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EXPLODED DRAWINGS OF ANTENNA

RECOMMENDED FOUNDATION DRAWING

## SECTION 1.

## INTRODUCTION

The SATURN 3.1 meter commercial satellite antenna from Midwest Communications Corp. is a high quality, all metal antenna available in C-Band, Ku-Band, and combined C/Ku-Band receive configurations.

The SATURN 3.1 is available with either azimuth/elevation (Az/E1) mount for fixed use or with a polar mount for motorized and programmable full orbital arc coverage.

Each antenna incorporates eight precision formed panels fastened to a center hub with radial support beams. This provides a high level of stiffness and surface tolerance for excellent C-Band and Ku-Band receive performance.

The SATURN 3.1 is shipped in one stackable, space-saving container for ease in handling. It is ready for assembly on a standard pipe type mount for installation flexibility and minimal set-up time.

### Features:

- \* 40.0 dBi C-Band gain
- \* 49.6 dBi Ku-Band gain
- \* 2 degree FCC compliance
- \* Precision formed panels, radials, and hub assembly for ease of installation

The SATURN 3.1 commercial antenna is manufactured exclusively for Midwest Communications Corp. by Trump Communications of Marshall, Michigan.

## SECTION 3.

## PARTS LIST

## 318S 3.1 METER ANTENNA

QTY	DESCRIPTION	PART NO.	ITEM NO.
(1)	HUB ASSEMBLY		318ASHUB
(8)	RADIAL BEAM		318RB
(3)	ANTENNA PANEL		318AP
(6)	OUTBOARD SKIRT		318OS
	HUB CLEVIS		318HC
	UPPER PIVOT BLOCK		318UPB
	ELEVATION JACK SCREW		318EJS
	AZ/EL PEDESTAL MOUNT		318AZMT
(4)	FEED SUPPORT STRUT		318FSS
(1)	FEED MOUNT PLATE *		318FMP
HARDWARE LIST			
PART TYPE	DESCRIPTION OF HARDWARE		
HUB AND REFLECTOR HARDWARE	(8) 1/2" ID X 1 1/16" OD FLATWASHER (8) 1/2"-13 UNC X 1 1/4" LG HX BOLT (122) 1/4"-20 UNC WELL NUT (128) 1/4"-20 UNC X 5/8" BUTTON HEAD SCR (24) 5/16"-18 UNC X 3/4" HX HD CP SCR (24) 5/16"-18 UNC HEX NUT (46) 5/16" ID X 11/16" OD FLATWASHER (1) PIPE COVER 5 9/16" OD		
FEED AND HUB HARDWARE	(16) 1/4"-20 X 5/8" HX BUTTON SCR SS (4) 1/4"-20 X 3/4" HX BUTTON SCR SS (20) 1/4" WASHER SS (16) 1/4"-20 HEX NUTS SS (3) PLASTIC BLIND NUT (2) HUB PLUS		

\* NOT USED WITH ALL FEED ASSEMBLIES

**PERFORMANCE SPECIFICATIONS  
MODEL 318AS 3.1 METER SATELLITE ANTENNA**

RF SPECIFICATIONS	C-BAND RECEIVE	KU-BAND RECEIVE
Frequency.....	3.7-4.2 GHz	11.7-12.2 GHz
Typical Gain at Midband.	40.0 dBi	49.6 dBi
VSWR.....	1.25:1	1.25:1
Beamwidth: -3 dB.....	1.72 Deg.	0.55 Deg.
-15 dB.....	3.61 Deg.	1.16 Deg.
Antenna Noise Temp. at Midband:	2 Port LP Feed	2 Port LP Feed
5 Deg. Elevation.....	45 Deg.K	58 Deg.K
10 Deg. Elevation.....	34 Deg.K	43 Deg.K
20 Deg. Elevation.....	29 Deg.K	35 Deg.K
40 Deg. Elevation.....	27 Deg.K	32 Deg.K
Typical G/T at 20 Deg. Elevation,Clear Horizon, 4 GHz:		
W/ 40 Deg.K LNA, dB/Deg.K.....	21.3	
W/ 100 Deg.K LNA, dB/Deg.K.....	18.7	
Typical G/T at 20 Deg. Elevation,Clear Horizon, 12 GHz:		
W/ 250 Deg.K LNA, dB/Deg.K.....		24.8
W/ 190 Deg.K LNA, dB/Deg.K.....		25.5
Feed Interface.....	CPR-229G	WR-75 Choke
Feed Insertion Loss at OMT.....	0.05 dB	0.05 dB
Cross Polarization Isolation:		
On Axis.....	35 dB	35 dB
Within 1 dB Beamwidth	30 dB	30 dB
Focal Point.....	41.04"	41.04"
<b>MECHANICAL SPECIFICATIONS</b>		
Azimuth Travel.....	360 Deg. Continuous	
Elevation Travel.....	3 Deg. to 65 Deg. Continuous	
Polarization Travel.....	+ or - 90 Deg.	
Shipping Weight.....	400 Lbs. (approximate)	
Shipping Volume.....	31 cubic ft.	
Material:		
Reflector panels ....	Electro-galvanized steel	
Az/El Mount.....	Galvanized steel	

