

## **1. INSTALLATION, INTEGRATION AND CHECKOUT**

### **1.1 Introduction**

This section contains installation information for the independently located DME. If the DME is to be collocated with VOR or ILS refer to the basic instructions in this section and to the installation instructions for the VOR or ILS equipment. With respect to general requirements, a good VOR or ILS site will satisfy the DME requirements as well. System performance must be verified by flight inspection. [Figure 1-1](#) shows a typical DME site.

#### **NOTE**

After flight inspections and prior to use by pilots, it is mandatory that the monitor be left in control of the facility and not in bypass.

### **1.2 Site Information**

#### **1.2.1 Site Selection**

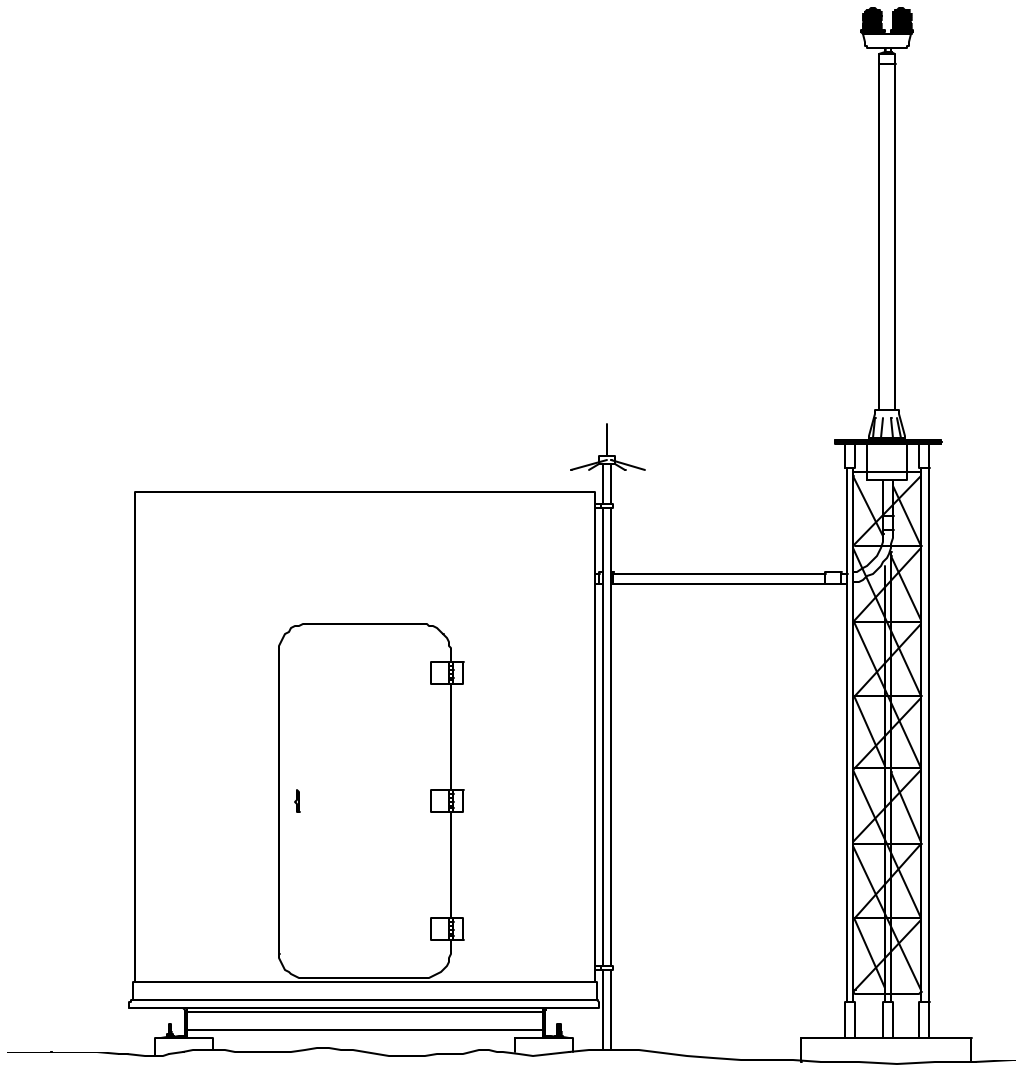
The signal radiated from the DME is affected by obstructions and terrain in the immediate vicinity of the antenna and by obstructions and terrain within the service range of the station. An ideal site would be the highest ground in the vicinity with level terrain, cleared of all objects for a radius of at least 3000 feet (915 meters), and with no obstructions extending above the horizontal plane of the antenna within the service range of the station. In most localities, it is not possible to satisfy the ideal site requirements. Every effort must be made to obtain the best site available. Although no absolute minimum requirements can be stated, a site is normally acceptable if it meets the recommendations contained in the following paragraphs.

##### **1.2.1.1 Terrain Features**

The terrain should be level within a radius of 200 feet (61 meters). In a radius between 200 and 1000 feet (61 and 305 meters), a downward slope is acceptable if (1) the rate of descent is not more than 4 feet in 100 feet (1.22 meters in 30.5 meters) and (2) contour lines are generally circular around the site. Beyond a radius of 1000 feet (305 meters), terrain should be below the horizontal plane of the antenna.

##### **1.2.1.2 Obstructions**

There should be no structures within 750 feet (229 meters) of the antenna. Metallic structures should not subtend vertical angles greater than 1.2 degrees as measured from the antenna. Wooden structures with negligible metal content should not subtend vertical angles greater than 2.5 degrees as measured from the antenna. Structures having considerable length (such as aircraft hangers or administration buildings) should be situated lengthwise on a radial from the antenna. Single trees less than 35 feet (11 meters) high may be tolerated beyond 750 feet. No group of trees or groves may be within 1000 feet. No overhead power or control lines are permissible within 750 feet of the antenna.



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**Figure 1-1 Typical DME Site**

### **1.2.2 Shelter Requirements**

The shelter location depends primarily on the maximum cable run allowed and on the desired location for the DME antenna. An RF transmission line of 2" foamflex cable (with Type N connectors at each end), one cable for the monitor antenna made up of 1/4" foamflex (with a Type N connector at one end and a TNC male connector at the opposite end), and one AC cable for the OB Lite may be supplied with the DME equipment. These cables are 35 feet long. When the requirements exceed 35 feet, company engineering personnel can provide the necessary planning to determine the requirements.

The DME ground equipment is designed to operate continuously and unattended, but space must be allocated for maintenance personnel and their equipment.

### **1.3 Unpacking and Repacking**

The DME electronic subsystem is shipped unassembled. Only general precautions can be given because the crating and unpacking depends upon destination and what optional equipment is included. Most items are packed separately in individual containers; these are then grouped for crating. Each crate contains a packing list which details what equipment is enclosed in the crate. Unpack the equipment and visually inspect each item for accuracy and damage, but **DO NOT REMOVE** any **ESD** protective wrapping. Report any damage immediately. After inspection, repack each item to prevent damage. During installation, unpack items as they are needed.

#### **1.3.1 Environmental Considerations**

The environmental conditions must not exceed those listed in the Specifications of [Table 1-1 Error! Reference source not found.](#)

#### **1.4 Input Power Requirement Summary**

The requirements for input power must not exceed those listed in the Specification of [Table 1-1 Error! Reference source not found.](#)

### **1.5 Installation Procedures**

#### **1.5.1 Installation Tools and Test Equipment**

Refer to [Error! Reference source not found.](#) for a list of test equipment and [Table 1-1](#) for a list of special tools required for installation.

**Table 1-1 Special Tools Required for Installation**

<u>Description</u>
Tube Cutter
File
Knife
2-1/4" Hole Saw
Assorted Screw Drivers and Wrenches
Thread Tape

### **1.5.2 Installation Kits**

Refer to [Table 1-2](#) for all component or modification kits required to install the DME station. Some kits listed are optional equipment. Kits ending with “X” have many different varieties and will vary depending on the site specific requirements. In all necessary cases installation drawings for each kit are provided with the kit hardware.

