

1. Operate the circuit breaker to the ON (up) position.
2. Operate the ON/OFF switch to ON.
- i. Perform the *Azimuth Offset Adjustment* procedure.

### 5.3.2.5 Azimuth Encoder Drive Belt

- a. Operate the ACU AUTO/MANUAL switch in to MANUAL.
- b. At the 300 VDC power supply:
  1. Operate the ON/OFF switch to OFF.
  2. Operate the circuit breaker to the OFF (down) position.
- c. If the belt is broken, remove all pieces of the old drive belt.

#### NOTE:

The replacement encoder drive belt is located at the lower portion of the pedestal, surrounding the waveguide and several cables.

- d. Loosen the bolts that hold the encoder bracket assembly. Move the assembly away from the main drive gear so that the belt will pass between the encoder pulley and the main drive gear.
- e. Position the encoder belt around the gears.
- f. Using your hands, pull the encoder mounting bracket as far as possible to achieve belt tightness. There should not be any obvious slack in the belt.
- g. While holding the mounting bracket, tighten the cap screws to 25 ft lb.
- h. At the 300 VDC power supply:
  1. Operate the circuit breaker to the ON (up) position.
  2. Operate the ON/OFF switch to ON.
- i. Perform the *Azimuth Offset Adjustment* procedure

### 5.3.2.6 Azimuth Offset Adjustment

- a. If not already, place the maintenance terminal in exclusive control of the TAC.
- b. Using the ACU AZ REV/FWD switch, move the radar dish until the feed horn of the dish points true north.
- c. At the maintenance terminal, change the azimuth offset to indicate an azimuth of 0°.
- d. At the ACU, operate the AUTO/MANUAL switch to AUTO.
- e. At the maintenance terminal, move the antenna as necessary to locate a predetermined reference point at a given azimuth and elevation.
- f. Modify the azimuth offset to indicate the actual position.

- g. Release the maintenance terminal from exclusive control of the TAC.

### 5.3.2.7 Azimuth Slip Ring

Refer to Figure 36 for locations of parts during this procedure.

• **Removal:**

**NOTE:**

These steps will require two people.

- a. Operate the ACU AUTO/MANUAL switch to MANUAL.
- b. At the 300 VDC power supply:
  1. Operate the ON/OFF switch to OFF.
  2. Operate the circuit breaker to the OFF (down) position.

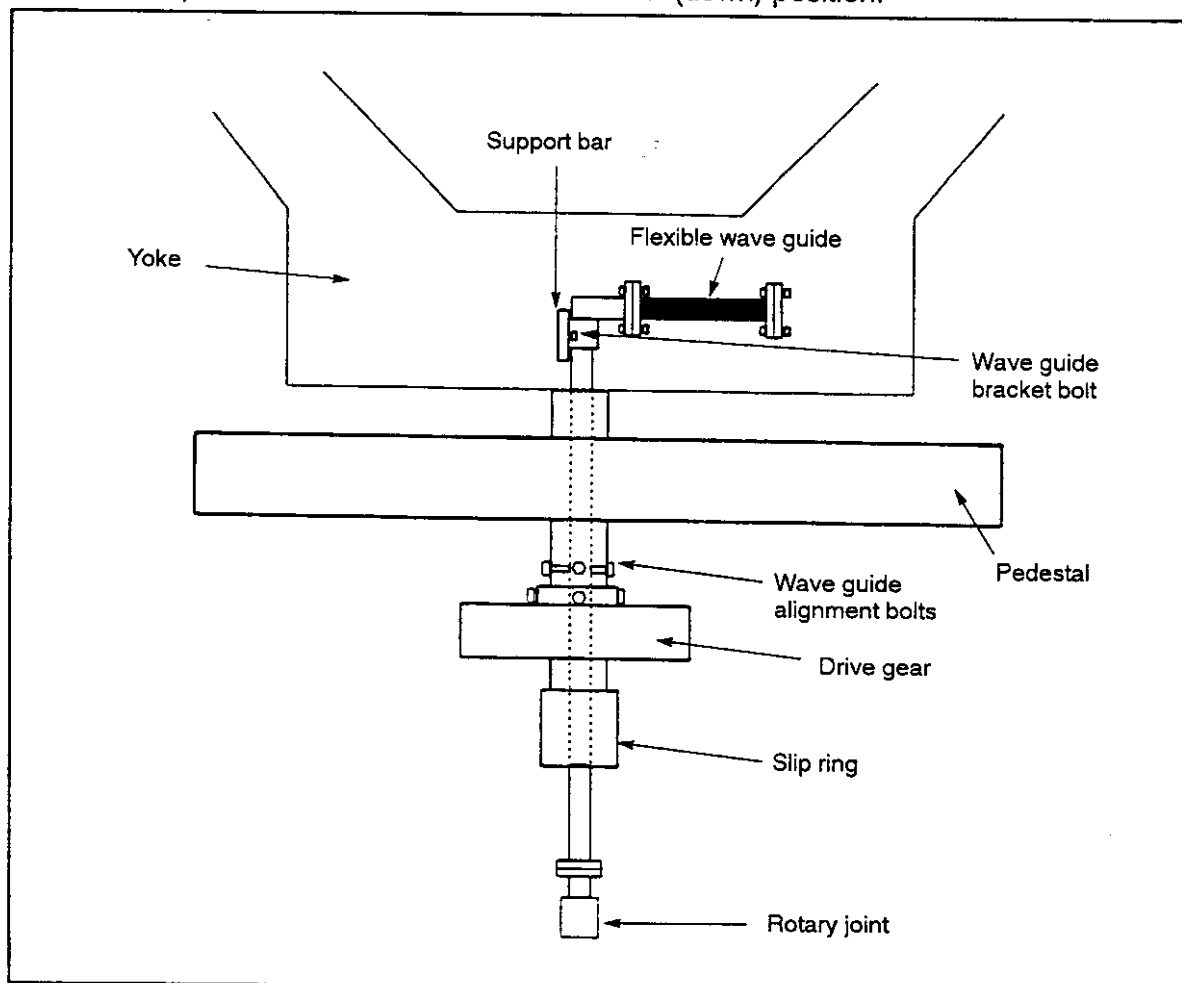


Figure 36. Side View of Rotating Wave Guide Assembly Through Antenna and Pedestal.

- c. Disconnect the slip ring wiring, noting the locations of each wire removed.
- d. Remove the four wave guide alignment bolts.

**NOTE:**

To prevent wave guide contamination, install wave guide protective covers in the exposed end of each wave guide segment.

**NOTE:**

After removing the flange bolts at the flexible wave guide, note the orientation of the rubber gaskets and the shim between the wave guide flanges as they are removed.

- e. Remove the wave guide flange bolts for the joints above the rotary joint and at the flexible wave guide segment.

**NOTE:**

The next step will require one person to grasp the wave guide above the flange that joins with the rotary joint and lift up so that no downward pressure is exerted on the rotary joint. The other person will perform the next step.

- f. Remove the bolts holding the wave guide bracket to the support bar. DO NOT remove the bolts holding the support bar to the yoke.

**NOTE:**

Several wires also pass through the shaft along side of the wave guide. Take care not to damage any of these wires.

- g. Carefully lift the wave guide segment up through the shaft.
- h. On the bracket for the alignment pin at the base of the slip ring, remove the two bolts holding the bracket to the pedestal and remove the bracket.
- i. At the ECU, disconnect the three connectors for the slip ring wires.
- j. Using one end of a string that is at least 2m long, tie the three slip ring wire connectors together.

**NOTE:**

Attach the other end of the string to something in the ECU to prevent it from falling down the shaft.

- k. While supporting the slip ring assembly, disconnect the three screws at the top of the slip ring assembly and set the slip ring assembly on the pedestal.
- l. Gently pull the slip ring wires and connectors from the shaft.

- **Installation:**

- a. Attach the end of the string in the shaft to the wires and connectors of the new slip ring and carefully pull them into the ECU.

**NOTE:**

Be carefull not to pinch the wires in the shaft during the next step.

- b. Insert the slip ring assembly into the shaft and tighten the screws to 15 ft lb.
- c. Position the slip ring alignment bracket and tighten the bolts to 25 ft lb.
- d. At the ECU, connect the wiring connectors from the slip ring.

**NOTE:**

When removing wave guide protective covers, use caution to prevent contamination of the interior of the exposed wave guide segment. Before installing each wave guide segment, perform a visual examination to verify that no contaminants exist within the wave guide. If contaminants exist, refer to the wave guide paragraphs for instructions on cleaning.

- e. Carefully lower the wave guide through the shaft to a point where one person can support it slightly above the rotary joint.
- f. Install the wave guide bracket around the wave guide in the yoke assembly and tighten the bolts enough to prevent the wave guide from moving.
- g. Noting the orientation of when they were removed, insert the rubber gaskets and shims in the joints between all disconnected segments of wave guide and attach the hardware.
- h. Using an alternating cross-over pattern for tightening the flange bolts, tighten the flange bolts to 25-40 ft lb.
- i. Install the four wave guide alignment bolts and tighten each one until it barely touches the wave guide. Adjust each bolt so that it is finger tight against the wave guide. Tighten the lock nut on the alignment bolts that have them.
- j. Tighten the wave guide bracket bolts to 25 ft lb.
- k. Connect the external slip ring wiring.
- l. At the 300 VDC power supply:
  - 1. Operate the circuit breaker to the ON (up) position.
  - 2. Operate the ON/OFF switch to ON.
- m. Operate the ACU AUTO/MANUAL switch to AUTO.

### 5.3.2.8 Azimuth Rotary Joint

- **Removal:**

- a. Operate the ACU AUTO/MANUAL switch to MANUAL.
- b. At the 300 VDC power supply:
  1. Operate the ON/OFF switch to OFF.
  2. Operate the circuit breaker to the OFF (down) position.
- c. In the antenna yoke, loosen the bolts holding the wave guide bracket to the support bar. DO NOT remove the bolts holding the support bar to the yoke.
- d. Remove the wave guide flange bolts for the flanges above and below the rotary joint.

**NOTE:**

Observe the location of the flange with the groove. The new rotary joint will need to be oriented the same way.

**NOTE:**

To prevent wave guide contamination, install wave guide protective covers in the exposed end of each wave guide segment.

- e. Use care not to damage the rubber gaskets and remove the rotary joint.

• **Installation:**

**NOTE:**

When removing wave guide protective covers, use caution to prevent contamination of the interior of the exposed wave guide segment. Before installing each wave guide segment, perform a visual examination to verify that no contaminants exist within the wave guide. If contaminants exist, refer to the wave guide paragraphs for instructions on cleaning.

- a. Using rubber gaskets at each flange, install the rotary joint and tighten the flange bolts, using an alternating cross-over pattern, to 25–40 ft lb.
- b. In the antenna yoke, tighten the bolts holding the wave guide bracket to the support bar to 25 ft lb.
- c. At the 300 VDC power supply:
  1. Operate the circuit breaker to the ON (up) position.
  2. Operate the ON/OFF switch to ON.
- d. Operate the ACU AUTO/MANUAL switch to AUTO.

### 5.3.2.9 Azimuth Control Unit

#### 5.3.2.9.1 Servo Board

• **Removal:**

- a. Operate the ACU AUTO/MANUAL switch to MANUAL.
- b. At the 300 VDC power supply:
  1. Operate the ON/OFF switch to OFF.
  2. Operate the circuit breaker to the OFF (down) position.
- c. At the ACU, open the door for the box with 300 VDC indicator (right side box).
- d. Remove the circuit board edge connectors from the servo board.
- e. Verify that the positions of the jumpers on the new servo board match those of the servo board being replaced.
- f. Remove the nuts holding the servo board mounting bracket to the back of the ACU and remove the servo board.
- g. Verify that the replacement servo board has two stand-off lugs attached to the two screws on the edge of the servo board opposite to the mounting bracket.
- h. If necessary, remove the mounting bracket from the old servo board and attach to the replacement servo board.

• **Installation:**

- a. Mount the replacement servo board to the ACU and tighten the nuts to 15 ft lb.
- b. Attach the circuit board edge connectors to the servo board.
- c. Close the door to the ACU.
- d. At the 300 VDC power supply:
  1. Operate the circuit breaker to the ON (up) position.
  2. Operate the ON/OFF switch to ON.
- e. Operate the ACU AUTO/MANUAL switch to AUTO.

#### 5.3.2.9.2 Control Board

• **Removal:**

- a. Operate the ACU AUTO/MANUAL switch to MANUAL.
- b. At the 300 VDC power supply:
  1. Operate the ON/OFF switch to OFF.
  2. Operate the circuit breaker to the OFF (down) position.
- c. At the ACU, open the door for the left side box.
- d. Remove the circuit board connectors from the control board.
- e. Verify that the positions of the jumpers on the new control board match those of the control board being replaced.
- f. Remove the nuts holding the control board to the back of the ACU and remove the control board.

- **Installation:**

- a. Verify that the jumpers (JP1 & JP2) are in the correct positions.
- b. Mount the replacement control board to the ACU and tighten the nuts to 15 ft lb.
- c. Attach the circuit board connectors to the control board.
- d. Close the door to the ACU.
- e. At the 300 VDC power supply:
  1. Operate the circuit breaker to the ON (up) position.
  2. Operate the ON/OFF switch to ON.
- f. Operate the ACU AUTO/MANUAL switch to AUTO.

### 5.3.2.9.3 Fans

- a. Operate the ACU AUTO/MANUAL switch to MANUAL.
- b. At the 300 VDC power supply:
  1. Operate the ON/OFF switch to OFF.
  2. Operate the circuit breaker to the OFF (down) position.
- c. Disconnect the wiring to the fan.
- d. Remove the fan mounting hardware.
- e. Remove the fan.
- f. Verify the direction of air flow for the new fan and mount to provide air flow from inside the cabinet.
- g. Attach the fan mounting hardware and tighten to 15 ft lb.
- h. Attach the fan wiring.
- i. At the 300 VDC power supply:
  1. Operate the circuit breaker to the ON (up) position.
  2. Operate the ON/OFF switch to ON.
- j. Verify that the fan is expelling air.
- k. Operate the ACU AUTO/MANUAL switch to AUTO.