\*\* Specifications subject to change without notice \*\*

**SECTION 4:                    GROUND POLE INSTALLATION**

- STEP 1:** Select a site that is clear of physical and microwave interference. The distance from the antenna to the receivers should be as short as possible to maximize performance.
- STEP 2:** The soil under the foundation should consist of undisturbed or compacted material with a minimum bearing capacity of 2000 psf. If the frost line is below 14", special consideration to the design of the subsoil base will be necessary to prevent heaving.
- STEP 3:** Form work is constructed after laying out the foundation and the necessary grading and compacting is complete. Forms should be level and set to cause the foundation to protrude at least 1" above the surrounding finished grade.
- STEP 4:** Reinforcing steel is installed according to the foundation drawing. The in-place bars should have 2" concrete cover on the top mat, and 3" on the sides and bottom. Rebar intersections should be secured with tie wire. The finished steel cage should not be susceptible to shifting or distortion when the concrete is placed.
- STEP 5:** It is essential that the Std. 4" Schedule 40 pipe ( 4.5" OD ) be installed within +/- 1 degree and properly secured to prevent shifting when the concrete is placed. The concrete should be consolidated in the forms by vibrating to prevent voids. The completed foundation should be smooth and sloped slightly away from the center for drainage and have a broom finish.

**REFER TO DRAWING ON PAGE 18**

**SECTION 5.**

**ANTENNA ASSEMBLY INSTRUCTIONS  
SATURN 318S ANTENNA**

**STEP 1:** Inspect parts list to insure that all components have been delivered. The following tools are recommended:

- ~ Cordless drill or screwdriver
- ~ 5/32" Hex Allen bit attachment
- ~ 5/32" Hex Allen Wrench
- ~ 3/8 Drive Socket Set thru 3/4"
- ~ 3/4" combination wrench
- ~ Open End Wrench Set thru 3/4"
- ~ (2) Adjustable Wrenches (at least 12")
- ~ 12' Tape Measure
- ~ Pocket Apron for Hardware
- ~ 3' Step Ladder

**\*\* NOTE: PLEASE REFER TO YOUR AJAK HORIZON 180 MANUAL FOR THE FOLLOWING STEPS**

**STEP 2:** Place the clamp assembly on pole, insert four 1/2" x 2 3/4" bolts, nuts and lockwashers.

**STEP 3:** Attach the motor assembly to the clamp with 5/8" x 5 1/2" bolt and lock nut. Lift motor assembly upward to allow threaded elevation rod to engage collar. Now insert threaded end into slot on clamp assembly. Use two 3/4" nuts and four flat washers.

**\*\* NOTE: Later steps will be easier if the motor assembly is now adjusted to its lowest position.**

**STEP 4:** Connect a temporary voltage source (preferably an "east-west" control box to terminals one and two. Run the motor to the top (arc-zenith) position.

**STEP 5:** Install flanged bearing in the top hole with flange on the side. (May be necessary to tap bearing in with hammer).

**STEP 6:** With bushing in place install dish support frame with 5/8" x 2" bolt, flat washer, and lock nut. (Tighten fully, so that bushing turns with bolt.)

**STEP 7:** Install the top of the dish backing ring to the top of the motor drive assembly using one 1/2" x 1 1/4" bolt and nut. Set the declination angle for your area at this time.

SECTION 5.  
(Cont.)

ANTENNA ASSEMBLY INSTRUCTIONS  
SATURN 318S ANTENNA

- STEP 8:** Install the counter weight at this time. Have a helper hold the weight! The weight is installed on the upper dish support and motor assembly. Use a 1/2" x 1 1/4" bolt on the side of this union that you did not previously use. Now remove the first bolt, swing the counterweight in place and replace the bolt. Tighten both bolts securely!
- STEP 9:** Now attach the Saturn 318S hub assembly to the antenna frame. Align the back side of the hub (the front side has eight holes encircling the center hole) with the frame by lining up the bolt holes of the frame with those on the inside lip of the hub. Use the 5/16"-18 x 3/4" hex bolts and hardware. \*\* Note: an alignment tool may be necessary.
- STEP 10:** Insert rubber well nuts (9), into each radial beam and the into each outboard skirt. Insert the hard plastic blind nuts into the holes on the front of the hub. Also, insert the hub plugs in the center holes in the front and rear of the hub.
- STEP 11:** From the front side of the hub, starting at 9 o'clock position, attach the first radial beam with 5/16"-18 x 3/4" hex bolts washers and nuts. The first bolt was installed through the frame tab in STEP 11.
- STEP 12:** Begin attaching the outboard skirts to the radial beams. Note the recessed ends for overlap. Two long screws (1/4"-20 x 5/8") are used at each radial beam and are secured by two previously installed well nuts. Increasing the elevation angle to allow the antenna lie back will allow easier access from your ladder.
- STEP 13:** Working counterclockwise from the front of the antenna, install the panels. Attach the panels with 1/4"-20 x 5/8" screws. Note the offset on the leading edge of the panel. Attach the first two panels leaving the trailing edge of the trailing panel unattached. This will allow the attachment of the final panel. Each panel should be installed as follows: One screw to the hub, six screws to the outboard skirt and final screws to the radial beam.