**Table 1-2 Component or Modification Kits Required to Install the DME**

<u>Part Number</u>	<u>Description</u>
470085-000X	DME Tower Antenna Kit
470561-0001	DME Unidirectional GS Tower Mount Antenna Kit
470628-000X	DME Battery Backup Kit, 35Ahr
470622-0001	DME Accessory Kit
470627-0001	DME AC Power/Installation Kit
470291-000X	DME OB Light Kit
470623-0001	Environmental Sensors Kit
470360-000X	PMDT Kit

**Table 1-3 Additional kits required to Install Shelter and Tower Grounding Systems**

<u>Part Number</u>	<u>Description</u>
470252-0002	Civil Install Kit, 45G Rohn Tower
470225-0001	Civil Install Kit, Shelter
470557-0001	Shelter Internal Grounding Kit

### **1.5.3 Shelter Foundation Installation**

For shelters not supplied by SELEX Sistemi Integrati Inc., the manufacturer of the shelter will supply drawings for the site engineer.

### **1.5.4 Shelter Installation**

- a. Use a crane and four nylon slings (20 feet long) to position the equipment shelter on the four concrete piers.
- b. Attach the shelter to the pier anchor bolts using appropriate hardware.

### **1.5.5 Tower Foundation and Tower Installation**

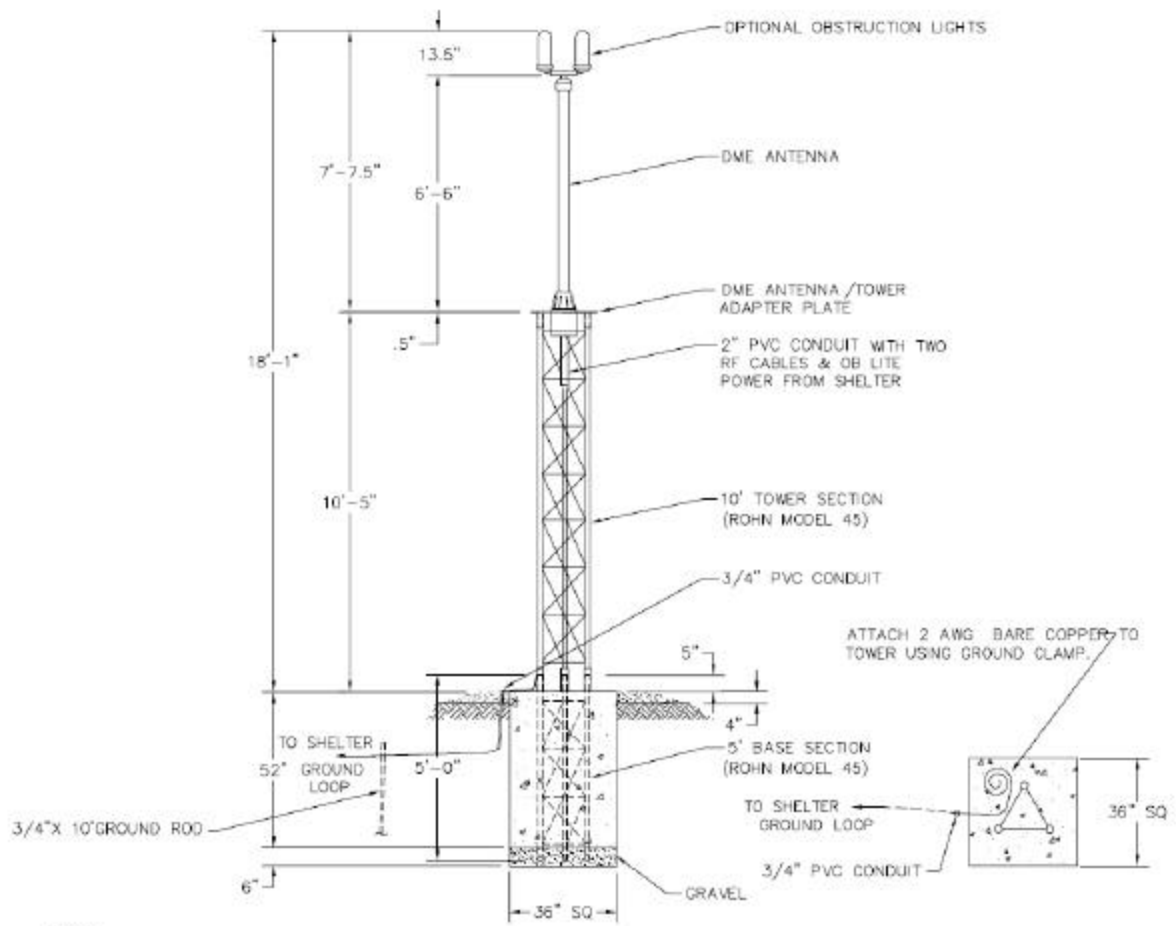
A triangular steel tower is available for use as a support for the DME antenna. [Figure 1-2](#) shows the installation details for this tower. [Figure 1-3](#) illustrates the triangular tower adapter plate required to mount the antenna to the DME tower.

### **1.5.6 Shelter and Tower Installation Grounding**

- a. Install ground rods and ground wire as detailed in [Figure 1-2](#) and [Figure 1-4](#).
- b. Install the 470557 Shelter Internal Grounding Kit per the drawing provided with the kit.
- c. Verify the shelter grounding plate, AC wiring, lightning protection, RF tower, and telephone equipment all share a common grounding potential. The impedance between any of these items should be below 100.

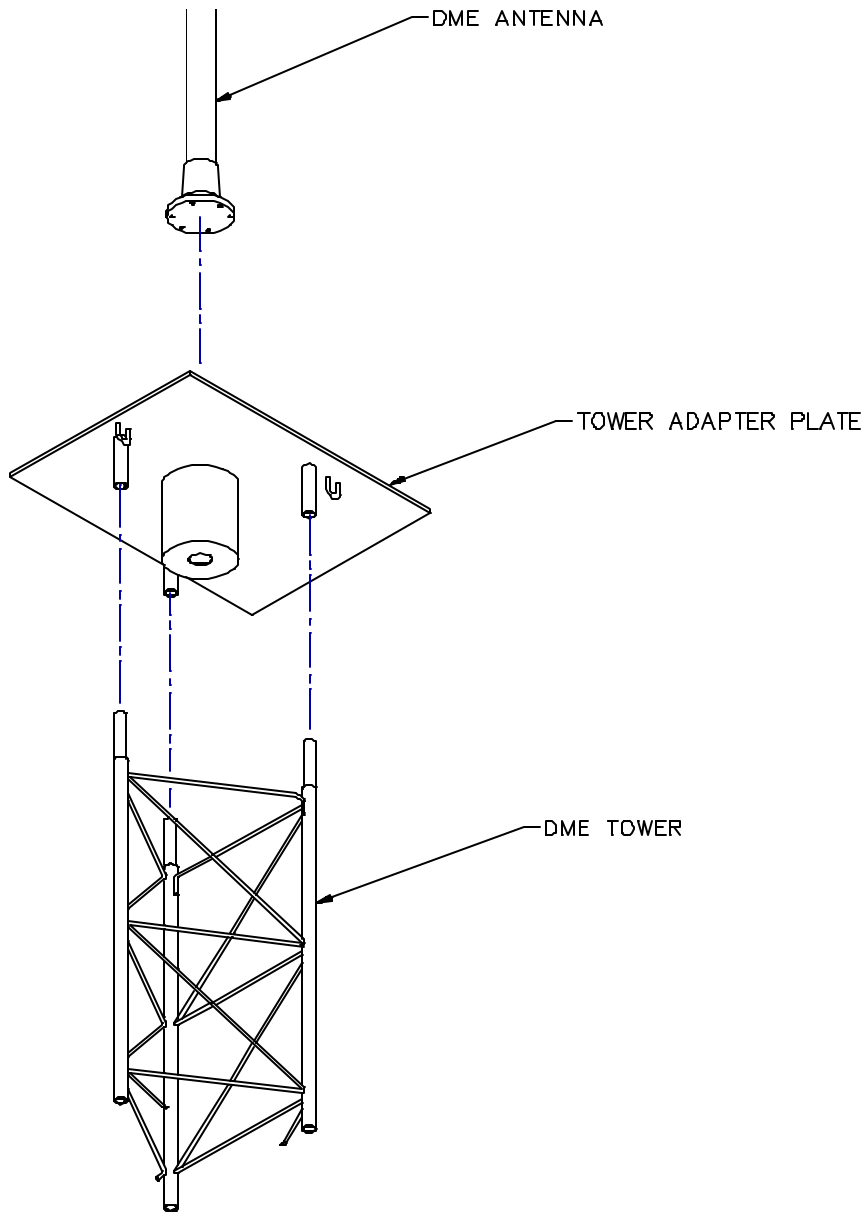
### **1.5.7 Air Conditioner Installation**

If a wall mounted air conditioner is supplied, install the air conditioner in the wall opening and secure it in place using bracket supplied. Apply silicon seal around air conditioner and wall opening to maintain a weather tight seal.

