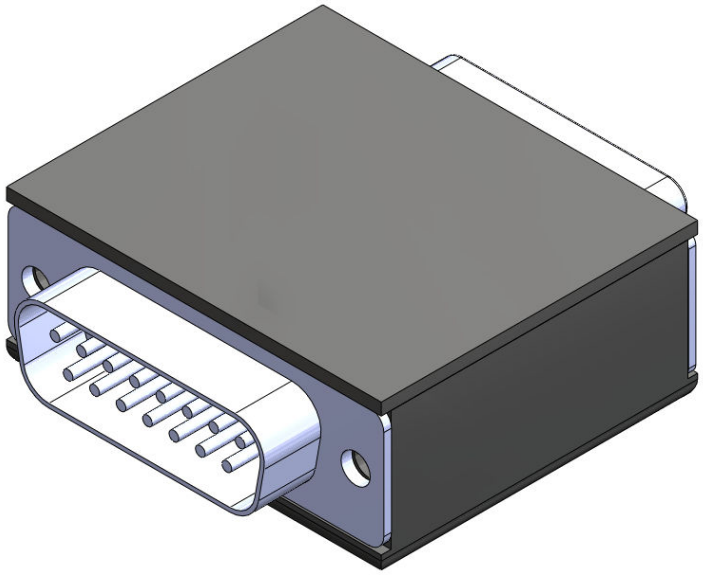

DESCRIPTION, INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

ME-183 NAV INTERFACE 453-0012

Document No.: 570-0001 Rev. -

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REVISION HISTORY

REVISION	ENGINEERING CHANGE ORDER	DATE
-	RELEASE	07/14/09

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1. INTRODUCTION

This manual provides description, installation, operation, and maintenance information for the ME-183 NAV Interface (ME-183 NAV). The ME-183 NAV relays latitude and longitude position data to the ELT for incorporation into the 406 MHz Search and Rescue (SAR) satellite message. The ME-183 NAV is designed as a retrofit accessory for Artex ME406 Series ELT installations.

1.1 System Advantages

An ME406 ELT system, with the ME-183 NAV interface retrofit kit installed, contains a number of significant advantages over older technology ELT systems:

- Greater Position Accuracy (Figure 1-1)
- Position Data from a Single Beacon Transmission
- No Aircraft Power (power derived from GPS data output)