## 5.3.3 Lubricant Application

### 5.3.3.1 Azimuth Drive Belt Idler Wheel Bearing Lubrication

- a. Operate the ACU AUTO/MANUAL switch to MANUAL.
- b. At the 300 VDC power supply:
  1. Operate the ON/OFF switch to OFF.

2. Operate the circuit breaker to the OFF (down) position.
- c. Place the grease gun fitting on the grease fitting on the top of the azimuth drive belt idler wheel.
- d. Add grease only until a very small amount of grease shows from either the top bearing seal or the bottom bearing seal.
- e. Wipe off any grease from the idler wheel and the grease fitting.
- f. At the 300 VDC power supply:
  1. Operate the circuit breaker to the ON (up) position.
  2. Operate the ON/OFF switch to ON.
- g. Operate the ACU AUTO/MANUAL switch to AUTO.

#### **5.3.3.2 Azimuth Primary Gearbox Oil Level**

For location of oil plugs, refer to Figure 37.

- a. Operate the ACU AUTO/MANUAL switch to MANUAL.
- b. At the 300 VDC power supply:
  1. Operate the ON/OFF switch to OFF.
  2. Operate the circuit breaker to the OFF (down) position.
- c. Remove the oil level plug from the side of the gearbox.
- d. Observe the level of the oil. If the oil level is below the lower lip of the oil level plug hole, perform the following. Otherwise, proceed to step e.
- e. Remove the oil fill plug and add gear lubrication that complies with the specifications for Mobil Oil Corp. oil type SHC 629 (or equivalent) until it reaches the lower lip of the oil level plug hole.
- f. Replace the oil fill and oil level plugs.
- g. At the 300 VDC power supply:
  1. Operate the circuit breaker to the ON (up) position.
  2. Operate the ON/OFF switch to ON.
- h. Operate the ACU AUTO/MANUAL switch to AUTO.

#### **5.3.3.3 Azimuth Primary Gearbox Bearing Lubrication**

For location of grease fitting, refer to Figure 37.

- a. Operate the ACU AUTO/MANUAL switch to MANUAL.
- b. At the 300 VDC power supply:
  1. Operate the ON/OFF switch to OFF.
  2. Operate the circuit breaker to the OFF (down) position.



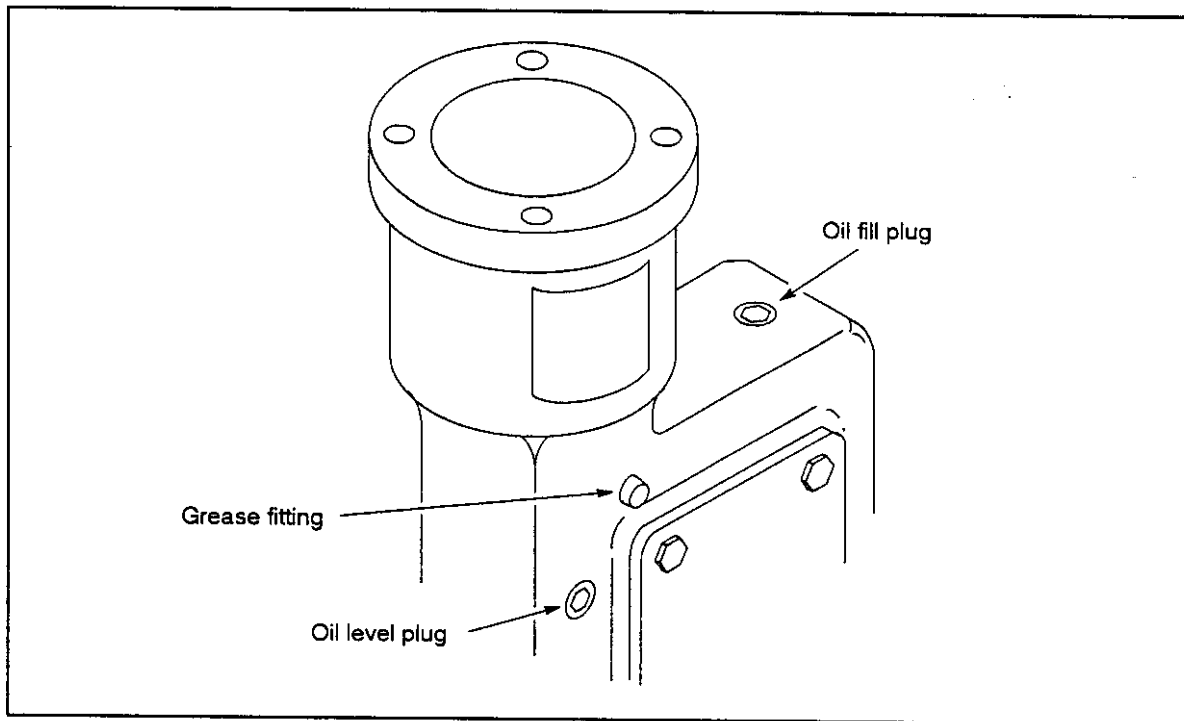


Figure 37. Azimuth Primary Gearbox Oil Plug and Bearing Lubrication Locations.

**NOTE:**

Ensure that the grease gun expels grease when the handle is operated.

- c. Place the grease gun fitting on the grease fitting.
- d. Add two pumps of grease.
- e. Wipe off any grease from the grease fitting.
- f. At the 300 VDC power supply:
  - 1. Operate the circuit breaker to the ON (up) position.
  - 2. Operate the ON/OFF switch to ON.
- g. Operate the ACU AUTO/MANUAL switch to AUTO.

#### 5.3.3.4 Azimuth Secondary Gearbox Oil Level

For location of oil plugs, refer to Figure 38.

- a. Operate the ACU AUTO/MANUAL switch to MANUAL.
- b. At the 300 VDC power supply:
  - 1. Operate the ON/OFF switch to OFF.
  - 2. Operate the circuit breaker to the OFF (down) position.

**NOTE:**

The plug on the face of the gearbox with the four exposed threaded holes is not the oil level plug. The oil level plug is located on the primary gearbox side of the secondary gearbox.

- c. Remove the oil level plug from the side of the gearbox.
- d. Observe the level of the oil. If the oil level is below the lower lip of the oil level plug hole, perform the following. Otherwise, proceed to step f.
- e. Remove the oil fill plug and add gear lubrication that complies with the specifications for Mobil Oil Corp. oil type SHC 629 (or equivalent) until it reaches the lower lip of the oil level plug hole.
- f. Replace the oil fill and oil level plugs.
- g. At the 300 VDC power supply:
  - 1. Operate the circuit breaker to the ON (up) position.
  - 2. Operate the ON/OFF switch to ON.
- h. Operate the ACU AUTO/MANUAL switch to AUTO.

**5.3.3.5 Azimuth Secondary Gearbox Bearing Lubrication**

For location of grease fitting, refer to Figure 38

- a. Operate the ACU AUTO/MANUAL switch to MANUAL.
- b. At the 300 VDC power supply:
  - 1. Operate the ON/OFF switch to OFF.
  - 2. Operate the circuit breaker to the OFF (down) position.
- c. Place the grease gun fitting on the grease fitting.
- d. Add grease until a slight amount of grease escapes from the bearing seal.
- e. Wipe off any grease from the grease fitting and the bearing seal.
- f. At the 300 VDC power supply:
  - 1. Operate the circuit breaker to the ON (up) position.
  - 2. Operate the ON/OFF switch to ON.
- g. Operate the ACU AUTO/MANUAL switch to AUTO.

**5.3.3.6 Yoke Spindle Bearing Lubrication**

- a. Operate the ACU AUTO/MANUAL switch to MANUAL.
- b. At the 300 VDC power supply:
  - 1. Operate the ON/OFF switch to OFF.

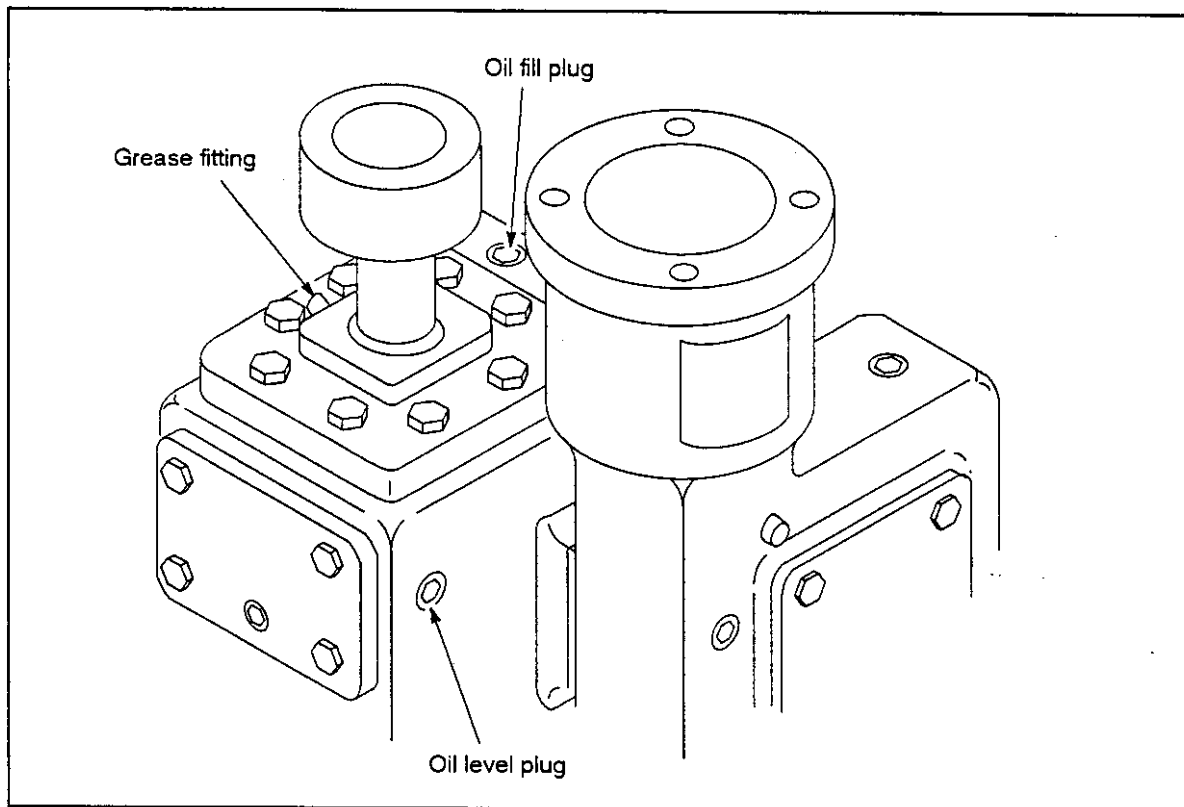


Figure 38. Azimuth Secondary Gearbox Oil Plugs and Lubrification Locations.

2. Operate the circuit breaker to the OFF (down) position.
- c. Place the grease gun fitting on the grease fitting located on the side of the yoke spindle bearing chamber on the pedestal.
- d. Add grease until the 2 psi relief fitting next to the grease fitting allows grease to escape or the seal at the bottom of the bearing allows grease to escape.
- e. Wipe any grease from the grease fitting and the lower seal area.
- f. At the 300 VDC power supply:
  1. Operate the circuit breaker to the ON (up) position.
  2. Operate the ON/OFF switch to ON.
- g. Operate the ACU AUTO/MANUAL switch to AUTO.

#### 5.3.3.7 Elevation Control Arm Bearing Lubrication

- a. Operate the ACU AUTO/MANUAL switch to MANUAL.
- b. At the 300 VDC power supply:
  1. Operate the ON/OFF switch to OFF.
  2. Operate the circuit breaker to the OFF (down) position.
- c. On the elevation drive motor arm of the yoke, place the grease gun on the grease fitting of one of the radar dish support arm bearings.

- d. Add grease until a slight amount of grease escapes at one of the seals.
- e. Wipe off any grease at the grease fitting and at the seals.
- f. Repeat steps c. through e. for the other radar dish arm bearing.
- g. At the 300 VDC power supply:
  - 1. Operate the circuit breaker to the ON (up) position.
  - 2. Operate the ON/OFF switch to ON.
- h. Operate the ACU AUTO/MANUAL switch to AUTO.

### 5.3.3.8 Cooling Pump Bearing Lubrication

- a. At the operator's console, place the transmitter in the standby mode.
- b. Remove the left panel of the rack.
- c. On the cooling pump, locate the oil holes by observing an alignment arrow on the label attached to the body of the pump. Refer to Figure 39 for location of the oil holes.
- d. Put two drops of SAE 20 motor oil in each of the oil holes of the pump motor.
- e. Install the left panel of the rack.

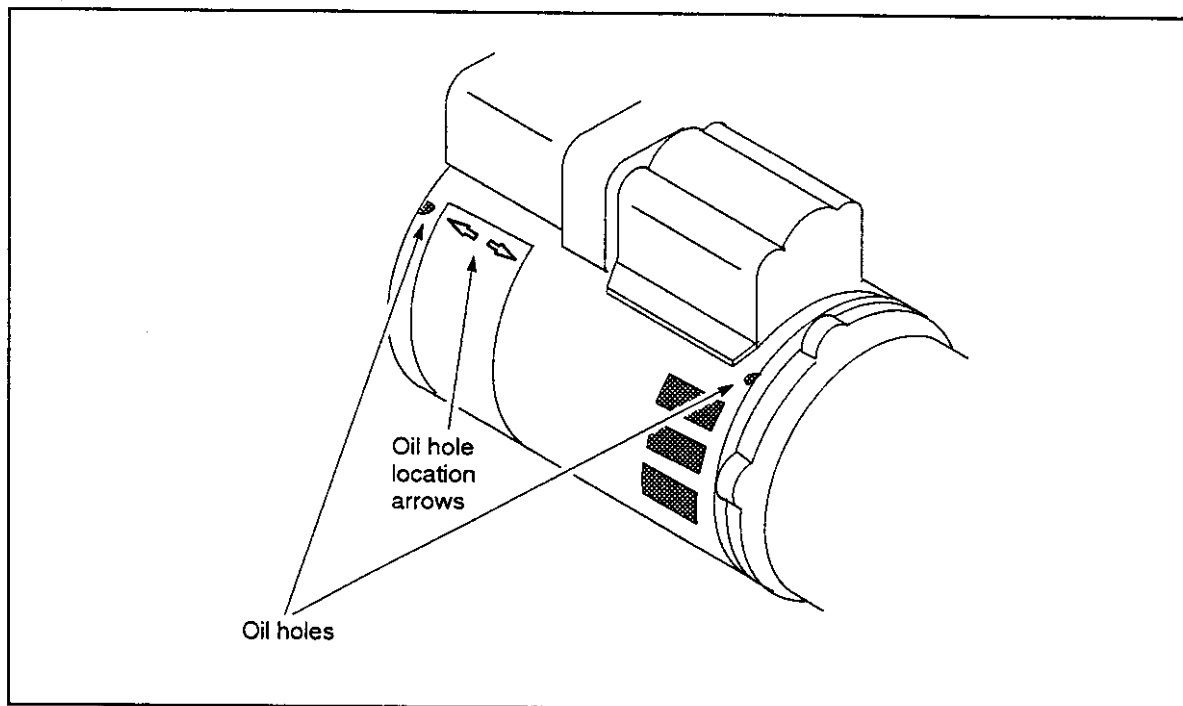


Figure 39. Cooling Pump Oil Hole Locations.