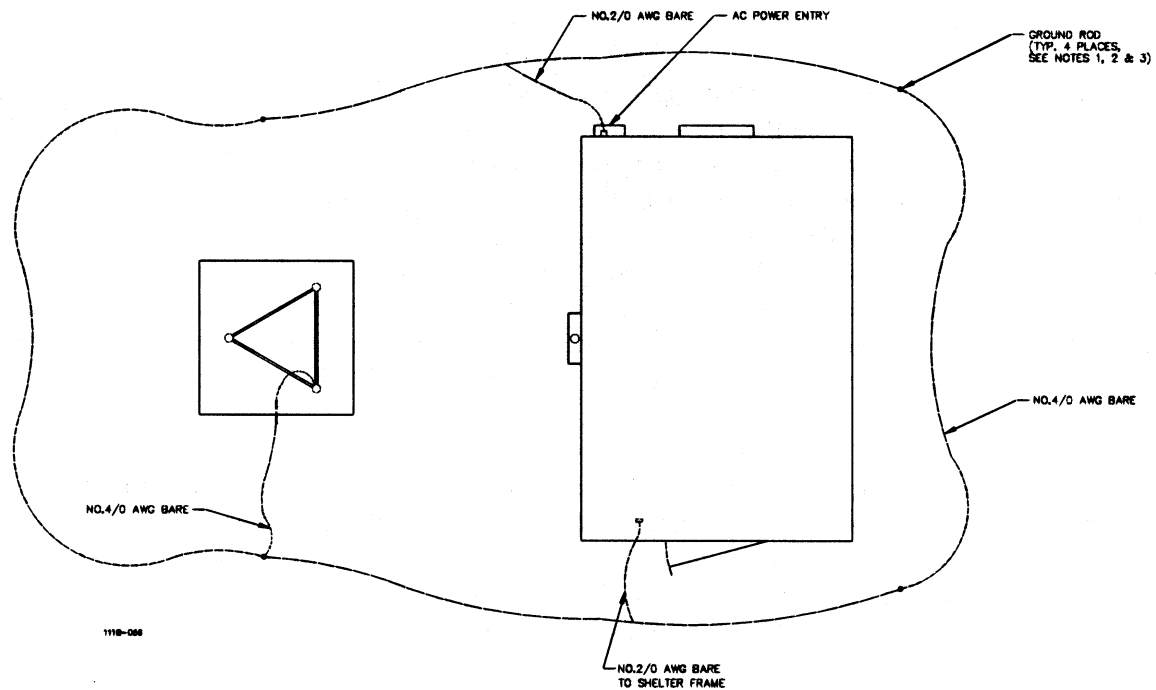


TYPICAL DME TOWER & ANTENNA INSTALLATION

**Figure 1-2 Typical DME Tower Installation Diagram**



**Figure 1-3 Triangular Tower Adapter Plate**



**NOTES:**

1. ALL GROUND RODS SHALL BE 3/4" x 10' COPPER CLAD STEEL, DRIVEN TO 12" BELOW GRADE.
2. ALL BONDS BELOW GRADE SHALL BE EXOTHERMICALLY WELDED, UNLESS OTHERWISE NOTED.
3. ALL GROUND RODS SHALL BE AT LEAST 24" FROM ANY FOUNDATION (8" MAX.).

**Figure 1-4 Typical DME Shelter and Tower Grounding Diagram**

**1.5.8 DME Cabinet Installation**

- a. Unpack the DME 19" rack system and stand upright inside the equipment shelter.
- b. The rack can be located on an outside wall or in the center of the room; however the ventilation louvers located on the left side of the cabinet must not be obstructed.
- c. To level the rack use the adjustable feet then lock the feet positions using the jam nuts.
- d. If desired the front and rear doors can easily be removed by sliding up the three hinge pins on the left inside edge of each door. If the doors are removed be sure to replace them after installation.
- e. Use #6 grounding wire provided in the AC Power/Installation Kit (**Figure Error! Reference source not found.**) to connect from the DME grounding bus bar to the shelter grounding plate using the shortest path possible.

**NOTE: Do not install any modules in the rack until it is properly grounded.**

**1.5.9 Battery Backup Assembly Installation**

- a. Insure DME system AC and DC circuit breakers are in the OFF position.
- b. Construct battery backup unit as detailed in **Figure Error! Reference source not found.** or per the drawing provided with supplied battery backup kit.
- c. Install the four twelve-volt batteries and connect batteries in series.

- d. Install battery backup wiring between the DME transmitter cabinet and the battery backup assembly. The battery ground lead should connect to the grounding bus bar and the battery hot wire (+48V) should connect to TX1 DC breaker located on the 1A26 Status Panel Assembly.
- e. When supplied with two battery kits then connect the hot wire (+48V) from the second battery set to the TX2 DC breaker; otherwise install the jumper wire between TX2 DC breaker and TX1 DC breaker as provided in the battery kit.
- f. Install safety cover(s) over batteries or lid(s) on battery backup box.

**CAUTION: Shorting the battery leads can cause a fire or explosion.**

#### **1.5.10 Primary AC Power Installation**

AC wiring for the DME will require a separate circuit breaker for the DME system and DME obstruction lights. The convenience outlet located on the front of the 1A26 Status Panel is powered from the obstruction light breaker.

- a. Insure DME system AC and DC circuit breakers are in the OFF position
- b. Insure that shelter DME system circuit breaker is in the OFF position.
- c. Connect primary AC power to DME as detailed in [Figure Error! Reference source not found.](#)

#### **1.5.11 Shelter to Tower Conduit Connections**

- a. Using a 2-1/4" hole saw, cut a hole in the wall between the DME transmitters and the antenna tower at a height above the top of the DME transmitter cabinet.
- b. Refer to [Figure Error! Reference source not found.](#) Slide 2" x 5" threaded conduit into hole. Install reducing washer and 2" locknut on each end of threaded conduit. Tighten locknut.
- c. Install protective bushing on exposed threaded conduit threads of interior shelter wall. Install 2" PVC female adapter on threaded conduit of outer shelter wall.
- d. Refer to [Figure 1-7](#). Cut 2" PVC appropriate length to center of tower directly under antenna.
- e. Install 2" PVC hole adapter in bottom of triangular tower adapter plate. Install reducing washer and 2" locknut onto hole adapter. Install protective bushing over exposed threads.
- f. Cut 2" PVC appropriate length to extend from triangular tower adapter plate to 2" PVC from shelter. Insure that 2" PVC from triangular tower adapter plate is cut so that PVC from shelter slopes slightly downward as it runs to tower.
- g. Install 2", 90 degree PVC connector and 2" conduit adapters between the two pieces of 2" PVC and insure that all pieces fit. Drill a 1/8" hole in the bottom of 2" 90 degree PVC connector. This will allow any water seepage to drain. Pre-fit all pieces to insure proper mating.

#### **1.5.12 Obstruction Light Installation and Wiring**

The obstruction light assembly is shipped separately from the DME antenna and it is necessary to attach the obstruction light to the top of the DME antenna; and the wiring that extends from the antenna must be connected to the bulb sockets. [Figure 1-8](#) shows the assembly details.

#### **NOTE**

The mounting hole on the top of the DME antenna is threaded for a 3/4" pipe thread. There are two versions of obstruction light assemblies available: one is threaded for a 3/4" pipe thread; the other is threaded for a 1" pipe thread. For the 3/4" pipe version, a 1" to 3/4" reducer and a 3/4" by 1-1/2" nipple stainless steel combination should be used.

- a. Remove lens and bulbs.
- b. Remove the hole cap at the top of the DME antenna and fish out the AC wires using stiff wire bent into a hook.
- c. Route the three wire AC cable from the DME antenna through the required pipe adapters and into the bulb sockets.