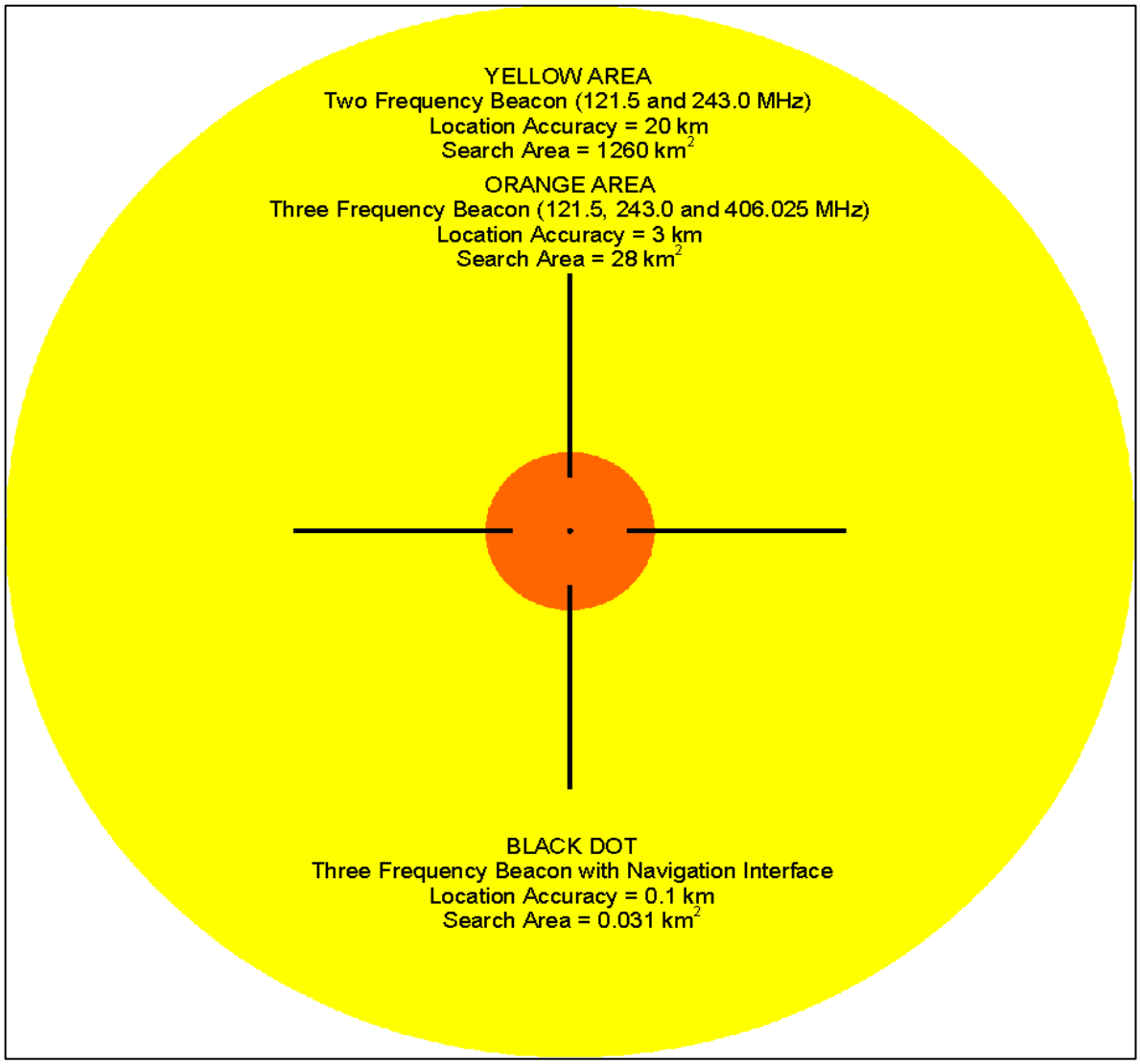

Figure 1-1: ELT Systems Accuracy Comparison

1.2 System Description

The ME-183 NAV integrates with existing equipment, as illustrated in Figure 1-2.

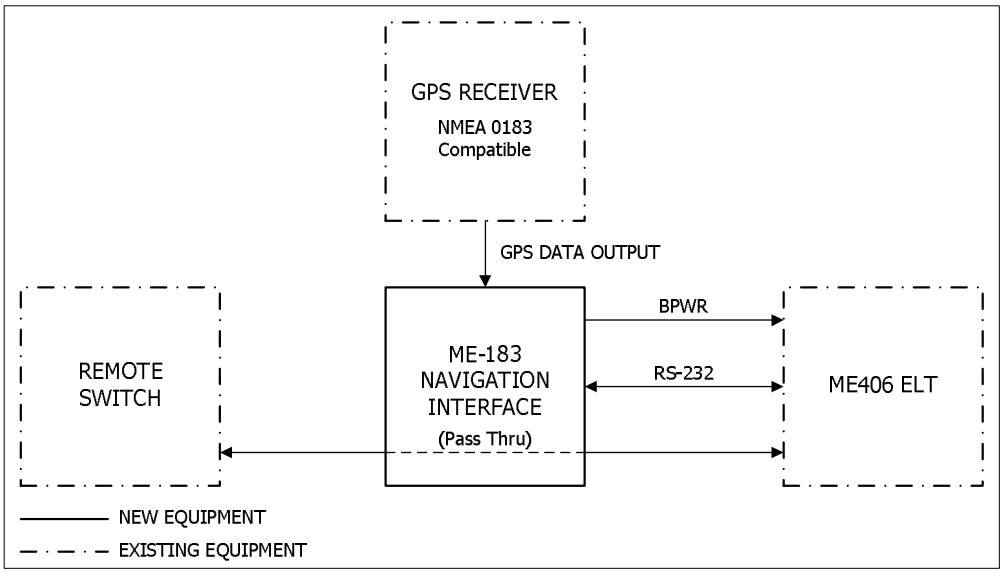

Figure 1-2: ME-183 NAV Interface System Integration Block Diagram

Installation of the ME-183 NAV requires an on-board navigation system (GPS) supporting NMEA 0183 output, in addition to an Artex ME406 ELT system. The GPS receives satellite signal information, calculates latitude and longitude position, and sends the position data to the ME-183 NAV.

If the ELT is programmed with a short message (non-location protocol), it must be reprogrammed to a long message (location protocol) in order to interface with the ME-183 NAV.

NOTE: The appropriate ME406 ELT user manual should be consulted for more detailed information on ELT protocols and programming.

1.3 Operational Overview

The ME-183 NAV receives power from the GPS receiver via its data output. Upon power up, there is an initial 80-second charge time before the ME-183 NAV can respond to an ELT activation event.

The ME-183 NAV periodically receives position data from the GPS receiver and converts the position data to an ELT compatible format.

The ME-183 NAV stores position data in RAM and waits for a signal from the ELT indicating it has been:

- Activated automatically by the G-Switch, or
- Activated manually via the ELT local or cockpit remote switch.

As long as the ELT is activated and the GPS receiver continues to supply position data, the ME-183 NAV attempts to transmit current position data every 2 seconds; however, the ELT locks position data upon activation and will only accept new data if it is reset using the local or remote switch.

If the data link from the GPS to the ME-183 NAV is lost, the ME-183 NAV holds the last known position data for 60 seconds, as required by C/S T.001 "Specification for COSPAS-SARSAT 406 MHz Distress Beacons", Subsection 4.5.5.4.