SECTION 5.  
(Cont.)

ANTENNA ASSEMBLY INSTRUCTIONS  
SATURN 318S ANTENNA

STEP 14: Install the feed mount and struts to the reflector. Remove the fourth inbound 5/8" long from every other panel. Secure feed struts to these locations with 1/4-20 x 3/4" long screws. Attach the feed mount plate under the strut flanges with 1/4-20 x 5/8" screws, nuts, and washers.

## SECTION 6.

## FEED ASSEMBLY

### TYPE 1: DUAL POLE C-BAND (Seavey Model ESA44B-1)

Separate the orthomode transducer from the scalar plate by removing the four mounting bolts. Using four 1/4"-20 x 5/8" hex screws and washers attach the scalar plate to the feed struts. Attach the rear portion of the feed cover (Seavey Model C18FC) to the back of the plate also using 1/4"-20 screws and washers. Mount LNA/LNB's to feed flanges and rejoin this assembly to the scalar plate. Finger tighten the four hex bolts at this time. Cables can now be run through the knockout holes in the cover and connected to the LNA/LNB's. The feed support assembly is now ready to be attached to the reflector. See **STEP 14 in Section 5.**

### TYPE 2: C/KU FEED (Chaparral Corotor II)

Disconnect the Corotor scalar ring from the feedhorn and bolt it to the feed mount plate (C18FMP). Now, attach the rear portion of the feed cover to the mount plate and feed support struts using the hardware provided. Attach the C-Band elbow and bolt the LNB's to the feedhorn using the supplied gaskets and hardware. The feed support assembly should now be attached to the reflector. See **STEP 14 in SECTION 5.**

Install the feedhorn by inserting it into the scalar ring. Attach the polar axis alignment arrow provided with the feed and adjust the feedhorn to the .34 mark, and with the arrow aligned with the antenna's polar axis. Tighten the set screws.

The focal length of the C18AS antenna is about **41** inches. Measure this length from the center of the reflector to the 1/16" inside the 12 GHz throat. Make necessary adjustments toward or away from the dish to achieve this length without changing the polar axis alignment.

Make sure the feedhorn is pointing directly at the center of the dish. Make necessary adjustments without changing the focal length.

SECTION 6.  
(Cont.)

FEED ASSEMBLY

Check the centering of the feedhorn by measuring from three points on the edge of the dish to the edge of the scalar ring.

These measurements should be equal. Make adjustments without changing the focal length. Install the throat cover.

Using the supplied Scotchlok connectors, connect the servo motor wires to their respective leads from the controller; red to +5 Volt, white to pulse, black to ground. **USE ONLY SHIELDED WIRE.**

Connect coaxial cables to the LNB's. Proper sealing of cable connections is recommended. Install the front half of the feed cover.

**SECTION 7:                   ANTENNA ALIGNMENT:  
                              POLAR MOUNT**

- STEP 1:** With the feed assembly installed you should now be ready for antenna alignment. Use a tape measure to check the centering of the feed assembly. Measure the feed aperture location from the edge of the reflector at the top, bottom, left and right sides. If necessary, adjust for minimum radial error ( not to exceed 1/16" ). Measure the feed aperture location from the front of the hub. The proper focal length should be 41.04" ( +/- .125" )
- STEP 2:** Connect a temporary wiring harness to the LNA's or LNB's and connect to a receiver and spectrum analyzer and/or video monitor.
- STEP 3:** The Ajak polar mount can be used with any number of controllers or controller/receiver combinations. It has mechanical limits that are set to enable full U.S. Domsat reception. The limit switch arms may be adjusted to increase or decrease the mechanical limits. The mount comes with the motor set to the zenith of its arc. If possible, have a bench type 24 to 30 volt DC supply (4 amp is sufficient). It is easier to track the antenna without having to worry about the controllers set up at this time.

