DESCRIPTION, OPERATION, INSTALLATION
AND MAINTENANCE MANUAL

DOCUMENT NUMBER: 570-5012 REV. E

ARTEX
A Cobham Group company

ARTEX 406 MHz EMERGENCY LOCATOR TRANSMITTERS

G406-4
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SYSTEM DESCRIPTION
1.1. SYSTEM DESCRIPTION

The ARTEX G406-4 ELT is a "third generation ELT," transmitting on 121.5, 243.0 and 406.025 MHz. The ELT’s are designed to meet or exceed the requirements of TSO C91a, TSO C126 and the mandatory automatic ELT requirements of FAR Part 91. The ELT meets the requirements of Canadian Aviation Regulations (CAR) Part V, Subpart 51, Airworthiness Manual Section 551.104. In addition, this ELT is designed to meet the requirements of Eurocae ED-62.

The G406-4 ELT employs a completely new transmitter which features higher output power and a more integrated design. The 121.5/243.0 MHz section of the transmitter is contained in a module with the 406.025 MHz transmitter. The top circuit board contains the microprocessor that controls the module and all ELT functions. The G406-4 is a dual output ELT, as all previous models of Artex 406 MHz ELT’s have been.

The ELT automatically activates during a crash and transmits the standard swept tone on 121.5 and 243.0 MHz. Every 50 seconds for 520 milliseconds (long message protocol) the 406.025 MHz transmitter turns on. During that time an encoded digital message is sent to the satellite. The information contained in that message is shown below:

- Serial Number Of The Transmitter or Aircraft ID.
- Country Code
- I.D. Code
- Position Coordinates (when coupled to an ARTEX ELT/NAV Interface unit [453-6500])

Refer to Appendix D (ELT/NAV Interface Capability) for a detailed discussion of the interaction between the ELT, the ELT/NAV Interface unit and the aircraft navigation system.

The 406.025 MHz transmitter will operate for 24 hours and then shuts down automatically. The 121.5/243.0 MHz transmitter will continue to operate until the unit has exhausted the battery power which typically will be at least 72 hours.

The ELT/NAV Interface unit allows the ELT to communicate with the aircraft’s navigation system and receive position data (longitude and latitude) which the ELT will transmit in the event of a crash. Programming the ELT with the 24 bit long message protocol allows the ELT to be automatically programmed by the ELT/NAV Interface with the aircraft’s 24 bit address. The ELT/NAV Interface unit must be strapped (binary “1” bits tied to ground) with the same 24 bit address as the ICAO or Mode S transponder system 24 bit address. This gives the ELT the ability to be moved from one aircraft to another without the need for manual reprogramming of the ELT. This is advantageous for fleet operators since the ELT/NAV Interface unit will automatically reprogram the ELT with the new aircraft’s 24 bit address identification.

One advantage of the 406.025 MHz transmitter is that it will produce a much more accurate position, typically 1 to 2 kilometers as compared to 15 to 20 kilometers for 121.5/243.0 MHz transmitters. When coupled with the
aircraft's navigation system the position accuracy improves to approximately 100 meters. The ELT also transmits a digital message which allows the search and rescue authorities to contact the owner/operator of the aircraft through a database. Information contained in the database that may be useful in the event of a crash is shown below:

• Type of Aircraft
• Address of Owner
• Telephone Number of Owner
• Aircraft Registration Number
• Alternate Emergency Contact

Once the ELT is activated and the 406.025 MHz signal is detected from the satellite and a position is calculated, the 121.5/243.0 MHz transmissions are used to home in on the crash site. Because aircraft communication radios are not capable of receiving 406.025 MHz transmissions, the only method of monitoring the ELT is the blinking cockpit light, the buzzer or the 121.5/243.0 MHz transmissions which may be monitored on the aircraft communication transceiver.

The switch below the ELT cockpit light allows you to turn the unit on for testing and to reset the unit. You cannot "disarm" or disable the unit from the cockpit. Cockpit operation is limited to deactivating the ELT after it has been activated, or manually activating the ELT.