- d. Thread the obstruction light assembly into the antenna. Use thread tape on all pipe threads to insure a water tight fit.
- e. Connect the three AC wires from the antenna to the bulb sockets, as shown in Figure 1-5 or Figure 1-6.
- f. Install the lighting rod to the obstruction light nipple as detailed in Figure Error! Reference source not found..
- g. Verify the obstruction light bulbs match the site AC voltage rating then install the bulbs and lens.
- h. After installing antenna to tower, connect remaining obstruction light power wires to DME cabinet and shelter circuit breaker box as shown in Figure 1-5 or Figure 1-6. Note that the 070219-0001 cable is located in the Antenna Kit (Figure Error! Reference source not found.).

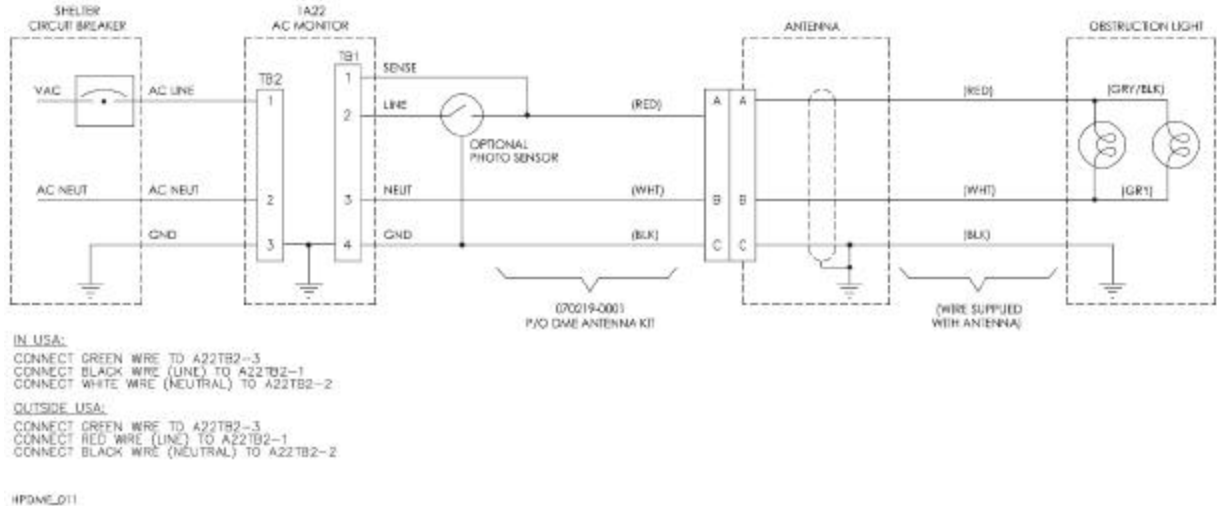


Figure 1-5 DME Obstruction Light Interconnect Diagram with Photo Sensor

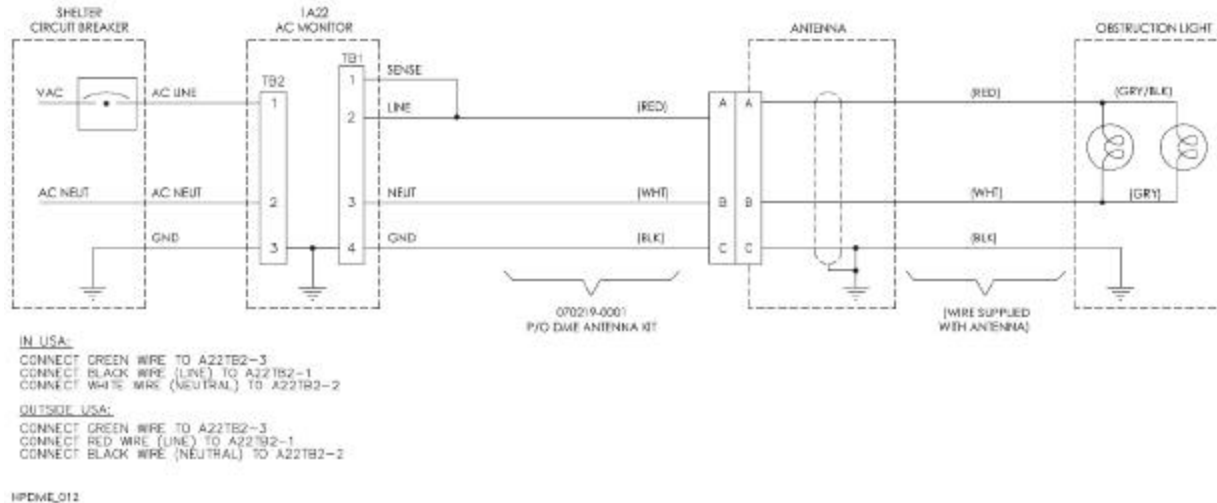
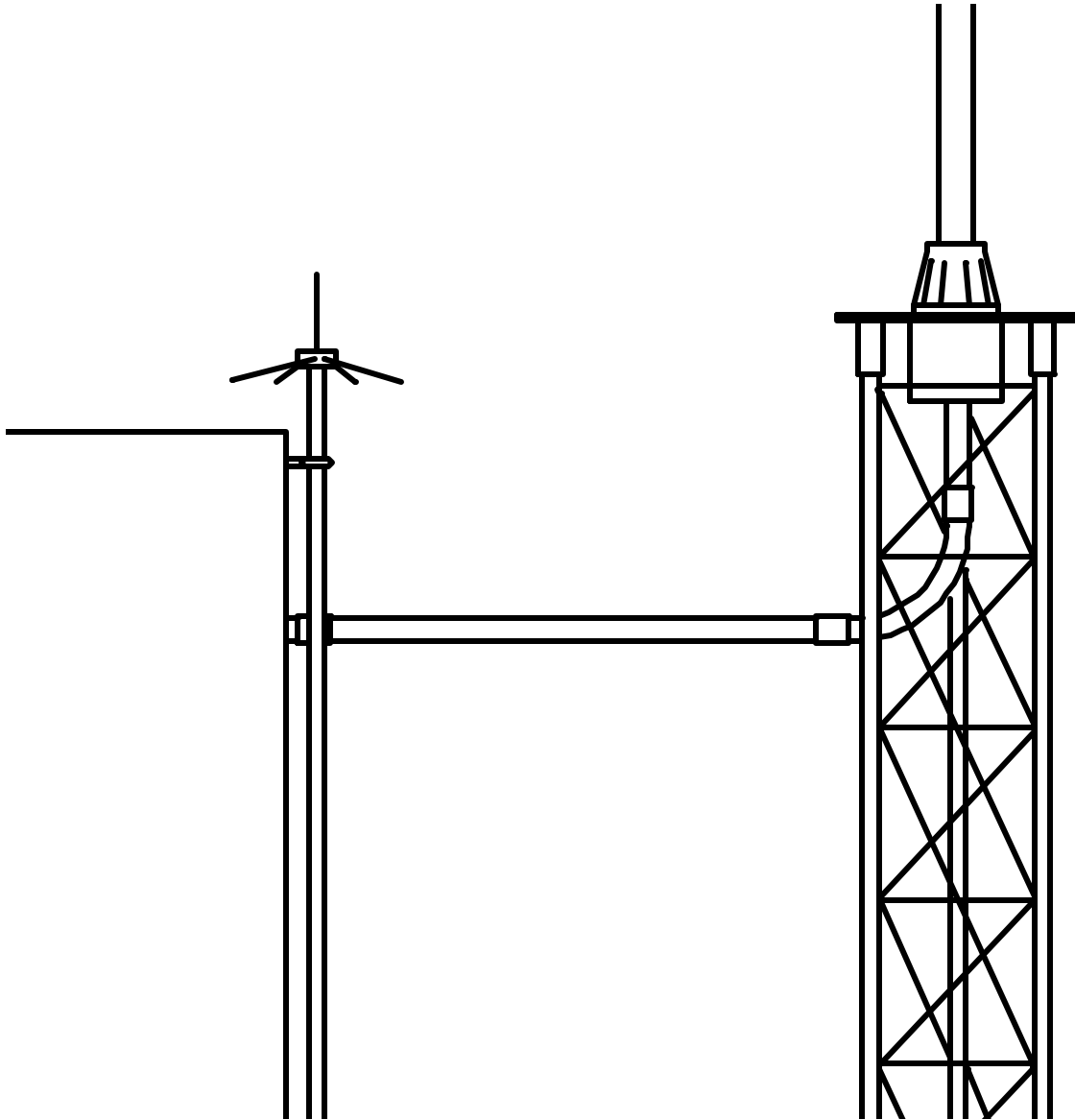


Figure 1-6 DME Obstruction Light Interconnect Diagram without Photo Sensor

### **1.5.13 DME Antenna Installation**

- a. Use a crane and nylon slings to lift the DME antenna to the top of tower.
- b. Install DME antenna on triangular tower adapter plate as shown in [Figure Error! Reference source not found.](#). Orientation of the obstruction bulbs and lightning rod is not important.
- c. Secure antenna with appropriate hardware provided in the DME antenna kit.