Connect a ten foot piece of two conductor wire (14 gauge) to the "motor" terminals on the drive and the to either power supply or controller. Referring to your Ajak manual set the elevation of your mount for your location. Now lower the dish with the motor to the approximate elevation of the western most satellite in your visible arc. Loosen the clamp assembly to allow rotation of the entire antenna and mount assembly. Rotate the antenna through the bearing you estimate for the satellite while monitoring the spectrum analyzer. If you don't find any signals, raise or lower the dish with the motor and repeat this process until you acquire a satellite signal. Peak the azimuth , then the elevation (with the motor), then snug the clamp bolts. Now raise the elevation with the motor and find a satellite near the zenith of the mounts travel. Use the elevation adjustment screw and peak this satellite. Now lower the antenna to the eastern most visible satellite. Loosen the clamp assembly only enough to be able to manually rotate the whole assembly. Peak the signal and tighten the

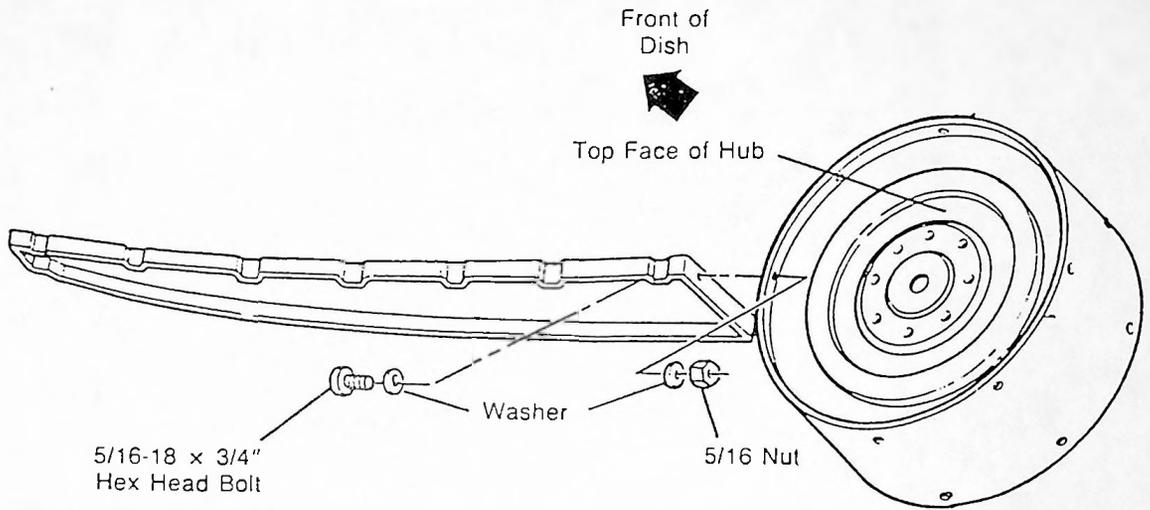
**SECTION 7:       ANTENNA ALIGNMENT**  
**(cont.)**

**STEP 3:**   clamp bolts. Repeat this process until no  
**(cont.)**   further signal increase is possible. Tighten all  
hardware. Now run the dish east and west until  
the mechanical limits stop travel. This is to  
insure that nothing is in the way of the dish.

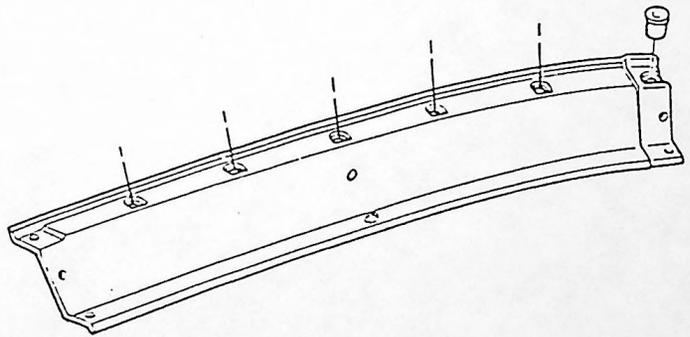
**STEP 4:**   You have now completed the dish installation and  
alignment. Make sure that all hardware is tight.  
When installing the permanent control and signal  
cables be sure to allow for the dish travel.  
Install the plastic motor cover assembly. Refer  
to the controllers manual for programming the  
antenna system.