The G406-4 ELT is housed in a high impact fire resistant polycarbonate plastic case. The ELT unit is able to withstand extremely harsh environments. Units, exactly like yours, have been subjected to numerous 500g shock pulses, 1000 pound crush weights and severe penetrator tests, and continue to operate normally. Continued operation in a temperature range of -20 degrees C through +55 degrees C is assured.

1.1.1. LINE REPLACEMENT UNITS (LRU)

1.1.2. The G406-4 system consists of the following components:

ELT Unit
• a. G-Switch
• b. Transmitter
• c. Microprocessor
• d. Miscellaneous components
• e. "ON" Light
• f. Transmitter Module

Battery Pack
Fixed Antenna
Connecting Coax Cable
Mounting Tray
Protective Top Cover
Mounting Tray End Cap
Cockpit Remote Switch Assembly
Buzzer
Installation Kit

1.2. TRANSMITTER CHARACTERISTICS

The printed circuit assembly (PCA) of the G406-4 ELT is unique in that the PCA has no RF function but rather only control functions for the RF module. The PCA contains a one time programmable microprocessor that controls all the ELT functions (ON/OFF, modulation, 406 MHz digital message and RESET).
All RF functions are contained in a separate module. The transmitter operates simultaneously on 121.5 and 243.0 MHz with the carrier frequencies remaining within 0.005% under all environmental operating conditions. Approximately every 50 seconds the 406.025 MHz transmitter transmits. During this time the 121.5 and 243.0 MHz transmitter is momentarily turned off.

1.2.1. 121.5/243.0 MHz TRANSMITTER

The AM modulation at 121.5 and 243.0 MHz is designated as A9 with the carrier amplitude modulated with an audio frequency sweeping downward over a range of not less than 700 Hz, within the range of 1,600 to 300 Hz. The sweep repetition rate is between 2 and 4 Hz with a modulation factor of at least 0.85. The modulation applied to the carrier frequency has a minimum duty cycle of 33% and a maximum duty cycle of 55%.

The ARTEX G406-4 series ELT is designed for a constant power output at 121.5 and 243.0 MHz that will not be less than 23 dBm (200 mW) during the 50 hour operational period at both -20 degrees Centigrade and +55 degrees Centigrade.

1.2.2. 406.025 MHz TRANSMITTER

A digital information message is sent to the satellite via the 406.025 MHz transmitter. The modulation is phase modulated and classified as 16K0G1D. Every 47.5 to 52.5 seconds the 5 Watt transmitter is turned on for 440 mS (short message) or 520 mS (long message).
The information sent to the satellite is programmed at the factory and contains a unique number that can be used to identify the beacon.

1.3. FCC REQUIREMENTS

The ELT shall maintain a frequency stability of 50 parts per million on 121.5 and 243.0 MHz. This allows a variation of plus or minus 6.075 KHz at 121.5 MHz.

On any frequency removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth the power is to be attenuated at least 25 dB.

On any frequency removed from the assigned frequency by more than 100 percent up to and including 250 percent of authorized bandwidth the power is to be attenuated at least 35 dB.

On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth the power is to be attenuated at least 40 dB.

There are no equivalent FCC requirements for the 406.025 MHz frequency.

1.4. TSO REQUIREMENTS

To gain TSO approval of a 406.025 MHz ELT it is necessary to meet the requirements of TSO C126. The following sections contain descriptions of components necessary to meet TSO C126 with the ARTEX G406-4 series ELT's.

1.4.1. ACTIVATION MONITOR

An aural and/or visual monitor is provided to alert the pilot when the ELT has been activated and is transmitting.

The following requirements apply to the activation monitors:

a. Aural Monitor - The aural monitor provides a distinct signal enabling a search and rescue team to locate an aircraft with a transmitting ELT in a confined area with a large number of aircraft (i.e. such as an airport). The search and rescue team would listen for the aural monitor and easily locate and disable the offending ELT without a great deal of effort.

b. Visual Monitor - The visual monitor is designed to be installed so that it can be viewed from the pilot's position. Its intended function is to inform the pilot that the ELT is transmitting, avoiding a situation where an aircraft is flying with its ELT transmitting.