## 5.4 Wave Guides

**NOTE:**

To prevent wave guide contamination, install wave guide protective covers in the exposed end of each wave guide segment.

**NOTE:**

When removing wave guide protective covers, use caution to prevent contamination of the interior of the exposed wave guide segment. Before installing each wave guide segment, perform a visual examination to verify that no contaminants exist within the wave guide.

**WARNING**

**Operation of the radar system while working in this area could result in exposure to microwave energy.**

Power down the system while working in this area.

### 5.4.1 Wave Guide Visual Inspection

Each time a section of wave guide is installed, it should be visually inspected internally to verify that no contaminants have been introduced or to observe any minor deformations of the wave guide. Any segment of wave guide found to be contaminated must be cleaned prior to installation. Any deformations in a wave guide segment require the replacement of that segment.

**WARNING**

**Operation of the radar system while deformations exist in the wave guide will result in hot spots in the wave guide and probable exposure to microwave energy.**

Replace segments of wave guide which have even minor deformations of the interior surfaces prior to operating this equipment.

### 5.4.2 Wave Guide Internal Cleaning

If it is necessary to clean the interior of a section of wave guide due to contamination, perform the following steps, depending on the type of contamination:

- **Dust or other dry particles:**

Using a source of clean dry air (CDA), blow the particles from the wave guide segment.

- **Liquids that evaporate:**

Using a source of CDA, blow the particles from the wave guide segment.

- **Materials that leave a residue (oil, smoke, etc.)**

Use a pressurized chemical spray (trichloroethane or similar) to remove the residue, followed by CDA to prevent dust or other air-borne particles from adhering to the wet surface.

### 5.4.3 Wave Guide Shim and Gasket Positioning

Replacing wave guide segments requires the installation of a rubber gasket in any joint between wave guide segments. Replacing a flexible wave guide segment requires the installation of a shim at each end of the segment. The shim is necessary because the flanges on the flexible wave guide segments are a different type of metal than the flanges on the rigid wave guide segments. If the shim is not installed, the dissimilar metals will react to each other and cause corrosion.

Figure 40 shows flange and gasket positioning.

### 5.4.4 Wave Guide Flange Tightening Procedure

When replacing wave guide segments, it is necessary to orient the segment so that the flange with the groove is facing the proper direction. The groove is for the positioning of a rubber gasket. If wave guide segments are placed in the wrong direction, a poor seal can be achieved, resulting in poor performance of the radar. As a rule, the flange with the groove

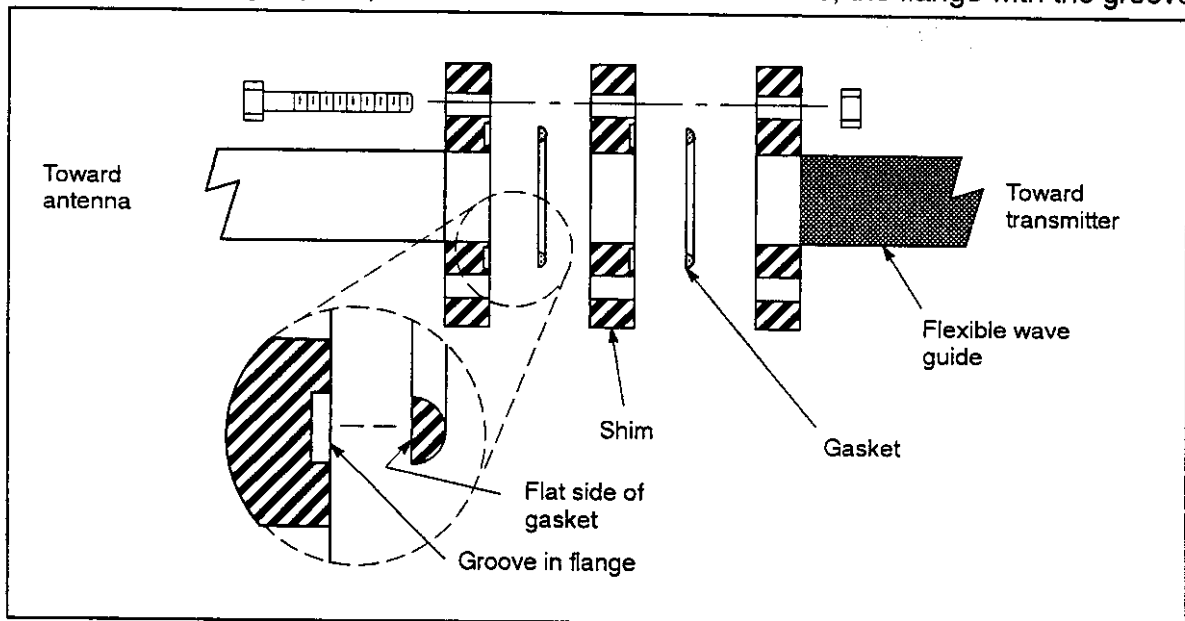


Figure 40. Flange and Gasket Positioning.

should always be placed so that a signal traveling from the transmitter to the antenna will pass through the grooved flange end of the wave guide segment first.

**CAUTION**

**Tightening flange bolts improperly can result in damage to the flanges or rubber gaskets.**

Read and follow the procedure for tightening wave guide flanges.

To properly tighten the flange bolts, perform the following:

- a. Install all hardware and tighten finger tight.
- b. Using an alternating cross-over pattern, as shown in Figure 41, tighten each bolt 1 turn.
- c. Repeat step b., increasing the torque no more than 10 ft lb each time, until the desired torque is achieved.

## 5.4.5 VSWR Stub Tuner

### 5.4.5.1 VSWR Stub Tuner Replacement

- **Removal:**

- a. At the maintenance terminal:
  1. Obtain exclusive control of the radar.
  2. Place the transmitter in the standby mode.
- b. Open the rear door of the rack.
- c. On the rear door, operate the FAN LOCAL/OFF/REMOTE switch to LOCAL.

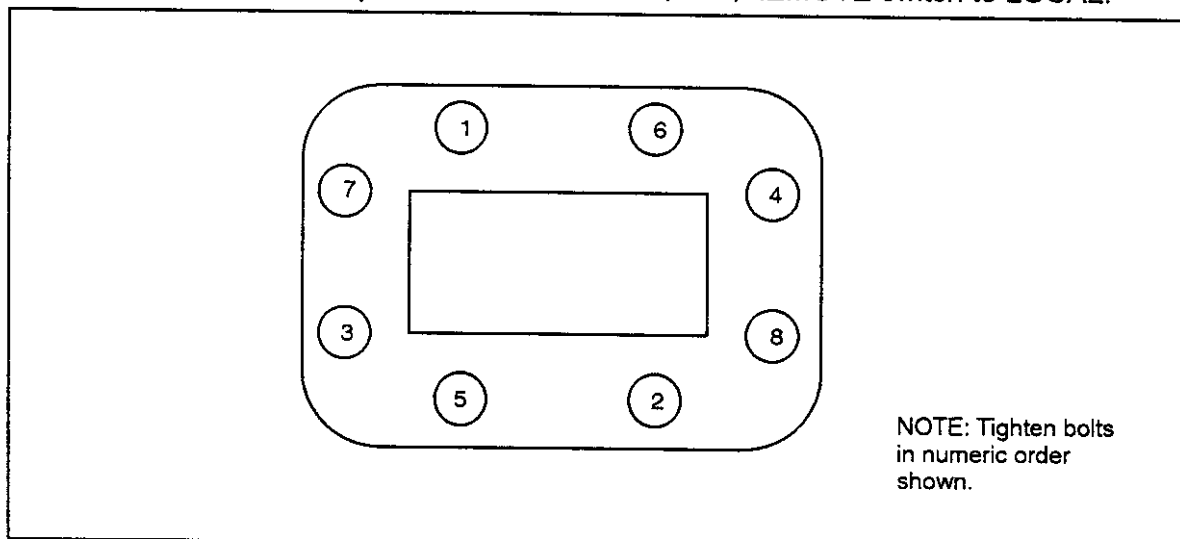


Figure 41. Wave Guide Bolt Tightening Alternating Cross-over Pattern.

- d. At the mounting bracket directly below the stub tuner, loosen, but do not remove, the two bolts holding the bracket to the rack frame.
- e. Remove the flange bolts from the bottom flange of the stub tuner.
- f. Remove the flange bolts from the top flange of the stub tuner.
- g. While ensuring that none of the gaskets fall into the wave guide, carefully remove the air manifold, the shim above the air manifold, and the stub tuner.

**NOTE:**

To prevent wave guide contamination, install wave guide protective covers in the exposed end of each wave guide segment.

• **Installation:**

**NOTE:**

When removing wave guide protective covers, use caution to prevent contamination of the interior of the exposed wave guide segment. Before installing each wave guide segment, perform a visual examination to verify that no contaminants exist within the wave guide. If contaminants exist, refer to the wave guide paragraphs for instructions on cleaning.

**NOTE:**

When tightening wave guides, verify that the gasket is properly positioned with the flat surface in the groove of the flange. Perform the bolt torque in steps to reduce the possibility of damaging the gaskets or flanges.

- a. Assemble the stub tuner, air manifold, and shim, ensuring all gaskets are properly positioned.
- b. Tighten all flange bolts, using an alternating cross-over pattern for each flange, to 25–40 ft lb.
- c. Tighten the wave guide mounting bracket to 25–40 ft lb.
- d. On the rear door, operate the FAN LOCAL/OFF/REMOTE switch to REMOTE.
- e. Close the rear rack door.
- f. Perform the *VSWR Stub Tuner Calibration* procedure.



#### 5.4.5.2 VSWR Stub Tuner Calibration

The VSWR stub tuner is located at the top of the wave guide in the rack, directly behind the dehydrator (see Figure 42 for location). This assembly is tuned for the output and input power of the system. Tuning is required when the TWT has been changed or the power levels have changed dramatically.

#### 5.4.6 Forward Power Sampler

Refer to Figure 43 for item location.

- **Removal:**

- a. At the maintenance terminal:

1. Obtain exclusive control of the radar.
2. Place the transmitter in the standby mode.

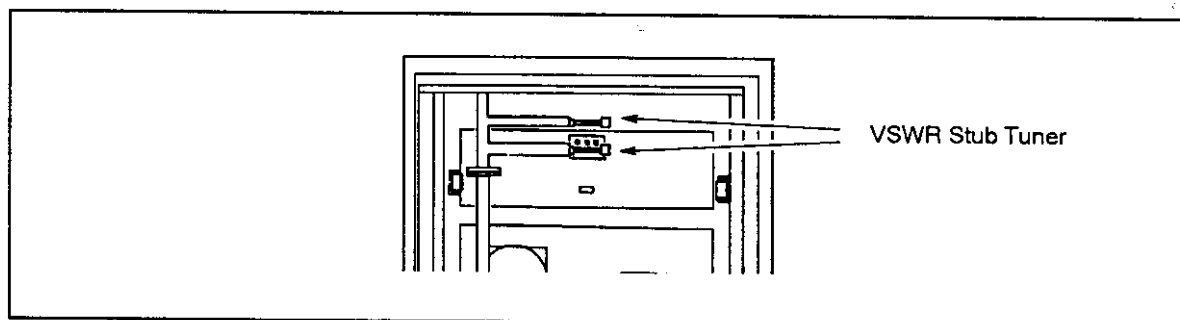


Figure 42. VSWR Stub Tuner.

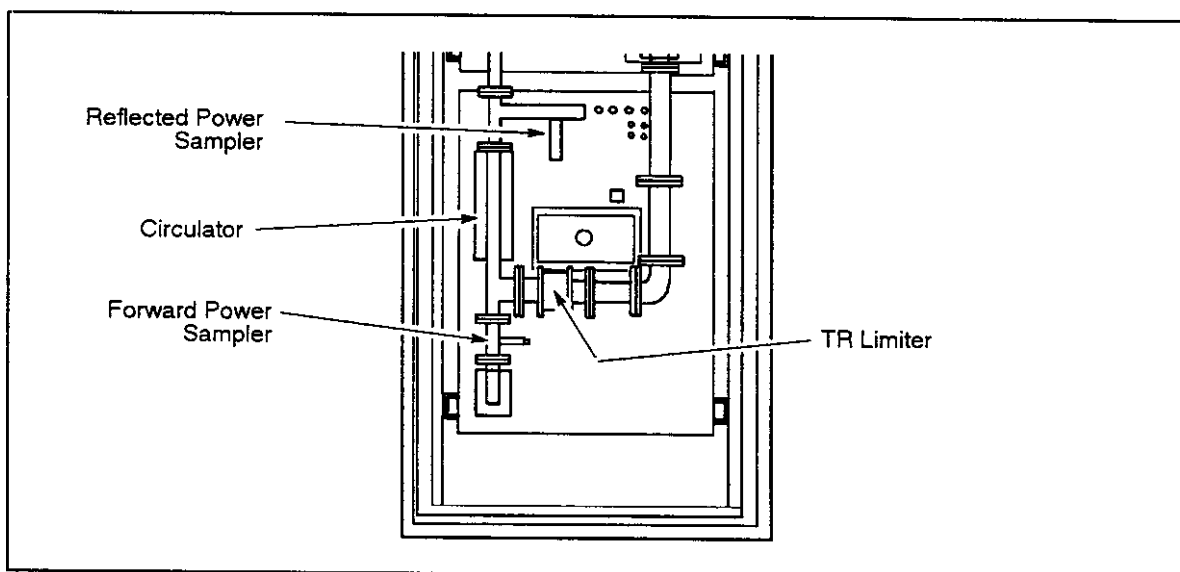


Figure 43. Lower Rack Wave Guide Components.