- The ELT must be activated within the 60-second timeframe for the ME-183 NAV to transmit position data to the ELT.
- After the 60-second timeframe has lapsed, the last known position is lost.
- The ELT transmits a default message if it does not receive valid position data.

1.4 Compatibility

The ME-183 NAV is compatible with the following Artex ME406 Series ELTs:

- ME406 ELT – 453-6603
- ME406 HM ELT – 453-6604
- ME406P ELT – 453-6611

2. INTEGRATION

This section describes GPS receiver and ME-183 NAV integration requirements. Consult your navigation system manufacturer's user manual to determine if data output and sentence structure formats are compatible with the following requirements.

The ME-183 NAV is compatible with NMEA 0183. Artex recommends the use of a dedicated GPS data output channel for the ME-183 NAV.

2.1 Data Output Requirements

In order to receive data, the ME-183 NAV requires:

- Baud Rate (fixed): 4800
- Parity: None
- Data Bits: 8
- Stop Bits: 1

2.2 NMEA 0183 Sentence Structure Requirements

The ME-183 NAV accepts the following NMEA 0183 sentences:

- GPRMC
- GPGLL

3. OVERVIEW

This section provides an installation overview and should be reviewed by personnel performing the work.

3.1 Regulatory Requirements

TSO C126, Paragraph D

"The conditions and tests required for TSO approval of this article are minimum performance standards. It is the responsibility of those desiring to install this article on a specific type or class of aircraft to determine that the aircraft installation conditions are within the TSO standards. The article may be installed only if further evaluation by the applicant documents an acceptable installation and it is approved by the administrator."

FAA Requirements

In addition to the procedures outlined herein, the installer must adhere to the guidelines established in FAA Advisory Circular (AC) 43.13 "Acceptable Methods, Techniques and Practices Aircraft Alterations", specifically Chapters 1 through 3, 11 and 13.

By signing the aircraft logbook or FAA Form 337, you are stating the installation has been performed in accordance with current FAR requirements and the steps and procedures outlined herein.

3.2 Installation

The ME-183 NAV plugs into the ELT, between the remote switch harness DB15 plug and the ELT.

- Data output from the GPS interfaces with the ME-183 NAV at the DB15 plug.
- An installation overview is shown in Figure 3-1.

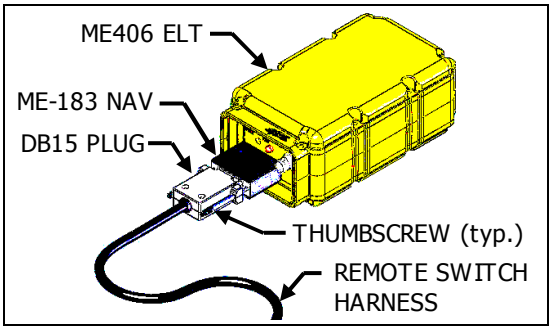

Figure 3-1: Installation Overview

3.3 Electrostatic Discharge (ESD) Precautions

The ME-183 NAV is an electrostatic discharge sensitive (ESDS) device. As such, it must be handled with care. If possible, wear a grounded wrist strap or ESD protective footwear when handling the ME-183 NAV during installation and maintenance activities. Take particular care to avoid touching the exposed metal portion of the connectors and exposed receptacle pins on the ME-183 NAV and ELT.

4. INSTALLATION

The following subsections provide detailed installation instructions for the ME-183 NAV. Consult AC 43.13 for general guidelines pertaining to installation, wiring, soldering, and grounding.

4.1 Installation Kit

The ME-183 NAV Installation Kit (455-0016) details are shown in Table 4-1.

Table 4-1: ME-183 NAV Installation Kit Parts List

PART NUMBER	DESCRIPTION	QTY
150-1127	D-Sub Housing, 15-Pin, Grommet	1
150-1130	Plug, D-Sub, 15-Pin	1
217-0001	Thumbscrew, ME-183 NAV Interface	2
453-0012	Main Assembly, ME-183 NAV Interface	1
570-0001	Manual, ME-183 NAV Interface Description, Installation, Operation, and Maintenance	1
850-0814	Sealant Strip, D-Sub Connector	4*

* 1 ea. provided as a spare

4.2 ME406 ELT Reprogramming

The ELT must be programmed with a long message (location protocol), if necessary, before installing the ME-183 NAV. ELT reprogramming may be accomplished by an authorized service center or by using an Artex ME406 Reprogramming Adapter (455-6600).

4.3 Installation Instructions

The following subsections provide installation guidelines and instructions. Differences in shielded and unshielded installations are noted, where applicable.

4.3.1 General Wiring and Grounding Considerations

WARNING: If ground or other connections are broken or otherwise damaged, the ELT is still capable of automatic activation; however:

- The remote switch may be incapable of resetting the ELT,
- Operation may not be indicated on the remote switch LED, and/or
- The ME-183 NAV may not receive position data.