1.4.2. G-SWITCH

The crash force activation sensor or G-Switch is designed to activate with a change of velocity of 4.5 fps +/-0.5 fps both under normal conditions and while being subjected to 30 G's of cross axis forces. Figure 1-1 shows the plot of time versus G Force that the G-Switch must be qualified to in order to meet ED-62 approval criteria. The FAA has allowed the use of this G-Switch under TSO C126.
1.4.3. BATTERY PACK

ARTEX holds C142 TSO approval for the Lithium Battery Pack. As such, the following paragraph is required by TSO C142.

The conditions and tests required for this TSO approval of this battery are minimum performance standards. It is the responsibility of those desiring to install this battery in a special class of aircraft to determine that the aircraft installation conditions are within the TSO standards. The battery may be installed only if further evaluation by applicant documents an acceptable installation and is approved by the Administrator. Lithium battery safety concerns include the possibility of fire, venting violently, and venting of toxic gases.

The Battery Pack for the G406-4 ELT consists of 4 “D” size Lithium Manganese Dioxide cells connected in series. In an effort to increase the safety of the battery pack, a number of features were designed into the battery pack. To prevent the cells from being charged, diodes are connected across each cell and fuses are connected to the output.

1.4.4. REMOTE CONTROL

The remote control (cockpit panel switch) provides "MANUAL ON," "ARMED," and "RESET" modes. The remote control wiring between the control and the ELT is designed so that no combination of short circuits between the remote control, monitor(s), associated wiring and the airframe will:

- Inhibit the equipment from being automatically activated.
- Deactivate the ELT after it has been activated.
- Result in additional power drain so that the ELT will not meet the minimum Peak Effective Radiated Power (PERP) of 17 dBm or Equivalent Isotropic Radiated Power (EIRP) of 20 dBm through the 50 hour operation period at any of the specified operating temperatures (-20° C to +55° C).

1.5. ARTEX Antennas

Although any of the ARTEX 406 dual element antennas are designed to work with the G406-4, the primary antennas intended for use with the G406-4 are the rod antenna and separate whip antennas for the 121.5/243 MHz and 406 MHz outputs.

1.5.1. Rod Antenna (Dual Input)

The 110-320 Rod Antenna (refer to Figure 1-2) is intended for lower speed aircraft that do not exceed 350 knots TAS.

110-320 SPECIFICATIONS

- Freq: 121.5, 243.0 & 406.025 MHz
- VSWR: 2.0:1 Max. for 121.5/243.0 MHz
- 1.5 Max. for 406.025 MHz
- Polarization: Vertical
- Radiation Pattern: Omnidirectional
- Airspeed Rating: 350 Knots TAS
- Connectors: BNC & TNC
1.5.2. Whip Antenna (121.5/243 MHz)

The 110-324 Whip Antenna (refer to Figure 1-3) is intended for lower speed aircraft that do not exceed 300 knots TAS.

110-324 SPECIFICATIONS
- Freq: 121.5, 243.0 MHz
- VSWR: 2.0:1 Max. @ 121.5/243.0 MHz
- Polarization: Vertical
- Radiation Pattern: Omnidirectional
- Airspeed Rating: 300 Knots TAS
- Connector: BNC

1.5.3. 406 Whip Antenna

The 110-329 Whip Antenna (refer to Figure 1-4) must be used in conjunction with the 110-324 and is also intended for lower speed aircraft that do not exceed 300 knots TAS.

110-329 SPECIFICATIONS
- Freq: 406.025 MHz
- VSWR: 1.50:1 Max @ 406.025 MHz
- Polarization: Vertical
- Radiation Pattern: Omnidirectional
- Airspeed Rating: 300 Knots TAS
- Connector: TNC
G406-4 OPERATION
2.1. Operation

One of the primary features of the G406-4 ELT is its simplicity of operation. As long as the ELT is locked into its mounting tray, it will activate in a crash. Neither the cockpit switch nor the ELT unit switch can be positioned to prevent automatic activation once the unit is mounted properly.