- b. Open the rear door of the rack.
- c. On the rear door, operate the FAN LOCAL/OFF/REMOTE switch in LOCAL.
- d. Disconnect the connector from J3 on the transmitter.
- e. Remove the flange bolts from the top flange of the forward power sampler.
- f. Remove the flange bolts from the lower flange of the 90° segment of wave guide that connects to the transmitter.
- g. Remove the mounting bracket bolts at the frame for the forward power sampler.
- h. Remove the forward power sampler and 90° elbow, retaining gaskets for re-use.
- i. Remove the flange bolts between the 90° elbow and the forward power sampler, retaining the gasket and bracket for re-use.

• **Installation:**

- a. Connect the forward power sampler to the 90° elbow, replacing the gasket, bracket, and torquing the flange bolts in an alternating cross-over pattern to 25 ft lb.
- b. Connect the forward power sampler, 90° elbow, mounting bracket assembly to the transmitter and circulator flanges, replacing the gaskets and loosely installing all flange bolts.
- c. Tighten all flange bolts finger tight.
- d. Attach the mounting bracket to the rack frame and tighten.
- e. Torque all flange bolts to 25–40 ft lb using an alternating cross-over pattern.
- f. Connect the cable to J3 of the transmitter.
- g. On the rear door of the rack, operate the FAN LOCAL/OFF/REMOTE switch to REMOTE.
- h. Close the rear door of the rack.
- i. At the maintenance terminal:
  - 1. Place the transmitter in the operational mode.
  - 2. Return the radar to nonexclusive use by the maintenance terminal.

### 5.4.7 Reflected Power Sampler

The reflected power sampler must be replaced with the circulator.

### 5.4.8 Circulator

Refer to Figure 43 for item location.

#### CAUTION

**The circulator is susceptible to damage from magnetic fields.**

Do not position any source of magnetic field within 4 inches of the circulator.

- **Removal:**

- a. At the maintenance terminal:
  1. Obtain exclusive control of the radar.
  2. Place the transmitter in the standby mode.
- b. Open the rear door of the rack.
- c. On the rear door, operate the FAN LOCAL/OFF/REMOTE switch in LOCAL.
- d. Disconnect the connector from J3 on the transmitter.
- e. Remove the flange bolts from the top flange of the circulator.
- f. Remove the flange bolts from the flange that attaches the circulator to the TR Limiter.
- g. Remove the flange bolts from the circulator bottom flange.

**NOTE:**

If additional clearance is needed to remove the circulator from the wave guide, disconnect the bottom flange of the 90° elbow that is attached to the transmitter and the mounting bracket from the rack frame.

- h. Remove the circulator, saving the gaskets for re-use.

- **Installation:**

- a. Connect the circulator, replacing all pieces removed.
- b. Tighten all flange bolts finger tight.
- c. If loosened, attach the mounting bracket to the rack frame and tighten.
- d. Torque all flange bolts to 25–40 ft lb using an alternating cross-over pattern.
- e. Connect the cable to J3 of the transmitter.
- f. On the rear door of the rack, operate the FAN LOCAL/OFF/REMOTE switch to REMOTE.
- g. Close the rear door of the rack.
- h. At the maintenance terminal:
  1. Place the transmitter in the operational mode.
  2. Return the radar to nonexclusive use by the maintenance terminal.

### **5.4.9 TR Limiter**

Refer to Figure 43 for item location.

- **Removal:**

- a. At the maintenance terminal:

1. Obtain exclusive control of the radar.
2. Place the transmitter in the standby mode.
- b. Open the rear door of the rack.
- c. On the rear door, operate the FAN LOCAL/OFF/REMOTE switch in LOCAL.
- d. Disconnect the connector from J3 on the transmitter.
- e. Remove the flange bolts from the TR limiter flange attached to the 90° elbow.
- f. Remove the bracket bolts that attach the mounting bracket to the rack frame.
- g. While supporting the TR limiter, remove the flange bolts from the flange attached to the circulator.

**CAUTION**

**The TR limiter contains an isotope that is a hazardous material.**

Discard in an approved manner.

- h. Using care not to damage the TR limiter, remove it. Save all gaskets for re-use.

- **Installation:**

- a. Connect the TR limiter, replacing all pieces removed.
- b. Tighten all flange bolts finger tight.
- c. Attach the mounting bracket to the rack frame and tighten.
- d. Torque all flange bolts to 25–40 ft lb using an alternating cross-over pattern.
- e. Connect the cable to J3 of the transmitter.
- f. On the rear door of the rack, operate the FAN LOCAL/OFF/REMOTE switch to REMOTE.
- g. Close the rear door of the rack.
- h. At the maintenance terminal:
  1. Place the transmitter in the operational mode.
  2. Return the radar to nonexclusive use by the maintenance terminal.

## **5.5 Dehydrator**

### **5.5.1 Chassis Replacement**

- **Removal:**

- a. Open the front door of the rack.
- b. Operate the dehydrator power switch to OFF.

- c. Open the rear door of the rack.
- d. Disconnect the cables to the dehydrator.

**NOTE:**

Use care when removing the hose from the barbed fitting. Pulling too hard can break the barbed fitting from the dehydrator.

- e. Disconnect the hose from the barbed fitting.
- f. Unscrew the four screws that hold the dehydrator faceplate to the rack and slide the dehydrator to the extended position.
- g. Press the slide release buttons and remove chassis from the rack.
- h. Remove slide assemblies from dehydrator.

- **Installation**

- a. Install slide assemblies on replacement dehydrator.

**CAUTION**

**The slide units are easily damaged if misaligned.**

When installing the slide assemblies on the chassis into the slide assemblies in the rack, two people will be required. One person needs to lift and hold the chassis, and one person needs to guide the slide assemblies together.

- b. Insert slide into mating slide sections and slide the dehydrator into the rack.
- c. Screw the four screws that hold the dehydrator in the rack into the faceplate.
- d. Connect all cables and the air hose.
- e. Close the rear door of the rack.
- f. Operate the dehydrator power switch to ON.
- g. Close the front door of the rack.

## **5.5.2 Dehydrator Checkout**

Verify that the dehydrator pump cycle time is between 10 – 50%.

## 5.6 Transceiver Antenna Control (TAC)

The TAC is slide mounted.

### 5.6.1 Chassis Replacement

- **Removal:**

- Open the front door of the rack.
- Operate the TAC power switch to OFF.
- Open the back door of the rack.
- Disconnect all cables from the TAC.
- Remove the four screws on the front panel that hold the chassis in the rack.
- Pull the chassis to the extended position.

**CAUTION**

**The weight and position of this chassis can cause injury if removal is attempted by one person.**

Lifting should be performed by at least two people.

- Press the slide release buttons and remove the chassis from the rack.
- Remove the slides from the TAC.

- **Installation:**

- Install the slides on the replacement TAC.

**CAUTION**

**The slide units are easily damaged if misaligned.**

When installing the slide assemblies on the chassis into the slide assemblies in the rack, three people will be required. Two people need to lift and hold the chassis, and one person needs to guide the slide assemblies together.

- Insert slides into mating slide sections.
- Close chassis. Fasten the TAC front panel to the rack.
- Connect the cables. Use a 12 in lb torque wrench to tighten the fiber optic cable connectors.
- Close the rear door of the rack.
- Operate the TAC power switch to ON.

- g. Close the front door of the rack.

### **5.6.2 Circuit Board Replacement**

- a. Operate the TAC power switch to OFF.
- b. Loosen the four chassis mounting screws from the front of the TAC.
- c. Remove the front cover of the TAC.

**NOTE:**

If removing the KPB 961 circuit board, disconnect the disk drive ribbon cable connector from the front edge of the circuit board prior to removing the circuit board.

- d. Grasp the circuit board hold-down clips and simultaneously move them to disengage the circuit board from the connectors at the back of the card cage.
- e. Slide the circuit board out of the card cage.
- f. Insert the new circuit board into the card cage until it comes in contact with the connector at the back of the card cage.
- g. Engage the hold-down clips into the card cage frame and engage the circuit board into the card cage connector by simultaneously pressing both hold-downs toward the circuit board.

**NOTE:**

If replacing the KPB 961 circuit board, attach the disk drive ribbon cable connector to the circuit board.

- h. Replace the TAC front cover and install the mounting screws.
- i. Operate the TAC power switch to ON.
- j. Close the front door of the rack.

### **5.6.3 Card Cage Replacement**

• **Removal:**

- a. Operate the TAC power switch to OFF.
- b. Loosen the four chassis mounting screws from the front of the TAC.
- c. Open the TAC to the extended position.
- d. Remove the top cover of the TAC.
- e. Remove the front cover of the TAC.
- f. Remove the four screws securing the top power supply and remove the supply.
- g. Remove the power supply mounting plate.

- h. Remove the four screws securing the bottom power supply and remove the supply.

**NOTE:**

Do not remove any connectors attached to the pins on the back of the circuit board connectors.

- i. Disconnect the card cage cables connections at the other assemblies.  
j. Remove the screws that attach the card cage to the side and bottom of the TAC.  
k. Rotate the back of the card cage toward the center of the TAC until the edge of TB1 is clear of the hold-down bracket on the side of the TAC.  
l. Lift the card cage out of the TAC.

• **Installation:**

- a. Place the card cage in the TAC and place in position so that the lip of TB1 is under the hold-down bracket on the side of the TAC.

**NOTE:**

When installing screws, tighten to 25 ft lb.

- b. Attach all mounting hardware for the sides and bottom of the card cage.  
c. Connect all connectors from the card cage to their appropriate assemblies.  
d. Attach the bottom power supply to the TAC and connect the connectors.  
e. Attach the power supply mounting bracket to the TAC.  
f. Attach the top power supply to the mounting bracket and connect the connectors.  
g. Replace the top cover to the TAC.  
h. Push the TAC into the rack and attach the mounting screws through the front of the TAC.  
i. Operate the TAC power switch to ON.  
j. Perform the *TAC Operation* procedure.

## **5.6.4 Disk Drive Replacement**

• **Removal:**

- a. Perform the *Card Cage Replacement* procedure  
b. Remove the disk drive cables from the back of the disk drive.  
c. Remove the four screws that attach the disk drive mounting brackets to the side of the card cage and slide out the disk drive.  
d. Remove the mounting brackets from the disk drive and retain for installation on the new disk drive.

• **Installation:**



**NOTE:**

When installing screws, tighten to 25 ft lb.

- a. Attach the disk drive mounting brackets to the disk drive.
- b. Attach the disk drive mounting brackets to the card cage.
- c. Connect the disk drive cables.
- d. Perform the *Card Cage Replacement* installation procedure.
- e. Replace the top cover to the TAC.

**5.6.5 Power Supply Replacement**

- **Removal of the +15 VDC power supply:**

- a. Operate the TAC power switch to OFF.
- b. Loosen the four chassis mounting screws from the front of the TAC.
- c. Open the TAC to the extended position.
- d. Remove the top cover of the TAC.
- e. Remove the front cover of the TAC.
- f. Disconnect the top power supply and remove from the mounting bracket.

- **Installation of the +15 VDC power supply:**

**NOTE:**

When installing screws, tighten to 25 ft lb.

- a. Attach the top power supply to the mounting bracket and connect the connectors.
- b. Replace the top cover to the TAC.
- c. Push the TAC into the rack and attach the mounting screws through the front of the TAC.
- d. Operate the TAC power switch to ON.
- e. Perform the *TAC Operation* procedure.

- **Removal of the +5 VDC power supply:**

- a. Perform the *removal of the +15 VDC power supply* steps.
- b. Remove the screws for the top power supply mounting bracket.
- c. Disconnect the lower power supply and remove from the cabinet.

- **Installation of the +5 VDC power supply:**

**NOTE:**

When installing screws, tighten to 25 ft lb.

- a. Attach the +5 VDC power supply to the cabinet and connect the connectors.
- b. Replace the top power supply mounting bracket.
- c. Perform the *installation of the +15 VDC power supply steps*.

### **5.6.6 TAC Operation**

The TAC can be operated by the maintenance console for maintenance and troubleshooting, or by the operator's console for normal operation.

#### **5.6.6.1 TAC Power Supply Voltage Checkout**

To verify the voltage outputs from the TAC power supplies, perform the following:

- a. Open the front door of the rack.
- b. Open the front cover of the TAC.
- c. Observe the voltage level LEDs located near the lower edge of the circuit board (KPB 961) in slot 5. If either of the red LED's are lit (OV or UV), the TAC voltages are out of tolerance. If the green LED is lit, the voltages are within tolerance.
- d. If the voltages are within tolerance, replace the front cover to the TAC, there is no further action required.
- e. Close the front door of the rack.

#### **5.6.6.2 TAC Power Supply Voltage Adjustment**

- a. Operate the TAC power switch to OFF.
- b. Loosen the four chassis mounting screws from the front of the TAC.
- c. Open the TAC to the extended position.
- d. Remove the top cover of the TAC.
- e. Remove the front cover of the TAC.
- f. Using the test points shown in Figure 44, connect a multimeter to the appropriate test points on the KPB 961 circuit board in slot 5 to measure the applicable output voltage.
- g. Locate, using Figure 44, the position of the adjustment potentiometer for the desired power supply.
- h. Operate the TAC power switch to ON.