**Figure 1-7 Typical Shelter to Tower Conduit Installation**

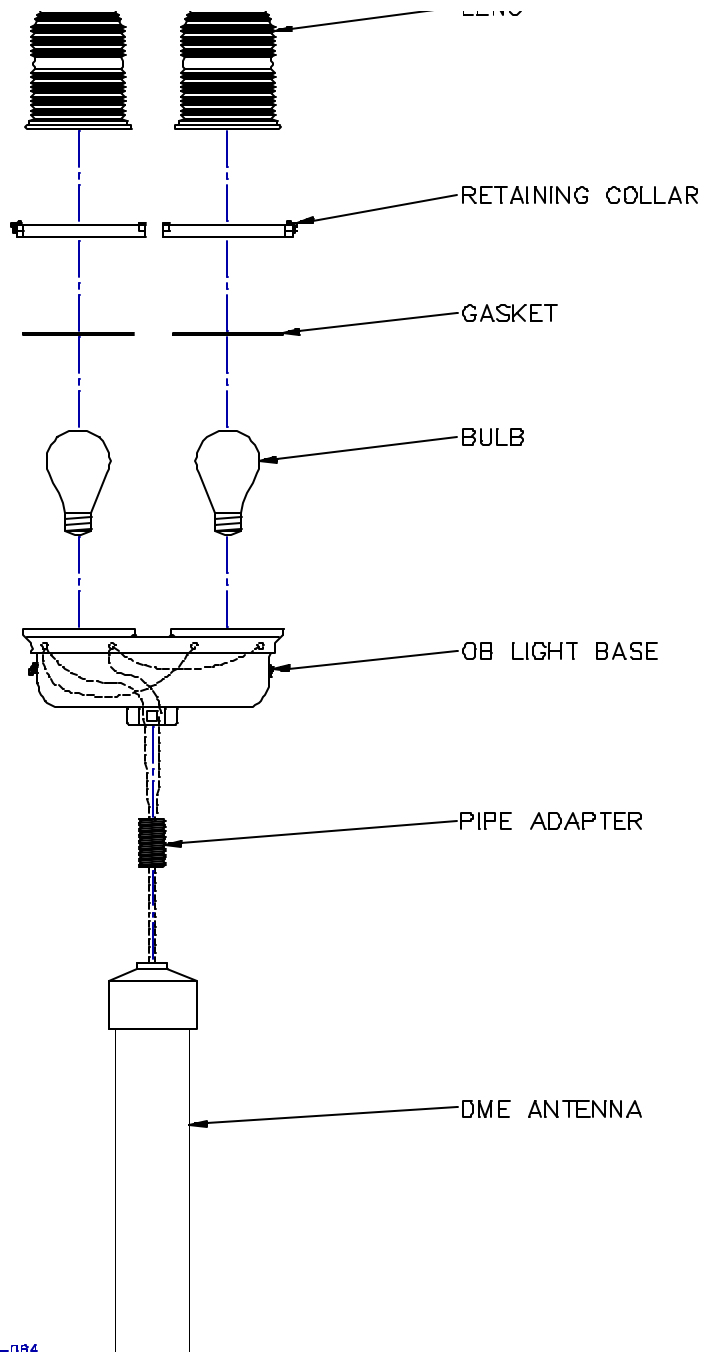


Figure 1-8 Obstruction Light Installation Diagram

#### **1.5.14 DME Transmitter to Antenna Interconnect**

- a. Refer to [Figure 1-7](#). Route ½” Heliac RF feedcable through conduit and connect to antenna connector J1 (RF INPUT).
- b. Route ¼” Heliac antenna monitor cable through conduit and connect to antenna connector J2 (RF MONITOR OUTPUT). Note that in most installations the J3 RF MONITOR OUTPUT port can be used instead of J2 however J2 is preferred.
- c. Route obstruction light power cable through conduit and to antenna connector J4 (OBSTN LT INPUT).
- d. Connect ½” Heliac RF feedcable to DME transmitter connector 1J1 (RF OUT).
- e. Connect ¼” Heliac antenna monitor cable to DME transmitter connector 1J2 (ANT MON1).
- f. Place obstruction light circuit breaker to the ON position. Verify obstruction lights illuminate.
- g. Using PVC cement, glue 2” PVC conduit connections previously installed.

#### **1.5.15 Connecting VOR or ILS Keyer Wiring**

- a. Verify that the primary AC power (located in the shelter main circuit breaker box), VOR equipment and DME equipment circuit breakers are in the OFF position.
- b. Using the two-conductor electrical cable and forked terminal lugs provided in the AC Power/Installation kit ([Figure Error! Reference source not found.](#)), connect KEY\_OUT+ and KEY\_OUT- signals from the 1A19 Interface CCA located in rear of the DME cabinet to the appropriate location as identified in [Table 1-4](#).

Note after equipment startup refer to section [Error! Reference source not found. Error! Reference source not found.](#) to configure external keying.

**Table 1-4 External Keying Connection Locations**

SELEX Navaid	KEY_OUT+ (1A19TB2-14) Destination	KEY_OUT- (1A19TB2-15) Destination
1150 VOR	TB10-5	TB10-6
2100 Localizer	1A18TB4-1	1A18TB4-2
2110 Glideslope	1A18TB4-1	1A18TB4-2

#### **1.5.16 RCSU and RMM Connections**

- a. If the DME is provided with a 2238 RCSU then connect the copper wires from the RCSU to the 1A19TB2-1 and 1A19TB2-2 locations on the Interface CCA for a Dedicated Modem connection type. For a RF Modem/Fiber connection type, the RS232 connection should be made to the 1A19J5 DB9 connector. DIP switch S2-1 located on the 1A8A1 Low Power Backplane CCA should be set to match the Connection Type as well.
- b. If a telephone line is available for remote maintenance monitoring (RMM), connect the tip and ring wires from the telephone interface box to the 1A19 Interface CCA locations TB2-3 and TB2-4. Polarity is not important. DIP switch S2-2 located on the 1A8A1 Low Power Backplane CCA should be set to “DIAL-UP” when using this internal dial-up modem. Use the two-conductor electrical cable provided in the AC Power/Installation kit ([Figure Error! Reference source not found.](#)) for this connection.
- c. If the DME’s internal dial-up modem is unable to comply with local telephone requirements then connect the telephone line to an external modem and connect the external modem serial port to the 1A19 Interface CCA J6 connector. DIP switch S2-2 located on the 1A8A1 Low Power Backplane CCA should be set to “~EXTERNAL” when using an external dial-up modem. Reset the DME station after changing the S2-2 switch.
- d. DIP switch S1-6 located on the 1A8A1 Low Power Backplane CCA controls whether the DME station will allow remote configuration of transmitter and monitor parameters. When set to “RMT

ALLOWED” a remote user logged into Security Level 3 can put the DME station in Local Mode from the PMDT and change all parameters as if connected directly to the cabinet in the shelter. When set to “~NOT ALLOWED” the system can not be put in Local Mode from the PMDT and remote parameter changes are blocked throughout the software.

### **1.6 Inspection**

Prior to energizing the equipment, a visual inspection is made to eliminate circumstances that could cause power-up failures.

