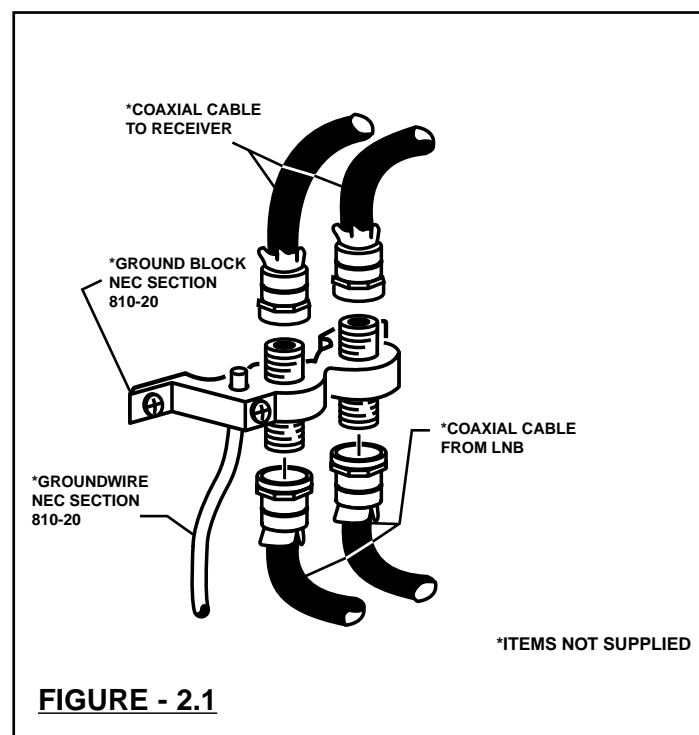


FIGURE - 2.1

ANTENNA ALIGNMENT PROCEDURE

Alignment with the satellite is obtained by setting polarization, elevation and azimuth. Charts 1, 2 & 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.

POLARIZATION OF FEED

Loosen feed horn clamp bolts and turn feed clockwise or counterclockwise, depending on being east or west of the satellite as shown on Chart 1. 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 3.0).

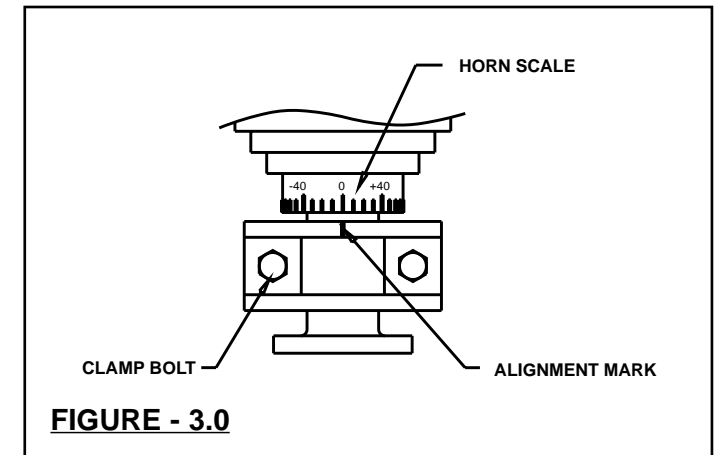


FIGURE - 3.0

ELEVATION ALIGNMENT

Use Chart 2 and determine your elevation setting. Using a clinometer, adjust the elevation by turning the elevation screw adjusting nuts until the desired elevation is obtained. Reference 3.1. **NOTE: Degree values shown on the clinometer are mechanical; that is when the reflector face is vertical, mechanical elevation is 90° or axis is 0°, while the beam elevation (signal) axis is 22.62°.** Therefore, as the reflector is tilted, remember to compensate for the 22.62° offset angle to get the correct beam elevation. (See Appendix A, Outline Drawing, Page 17). This is an approximate setting. Optimum setting will be achieved during the fine tuning.

AZIMUTH

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 six azimuth locking bolts until snug. This will allow the reflector to rotate with slight resistance (Ref. Fig. 3.2.)

Rotate reflector and mount, pointing to the compass reading for your location (Ref. Fig. 3.3.)

Slowly sweep the reflector in azimuth until signal is found. If desired signal is not found, increase or decrease elevation setting and repeat the azimuth sweep. Tighten locking bolts.

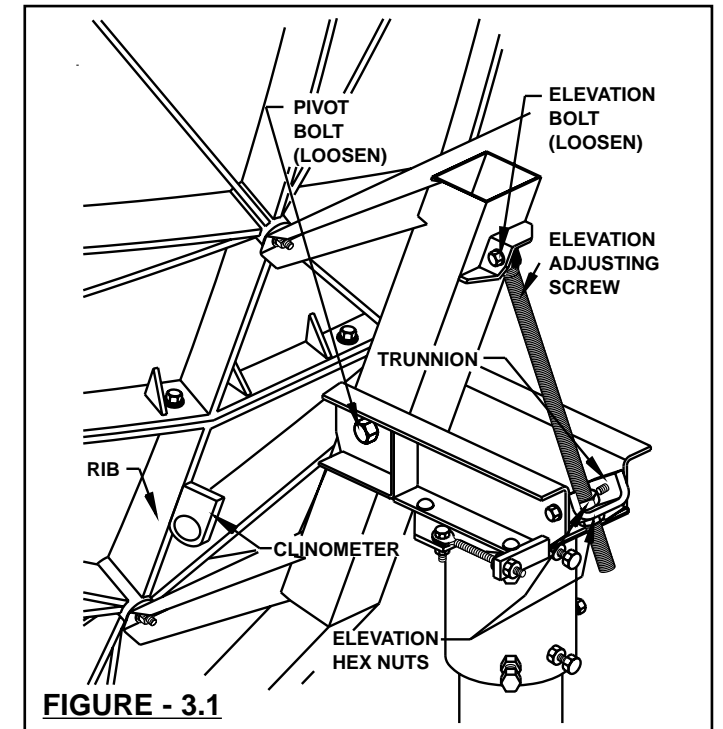


FIGURE - 3.1

FINE TUNING

Progressively tighten and torque azimuth locking bolts to 85-95 Ft-lbs. The four top plate locking bolts are factory torqued to 10-11 Ft-lbs., maintain this torque until after azimuth is fine tuned.