SECTION 8. FINAL CHECKLIST

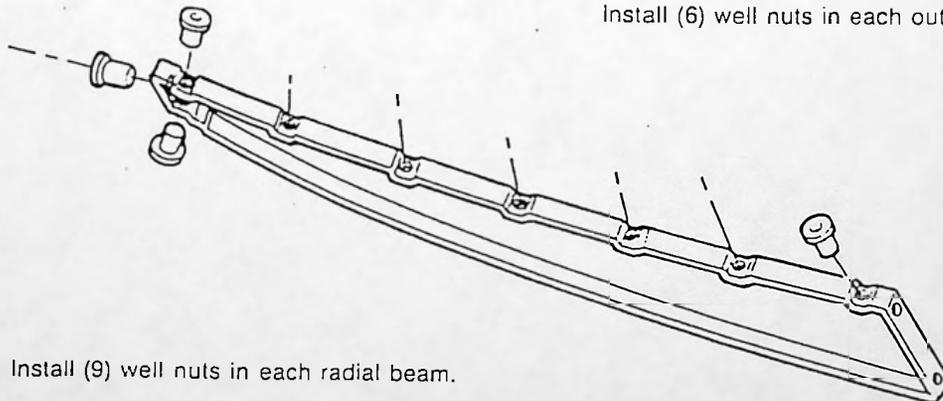
- STEP 1: A ground strap should be installed from the Az/E1 pedestal head to a customer supplied ground rod or grounding system. There is an attachment point on the mount for this purpose.
- STEP 2: Inspect all hardware for proper installation and tightness.
- STEP 3: Touch up damaged painted surfaces with touch-up paint as required.



RADIAL BEAM INSTALLATION

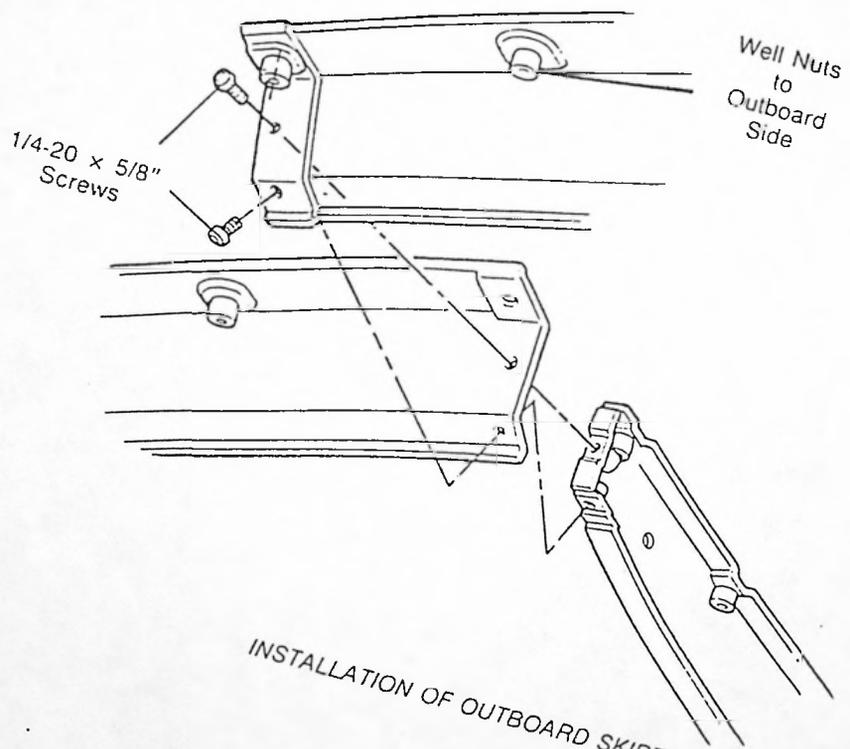


Install (6) well nuts in each outboard skirt.