WARNING: It is possible to inadvertently activate the ELT when working on the remote switch wiring harness and/or installing the ME-183 NAV. Always keep an AM or aircraft radio tuned to 121.5 MHz during installation, such that an audible alert (i.e., transmission sweeps) can be heard immediately.

The following wiring and grounding considerations are applicable.

- Minimum 24 AWG wire size.
- Shielding is recommended to help prevent EMI and RF interference.
- Use high quality conductor meeting MIL-W-16878, M22759, M27500, or a commercial equivalent acceptable for use in aircraft applications.

- Make a "Drip Loop" in the remote switch harness connection to the ME-183 NAV to divert moisture from the DB15 plug.

  NOTE: A drip loop is an extra length of cable formed into a U-shaped bend just before the plug. Water or other fluids flow down to the bottom of the loop and drip off, diverting them away from the plug.
- GPS ground must be common to aircraft ground.

4.3.2 Wiring Diagrams

The following wiring diagrams are applicable as noted:

- Figure 4-1 – Installation using a shielded harness in a metal airframe
- Figure 4-2 – Installation using an unshielded harness in a metal airframe with no harness ground conductor
- Figure 4-3 – Installation using an unshielded harness in a metal airframe with a harness ground conductor
- Figure 4-4 – Installation in a composite airframe

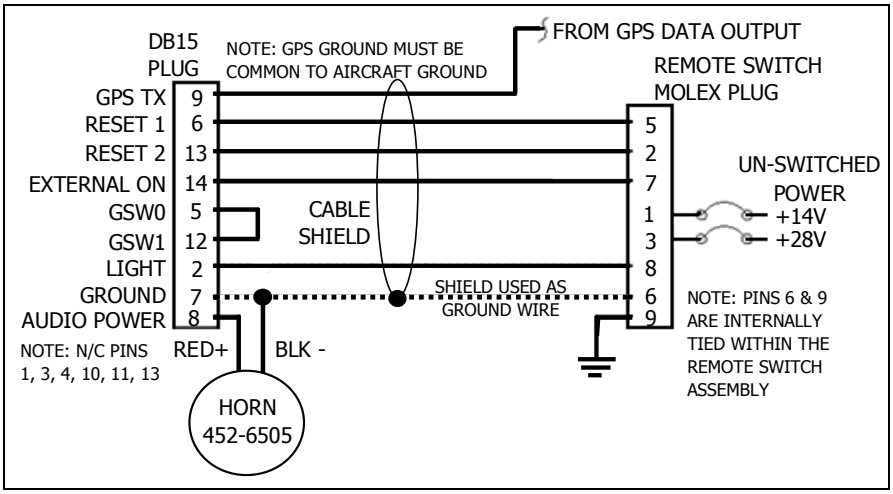

Figure 4-1: Metal Airframe Installation w/Shielded Harness Shield Used as Ground Conductor

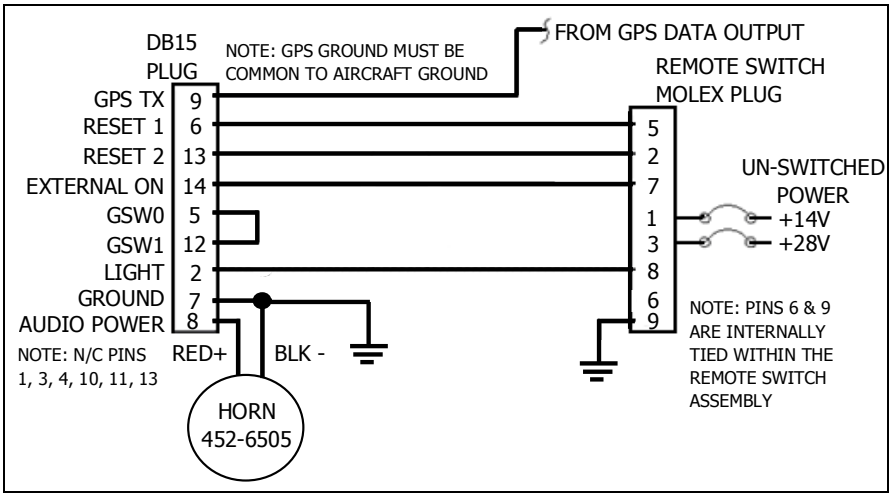

Figure 4-2: Metal Airframe Installation w/Unshielded Harness No Harness Ground Conductor