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. Gradually tighten ($\frac{1}{8}$ turn increments max.) top plate bolts in sequence 1, 3, 4 and 2 to 75 Ft-lbs., refer to Figure 3.2. Observe for maximum signal strength as elevation screw's locking nuts are tighten.

Polarization tune may be checked by carefully and slowly rotating feed assembly in clamp. When maximum signal strength is found, gradually tighten clamp bolts (Fig. 3.0). If a signal on the opposite polarity is available, this signal should be minimized.

Tighten and torque all hardware. Refer to Torque Chart on Page 3.

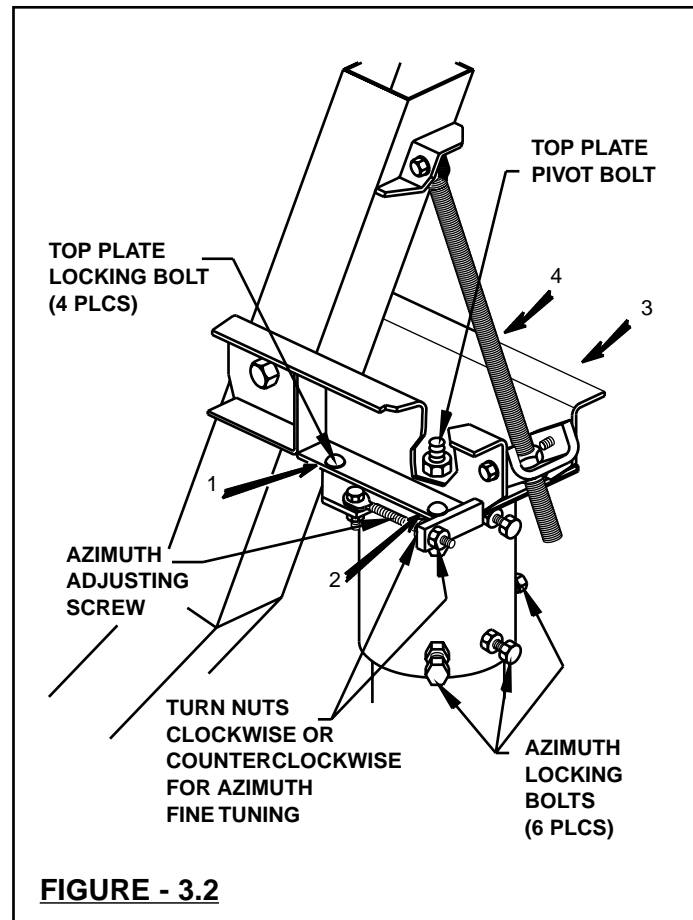


FIGURE - 3.2

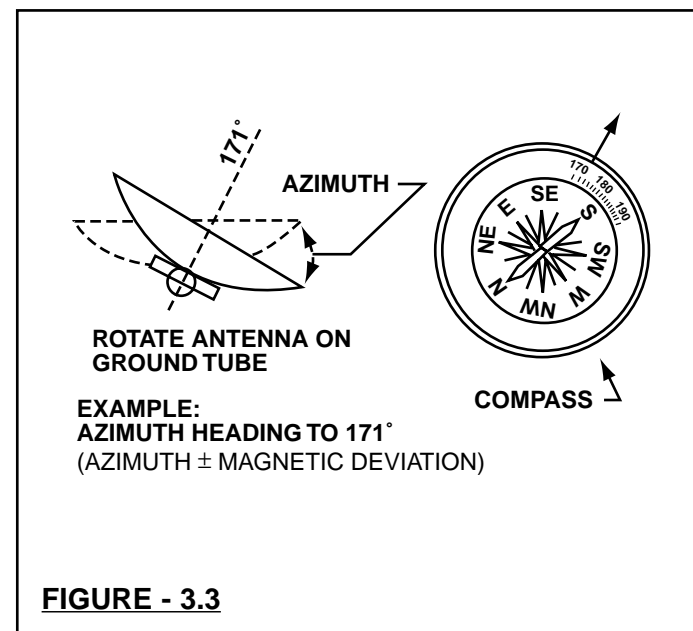


FIGURE - 3.3

POLARIZATION CHART

" ΔL " IS THE DIFFERENCE BETWEEN THE EARTH STATION ANTENNA SITE LONGITUDE AND THE SATELLITE LONGITUDE

+ POLARIZATION WHEN EARTH STATION IS WEST OF SATELLITE
- POLARIZATION WHEN EARTH STATION IS EAST OF SATELLITE

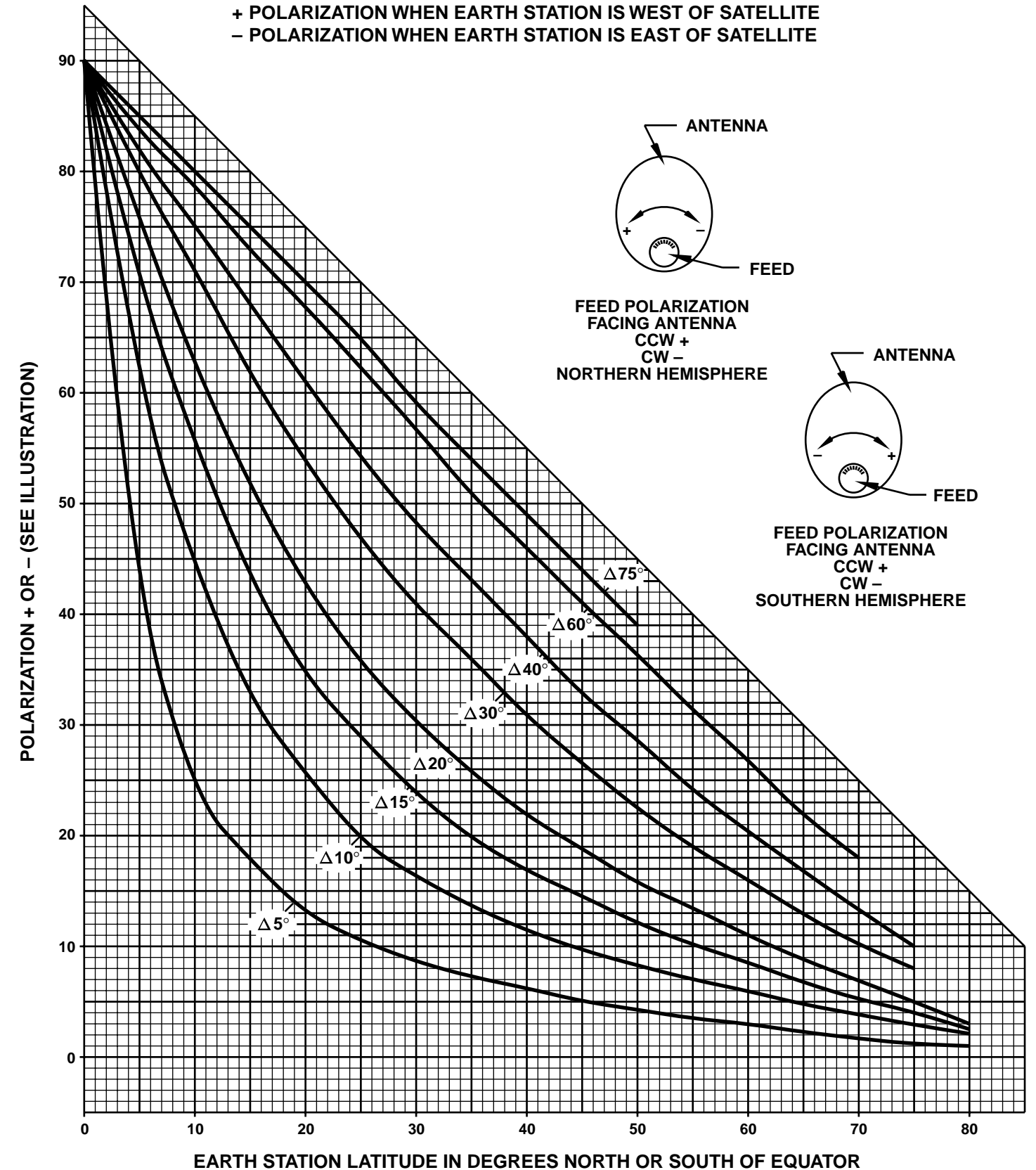


CHART 1

AZIMUTH CHART

" ΔL " IS THE DIFFERENCE BETWEEN THE EARTH STATION ANTENNA SITE LONGITUDE AND THE SATELLITE LONGITUDE