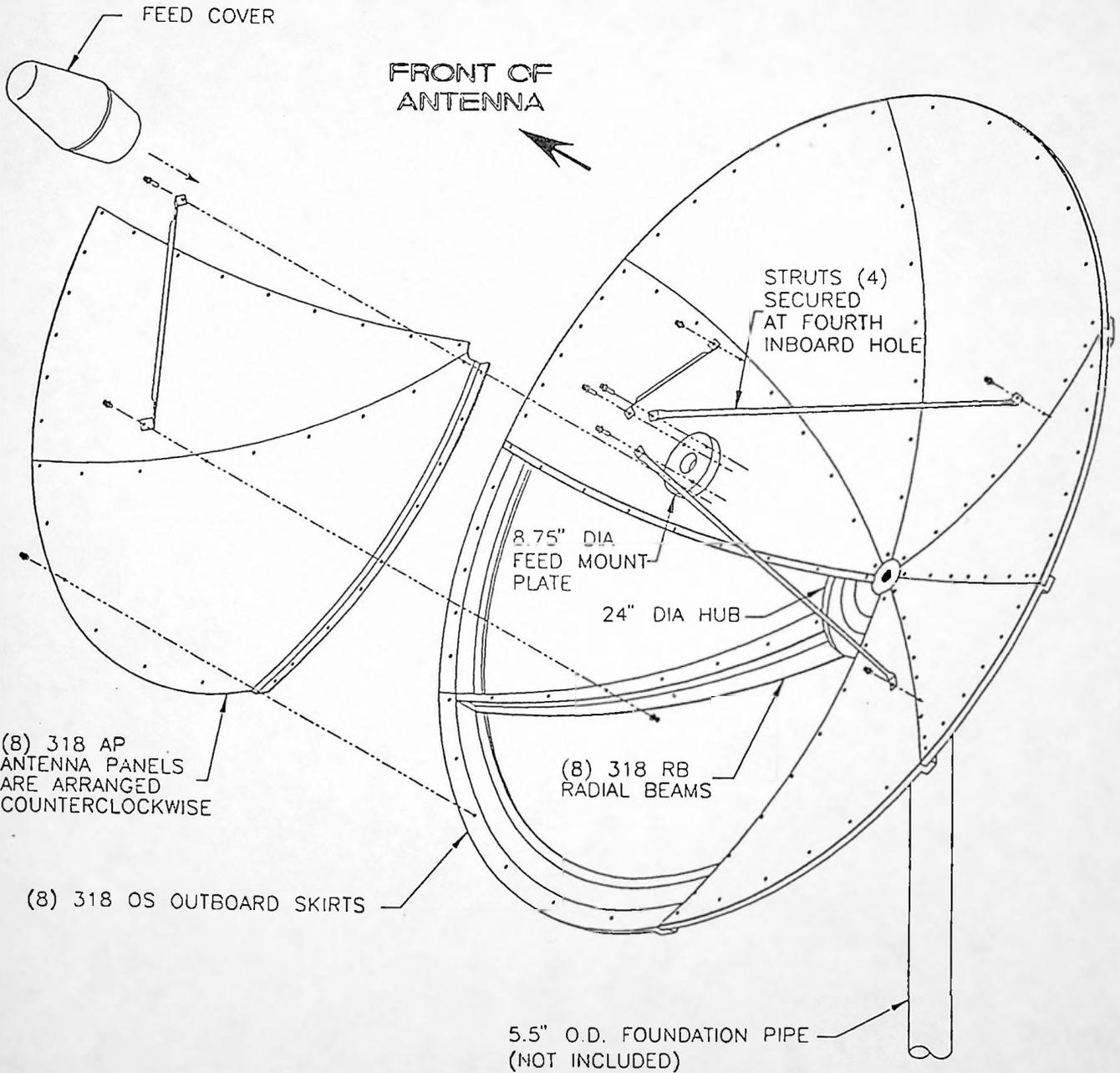


Install (9) well nuts in each radial beam.