**NOTE:**

The +15 VDC power supply supplies both + and - voltages from the same adjustment potentiometer. After adjusting, verify that both voltage levels are at an acceptable level. It

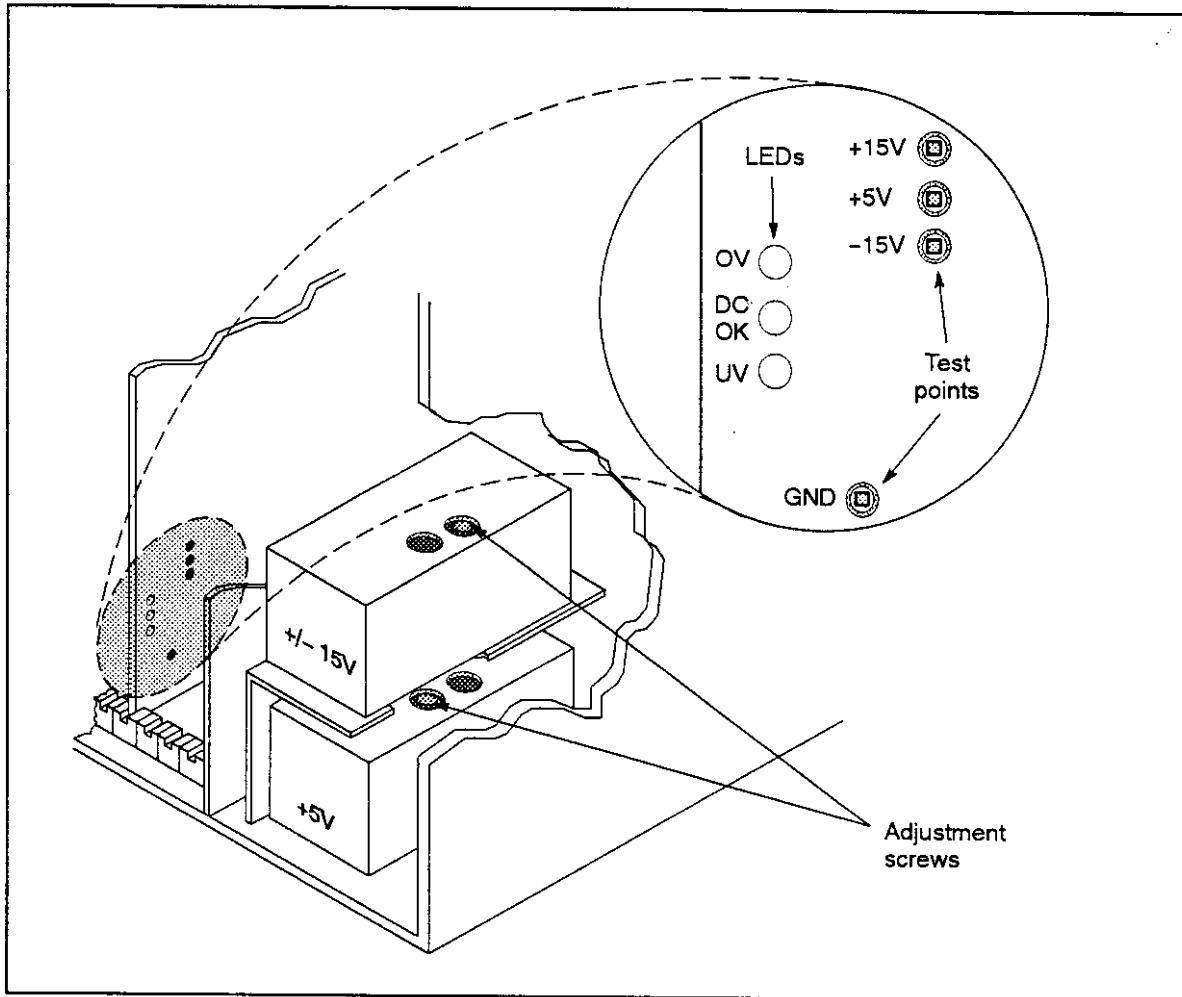


Figure 44. TAC Power Supply Adjustments.

may be necessary to increase or decrease one voltage level to achieve the desired voltage level for the other output voltage.

- i. While observing the meter reading, use the plastic screwdriver to adjust the potentiometer on the power supply.
- j. When the desired voltage level is achieved, verify that the out-of-tolerance LED for the adjusted voltage has been extinguished.
- k. Repeat steps i. and j. as necessary to adjust the other voltage levels.
- l. Operate the TAC power switch to OFF.
- m. Replace the top cover to the TAC.
- n. Replace the TAC front cover and install the mounting screws.
- o. Return the TAC to the closed position in the rack and tighten the hold-down screws.

- p. Operate the TAC power switch to ON.
- q. Close the front door of the rack.

## 5.7 Receiver

The receiver is slide mounted.

### 5.7.1 Chassis Replacement

- **Removal:**

- a. At the maintenance terminal:
  - 1. place the radar system under exclusive control by the maintenance terminal.
  - 2. Place the radar in the standby mode.
- b. Open the front door of the rack.
- c. Operate the receiver power switch to OFF.

**NOTE:**

The latches on the left side of the chassis rotate in a different direction from the latches on the right side.

- d. Rotate the chassis latches to unlatch the receiver.
- e. Open the rear door of the rack.
- f. Unbolt the flange of the 90° segment of the wave guide that attaches to the receiver chassis.
- g. Disconnect the cable that extends from the 3-way directional coupler attached to J10 to J8 of the transmitter.
- h. Push the receiver out part way and remove the rubber gasket from the wave guide, saving for later use.
- i. Disconnect all cables from the back of the receiver.
- j. Pull the chassis out as far as it will go.

**CAUTION**

**This unit weighs in excess of 100 pounds.**

Lifting should be performed by at least two people.

- k. Press the slide release buttons and remove the chassis from slide.
- l. Remove the slide assemblies from receiver and save for further use.

- **Installation:**

- a. Install the slide on replacement receiver.

**CAUTION**

**The slide units are easily damaged if misaligned.**

When installing the slide assemblies on the chassis into the slide assemblies in the rack, three people will be required. Two people need to lift and hold the chassis, and one person needs to guide the slide assemblies together.

- b. Insert the slides into the mating slide sections.
- c. Ensuring that the jack number and the cable plug numbers match, connect all cabling. Use a 12 in lb torque wrench for the cables mounted on J8–J10 & J16.

**NOTE:**

If the power supply output levels are to be adjusted at this time, proceed directly to the *Receiver Power Supplies* paragraph.

- d. Ensure that the wave guide gasket is positioned properly.

**NOTE:**

When pushing the receiver to the closed position, ensure that no cables are pinched.

- e. Push the receiver all the way in.
- f. Using the front panel latches, latch the receiver into the rack.

**NOTE:**

It is very important to use an alternating cross-over pattern when tightening wave guide flanges to avoid warping the flange, cracking the seam, and to avoid RF leakage.

- g. Install wave guide bolts. Tighten to 25–40 ft lb.
- h. Attach the cable that extends from the 3-way directional coupler attached to J10 to J8 of the transmitter.
- i. Close the rear door of the rack.
- j. Operate the receiver power switch to ON.
- k. Close the front door of the rack.
- l. Perform the *Receiver Power Supplies* adjustment procedures.

## **5.7.2 Receiver Power Supplies**

### **5.7.2.1 Gaining Access to the Power Supplies**

- a. At the maintenance terminal, place the radar system under exclusive control by the maintenance terminal.

- b. Place the radar in the standby mode.
- c. Open the front door of the rack.
- d. Operate the receiver power switch to OFF.

NOTE:

The latches on the left side of the chassis rotate in a different direction from the latches on the right side.

- e. Rotate the chassis latches to unlatch the receiver.
- f. Open the rear door of the rack.
- g. Unbolt the flange of the 90° segment of the wave guide that attaches to the receiver chassis.
- h. Disconnect the cable that extends from the 3-way directional coupler attached to J10 to J8 of the transmitter.
- i. Push the receiver out part way and remove the rubber gasket from the wave guide, saving for later use.
- j. Pull the chassis out as far as it will go.
- k. Remove the top and left side covers of the chassis.

NOTE:

Refer to Figure 45 for the location of the various voltages on the receiver terminal block.

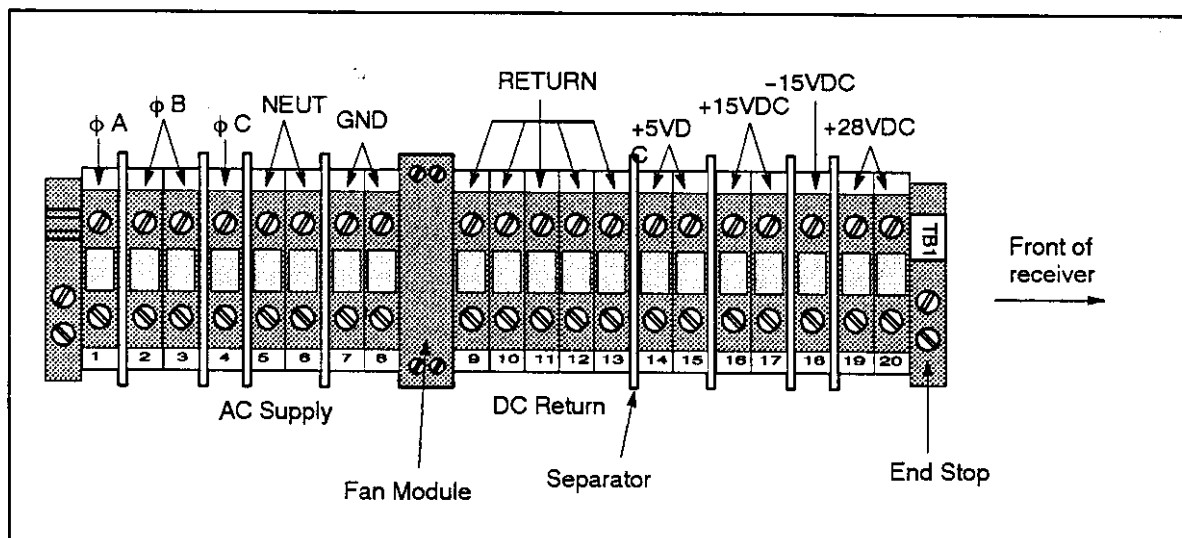


Figure 45. Receiver Power Terminal Block (TB1).

### 5.7.2.2 +5 VDC Adjustment

**NOTE:**

Due to the locations of the terminals with relation to the power supply, it will be necessary for two people to perform this operation.

- Operate the receiver power switch to ON.
- Measure the +5 VDC output between the +5V and GND connections on TB1.
- If necessary to adjust the output level, use Figure 46 to locate the voltage adjustment potentiometer.
- Using a non-conducting screwdriver, turn the adjustment potentiometer to achieve a  $+5 \pm 5\%$  VDC output level.

### 5.7.2.3 $\pm 15$ VDC Adjustment

- Operate the receiver power switch to ON.
- Measure the  $\pm 15$  VDC output between the +15V and GND & -15V and GND connections on TB1.
- If necessary to adjust the output level, use Figure 47 to locate the voltage adjustment points.

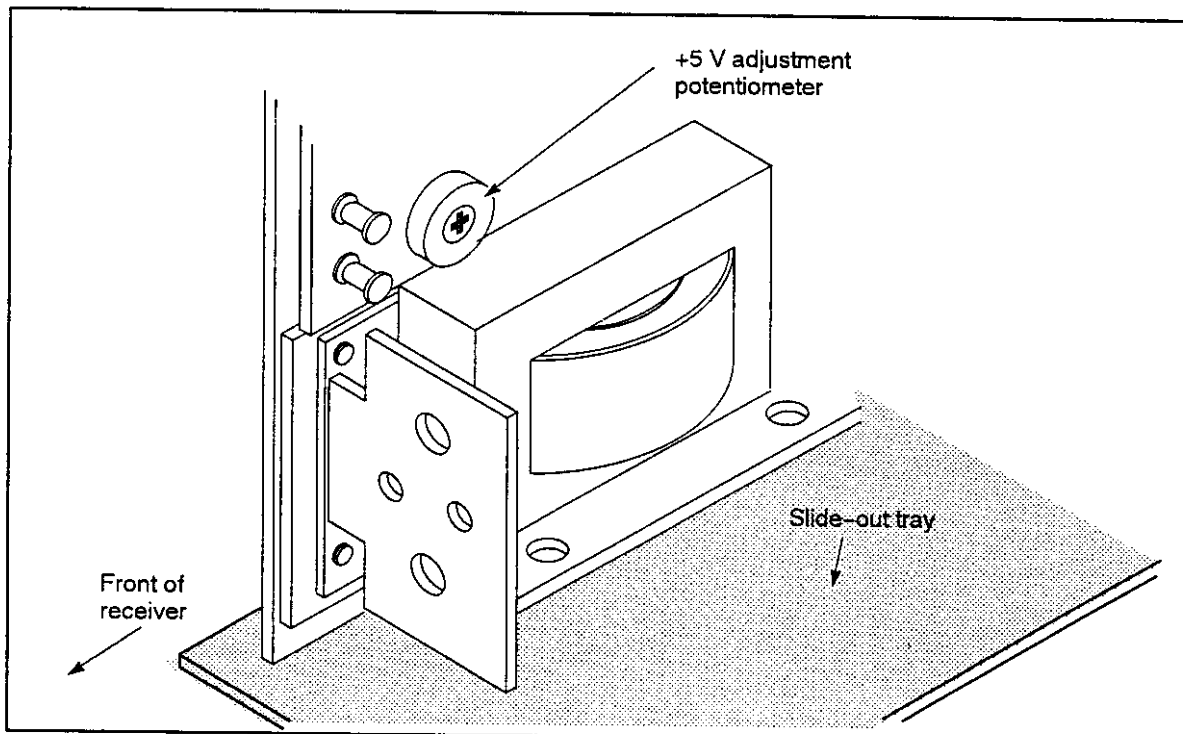


Figure 46. Location of the Receiver +5 VDC Adjustment.