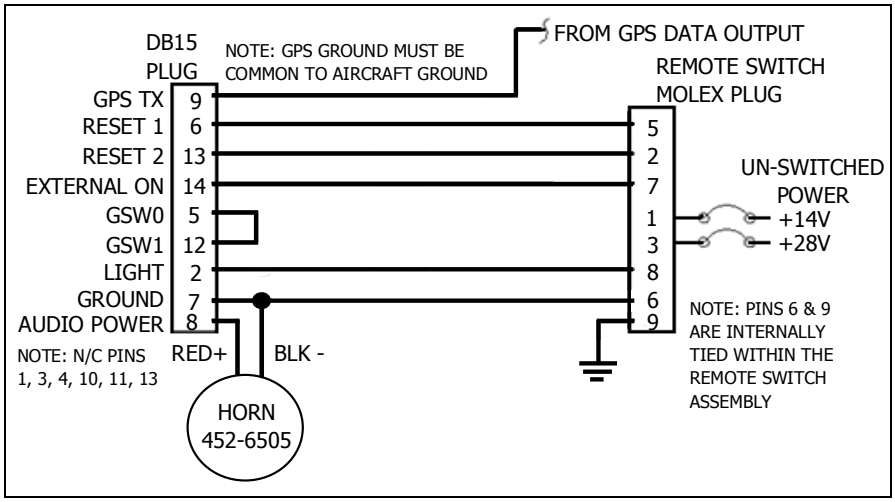

Figure 4-3: Metal Airframe Installation w/Unshielded Harness With Harness Ground Conductor

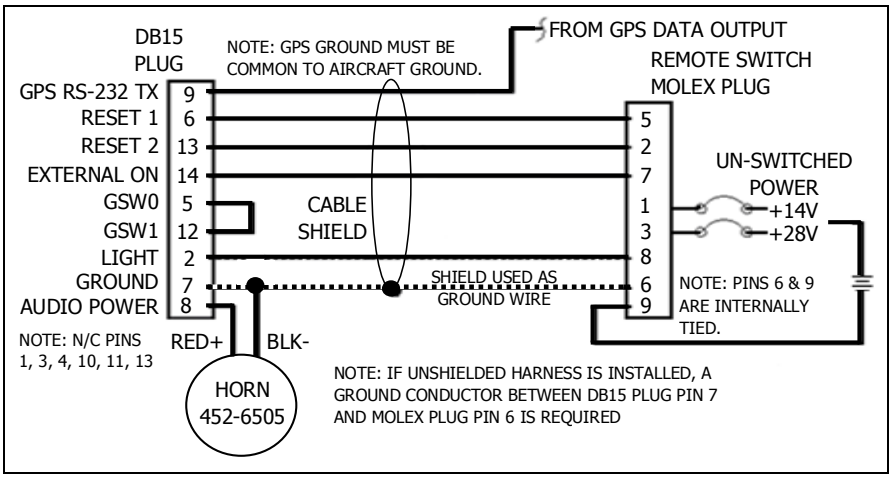

Figure 4-4: Composite Airframe w/Shielded Harness Shield Used as the Ground Conductor (See Diagram Note)

4.3.3 GPS Data Output Interface with Remote Switch Harness

Referring to the wiring diagrams in Subsection 4.3.2, install a GPS data output conductor as follows:

1. Run a minimum 24-AWG conductor from the GPS data output to the remote switch harness DB15 plug.
2. Connect the GPS end of the data conductor in accordance with the GPS manufacturer's recommendations.
3. Disconnect the harness DB15 plug from the ELT.
4. Perform the following steps if the back shell of the DB15 plug has not been filled with RTV or other potting compound. If the plug back shell is potted, proceed to Step 5.
   a) Strip the insulation from the conductor back approximately 1/8" (0.125").
   b) Solder the conductor into the Pin 9 solder cup of the plug in accordance with the wiring diagrams shown in Subsection 4.3.2.

c) Provide adequate strain relief for the conductor.

d) Reassemble the back shell in accordance with Subsection 4.3.4, beginning with Step 8.

NOTE: Artex recommends sealing the plug back shell in accordance with Subsection 4.3.5.

5. Cut off the harness DB15 plug.
6. Note the conductor color coding and pin relationships using a multimeter or other means of checking continuity.
7. Replace the DB15 plug following the instructions in Subsection 4.3.4.

4.3.4 DB15 Plug Replacement

Referring to the wiring diagrams in Subsection 4.3.2 and Figure 4-5, install a new DB15 plug on the harness as follows:

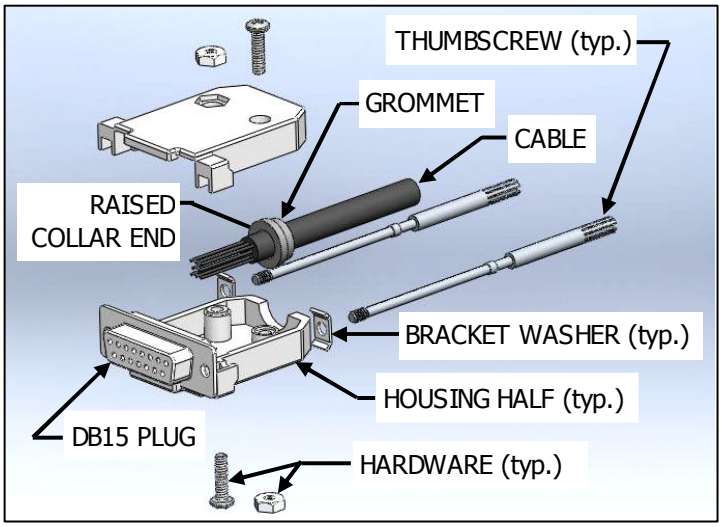

Figure 4-5: DB15 Plug Assembly
(Horn and GPS conductors not shown)