RUBBER WELL NUT INSTALLATION

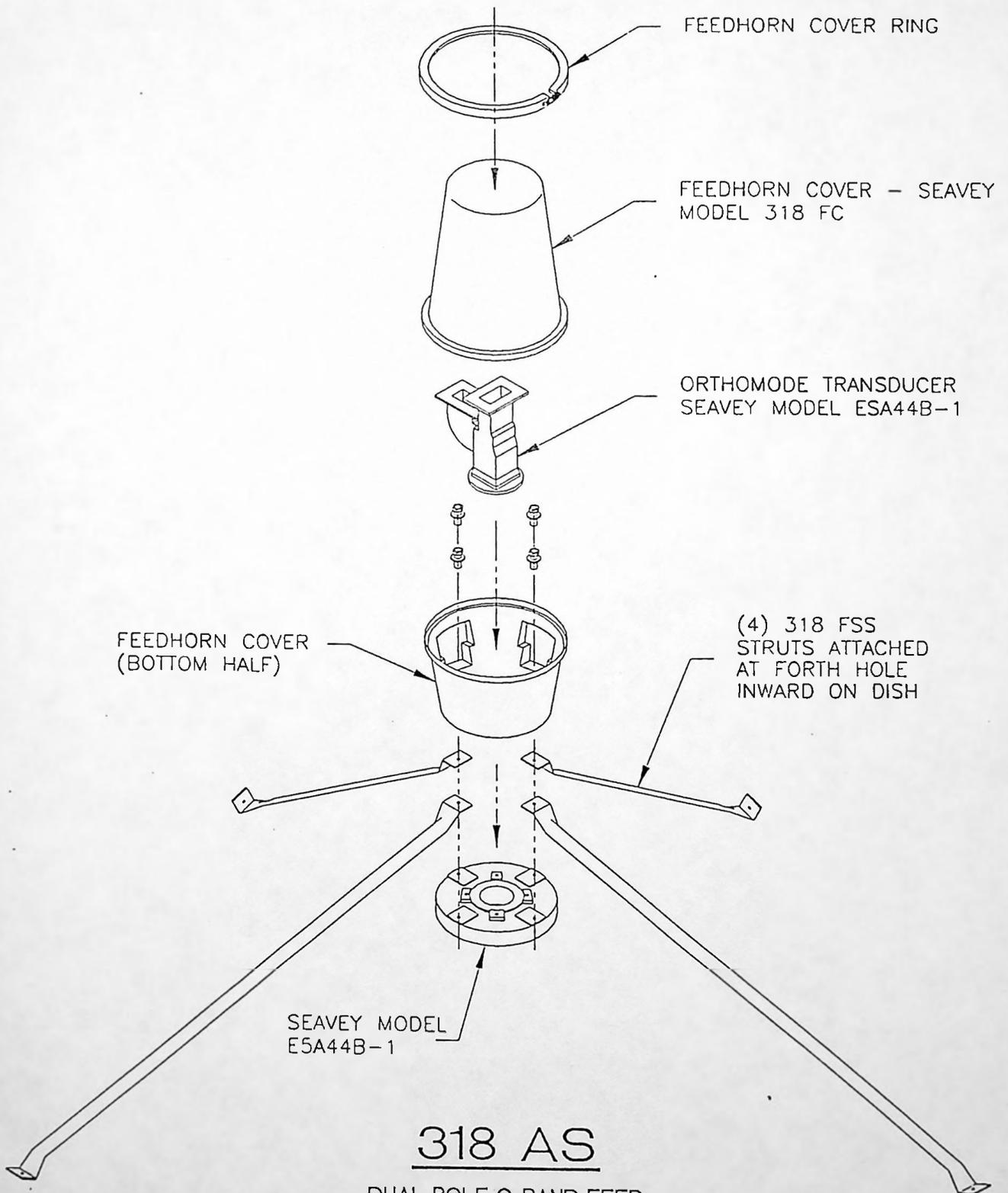


INSTALLATION OF OUTBOARD SKIRT



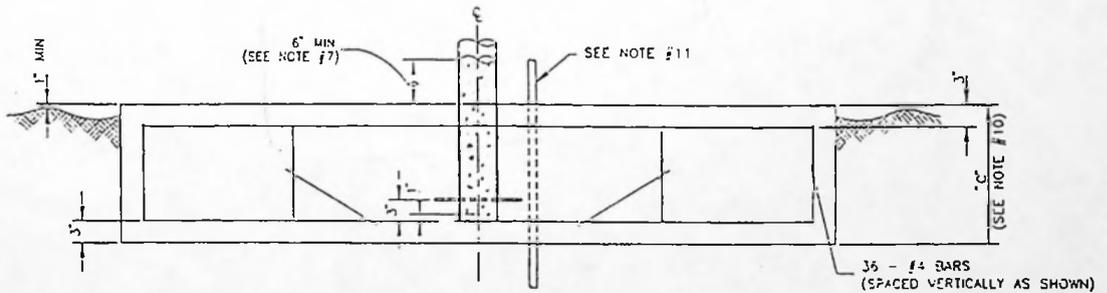
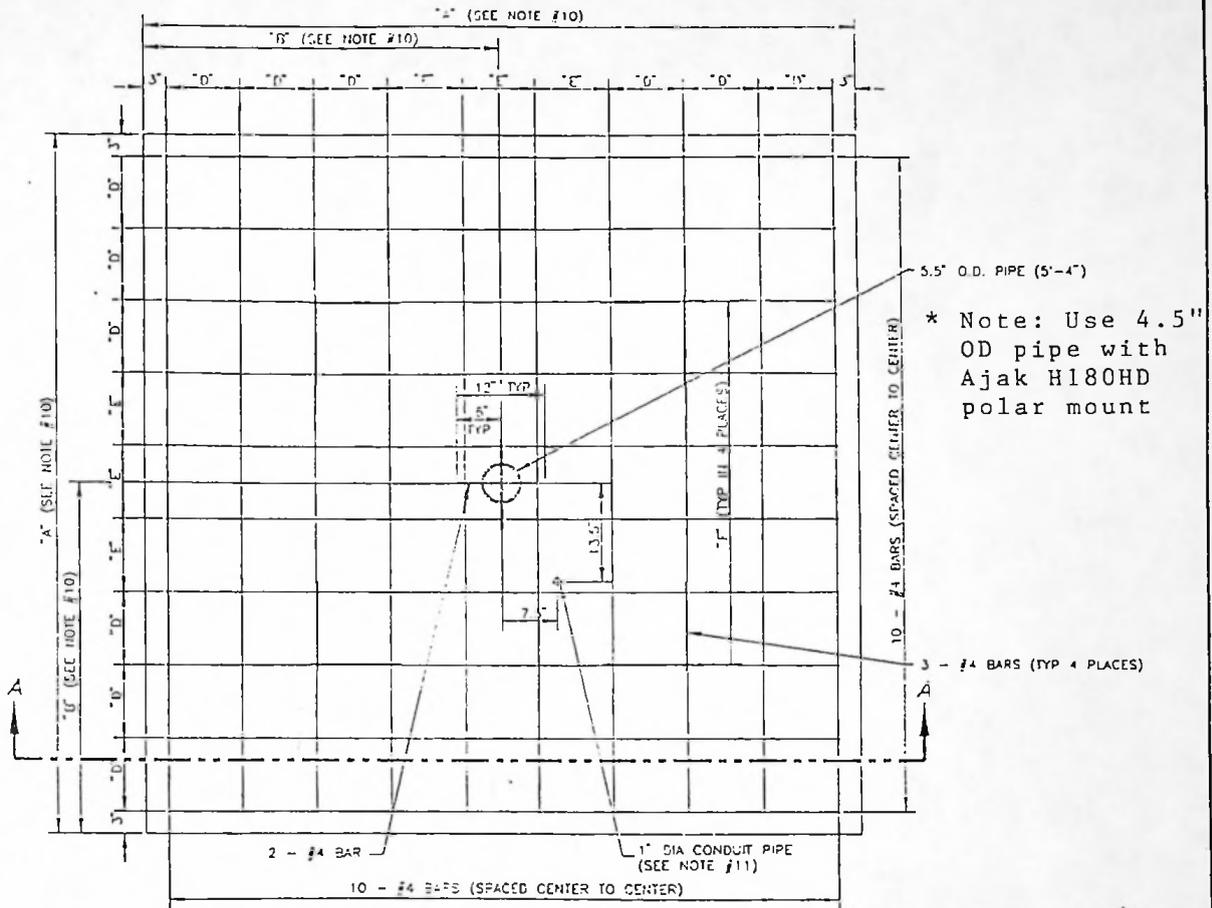
# 318 AS