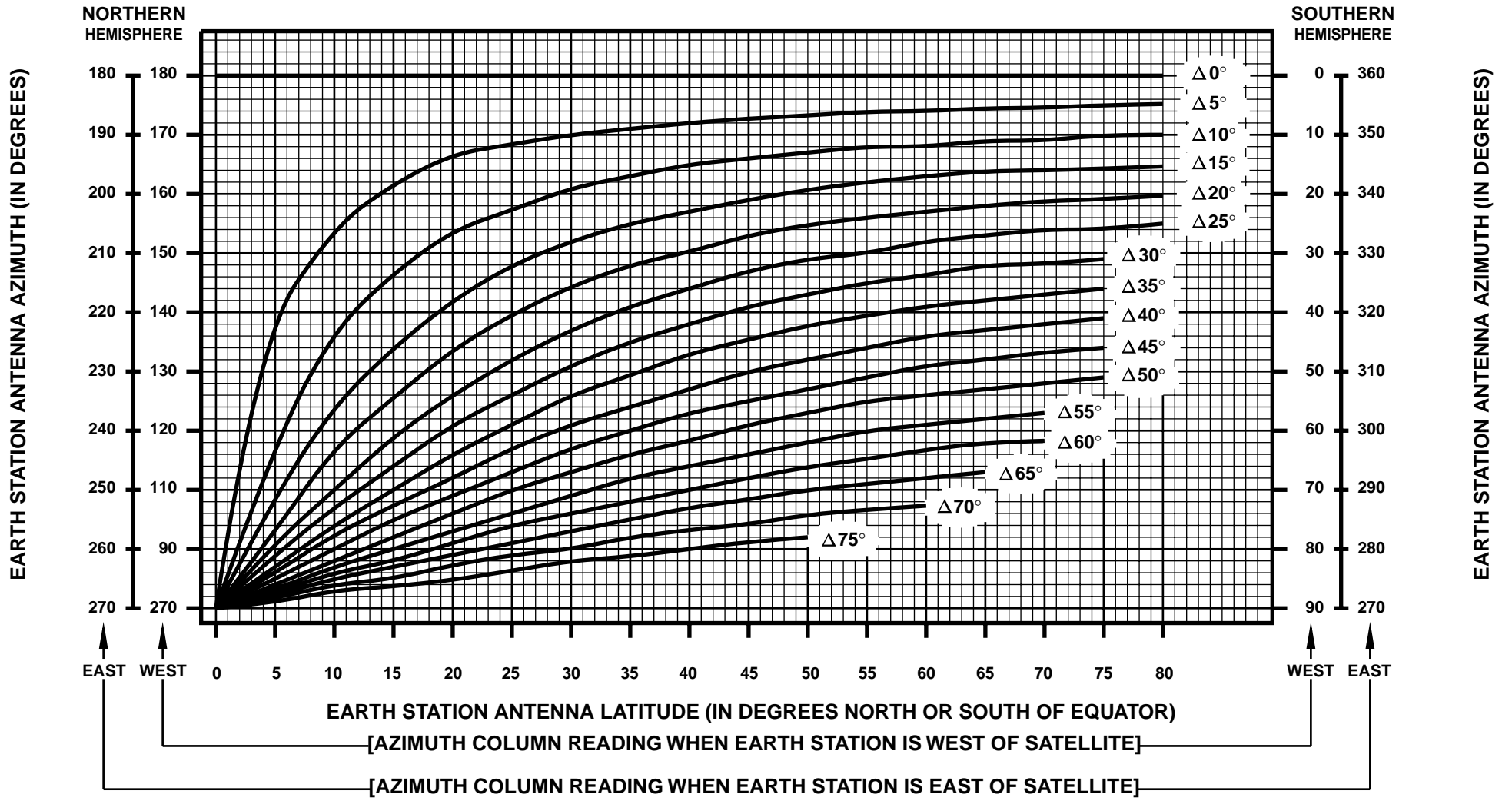


CHART 3

ELEVATION CHART

" ΔL " IS THE DIFFERENCE BETWEEN THE EARTH STATION ANTENNA SITE LONGITUDE AND THE SATELLITE LONGITUDE

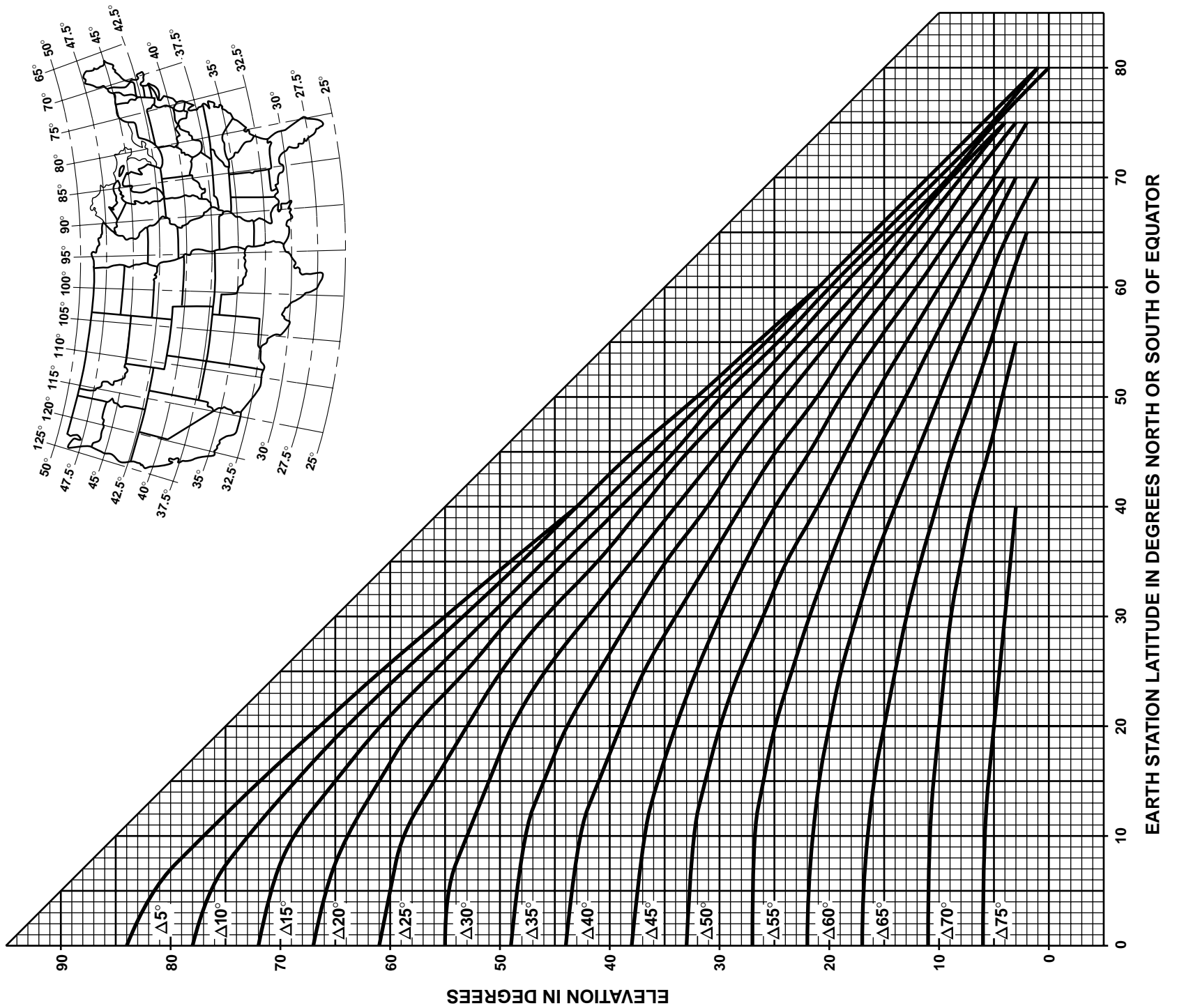


CHART 2

PARTS AND HARDWARE

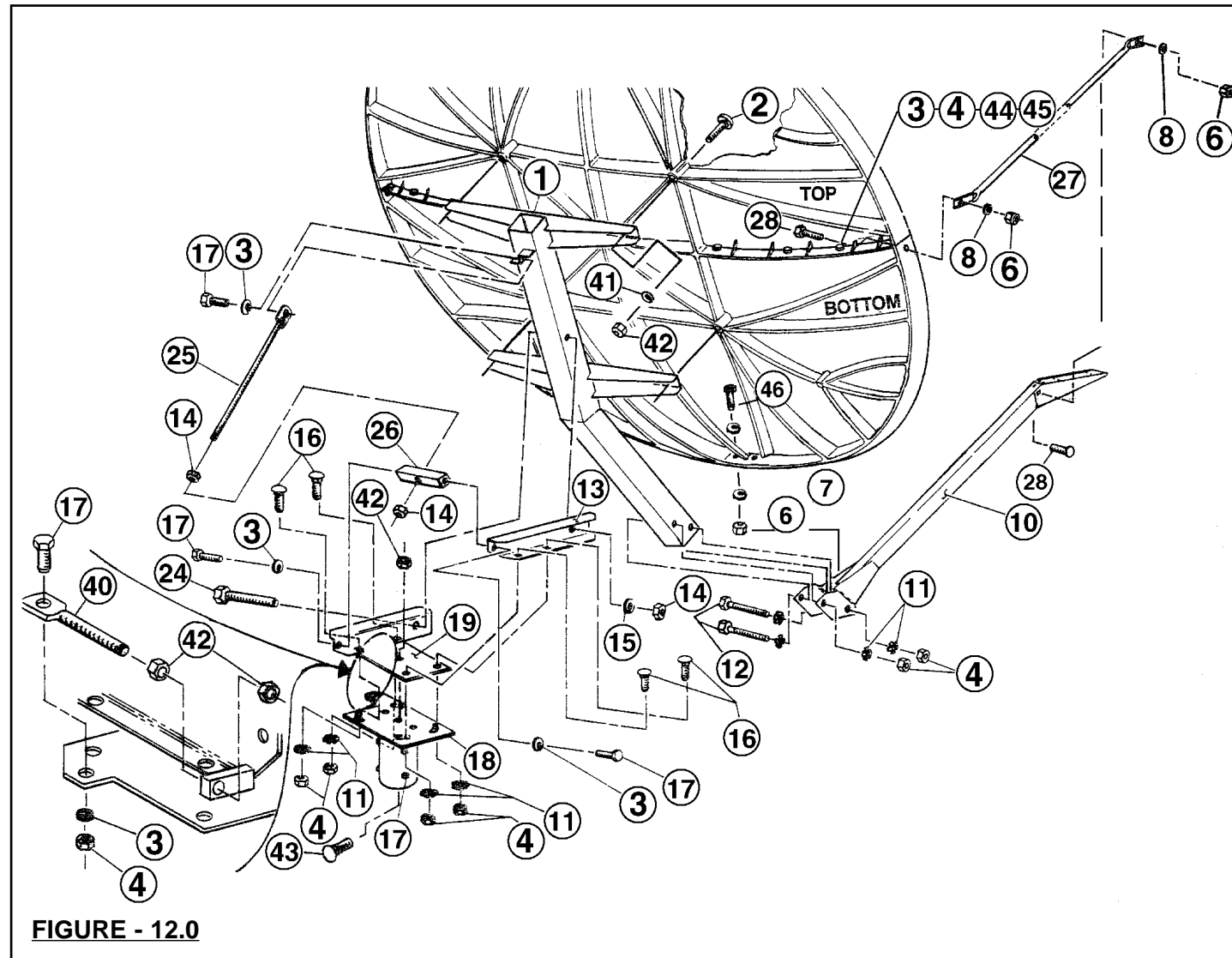


FIGURE - 12.0

Tx MOUNT AND BOTTOM FEED SUPPORT TUBE

ITEM	PART NO.	DESCRIPTION	QTY.
1	2020753-03	BACKFRAME ASSEMBLY, GALV	1
2	2070035-01	RD HD SQ NK BLT GALV 5/8-13 x 5 1/2"	4
3	2509008-02	LOCK WASHER, GALV. 1/2"	20
4	2389002-01	HEX NUT, GALV 1/2"-13	19
5	3040748-35	2.4M SMC ANTENNA TOP HALF (TX QUALITY)	1
-	3040747-35	2.4M SMC ANTENNA BTM HALF (TX QUALITY)	1
6	2382600-01	HEX NUT, SS 1/4"-20	6
7	2502600-01	FLAT WASHER, SS 1/4"	2
8	2602600-01	LOCK WASHER, SS 1/4"	4
10	2020773-02	BOTTOM FEED SUPPORT TUBE	1
11	2509009-01	EXTERNAL TOOTH LOCK WASHER 1/2"	4
12	2075088-01	HEX BOLT, GALV 1/2" x 5 1/2"	2
13	2010301-02	L.H. CHANNEL, CAP MT., GALV	1
14	2389005-01	HEX NUT, GALV 7/8"-9	3
15	2509008-04	LOCK WASHER 7/8"	1
16	2070020-02	RD HD SQ NK BLT GALV 1/2" x 1 1/2" GD 5	1