1. Select a rubber grommet, supplied as part of the D-Sub housing kit (150-1127), that fits snugly around the harness cable and other conductors.
2. Feed the cable and other conductors through the rubber grommet, such that the raised collar end will fit inside the D-Sub housing, as shown in Figure 4-5 and Figure 4-7.
3. Slide the grommet away from the cable and other conductor ends, such that it does not interfere with soldering the conductors to the DB15 plug.
4. Strip insulation from the conductors back approximately 1/8" (0.125").
5. Splice the horn ground conductor to the cable shield (Figure 4-1), or harness ground conductor (Figure 4-3) near Pin 7 (Figure 4-6), such that one conductor is terminated in Pin 7.

   NOTE: For metal airframe installations with no conductor between Molex plug Pin 6 and DB15 plug Pin 7, the horn ground conductor and DB15 plug Pin 7 are grounded to the airframe (Figure 4-2).

6. Solder a jumper between Pins 5 and 12 of the DB15 plug (Figure 4-6).
7. Solder the conductors into the solder cups of the DB15 plug (Figure 4-6).

   NOTE: Check conductor color coding and pin relationships noted in Subsection 0, Step 6, to ensure proper connection of the conductors.

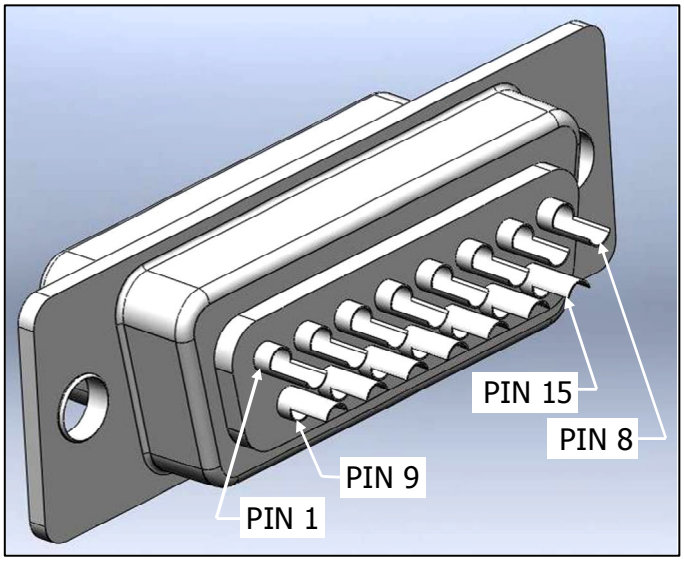

Figure 4-6: DB15 Plug Pin Orientation

Pin position numbering is identical to that inscribed on the front of the plug.

8. Fit the plug into a housing half supplied as part of the D-Sub housing kit.
9. Position the grommet, such that it fits into the recess on the cable end of the D-Sub housing, with the raised collar step against the housing inside face, as shown in Figure 4-7.

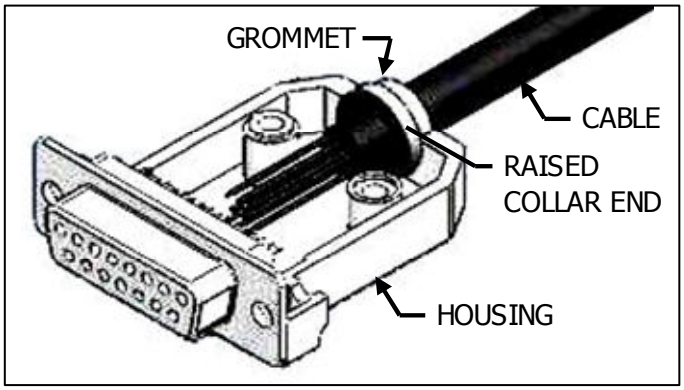

Figure 4-7: Cable Grommet Position

10. Install the bracket washers, supplied as part of the D-Sub housing kit, onto the thumbscrews (217-0001).

    NOTE: The thumbscrews supplied with the housing kit are too short and are replaced by the longer thumbscrews supplied as part of the ME-183 NAV kit.

11. Set the thumbscrews in place on the housing half.

12. Fit the other housing half into place, taking care to align the thumbscrews, bracket washers, grommet, and plug.
13. Screw the housing halves together using the long, fully-threaded screws and nuts supplied as part of the D-Sub housing kit.
14. Install the grommet clamp supplied as part of the D-Sub housing kit, around the grommet.
15. Ring out the remote switch harness to verify correct pin to pin continuity. Optionally, the system can be temporarily connected and operation checked via the remote switch.