- a. Visually inspect wire, RF coaxial cables and connectors for corrosion, loose connectors and improperly assembled connectors.
- b. Insure all terminal boards are free of foreign objects such as pieces of wire or other objects that could cause electrical shorts within the equipment. Remove foreign objects as necessary.
- c. Inspect the battery backup units to ensure that all terminals and connectors are tight and that there are no metal shavings or other objects that could cause damage to the equipment.

### **1.7 Initial Start-up and Preliminary Testing**

The following paragraphs detail the step-by-step procedures for initial start-up and preliminary testing of the DME.

#### **1.7.1 Input Voltage Checks**

After the AC and DC power has been connected to the DME transmitter. It is necessary to check the input power to insure the proper voltage is applied to the system.

- a. Assure that the DME AC and DC circuit breakers to the OFF position.
- b. Set the shelter primary AC power circuit breakers to the ON position.
- c. Using an AC voltmeter check voltage across the AC Monitor 1A22TB3-1 (LINE) to 1A22TB3-2 (NEUTRAL) terminals. Insure the voltage meets the range specified in section [Table I-1 Error! Reference source not found.](#)
- d. Turn on the DME DC circuit breaker while leaving the AC circuit breakers OFF.
- e. Using a DC voltmeter check voltage across 1A20 BCPS1 E7 (BATT\_POS) to E9 (GND). Insure the voltage is 42 to 50Vdc.
- f. For dual equipment check voltage across 1A21 BCPS2 E7 (BATT\_POS) to E9 (GND). Insure the voltage is 42 to 50Vdc.
- g. Turn DC circuit breakers to the OFF position.

#### **1.7.2 Installing Modules in Transmitter Cabinet**

Since the DME transmitter cabinet is shipped separately from its electronic modules, it will be necessary to install them into the transmitter equipment cabinet. Insure AC and DC circuit breakers are set to the OFF position.

### **CAUTION**

**Many of the modules used in the DME transmitter contain Electrostatic Discharge (ESD) sensitive components. ALWAYS wear protective wrist strap when installing modules or CCAs. Before modules are installed into transmitter cabinet, check modules or CCAs for cracked or broken connectors, bent pins, and loose hardware. Report any damage immediately.**

#### **1.7.3 Turn on Procedure**

- a. Verify all assemblies are properly installed and are fully seated.
- b. Turn AC and DC circuit breakers to the ON position.
- c. Verify the PWR\_OK LEDs are lit on all card cage modules.
- d. Verify the CPU\_OK LEDs are lit on the RTC, Monitor, and RMS assemblies.

#### **1.7.4 PMDT Hookup and Setup**

- a. Unpack the PMDT laptop computer and follow the manufacturer's installation instructions to power-up the computer, create a user account, and logon to Windows™ as an administrator.
- b. Insert the 978178-XXXX PMDT CD-ROM into the laptop computer.
- c. Select Start >> Run then type D:\Setup.exe to start the PMDT installation. Note if installation does not start then use the correct drive letter associated with the CD-ROM drive.
- d. Follow the default prompts for PMDT installation.
- e. In order for the PMDT controls to be properly displayed change the DPI Setting to "Normal (96 DPI)" in Windows on the Display Properties >> Settings >> Advanced >> General tab. Note that Display Properties can be accessed by right-clicking on the Windows background then selecting Properties.
- f. At the DME assure the AC and DC breakers are in the ON position.
- g. Plug the USB cord between the laptop computer and 1A13J1 (PMDT USB) located on the RMS CCA.
- h. Windows should detect the USB device and start installing a driver. If prompted for the USB driver files they are installed in the PMDT directory at C:\Program Files\SELEX-SI\PMDT\FTDI USB Driver.
- i. Start the PMDT application by double-clicking on the desktop icon named PMDT.
- j. Select System >> PMDT Setup.
- k. In the Navaid Direct COM Port control pick the COM port that contains "USB Serial Port" in the description.
- l. On the PMDT configuration screen, setup other options such as Language and Print Screen mode then select OK to save the changes.
- m. Refer to section **Error! Reference source not found. Error! Reference source not found.** to connect to the DME equipment at Security Level 3.

#### **1.7.5 Site Adjustments and Configurations**

- a. Press the LOCAL CONTROL button on the 1A1 LCU to put the DME into Local Mode.
- b. At the LCU bypass the Integral monitor and put Transmitter 1 on antenna.
- c. If the VSWR reading on the Monitors >> Data >> Integral screen is in alarm then shut down the DME and troubleshoot the RF feedcable to antenna connection before continuing. VSWR alerts detected by each power amplifier can also be found on the Transmitters >> Data >> Transmitter Data screen that indicate a faulty RF load.
- d. On the Monitors >> Data >> Integral screen note the ERP (Effective Radiated Power) value for each monitor.
- e. On the Monitors >> Configuration >> Integral screen change the Monitor 1 Replay Attenuation setting until the Monitor 1 EPR is  $0 \pm 1$ dB.
- f. For dual monitor equipment change the Monitor 2 Replay Attenuation setting until the Monitor 2 EPR is  $0 \pm 1$ dB.
- g. On the RMS >> Configuration >> Station screen verify the channel number and type (X or Y) match the site requirements and frequency paring requirements as identified in [Table 1-5](#). If corrections are needed then refer to section **Error! Reference source not found. Error! Reference source not found.**
- h. While on the RMS >> Configuration >> Station screen type a Station Identifier message that will be used to uniquely identify the station when performing local or remote maintenance. It is suggested that the site name and runway identifier be included.
- i. If the DME is provided with a 2238 RCSU then on the RMS >> Configuration >> General screen check the RCSU Present box and configure the Connection Type and Interlock Control to match the installation requirements.
- j. Set the Primary Ident Code to the assigned station identifier as detailed in section **Error! Reference source not found. Error! Reference source not found.** Also select the keying source and other keying options while on that screen.
- k. Select RMS >> Config Backup to save changes to the DME configuration.
- l. If using a wattmeter with removable elements for site maintenance then perform the procedure in section **Error! Reference source not found. Error! Reference source not found.**

Table 1-5 DME Channel Frequency Allocation								
DME Channel	ILS/VOR Frequency			Monitor Interrogator		Transmitter Reply		Receiver LO
	LOC (MHz)	GS (MHz)	VOR (MHz)	Freq (MHz)	Pulse Code $\mu$ s	Freq (MHz)	Pulse Code $\mu$ s	Freq (MHz)
1X	-	-	-	1025	12	962	12	900
1Y	-	-	-	1025	36	1088	30	900
2X	-	-	-	1026	12	963	12	901
2Y	-	-	-	1026	36	1089	30	901
3X	-	-	-	1027	12	964	12	902
3Y	-	-	-	1027	36	1090	30	902
4X	-	-	-	1028	12	965	12	903
4Y	-	-	-	1028	36	1091	30	903
5X	-	-	-	1029	12	966	12	904
5Y	-	-	-	1029	36	1092	30	904
6X	-	-	-	1030	12	967	12	905
6Y	-	-	-	1030	36	1093	30	905
7X	-	-	-	1031	12	968	12	906
7Y	-	-	-	1031	36	1094	30	906
8X	-	-	-	1032	12	969	12	907
8Y	-	-	-	1032	36	1095	30	907
9X	-	-	-	1033	12	970	12	908
9Y	-	-	-	1033	36	1096	30	908
10X	-	-	-	1034	12	971	12	909
10Y	-	-	-	1034	36	1097	30	909
11X	-	-	-	1035	12	972	12	910
11Y	-	-	-	1035	36	1098	30	910
12X	-	-	-	1036	12	973	12	911
12Y	-	-	-	1036	36	1099	30	911
13X	-	-	-	1037	12	974	12	912
13Y	-	-	-	1037	36	1100	30	912
14X	-	-	-	1038	12	975	12	913
14Y	-	-	-	1038	36	1101	30	913
15X	-	-	-	1039	12	976	12	914
15Y	-	-	-	1039	36	1102	30	914
16X	-	-	-	1040	12	977	12	915
16Y	-	-	-	1040	36	1103	30	915
17X	-	-	108.0	1041	12	978	12	916
17Y	-	-	108.05	1041	36	1104	30	916