It also is designed against human error and misuse in regard to automatic activation. The unit activates only when security mounted in its tray and has pins 5 & 8 jumpered. The ELT cannot be accidentally activated by dropping, rough handling or during shipping.

When the ELT is activated, the presence of the emergency swept tone and a flashing front panel light indicates a normally functioning unit. The front panel light must immediately begin to continuously flash upon ELT activation.

Under normal operation the switch configuration on your front panel is the down position, reading "ARM". The switch on the ELT unit will also be positioned down to read "OFF". Should an emergency arise to the degree that you want to manually activate your ELT, reverse either switch so it is in the up ("ON") position. Remember, that as long as the front panel and ELT switches are in the ARM/OFF position the ELT will automatically activate on impact.

If your ELT is activated accidentally, you will need to reset it. Do this by moving the front panel switch to "ON", then moving it back to "ARM" after approximately 1 second. You may also reset the ELT at the unit itself by positioning the switch on the ELT up to "ON", then back down to "OFF" after approximately 1 second.

2.2. Overall Functions

Figure 2-1 shows the functional flow for the ELT. The ELT unit is considered to be either "ACTIVE" or "INACTIVE". When "INACTIVE", the unit lies in a state of rest and performs no functions. Taking the unit from the "INACTIVE" to the "ACTIVE" state requires a positive switch transition from one of three sources:

- Panel Mounted Switch
- Unit Mounted Switch
- G-switch

Upon entering the "ACTIVE" state, the unit shall meet all the requirements as described herein. To exit the "ACTIVE" state and enter the "INACTIVE" state, a "RESET" condition must be entered. This may be accomplished in one of two ways.

(a) The front panel switch may be toggled from the "ARMED/RESET" position to "ON" and then back to "ARMED/RESET", or if the switch is already in the "ON" position, it must be placed into the "ARMED/RESET" position.

(b) The ELT unit switch may be moved from the "OFF" position to the "ON" position and then back to the "OFF" position. If the switch is already in the "ON" position, it must be placed into the "OFF" position.

It should be remembered that the ELT can not be "RESET" if either the panel mounted switch or the unit switch is in the "ON" position.

The periodicity of operational checks is at the operator's discretion, however, a monthly test is recommended. The check shall only be conducted during the first five minutes of any UTC (coordinated universal time) hour, and restricted in duration to not more than five seconds.
FIGURE 2-1 ELT FUNCTIONAL FLOW
INSTALLATION
3. PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

TSO C126 PARAGRAPH D REQUIREMENTS:

"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."

The ELT is designed with the installer in mind. Extra effort has been made to simplify the installation process.

Because of the critical nature of an ELT, it is very important that the installation be performed according to the following instructions. Installation of the ELT is somewhat unique; it requires experience in sheet metal work and avionics. Only licensed technicians should install the ELT.

Many problems associated with the older ELTs were due to poor installations. Many of those poor installations occurred at the factory on new airplanes. Therefore, duplicating a previous ELT installation with the ARTEX ELT may not be acceptable.

In addition to the procedures outlined herein, the installer must adhere to the guidelines established in FAA Advisory Circular 43.13-2A (Acceptable Methods, Techniques and Practices - Aircraft Alterations). Specifically, Chapters 1 through 3, 11 and 13.

By signing either the aircraft logbooks or the FAA Form 337, you are stating that the installation has been performed in accordance with the current FARs and with the steps and procedures outlined herein.

FIGURE 3-1 ELT AND REMOTE SWITCH PANEL
In Canada, all installations must be performed in accordance with Canadian Aviation Regulations (CAR) Part V, Subparts 37, 51 and 71.

3.1. ELT Mounting Locations

Many original ELT installations are inadequate as far as unit location and surface rigidity are concerned. Just because the "old" ELT was located in a particular position doesn't mean the "new" ELT should be located there.