ITEM	PART NO.	DESCRIPTION	QTY.
17	2075209-01	HEX BOLT, GALV 1/2" x 1 1/4" GD 5	10
18	2020755-04	YOKE CAP ASSEMBLY, GALV	1
19	2020754-02	TOP PLATE YOKE ASSY, GALV	1
24	2070039-01	HEX BOLT 7/8-9" x 6"	1
25	2020555-04	ELEVATION ADJUSTMENT SCREW	1
26	2010453-03	TRUNNION, GALV	1
27	2020774-01	SIDE STRUT	2
28	2072612-01	HEX BOLT, SS 1/4" x 3/4"	4
40	2075202-06	AZIMUTH ADJUSTMENT SCREW	1
41	2509008-03	LOCK WSHR, GALV 5/8"	4
42	2389003-01	HEX NUT, GALV 5/8" -13	1
43	2070035-02	RD HD SQ NK BLT GALV 5/8" x 1 1/2"	1
44	2075024-01	HEX BOLT, GALV 1/2" x 1 1/2"	12
45	2509014-01	FLAT WASHER, SS 1/2"	24
46	2060033-01	HEX BOLT, SS, 1/4" x 1 1/2" FULL THREAD	1

MAINTENANCE

To insure that the Tx/Rx Mount and 2.4m SMC Offset Antenna is operating efficiently and at an optimum, moderate maintenance is required. We recommend conducting a routine Maintenance Inspection every six months or as needed if unusual circumstances occur, such as severe weather conditions, falling objects or vandalism. The following checklist is provided for your convenience.

MAINTENANCE INSPECTION CHECKLIST:

1 - FOUNDATION

- Structural Damage

2 - Tx/Rx MOUNT

- All bolts (if any loosening has occurred tighten and torque - refer to Torque Chart page 3)
- Structural Damage
- Corrosion of galvanized steel members (if necessary, repair with cold zinc-rich galvanizing paint)

3 - 2.4m SMC OFFSET ANTENNA

- Bolts - 5/8" round head square neck, securing antenna to mount (Correct torque 20 Ft-lbs/27 N-m)
- Structural Damage

4 - BOTTOM FEED SUPPORT TUBE, SIDE FEED SUPPORT STRUTS AND ODU BRACKET

- All bolts (if loosening has occurred tighten and torque - refer to Torque Chart page 3)
- Corrosion of galvanized steel members (if necessary repair with cold zinc-rich galvanizing paint)
- Structural Damage

5 - FEED ASSEMBLY

- All securing hardware
- Structural Damage
- Feed Horn Weather Cover - Physical Damage (if damaged replace to prevent entry of water)

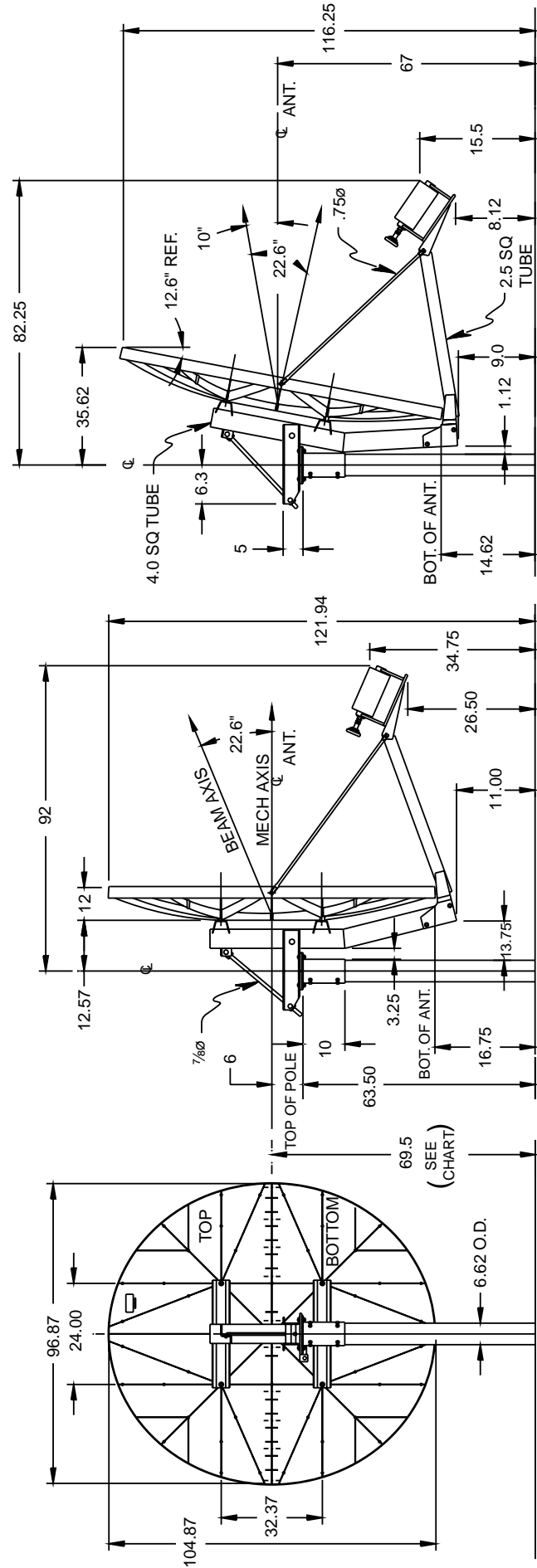
Upon inspection, make necessary repairs and replace any damaged parts.