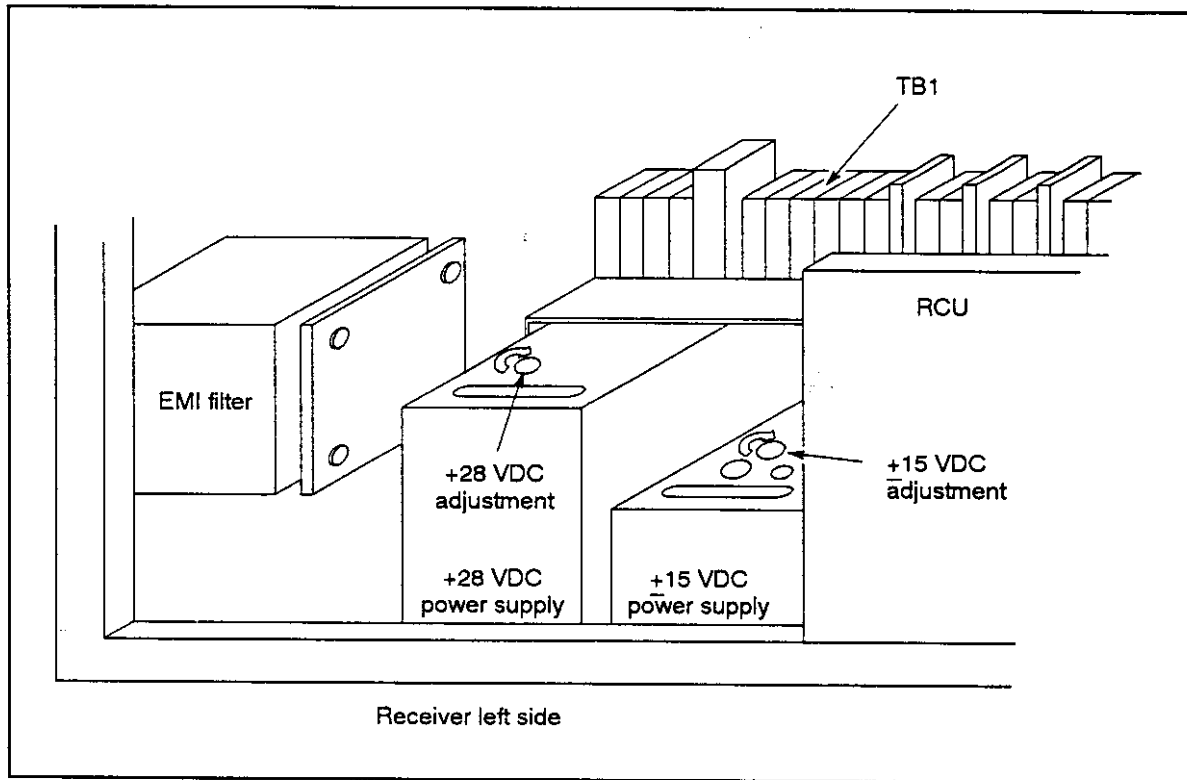


Figure 47. Receiver +28 & +15 VDC Power Supplies.

**NOTE:**

The adjustment potentiometer adjusts the output levels of both the +15 and -15 VDC.

- d. Using a non-conducting screwdriver, turn the adjustment potentiometer to achieve a  $+15 \pm 10\%$  VDC output level.

#### 5.7.2.4 +28 VDC Adjustment

- a. Operate the receiver power switch to ON.
- b. Measure the +28 VDC output between the +28V and GND connections on TB1.
- c. If necessary to adjust the output level, use Figure 47 to locate the voltage adjustment points.
- d. Using a non-conducting screwdriver, turn the adjustment potentiometer to achieve a  $+28 \pm 10\%$  VDC output level.

#### 5.7.3 Power Supply Replacement

- a. If necessary, perform the *Gaining Access to the Power Supplies* procedure.
- b. Unscrew the two slide-out tray hold-down screws at the front of the power supply tray.



- c. Disconnect any cabling and RF lines necessary to allow removal of the tray.
- d. Lift the front edge of the tray and pull it out of the receiver.
- e. Disconnect the connector to the power supply to be replaced.
- f. Unscrew the mounting screws for the power supply and remove it.
- g. Install the new power supply and tighten the mounting screws to 15 ft lb.
- h. Reconnect the power supply connector.
- i. Slide the tray back into the receiver, making sure to place the rear lip of the tray under the hold-down bracket at the rear of the receiver.
- j. At the front of the tray, tighten the hold-down screws.
- k. Connect all cabling and RF lines removed earlier.
- l. Perform the voltage adjustment procedure for the replaced power supply.

#### **5.7.4 Returning Receiver to Operational Position**

- a. Operate the receiver power switch to OFF.
- b. Ensure that the wave guide gasket is positioned properly.

**NOTE:**

When pushing the receiver to the closed position, ensure that no cables are pinched.

- c. Push the receiver all the way in.
- d. Using the front panel chassis latches, latch the receiver into the rack.

**NOTE:**

It is very important to use an alternating cross-over pattern when tightening wave guide flanges to avoid warping the flange, cracking the seam, and to avoid RF leakage.

- e. Install wave guide bolts. Tighten to 25–40 ft lb.
- f. Attach the cable that extends from the 3-way directional coupler attached to J10 to J8 of the transmitter.
- g. Close the rear door of the rack.
- h. Operate the receiver power switch to ON.
- i. Close the front door of the rack.

#### **5.7.5 Receiver Calibration**

The receiver calibration is performed at the operator's console.

**NOTE:**

Before taking the radar out of the transmit mode, set the pulse width to 2  $\mu$ s.

- a. At the operator's console, place the radar in the Standby mode.
- b. At the back of the receiver:
  1. Locate the 3-way directional coupler attached to J10. At the 3-way directional coupler, disconnect the connector of the cable that extends to J8 of the transmitter.
  2. Apply power to the power meter.
  3. Set the power meter to a range setting that will allow testing for the expected reading level and zero the meter.
  4. Attach the power meter test lead to the 3-way directional coupler.
  5. Obtain the reading at the power meter. The expected readings are:  
**For a two-frequency exciter** —  $5 \pm 5$  dB  
**For a four-frequency exciter** —  $2 \pm 5$  dB
  6. Record the measured reading for later use.
  7. Turn off the power meter and disconnect the test probe.
  8. Reconnect the cable removed in step b..1..
- c. At the operator's console:
  1. Change to the program manager screen.
  2. Double click on the **CALIBRATION** icon.
  3. Observe that the receiver calibration screen shown in Figure 48 appears.
  4. Determine the saturation value for the IF attenuator:

**NOTE:**

The saturation value for the attenuator is when the noise value line on the graphical display changes from a horizontal line to a sloping line.

- a) Select the **Start Calibration Mode** button.
- b) Change the **IF Attenuator** and **Test Attenuator** to a non-zero setting and then back to zero. See Figure 49 for attenuator movements.
- c) Select the **Plot Attenuator/Noise Value** button.
- d) For approximately five seconds, observe the **Noise Value** number. This number should change as the system updates the receiver noise value.
- e) Select the **Plot Attenuator/Noise Value** button.
- f) Increase the **IF Attenuator** by 5 dB.

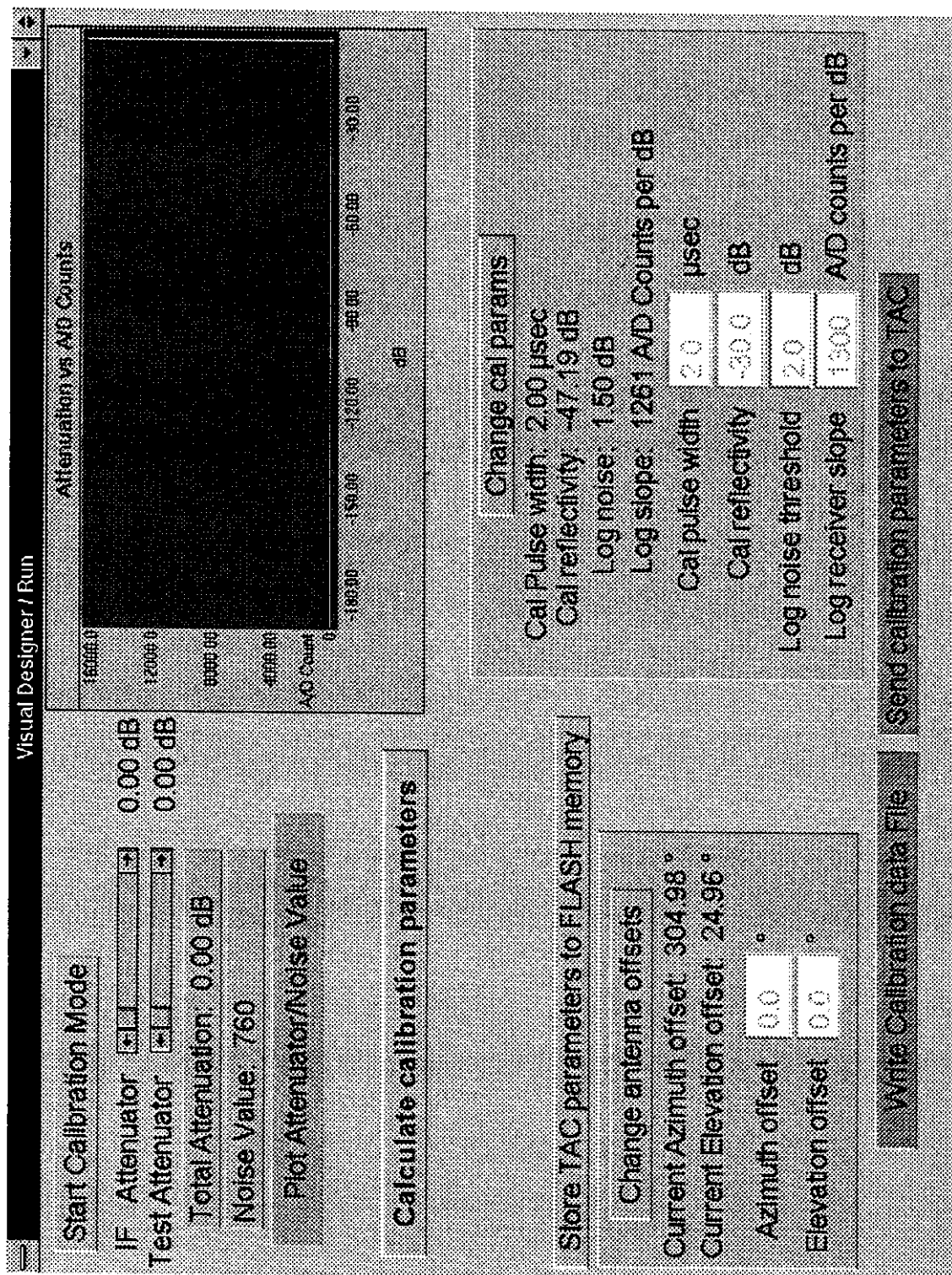


Figure 48. Receiver Calibration Screen.

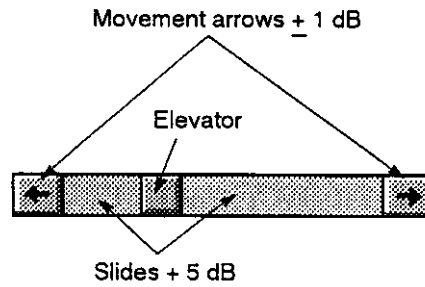


Figure 49. Attenuator Slide Bar Description.

- g) For approximately five seconds, observe the Noise Value number.
  - h) Select the **Plot Attenuator/Noise Value** button.
  - i) Observe the **Attenuation vs A/D Counts** graph to determine the graphical representation of the receiver noise in relation with the attenuator changes.
  - j) Repeat steps f) through i) until the IF Attenuator has been moved to the right side of the slide bar.
5. Determine the saturation value for the test attenuator:
    - a) Increase the Test Attenuator by 5 dB.
    - b) For approximately five seconds, observe the **Noise Value** number.
    - c) Select the **Plot Attenuator/Noise Value** button.
    - d) Observe the **Attenuation vs A/D Counts** graph to determine the graphical representation of the receiver noise in relation with the attenuator changes.
    - e) Repeat step a) through d) until the Test Attenuator has been moved to the right side of the slide bar.
  6. Select the End Calibration button.
  7. Move the **IF Attenuator** and **Test Attenuator** slides to the far left position.
  8. Select the **Calculate Calibration Parameters** button.
  9. Observe that the display screen changes from a graphical image to a text screen and the following message is displayed:
 

Slope = x.xxxxxx, x.xxxxx

Measured power level with no attenuation (dBm):
  10. Enter the reading obtained in step b..6. and press the Enter key.
  11. Observe the following messages:
 

Compression

Transmitter power (kW):
  12. Obtain the transmitter power value from the data sheet provided for the installed TWT. The desired value is the line titled: po(KW)
  13. Observe the following messages:

**NOTE:**

Press the Enter key after each of the following entries are made.

Pulse width ( $\mu$ sec): (enter a 2)  
Antenna Beam Width: (enter 1.3 for 3.0 meter antenna, 1 for 4.3 meter)  
Antenna Gain (dB): (enter 43 for 3.0 meter antenna, 44 for 4.3 meter)  
Transmitter loss (dB): (enter 3)

14. Observe a display with the following:

slope = x.xxxxxx(yyyy), dBz0 = -A.AAAAAA

Where:

x.xxxxxx = actual slope of receiver

(yyyy) = Log receiver slope

-A.AAAAAA = Calibration reflectivity

15. At the maintenance terminal:

- a) If not already, enter the maintenance mode by typing: maint <Enter>
- b) Select screen 19. Using the information obtained in step 14., enter the Calibration Reflectivity and Log Receiver Slope. Using the value (2 $\mu$ s) entered before placing the radar in standby mode, enter the Calibration Pulse Width.
- c) Select screen 15. If not already, set all entries to 65535
- d) Select screen 3. Set the IF Attenuator to 10.
- e) Press the ESC key.
- f) Select Save to Flash Memory

### 5.7.6 Receiver Operation

Three items can be checked on the receiver. LOG Amplifier Dynamic Range, Filter Band Width, and Receiver Sensitivity/(MDS).

#### LOG Amplifier Dynamic Range

- a. Energize the radar system but DO NOT RADIATE throughout this test. The computer must command the transmitter's gated RF Drive for a CV (constant output) condition.
- b. Insert a BNC (Tee) connector in the receiver rear output jack of the Log amplifier channel. Connect a 75 ohm coax between the Tee and the oscilloscope. Insert another BNC (Tee) connector at the oscilloscope and connect a millivolt multimeter to this Tee.
- c. Command the transmitter gated RF Drive to an OFF condition from the computer.
- d. Select the 40 kHz band pass filter mode from the computer.
- e. Adjust the IF attenuator (bandwidth gain) for minimum DC output indicated on the oscilloscope or multimeter.