Table 1-5 DME Channel Frequency Allocation								
DME Channel	ILS/VOR Frequency			Monitor Interrogator		Transmitter Reply		Receiver LO
	LOC (MHz)	GS (MHz)	VOR (MHz)	Freq (MHz)	Pulse Code $\mu$ s	Freq (MHz)	Pulse Code $\mu$ s	Freq (MHz)
18X	108.1	334.7	-	1042	12	979	12	917
18Y	108.15	334.55	-	1042	36	1105	30	917
19X	-	-	108.2	1043	12	980	12	918
19Y	-	-	108.25	1043	36	1106	30	918
20X	108.3	334.1	-	1044	12	981	12	919
20Y	108.35	333.95	-	1044	36	1107	30	919
21X	-	-	108.4	1045	12	982	12	920
21Y	-	-	108.45	1045	36	1108	30	920
22X	108.5	329.9	-	1046	12	983	12	921
22Y	108.55	329.75	-	1046	36	1109	30	921
23X	-	-	108.6	1047	12	984	12	922
23Y	-	-	108.65	1047	36	1110	30	922
24X	108.7	330.5	-	1048	12	985	12	923
24Y	108.75	330.35	-	1048	36	1111	30	923
25X	-	-	108.8	1049	12	986	12	924
25Y	-	-	108.85	1049	36	1112	30	924
26X	108.9	329.3	-	1050	12	987	12	925
26Y	108.95	329.15	-	1050	36	1113	30	925
27X	-	-	109.0	1051	12	988	12	926
27Y	-	-	109.05	1051	36	1114	30	926
28X	109.1	331.4	-	1052	12	989	12	927
28Y	109.15	331.25	-	1052	36	1115	30	927
29X	-	-	109.2	1053	12	990	12	928
29Y	-	-	109.25	1053	36	1116	30	928
30X	109.3	332	-	1054	12	991	12	929
30Y	109.35	331.85	-	1054	36	1117	30	929
31X	-	-	109.4	1055	12	992	12	930
31Y	-	-	109.45	1055	36	1118	30	930
32X	109.5	332.6	-	1056	12	993	12	931
32Y	109.55	332.45	-	1056	36	1119	30	931
33X	-	-	109.6	1057	12	994	12	932
33Y	-	-	109.65	1057	36	1120	30	932
34X	109.7	333.2	-	1058	12	995	12	933
34Y	109.75	333.05	-	1058	36	1121	30	933
35X	-	-	109.8	1059	12	996	12	934
35Y	-	-	109.85	1059	36	1122	30	934



Table 1-5 DME Channel Frequency Allocation								
DME Channel	ILS/VOR Frequency			Monitor Interrogator		Transmitter Reply		Receiver LO
	LOC (MHz)	GS (MHz)	VOR (MHz)	Freq (MHz)	Pulse Code $\mu$ s	Freq (MHz)	Pulse Code $\mu$ s	Freq (MHz)
36X	109.9	333.8	-	1060	12	997	12	935
36Y	109.95	333.65	-	1060	36	1123	30	935
37X	-	-	110.0	1061	12	998	12	936
37Y	-	-	110.05	1061	36	1124	30	936
38X	110.1	334.4	-	1062	12	999	12	937
38Y	110.15	334.25	-					
39X	-	-	110.2	1063	12	1000	12	938
39Y	-	-	110.25	1063	36	1126	30	938
40X	110.3	335	-	1064	12	1001	12	939
40Y	110.35	334.85	-	1064	36	1127	30	939
41X	-	-	110.4	1065	12	1002	12	940
41Y	-	-	110.45	1065	36	1128	30	940
42X	110.5	329.6	-	1066	12	1003	12	941
42Y	110.55	329.45	-	1066	36	1129	30	941
43X	-	-	110.6	1067	12	1004	12	942
43Y	-	-	110.65	1067	36	1130	30	942
44X	110.7	330.2	-	1068	12	1005	12	943
44Y	110.75	330.05	-	1068	36	1131	30	943
45X	-	-	110.8	1069	12	1006	12	944
45Y	-	-	110.85	1069	36	1132	30	944
46X	110.9	330.8	-	1070	12	1007	12	945
46Y	110.95	330.65	-	1070	36	1133	30	945
47X	-	-	111.0	1071	12	1008	12	946
47Y	-	-	111.05	1071	36	1134	30	946
48X	111.1	331.7	-	1072	12	1009	12	947
48Y	111.15	331.55	-	1072	36	1135	30	947
49X	-	-	111.2	1073	12	1010	12	948
49Y	-	-	111.25	1073	36	1136	30	948
50X	111.3	332.3	-	1074	12	1011	12	949
50Y	111.35	332.15	-	1074	36	1137	30	949
51X	-	-	111.4	1075	12	1012	12	950
51Y	-	-	111.45	1075	36	1136	30	950
52X	111.5	332.9	-	1076	12	1013	12	951
52Y	111.55	332.75	-	1076	36	1139	30	951
53X	-	-	111.6	1077	12	1014	12	952
53Y	-	-	111.65	1077	36	1140	30	952

Table 1-5 DME Channel Frequency Allocation								
DME Channel	ILS/VOR Frequency			Monitor Interrogator		Transmitter Reply		Receiver LO
	LOC (MHz)	GS (MHz)	VOR (MHz)	Freq (MHz)	Pulse Code $\mu$ s	Freq (MHz)	Pulse Code $\mu$ s	Freq (MHz)
54X	111.7	333.5	-	1078	12	1015	12	953
54Y	111.75	333.35	-	1078	36	1141	30	953
55X	-	-	111.8	1079	12	1016	12	954
55Y	-	-	111.85	1079	36	1142	30	954
56X	111.9	331.1	-	1080	12	1017	12	955
56Y	111.95	330.95	-	1080	36	1143	30	955
57X	-	-	112.0	1081	12	1018	12	956
57Y	-	-	112.05	1081	36	1144	30	956
58X	-	-	112.1	1082	12	1019	12	957
58Y	-	-	112.15	1082	36	1145	30	957
59X	-	-	112.2	1083	12	1020	12	958
59Y	-	-	112.25	1083	36	1146	30	958
60X	-	-	-	1084	12	1021	12	959
60Y	-	-	-	1084	36	1147	30	959
61X	-	-	-	1085	12	1022	12	960
61Y	-	-	-	1085	36	1148	30	960
62X	-	-	-	1086	12	1023	12	961
62Y	-	-	-	1086	36	1149	30	961
63X	-	-	-	1087	12	1024	12	962
63Y	-	-	-	1087	36	1150	30	962
64X	-	-	-	1088	12	1151	12	963
64Y	-	-	-	1088	36	1025	30	963
65X	-	-	-	1089	12	1152	12	964
65Y	-	-	-	1089	36	1026	30	964
66X	-	-	-	1090	12	1153	12	965
66Y	-	-	-	1090	36	1027	30	965
67X	-	-	-	1091	12	1154	12	966
67Y	-	-	-	1091	36	1028	30	966
68X	-	-	-	1092	12	1155	12	967
68Y	-	-	-	1092	36	1029	30	967
69X	-	-	-	1093	12	1156	12	968
69Y	-	-	-	1093	36	1030	30	968
70X	-	-	112.3	1094	12	1157	12	969
70Y	-	-	112.35	1094	36	1031	30	969
71X	-	-	112.4	1095	12	1158	12	970
71Y	-	-	112.45	1095	36	1032	30	970