ASSEMBLY DRAWING



# 318 AS

DUAL POLE C-BAND FEED  
ASSEMBLY DRAWING



ALTERNATE FOUNDATION DESIGNS FOR FROST LINES DEEPER THAN 11'

FROST LINE DEPTH	SLAB DIMENSIONS						CONCRETE VOL (YD'S)
	A	B	C	D	E	F	
0'-14' (AS SHOWN)	96"	48"	12"	10"	10"	49.5'	2.97
15'-23'	84"	42"	24"	8"	10"	45.5'	2.43
24'-35'	72"	36"	36"	8"	8"	39.5'	4.7
36'-48'	60"	33"	48"	7"	6"	31.5'	4.58

FROST LINE DEPTH	#4 STEEL REINFORCING BAR				BWR WEIGHT
	DIR	LGTH	DIR	TOTAL LGTH	
0'-14' (AS SHOWN)	40	92'	52	10'	2307
15'-23'	40	78'	52	10'	2307
24'-35'	40	72'	52	31'	2514
36'-48'	40	63'	52	44'	2524

NOTES:

- 1) ALL CONCRETE SHALL HAVE A 28-DAY MIN COMPRESSION STRENGTH OF 3,000 PSI
- 2) CONCRETE SHALL BE THOROUGHLY CONSOLIDATED BY EITHER ROODING OR VIBRATING.
- 3) REINFORCEMENT STEEL SHALL BE DEFORMED INTERMEDIATE GRADE NEW BILLET STEEL BARS WITH 60,000 PSI MIN YIELD STRENGTH IN ACCORDANCE WITH SPECIFICATION FOR DEFORMATION OF DEFORMED STEEL BARS FOR CONCRETE REINFORCEMENT (ASTM A-615)
- 4) ALL REINFORCEMENT BARS SHALL BE SECURELY WIPED TO PREVENT SHIFTING WHEN CONCRETE IS PLACED
- 5) THE BASE UNDER THE FOUNDATION SHALL CONSIST OF UNDISTURBED (OR COMPACTED) MATERIAL WITH A MINIMUM BEARING CAPACITY OF 2,000 PSI.
- 6) SURFACE TO HAVE A FINISH AND BE LEVEL TO THE HORIZON WITHIN 1/8"
- 7) WHEN PLACING CONCRETE, FILL 5" PIPE TO A MINIMUM OF 6" ABOVE TOP OF SLAB
- 8) COMPLIANCE WITH ALL BUILDING CODES AND THE REQUIRED PERMITS ARE THE RESPONSIBILITY OF OTHERS
- 9) PIPE MATERIAL MUST BE ASTM A-53, GRADE B PIPE ASSEMBLY SHOULD BE HOT-DIP GALVANIZED TO MAXIMIZE CORROSION RESISTANCE
- 10) REFER TO THE TABLE FOR ALTERNATE DESIGN WHERE FROST-LINE EXCEEDS 14' DEPTH.
- 11) LENGTH OF 1" DIA PVC CONDUIT TO BE DETERMINED BY SLAB THICKNESS, DIMENSION "C", AND PLUS 12"
- 12) 5.5" O.D. PIPE MUST BE VERTICAL WITHIN 1/8" TOP TO BOTTOM.