For replacement parts, contact:

U.S.A.: VSAT Customer Service, Channel Master
P.O. Box 1416
1315 Industrial Park Drive
Smithfield, NC 27577 U.S.A.
Telephone: (919) 989-2205
Fax: (919) 989-2200

England: CHANNEL MASTER
Premier Business Park
Croft Head Road, Off Philips Road
Whitebirk Industrial Estate
Blackburn, Lancashire England BB1 5UE
(0254) 680444 • Fax (0254) 672299

**APPENDIX A
OUTLINE DRAWING
TYPE 243 2.4m OFFSET SMC REFLECTOR W/Tx/Rx MOUNT
ALL DIMENSIONS IN INCHES**

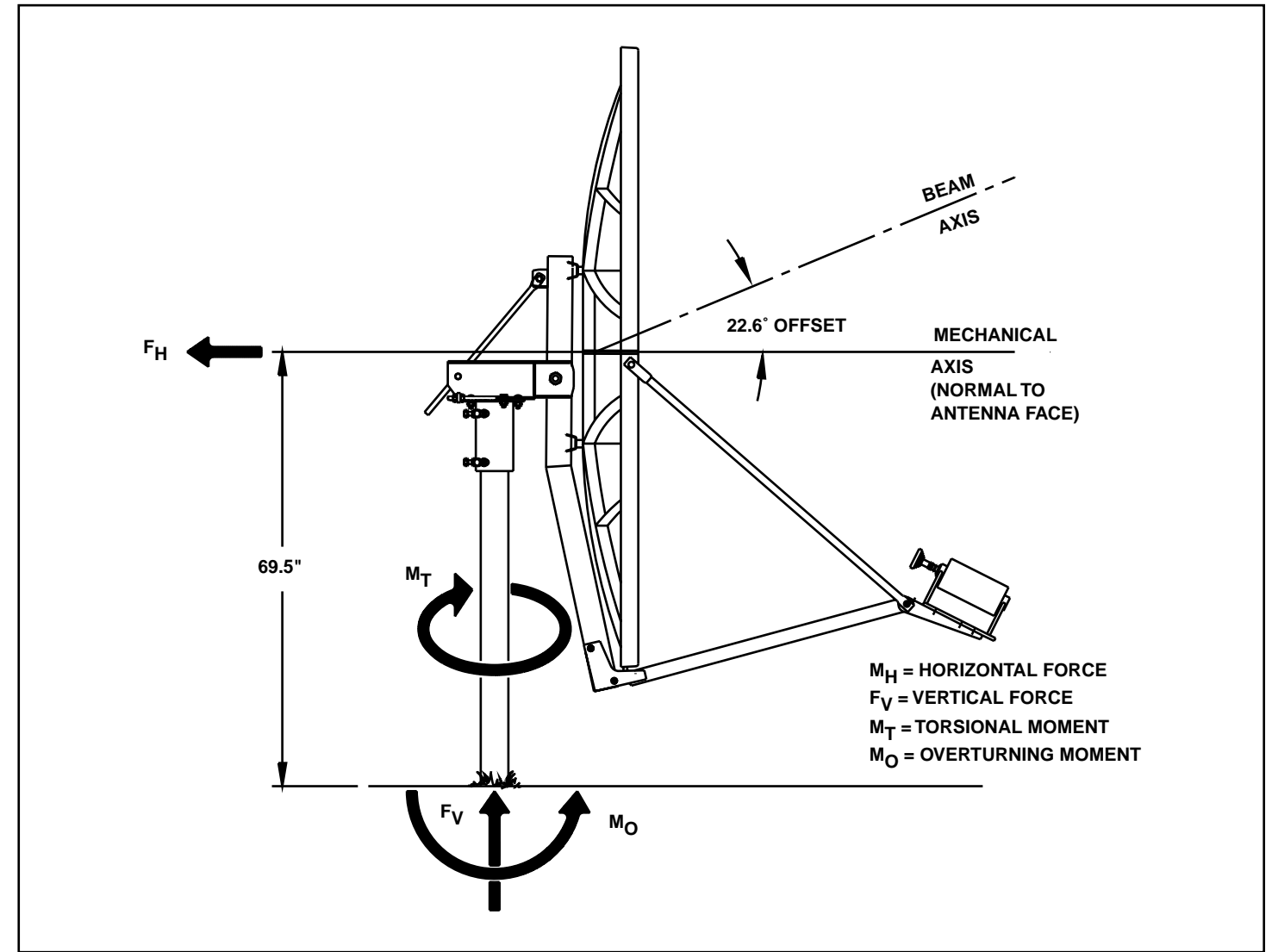


NOTES:

1. Antenna and mount certified to withstand 125 mph wind.
2. Chart based on A36 (36,000 psi yield) steel and 1.5 stability - 1991 Uniform Building Code Table 23G Exposure B, C or D at 0-15' height above ground.