- f. Verify the performance of the log amplifier compared to the appropriate Data Sheet by setting the CAL attenuator from the computer. Increase or decrease the attenuation value to obtain this data. The output value from the Log amplifier should be approximately 27 mV/division. The delta difference of the CAL attenuator should be 80 dB.

#### Filter Band Width

- a. Observe the 20 MHz output at the Receiver rear test jack. (three way splitter output)
- b. Input the 20 MHz IF attenuator for zero attenuation from the computer.

## 5.8 Transmitter

The transmitter is slide mounted.

### 5.8.1 Chassis Replacement

- **Removal:**

- a. Open the front door of the rack.
- b. Operate the transmitter power switch to OFF.

**NOTE:**

The latches on the left side of the chassis rotate in a different direction from the latches on the right side.

- c. Rotate the chassis latches to unlatch the transmitter.
- d. Open the rear door of the rack.
- e. Remove the flange bolts from the lower flange of the 90° wave guide elbow attached to the transmitter.
- f. Disconnect the cable that extends from the 3-way directional coupler attached to J10 of the receiver to J8 of the transmitter.
- g. Push the transmitter out part way and remove the rubber gasket from the wave guide, saving for later use.
- h. Disconnect all cables from the back of the transmitter.
- i. Place a catch tray or absorbent material below the two coolant fittings to catch any fluid that may leak out.
- j. Disconnect the two cooling tube connectors by pushing the gray button down and pulling the fitting out of the connector.
- k. Pull the chassis out as far as it will go.

**CAUTION**

**This unit weighs in excess of 100 pounds.**

Lifting should be performed by at least two people.

- l. Press the slide release buttons and remove the chassis from slide.
- m. Remove the slide assemblies from transmitter and save for further use.

- **Installation:**

- a. Install slide assemblies on the replacement transmitter.

**CAUTION**

**The slide units are easily damaged if misaligned.**

When installing the slide assemblies on the chassis into the slide assemblies in the rack, three people will be required. Two people need to lift and hold the chassis, and one person needs to guide the slide assemblies together.

- b. Insert the slides into the mating slide sections.
- c. Push the transmitter part way in so that cooling tube connectors are not above any electrical parts.
- d. Connect the two cooling tube connectors.
- e. Ensuring that the jack number and the cable plug numbers match, connect all cabling. Use a 12 in lb torque wrench for the cables mounted on J7-J11.
- f. Ensure that the wave guide gasket is positioned properly.

**NOTE:**

When pushing the transmitter to the closed position, ensure that no hoses or cabling are pinched.

- g. Push the transmitter all the way in.
- h. Using the chassis front panel latches, latch the transmitter into the rack.
- i. Install the wave guide bolts. Tighten to 25-40 ft lb using an alternating cross-over pattern.
- j. Attach the cable that extends from the 3-way directional coupler attached to J10 of the receiver to J8 of the transmitter.
- k. Close the rear door of the rack.
- l. Operate the transmitter power switch to ON.
- m. Close the front door of the rack.

## **5.8.2 Transmitter Power Supplies**

### **5.8.2.1 Gaining Access to the Power Supplies**

- a. At the maintenance terminal:

1. Place the radar system under exclusive control.
2. Place the radar in the standby mode.
- b. Open the front door of the rack.
- c. Operate the transmitter power switch to OFF.

**NOTE:**

The latches on the left side of the chassis rotate in a different direction from the latches on the right side.

- d. Rotate the chassis latches to unlatch the transmitter.
- e. Open the rear door of the rack.
- f. Unbolt the flange of the 90° segment of the wave guide that attaches to the transmitter chassis.
- g. Disconnect the cable that extends from the 3-way directional coupler attached to J10 of the receiver to J8 of the transmitter.
- h. Push the transmitter out part way and remove the rubber gasket from the wave guide, saving for later use.
- i. Pull the chassis out as far as it will go.
- j. Remove the front and right side covers of the chassis.

**NOTE:**

Refer to Figure 50 for the location of the various voltages on the receiver terminal block.

### 5.8.2.2 +5 VDC Adjustment

**NOTE:**

Due to the locations of the terminals with relation to the power supply, it will be necessary for two people to perform this operation.

- a. Operate the receiver power switch to ON.
- b. Measure the +5 VDC output between the +5V and +5V RTN connections on TB1.
- c. If necessary to adjust the output level, use Figure 51 to locate the voltage adjustment potentiometer.
- d. Using a non-conducting screwdriver, turn the adjustment potentiometer to achieve a  $+5 \pm 5\%$  VDC output level.

### 5.8.2.3 +15 VDC Adjustment

- a. Operate the receiver power switch to ON.



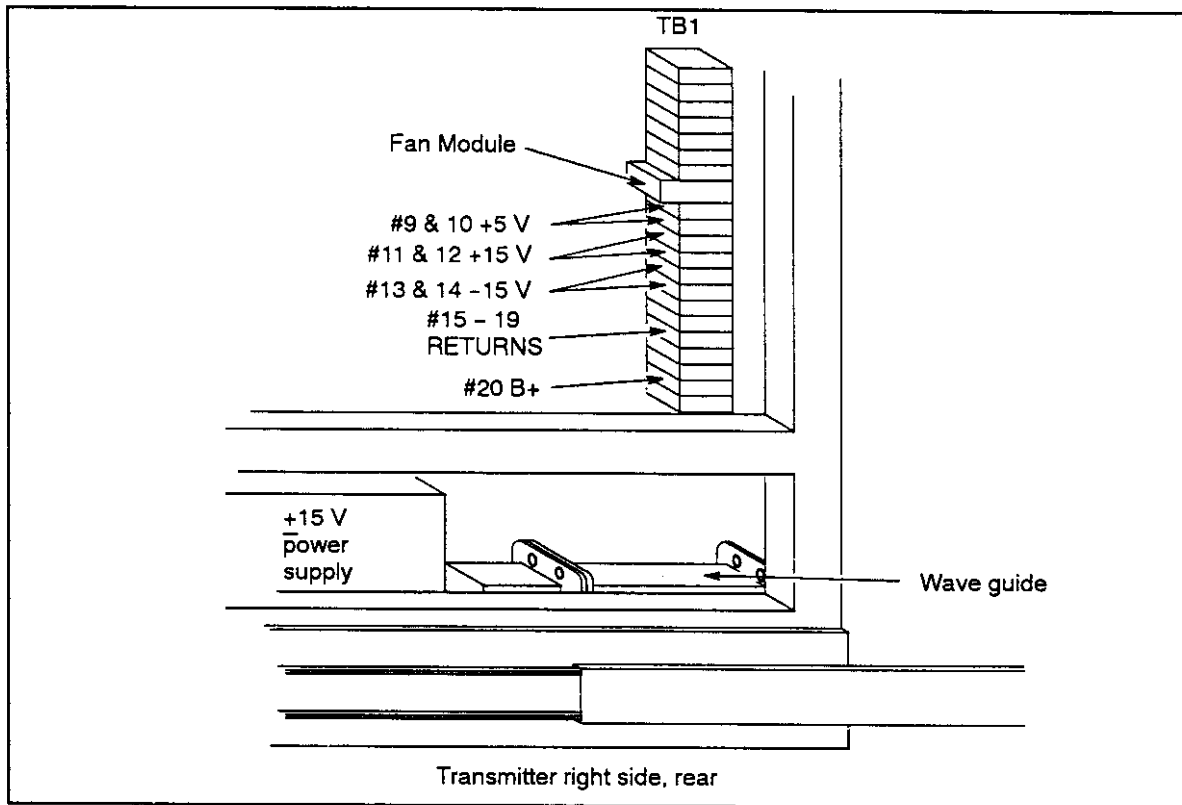


Figure 50. Transmitter Power Terminal Block (TB1).

- b. Measure the  $\pm 15$  VDC output between the +15V and +15V RTN & -15V and -15V RTN connections on TB1.
- c. If necessary to adjust the output level, use Figure 52 to locate the voltage adjustment points.

**NOTE:**

The adjustment potentiometer adjusts the output levels of both the +15 and -15 VDC.

- d. Using a non-conducting screwdriver, turn the adjustment potentiometer to achieve a  $\pm 15 \pm 10\%$  VDC output level.

### 5.8.3 TWT Replacement

• **Removal:**

- a. At the maintenance terminal:
  1. Obtain exclusive control of the radar.
  2. Place the transmitter in the standby mode.
- b. Open the front door of the rack.
- c. Operate the power switch for each chassis to the OFF position.

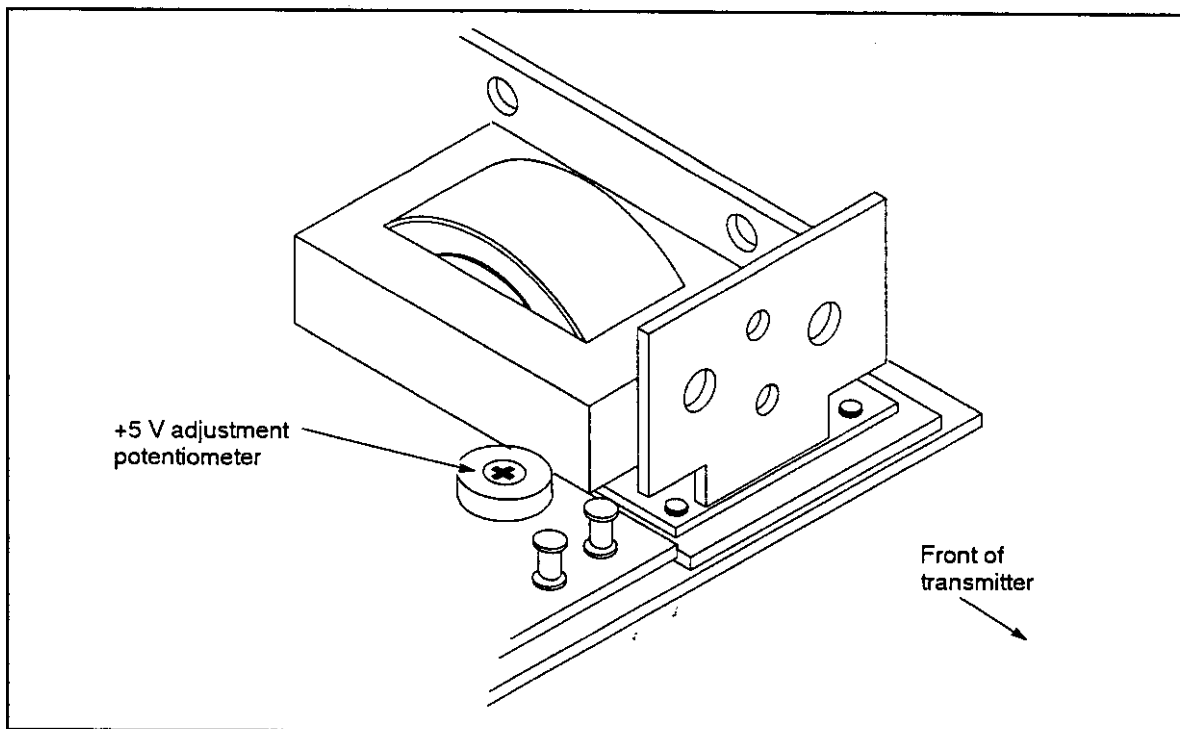


Figure 51. Location of the Transmitter +5 VDC Adjustment.

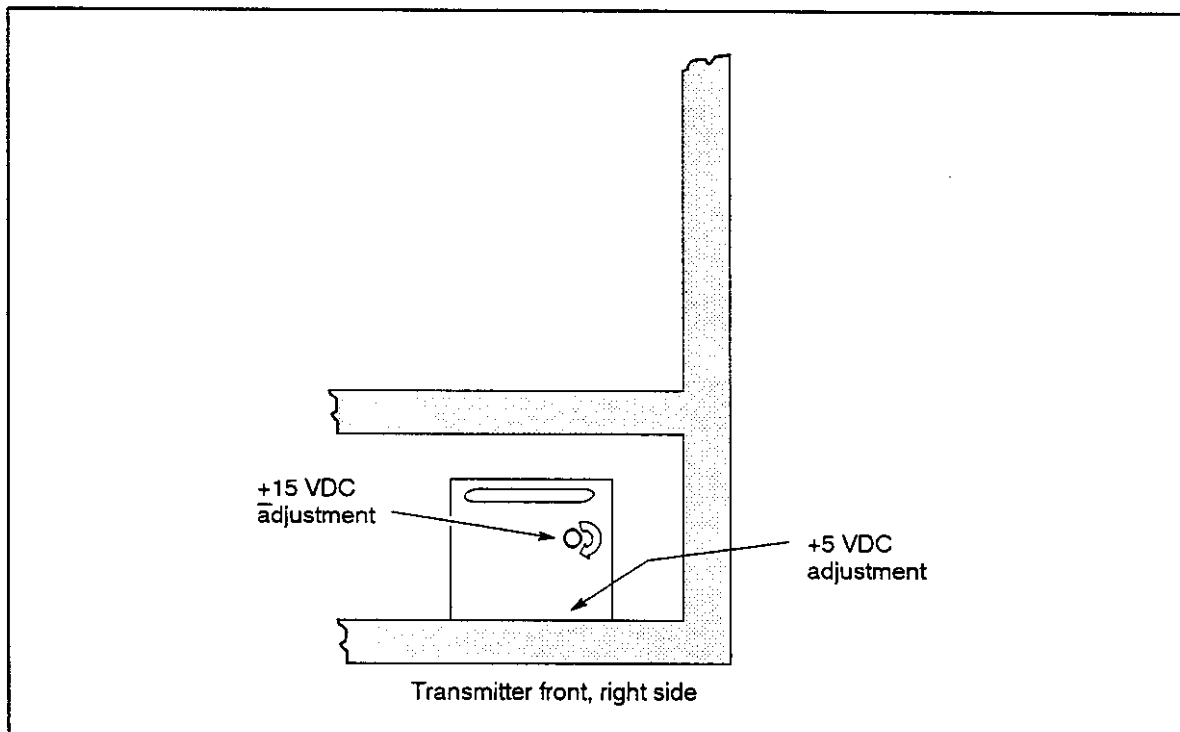


Figure 52. Transmitter +15 VDC Power Supply.

## NOTE:

The latches on the left side of the chassis rotate in a different direction from the latches on the right side.