4.3.5 DB15 Plug Back Shell Sealing

Seal the plug back shell using Dow Corning® 4 Electrical Insulating Compound, or an equivalent meeting MIL-S-8660C.

1. Disassemble the D-Sub housing and remove a housing half.
2. Inject Dow Corning® 4 into the back side of the plug, such that the insulating compound surrounds the conductors and covers the back of the plug.
3. Reassemble the D-Sub housing (Subsection 4.3.4, Steps 8-14).

4.3.6 Final Installation

CAUTION: When handling the ME-183 NAV and ELT, take precautions in accordance with Subsection 3.3, "Electrostatic Discharge (ESD) Precautions".

Referring to Figure 4-8:

1. Install sealant strip (850-0814) in the ELT DB15 receptacle as follows, if one is not already installed from a previous installation.
   a) Peel a sealant strip off the plastic sheet.
   b) Press 2 sealant strips tacky side against the male pins of the ELT receptacle.
   c) Peel the foam backing off the sealant strip.
2. Plug the ME-183 NAV into the ELT.

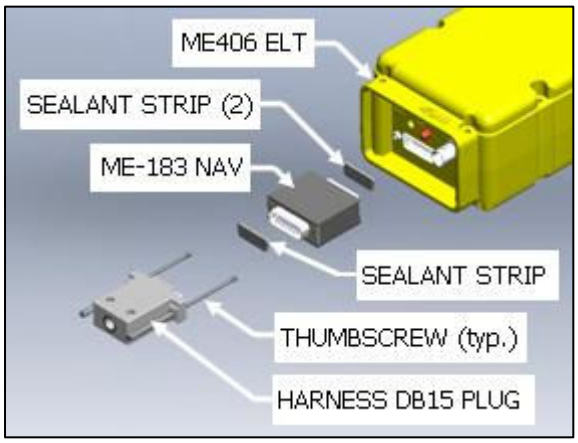

Figure 4-8: ME-183 NAV Final Installation

3. Install 1 sealant strip (850-0814) in the ME-183 NAV DB15 receptacle, following the procedures in Step 1.
4. Plug the harness into the ME-183 NAV.

   NOTE: Form a drip loop in the cable (Subsection 4.3.1).
5. Screw the thumbscrews into the ELT DB15 connector retaining nuts, making sure the harness plug and ME-183 NAV are seated properly in the receptacles.

   Torque: 1 – 2 in-lbs

5. ME-183 NAV INTERFACE TESTING

The purpose of this testing is to verify integrity of the ELT system after ME-183 NAV installation. This section also discusses the option of verifying position data transmission using a beacon test set.

5.1 Self-Test

The following procedure initiates an ELT self-test routine to verify integrity of the ELT system.

5.1.1 Precautions

When the ELT is switched from ON to ARM, it performs a self-test and a 406 MHz signal is transmitted; however, the transmission is ignored by the SAR satellite system.

WARNINGS: Any time the ELT is activated, it is transmitting a 121.5 MHz signal.

Tests should be no longer than three audible sweeps (Subsection 5.1.2). Do NOT allow ELT activation to exceed 5 seconds.

After activation for approximately 50 seconds, the ELT transmits a 406 MHz signal, **which will be interpreted as an actual emergency signal**.

CAUTION: Outside the United States, comply with local and/or national regulations for testing of ELTs.

5.1.2 Self-Test Procedure

Initiate an ME406 ELT self-test as follows:

1. Tune a receiver, usually the aircraft radio, to 121.5 MHz.
2. Verify the on-board GPS is active and has acquired a valid position.
3. Allow 80 seconds after GPS activation for the ME-183 NAV to charge.
4. Set the ELT remote switch to the ON position and listen for 3 audio sweeps on the radio, which takes approximately 1 second.
5. Set the switch back to the ARM (OFF) position and verify the switch panel LED indicates a 1-pulse code (System OK).
   - If multiple pulses (error codes) are displayed on the LED, refer to Table 5-1.
   - Multiple error codes are displayed on the LED sequentially. For example, if a 3-pulse error and a 4-pulse error are detected, the LED will display the 3-pulse code, followed by the 4-pulse code.
   - Refer to the appropriate ME406 ELT user manual for a more detailed explanation of error codes, their causes, and related troubleshooting guidelines.

Table 5-1: ME406 ELT Self-Test Error Codes

PULSES	PROBABLE CAUSE
1	System OK
3	Bad load detected
4	Low power detected

PULSES	PROBABLE CAUSE
5	No position data present or 406 MHz message not programmed
6	G-switch loop error
7	ELT battery usage over one hour

5.2 Position Data Verification

Artex does not require this test be performed; any problem with received position data will be indicated by the 5-pulse error (Table 5-1) during self-test (Subsection 5.1.2).

CAUTION: Artex only recommends this test be performed if the 406 MHz signal can be properly shielded inside a screen room or container. If the 406 MHz "live" burst is received by an SAR satellite, **the signal will be interpreted as an actual emergency signal**.