Table 1-5 DME Channel Frequency Allocation								
DME Channel	ILS/VOR Frequency			Monitor Interrogator		Transmitter Reply		Receiver LO
	LOC (MHz)	GS (MHz)	VOR (MHz)	Freq (MHz)	Pulse Code $\mu$ s	Freq (MHz)	Pulse Code $\mu$ s	Freq (MHz)
72X	-	-	112.5	1096	12	1159	12	971
72Y	-	-	112.55	1096	36	1033	30	971
73X	-	-	112.6	1097	12	1160	12	972
73Y	-	-	112.65	1097	36	1034	30	972
74X	-	-	112.7	1098	12	1161	12	973
74Y	-	-	112.75	1098	36	1035	30	973
75X	-	-	112.8	1099	12	1162	12	974
75Y	-	-	112.85	1099	36	1036	30	974
76X	-	-	112.9	1100	12	1163	12	975
76Y	-	-	112.95	1100	36	1037	30	975
77X	-	-	113.0	1101	12	1164	12	976
77Y	-	-	113.05	1101	36	1038	30	976
78X	-	-	113.1	1102	12	1165	12	977
78Y	-	-	113.15	1102	36	1039	30	977
79X	-	-	113.2	1103	12	1166	12	978
79Y	-	-	113.25	1103	36	1040	30	978
80X	-	-	113.3	1104	12	1167	12	979
80Y	-	-	113.35	1104	36	1041	30	979
81X	-	-	113.4	1105	12	1168	12	980
81Y	-	-	113.45	1105	36	1042	30	980
82X	-	-	113.5	1106	12	1169	12	981
82Y	-	-	113.55	1106	36	1043	30	981
83X	-	-	113.6	1107	12	1170	12	982
83Y	-	-	113.65	1107	36	1044	30	982
84X	-	-	113.7	1108	12	1171	12	983
84Y	-	-	113.75	1108	36	1045	30	983
85X	-	-	113.8	1109	12	1172	12	984
85Y	-	-	113.85	1109	36	1046	30	984
86X	-	-	113.9	1110	12	1173	12	985
86Y	-	-	113.95	1110	36	1047	30	985
87X	-	-	114.0	1111	12	1174	12	986
87Y	-	-	114.05	1111	36	1048	30	986
88X	-	-	114.1	1112	12	1175	12	987
88Y	-	-	114.15	1112	36	1049	30	987
89X	-	-	114.2	1113	12	1176	12	988
89Y	-	-	114.25	1113	36	1050	30	988

Table 1-5 DME Channel Frequency Allocation								
DME Channel	ILS/VOR Frequency			Monitor Interrogator		Transmitter Reply		Receiver LO
	LOC (MHz)	GS (MHz)	VOR (MHz)	Freq (MHz)	Pulse Code $\mu$ s	Freq (MHz)	Pulse Code $\mu$ s	Freq (MHz)
90X	-	-	114.3	1114	12	1177	12	989
90Y	-	-	114.35	1114	36	1051	30	989
91X	-	-	114.4	1115	12	1178	12	990
91Y	-	-	114.45	1115	36	1052	30	990
92X	-	-	114.5	1116	12	1179	12	991
92Y	-	-	114.55	1116	36	1053	30	991
93X	-	-	114.6	1117	12	1180	12	992
93Y	-	-	114.65	1117	36	1054	30	992
94X	-	-	114.7	1118	12	1181	12	993
94Y	-	-	114.75	1118	36	1055	30	993
95X	-	-	114.8	1119	12	1182	12	994
95Y	-	-	114.85	1119	36	1056	30	994
96X	-	-	114.9	1120	12	1183	12	995
96Y	-	-	114.95	1120	36	1057	30	995
97X	-	-	115.0	1121	12	1184	12	996
97Y	-	-	115.05	1121	36	1058	30	996
98X	-	-	115.1	1122	12	1185	12	997
98Y	-	-	115.15	1122	36	1059	30	997
99X	-	-	115.2	1123	12	1186	12	998
99Y	-	-	115.25	1123	36	1060	30	998
100X	-	-	115.3	1124	12	1187	12	999
100Y	-	-	115.35	1124	36	1061	30	999
101X	-	-	115.4	1125	12	1188	12	1000
101Y	-	-	115.45	1125	36	1062	30	1000
102X	-	-	115.5	1126	12	1189	12	1001
102Y	-	-	115.55	1126	36	1063	30	1001
103X	-	-	115.6	1127	12	1190	12	1002
103Y	-	-	115.65	1127	36	1064	30	1002
104X	-	-	115.7	1128	12	1191	12	1003
104Y	-	-	115.75	1128	36	1065	30	1003
105X	-	-	115.8	1129	12	1192	12	1004
105Y	-	-	115.85	1129	36	1066	30	1004
106X	-	-	115.9	1130	12	1193	12	1005
106Y	-	-	115.95	1130	36	1067	30	1005
107X	-	-	116.0	1131	12	1194	12	1006
107Y	-	-	116.05	1131	36	1068	30	1006

Table 1-5 DME Channel Frequency Allocation								
DME Channel	ILS/VOR Frequency			Monitor Interrogator		Transmitter Reply		Receiver LO
	LOC (MHz)	GS (MHz)	VOR (MHz)	Freq (MHz)	Pulse Code $\mu$ s	Freq (MHz)	Pulse Code $\mu$ s	Freq (MHz)
108X	-	-	116.1	1132	12	1195	12	1007
108Y	-	-	116.15	1132	36	1069	30	1007
109X	-	-	116.2	1133	12	1196	12	1008
109Y	-	-	116.25	1133	36	1070	30	1008
110X	-	-	116.3	1134	12	1197	12	1009
110Y	-	-	116.35	1134	36	1071	30	1009
111X	-	-	116.4	1135	12	1198	12	1010
111Y	-	-	116.45	1135	36	1072	30	1010
112X	-	-	116.5	1136	12	1199	12	1011
112Y	-	-	116.55	1136	36	1073	30	1011
113X	-	-	116.6	1137	12	1200	12	1012
113Y	-	-	116.65	1137	36	1074	30	1012
114X	-	-	116.7	1138	12	1201	12	1013
114Y	-	-	116.75	1138	36	1075	30	1013
115X	-	-	116.8	1139	12	1202	12	1014
115Y	-	-	116.85	1139	36	1076	30	1014
116X	-	-	116.9	1140	12	1203	12	1015
116Y	-	-	116.95	1140	36	1077	30	1015
117X	-	-	117.0	1141	12	1204	12	1016
117Y	-	-	117.05	1141	36	1078	30	1016
118X	-	-	117.1	1142	12	1205	12	1017
118Y	-	-	117.15	1142	36	1079	30	1017
119X	-	-	117.2	1143	12	1206	12	1018
119Y	-	-	117.25	1143	36	1080	30	1018
120X	-	-	117.3	1144	12	1207	12	1019
120Y	-	-	117.35	1144	36	1081	30	1019
121X	-	-	117.4	1145	12	1208	12	1020
121Y	-	-	117.45	1145	36	1082	30	1020
122X	-	-	117.5	1146	12	1209	12	1021
122Y	-	-	117.55	1146	36	1083	30	1021
123X	-	-	117.6	1147	12	1210	12	1022
123Y	-	-	117.65	1147	36	1084	30	1022
124X	-	-	117.7	1148	12	1211	12	1023
124Y	-	-	117.75	1148	36	1085	30	1023
125X	-	-	117.8	1149	12	1212	12	1024
125Y	-	-	117.85	1149	36	1086	30	1024

Table 1-5 DME Channel Frequency Allocation								
DME Channel	ILS/VOR Frequency			Monitor Interrogator		Transmitter Reply		Receiver LO
	LOC (MHz)	GS (MHz)	VOR (MHz)	Freq (MHz)	Pulse Code $\mu$ s	Freq (MHz)	Pulse Code $\mu$ s	Freq (MHz)
126X	-	-	117.9	1150	12	1213	12	1025
126Y	-	-	117.95	1150	36	1087	30	1025

### **1.7.6 System Checkout**

- a. Bypass the Integral monitor and select Tx1 Main.
- b. For dual equipment bypass the Standby monitor and select Tx2 Load.
- c. If the DME station has an alarm condition, then refer to **section Error! Reference source not found.** to perform fault isolation and corrective maintenance.
- d. Perform section **Error! Reference source not found. Error! Reference source not found.** procedure.
- e. Perform section **Error! Reference source not found. Error! Reference source not found.** procedure.
- f. Perform section **Error! Reference source not found. Error! Reference source not found.** procedure.
- g. Perform the SELEX-SI Site Acceptance Test (SAT) Procedure for the 2160/2170 DME system. Note if this procedure is not available then perform all remaining performance checks in **section Error! Reference source not found.** of this manual.
- h. Save the final DME configuration to disk using the System >> Configuration Save command from the PMDT. It is recommended that a backup copy of the station configuration also be maintained off site.

### **1.7.7 Performance Tuning During Flight Inspection**

- a. If the DME is not able to achieve usable distance then refer to section **Error! Reference source not found. Error! Reference source not found.** to adjust the receiver threshold.
- b. If flight inspection reports an unlock condition or a range error while on a radial approach then refer to section **Error! Reference source not found. Error! Reference source not found.** to configure echo suppression.
- c. If changes to the station are made during flight inspection then create a new station configuration file using the System >> Configuration Save command from the PMDT.