- d. Rotate the chassis latches to unlatch the transmitter.
- e. Open the rear door of the rack.
- f. Remove the flange bolts from the lower flange of the 90° wave guide elbow attached to the transmitter.
- g. Disconnect the cable that extends from the 3-way directional coupler attached to J10 of the receiver to J8 of the transmitter.
- h. Push the transmitter out part way and remove the rubber gasket from the wave guide, saving for later use.
- i. Remove the transmitter front cover, top cover, and side covers.
- j. Remove the connectors from the back of the modulator.
- k. Disconnect the two TWT high voltage leads from the front of the modulator by unscrewing the connectors at the modulator.
- l. Disconnect the modulator coolant hoses at the quick disconnect fittings at the bottom of the transmitter.

**CAUTION**

**The weight and position of this assembly can cause injury if removal is attempted by one person.**

Lifting should be performed by at least two people.

- m. Remove the four mounting screws at the base of the modulator and remove the modulator from the right side of the transmitter. Refer to Figure 53.
- n. Drain the coolant from the TWT:
  - 1. Disconnect the two cooling tube connectors by pushing the gray button down and pulling the fitting out of the connector.
  - 2. Using a container that can hold at least 4 quarts of liquid, place the open end of a coolant system drain hose in the container and connect the other end to lower transmitter coolant fitting.
  - 3. Using a second system drain hose, support the open end above the level of the TWT.
  - 4. Connect the quick-connect fitting of the second system drain hose to the other transmitter coolant fitting.
  - 5. Provide air pressure into the open end of the second system drain hose until most of the coolant has been removed from the TWT.

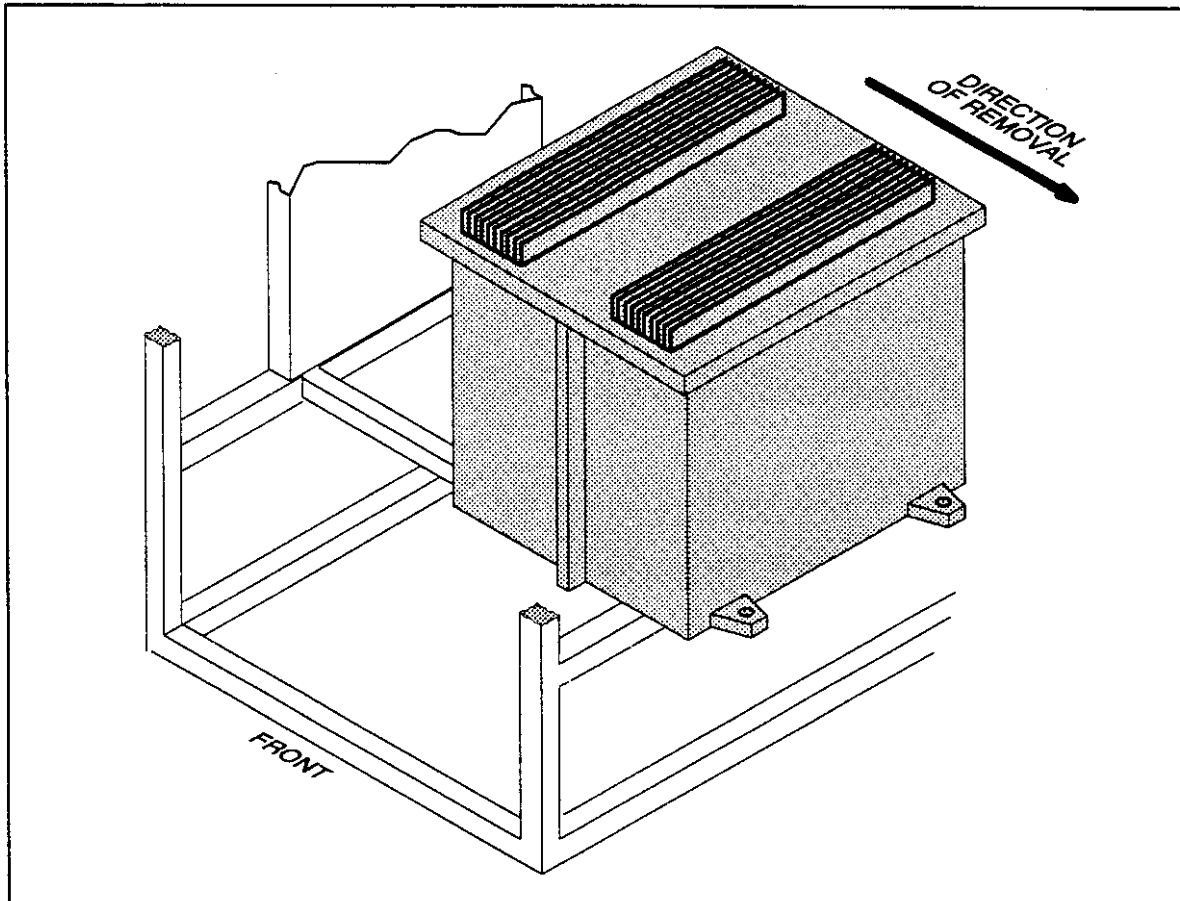


Figure 53. Modulator Removal.

- o. Disconnect the two RF connectors from the side of the TWT.
- p. Disconnect the TWT ground cable.
- q. Remove the four screws holding the TWT mounting blocks to the transmitter frame.

**NOTE:**

Support the end of the TWT with the coolant hoses attached so that it remains higher than the other end of the TWT to prevent any remaining coolant from leaking into the transmitter.

- r. Disconnect the coolant hoses from the TWT.
- s. Remove the TWT.

• **Installation:**

- a. Connect the coolant hoses to the TWT.
- b. Route the high voltage leads through the current doughnut at the front of the transmitter and attach them to the modulator.

- c. Attach the TWT high voltage leads to the modulator (yellow to J1, brown to J2).

**CAUTION**

**Incorrect installation of EPROM U4 can cause damage to the transmitter.**

Observe EPROM U4 orientation prior to removal.

- d. On the TCU, replace EPROM U4 with the EPROM that was included in the box with the replacement TWT.
- e. Attach the TWT mounting blocks to the transmitter frame.
- f. Attach the RF connectors to the TWT.
- g. Disconnect the system drain hoses from the transmitter coolant fittings.
- h. Connect the coolant hoses to the transmitter.

**NOTE:**

Pour the coolant removed earlier into the coolant reservoir so that air is not introduced into the coolant lines to the pump.

- i. While watching for leaks in the transmitter, operate the PUMP LOCAL/OFF/REMOTE switch to the LOCAL position to remove the air from the TWT.
- j. When the air is removed from the coolant lines, operate the PUMP LOCAL/OFF/REMOTE switch to REMOTE.

**CAUTION**

**The weight and position of this assembly can cause injury if removal is attempted by one person.**

Lifting should be performed by at least two people.

- k. Install the modulator assembly and attach the four mounting screws.
- l. Attach the modulator coolant hoses to the fittings on the base of the transmitter.
- m. Connect the connectors at the rear of the modulator.
- n. Replace the top and side panels on the transmitter.
- o. Replace the front panel on the transmitter.
- p. Replace the rubber gasket in the wave guide flange.
- q. With one person pushing the transmitter and another verifying that the wave guide rubber gasket remains in place, push the transmitter to the closed position.
- r. Using the front panel latches, latch the transmitter into the rack.
- s. Install the wave guide bolts. Tighten to 25–40 ft lb using an alternating cross-over pattern.

- t. Attach the cable that extends from the 3-way directional coupler attached to J10 of the receiver to J8 of the transmitter.
- u. Close the rear door to the rack.

#### **5.8.4 Power Supply Replacement**

- a. If necessary, perform the *Gaining Access to the Power Supplies* procedure.
- b. Unscrew the two slide-out tray hold-down screws at the front of the power supply tray.
- c. Disconnect any cabling necessary to allow removal of the tray.
- d. Lift the front edge of the tray and pull it out of the transmitter.
- e. Disconnect the connector to the power supply to be replaced.
- f. Unscrew the mounting screws for the power supply and remove it.
- g. Install the new power supply and tighten the mounting screws to 15 ft lb.
- h. Reconnect the power supply connector.
- i. Slide the tray back into the transmitter, making sure to place the rear lip of the tray under the hold-down bracket at the rear of the receiver.
- j. At the front of the tray, tighten the hold-down screws.
- k. Connect all cabling removed earlier.
- l. Perform the voltage adjustment procedure for the replaced power supply.

#### **5.8.5 Returning Transmitter to Operational Position**

- a. Operate the transmitter power switch to OFF.
- b. Ensure that the wave guide gasket is positioned properly.

**NOTE:**

When pushing the transmitter to the closed position, ensure that no cables are pinched.

- c. Push the transmitter all the way in.
- d. Using the knobs on the handles, latch the transmitter into the rack.

**NOTE:**

It is very important to use an alternating cross-over pattern when tightening wave guide flanges to avoid warping the flange, cracking the seam, and to avoid RF leakage.

- e. Install wave guide bolts. Tighten to 25–40 ft lb.
- f. Attach the cable that extends from the 3-way directional coupler attached to J10 of the receiver to J8 of the transmitter.

- g. Close the rear door of the rack.
- h. Operate the transmitter power switch to ON.
- i. Close the front door of the rack.

## **5.9 Rack**

### **5.9.1 TWT Cooling Unit**

The TWT cooling unit mounted on the back of the rack contains a 50% water, 50% automotive engine coolant mixture. The engine coolant shall meet the specifications stated in Table XXXII.

Table XXXII. Coolant Specifications.

<b>Unit</b>	<b>Fluid Type</b>
TWT (engine coolant)	Automotive anti-freeze
Transmitter Modulator	Exxon Univolt N61 Inhibited Transformer Oil ASTM-D-3487 Type II IEC 296 Class II A BS 148:1984 Class II A Product Code: 331831 Formula: 01831

### **5.9.2 Fans**

- a. Open the rear door of the rack
- b. On the rear rack door, operate the FAN switch to OFF.
- c. Disconnect the fan to be replaced.
- d. Remove the fan mounting hardware
- e. Using the old hardware, install the new fan.
- f. Connect the fan wiring.
- g. On the rear rack door, operate the FAN switch to LOCAL and verify that the fan operates.
- h. On the rear rack door, operate the FAN switch to REMOTE.
- i. Close the rear rack door.

### **5.9.3 Chassis Slides**

- a. At the maintenance terminal:
  - 1. Obtain exclusive control of the radar.

2. Place the radar in the off mode.
- b. Open the necessary rack doors.
- c. Power off the necessary chassis.
- d. Perform the appropriate chassis removal procedure.
- e. Remove the rack side panel(s) as necessary.
- f. Remove the slide from the rack.
- g. Install the new slide in the rack.
- h. Perform the appropriate chassis installation procedure.
- i. Power on the necessary chassis.
- j. Install the rack side panel(s).
- k. At the maintenance terminal:
  1. Place the radar in the appropriate mode
  2. Return the radar for operator use.

#### **5.9.4 Coolant System for the TWT**

- **Draining:**

- a. At the maintenance terminal, assume exclusive control of the radar system.
- b. Place the transmitter in the standby mode.
- c. Open the rear door of the rack.
- d. Disconnect both coolant hoses from the back of the transmitter.
- e. Connect a length of hose approximately three feet in length and a mating fitting for the coolant hoses to each of the removed transmitter hoses. Place the other end of each hose in a container large enough to hold all of the system coolant.
- f. On the rear rack door, operate the PUMP LOCAL/OFF/REMOTE switch to LOCAL.
- g. When the coolant system is empty to the inlet side of the pump, operate the PUMP LOCAL/OFF/REMOTE switch to OFF.

- **Filling:**

- a. Open the cap on top of the coolant reservoir.
- b. Fill the reservoir.
- c. On the rear rack door, operate the PUMP LOCAL/OFF/REMOTE switch to LOCAL.
- d. If the coolant level in the reservoir becomes low, operate the PUMP LOCAL/OFF/REMOTE switch to OFF, replenish the coolant level and return to step c.
- e. Operate the PUMP LOCAL/OFF/REMOTE switch to REMOTE.
- f. At the maintenance terminal, place the transmitter in the desired operational mode and release exclusive control of the radar system.



### **5.9.5 Panels**

**NOTE:**

To maintain proper operational temperatures within the rack, it is not recommended that any panels be removed while the system is in operation.

Panels can be removed by removing the mounting screws on the outside of the cabinet.

### **5.9.6 Doors**

**NOTE:**

To maintain proper operational temperatures within the rack, it is not recommended that any doors be removed while the system is in operation.

To remove a door, the two mounting screws on each hinge must be removed. When positioning the door for installation, place a support block under the door to aid in alignment.

## **5.10 Motor Generator**

Refer to the manufacturers motor generator manual for any allowable repairs.

## **5.11 Triton i7**

The maintenance procedures for the Triton i7 are performed in the Triton i7 Maintenance Manual, Publication Number 06060003. This manual should be included with this manual. Appendix B is for this purpose.

## **5.12 Display Screens**

- **Removal:**

- Operate the power switch to the off position.
- At the Triton i7, operate the power switch to the off position.
- Disconnect the display screen communication cable from the Triton i7.
- Unplug the display screen power cord.

**NOTE:**

If the display screen is not going to be replaced, operate the Triton i7 power switch to the on position at this time. The operation is complete.

- **Installation:**

- a. Connect the display screen communication cable to the Triton i7.
- b. Plug in the display screen power cord.
- c. Operate the display screen power switch to the on position.
- d. Operate the Triton i7 power switch to the on position.

## **5.13 Cabling**

### **5.13.1 Fiber Optic Cables**

Fiber optic cables require specialized test equipment for verifying their operation. contact Kavouras if a fiber optic cable is determined to be defective.

### **5.13.2 Electrical Wiring**

If the quality of any signal is deficient, the electrical wiring should be tested for continuity between the pins on the jack/plug on one end of a wire and the jack/plug at the other end. While the test is being performed, verify the integrity of the wiring along the entire path by wiggling the cable where possible to detect any worn insulation or pinched wires.

If it becomes necessary to replace an electrical wire, remove any markings from the old wire and attach to the replacement wire. The replacement wire should also be routed through all necessary wire wraps to prevent damage to the wire if it is allowed to move freely.