In order to read position data with a beacon test set, the following criteria must be met:

- The aircraft GPS system must be powered on for at least 80 seconds prior to ELT activation, and
- The ELT must be active for at least 50 seconds, or until the first "live" 406 MHz burst is transmitted and received by a beacon test set.

  The "live" burst message will contain position data (i.e., latitude and longitude).

6. PERIODIC MAINTENANCE

The following subsections describe periodic maintenance and testing requirements and procedures for the ME-183 NAV. Comply with these requirements at the same time periodic maintenance and testing is performed on the ELT system.

6.1 Inspection

WARNING: It is possible to inadvertently activate the ELT when working around the ELT and/or removing and installing the ME-183 NAV. Always keep an AM or aircraft radio tuned to 121.5 MHz during maintenance activities, such that an audible alert (i.e., transmission sweeps) can be heard immediately.

CAUTION: When handling the ME-183 NAV and ELT, take precautions in accordance with Subsection 3.3, "Electrostatic Discharge (ESD) Precautions".

Perform the following inspections:

1. Remove the ME-183 NAV.
2. Inspect unit for visible damage.
3. Inspect electrical connections for corrosion, bent or broken pins, and other evidence of damage.
4. Check security and condition of the GPS data output connection.
5. Correct any discrepancies found.
6. Reinstall the ME-183 NAV.

6.2 Testing

Perform an ELT self-test in accordance with the procedure set forth in Subsection 5.1.

Position data verification is optional and may be performed at the aircraft operator's discretion. In order to read position data, the criteria set forth in Subsection 5.2 must be met.

7. SPECIFICATIONS AND APPROVALS

The following subsections provide specifications and approval information for the ME-183 NAV.

7.1 Environmental Requirements and Specifications

Table 7-1 lists the environmental conditions testing required by RTCA DO-160F, "Environmental Conditions and Test Procedures for Airborne Equipment". Table 7-2 provides the ME-183 NAV environmental specifications.

Table 7-1: RTCA DO-160F Environmental Qualification Requirements

CATEGORY	SECTION	DESCRIPTION
[(C4)(D1)]	4.0	Temperature and Altitude
X	4.5.4	In Flight Loss of Cooling
B	5.0	Temperature Variation
A	6.0	Humidity
[DO-204]	7.0	Shock
[DO-204]	8.0	Vibration
X	9.0	Explosion Proofness
S	10.0	Waterproofness
X	11.0	Fluids Susceptibility
X	12.0	Sand & Dust
X	13.0	Fungus Resistance
X	14.0	Salt Spray
X	15.0	Magnetic Effect
X	16.0	Power Input
X	17.0	Voltage Spike
Z	18.0	Audio Frequency Conducted Susceptibility
AC	19.0	Induced Signal Susceptibility
T	20.0	Radio Frequency Susceptibility
M	21.0	Emission of Radio Frequency Energy
X	22.0	Lightning
X	23.0	Lightning Direct Effects
X	24.0	Icing
X	25.0	Electrostatic Discharge
[DO-204]	26.0	Fire, Flammability

Note: X = Not Applicable

Table 7-2: Environmental Specifications

PARAMETER	CHARACTERISTICS
Storage Temperature	-55° C to +85° C (-67º F to +185º F)
Operating Temperature	-40° C to +70° C (-40º F to +158º F)
Altitude	50,000 ft (15,240 m)
Vibration	10 G from 5 Hz to 2,000 Hz
Shock	500 G for 4 ms / 100 G for 23 ms
Humidity	95% for 50 hours
Overpressure	-15,000 ft (-4,572 m)
Decompression	50,000 ft (15,240 m)
Flammability	<1 second (UL 94, V-0)

7.2 Physical Specifications

Table 7-3 provides physical data for the ME-183 NAV.

Table 7-3: Physical Specifications

PARAMETER	CHARACTERISTICS
Weight	<4 oz (113 g)
Dimensions	1.8 x 1.5 x 0.7 in. (46 x 38 x 18 mm)

7.3 Communications Specifications

Table 7-4 provides communications requirements for the ME-183 NAV.

Table 7-4: Communications Specifications

PARAMETER	REQUIREMENT
GPS Data Output (NMEA 0183 Compatible)	
Speed (Baud Rate)	4800
Parity	None
Data Bits	8
Stop Bits	1
Sentence Formats (NMEA 0183)	
Sentences Accepted	GPGLL, GPRMC

7.4 Approvals

The ME-183 NAV is manufactured and approved under the following regulatory requirements:

- FAA TSO-C126, 406 MHz Emergency Locator Transmitter (ELT)
- ETSO-2C126, 406 MHz Emergency Locator Transmitter (ELT)
- RTCA DO-160F, Environmental Conditions and Test Procedures for Airborne Equipment
- RTCA DO-178B, Software Considerations in Airborne Systems and Equipment Certification
- RTCA DO-204, Minimum Operational Performance Standards for 406 MHz Emergency Locator Transmitters (ELT)