GROUND PIPE	EXPOSURE	MAXIMUM DISTANCE FROM GROUND TO ϕ OF ANTENNA (NOTE: ϕ IS 6" ABOVE TOP OF GROUND POLE) FOR WIND SPEED OF:			
		125 MPH	115 MPH	110 MPH	100 MPH
6"					
6.62 O.D. x 6.06 I.D. Schedule 40	B	96"	73"	80"	73"
	C	62"	61"	61"	
	D	-	-	-	-
6.62 O.D. x 5.76 I.D. Schedule 80	C	89"			
	D	67"			

2.4m OFFSET SMC ANTENNA SURVIVAL WINDLOADS AT 125 MPH VELOCITY

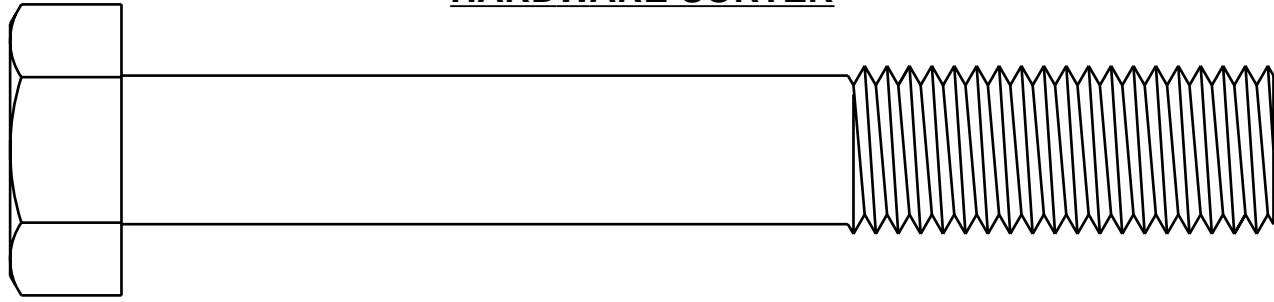


ELEVATION DEGREES	FORCE (POUNDS)	MOMENTS (FOOT-POUNDS)			
		M_T	M_O		
MECH.	BEAM	F_H	F_V	M_T	M_O
0	23	3,330	-89	2,612	19,286
10	33	3,152	-666	2,557	18,255
20	43	3,064	-1,288	2,426	17,746
30	53	2,775	-1,843	2,202	16,072
40	63	2,442	-2,220	1,867	14,143
50	73	2,131	-2,442	1,568	12,342
60	83	1,776	-2,553	1,213	10,286
70	93	1,332	-1,976	933	7,715

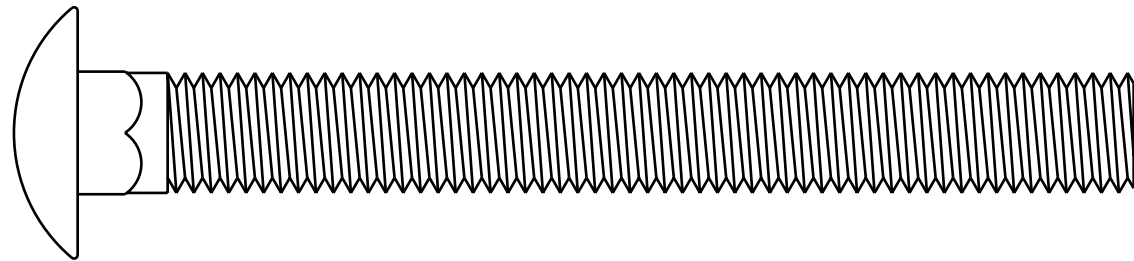
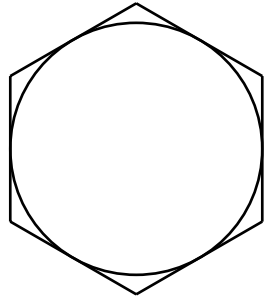
M_O BASED ON 69.5" FROM MOUNTING SURFACE TO ϕ OF ANTENNA.

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

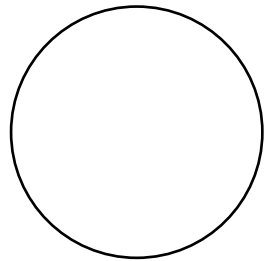
HARDWARE SORTER



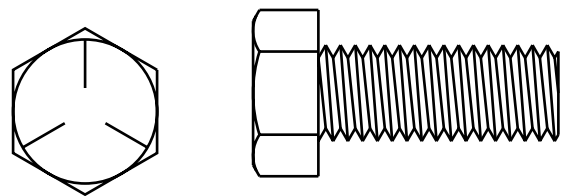
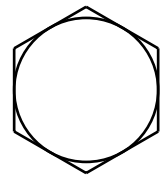
HEX (PIVOT) BOLT, GALV. $\frac{7}{8}$ -9 x 6"
Item 24



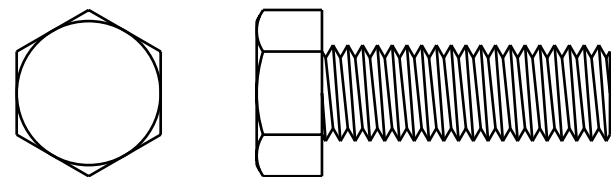
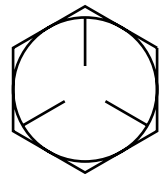
ROUND HD SQ NK BOLT, GALV. $\frac{5}{8}$ -11 x 5 $\frac{1}{2}$ "
Item 2



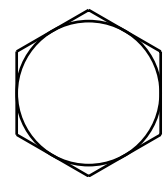
HEX HD BOLT, GALV. $\frac{1}{2}$ -13 x 5 $\frac{1}{2}$ "
Item 12



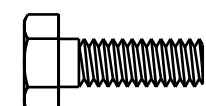
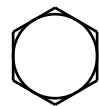
HEX HD BOLT, GALV. $\frac{1}{2}$ -13 x 1 $\frac{1}{4}$ ", Gd 5
Item 17



HEX HD BOLT, GALV. $\frac{1}{2}$ -13 x 1 $\frac{1}{2}$ "
Item 44



HEX HD CAP SCREW, SS $\frac{1}{4}$ -20 UNC x $\frac{3}{4}$ "
Item 28



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