Statistics show that the tail section of an airplane is least likely to be damaged during a crash and, therefore, provides a good mounting environment for the ELT unit.

Accessibility of the unit is an important factor in the location of the ELT. Mount the unit as far aft as practical, but where it can be easily retrieved for maintenance.

The mounting surface must be extremely rigid, therefore, mounting the ELT directly to the aircraft skin is unacceptable.

Mounting an ELT directly to the aircraft skin induces "crash hiding" vibrations and provides a very poor structural mounting surface. The mounting location must be able to support 100 pounds of force in any direction with no appreciable distortion in the structure.

The following are the FAA guidelines for mounting an ELT (per RTCA DO-183 Sec 3.1.8)

- "The ELT shall be mounted to primary aircraft load carrying structures such as trusses, bulkheads, longerons, spars, or floor beams."

![Figure 3-2 Mounting Tray Installation](image)
NOTES:

1. Allow 5 inches minimum clearance for end cap removal and installation.
2. Unit Weight: 4lbs 7 oz.
3. Unit Color: Orange
4. Unit Coax Connector: BNC (121.5/243.0) and TPS (406.025 MHz)
5. Mating plug does not extend beyond exterior surface of end cap
6. Tolerances are 0.030 inches
7. Recommended interconnect harness wire gauge is 22 AWG minimum
8. Pins 5 and 8 of the external connector must be jumpered to enable G-Switch

FIGURE 3-3 ELT OUTLINE DIMENSIONS
NOTES:
1. FREQUENCIES: 121.5, 243.0 AND 406.025 MHz
2. VSWR: 2:1 MAX FOR 121.5/243.0 MHz
3. IMPEDANCE: 50 OHMS NOMINAL
4. RADIATION PATTERN: OMNIDIRECTIONAL
5. POLARIZATION: VERTICAL
6. ENCAPSULATING MATERIAL: POLYURETHANE FOAM FILLED FIBERGLASS ROD
7. MATING CONNECTOR: BNC FEMALE AND TNC FEMALE
8. WEIGHT: .45 LBS
9. FINISH: WHITE POLYURETHANE PAINT
10. A TORQUE FORCE OF 20 IN-LBS IS RECOMMENDED ON MOUNTING SCREWS
11. ALL DIMENSIONS IN INCHES
12. MAXIMUM AIR SPEED RATING: 350 KNOTS TAS

INSTALLATION NOTES:
1. ANTENNA IS BONDED TO GROUND VIA BASE PLATE RATHER THAN MOUNTING SCREWS.
2. ENSURE GOOD BONDING BETWEEN ANTENNA BASE AND MOUNTING SURFACE.
4. GASKET IS NOT SUPPLIED AND USE IS OPTIONAL. CONTACT ARTEX AND REQUEST PN 280-0320 IF ONE IS DESIRED. GASKET MUST BE CONDUCTIVE.

FIGURE 3-4 ROD ANTENNA (110-320) OUTLINE
Notes:
1. Frequency: 121.5 and 243.0 MHz
2. VSWR: 2:1 max.
3. Polarization: Vertical
4. Radiation Pattern: Omnidirectional
5. Airspeed: 300 knots TAS @ Sea Level
6. Connector: BNC (female) provide .50 in. mounting hole
7. Impedance: 50 Ohms nominal
8. Weight: 2 oz.
9. All dimensions in inches

FIGURE 3-5 WHIP ANTENNA (110-324) OUTLINE
NOTES:

1. FREQUENCY: 406.025 MHz
2. VSWR: 1.5:1 MAX.
3. CONNECTOR: TNC
4. WEIGHT: 2.5 OZ. MAX
5. AIRSPEED RATING: 300 KTS TAS MAX.
6. POLARIZATION: VERTICAL
7. RADIATION PATTERN: OMNIDIRECTIONAL
8. ALL DIMENSIONS IN INCHES

FIGURE 3-6 406 MHz WHIP ANTENNA (110-329) OUTLINE
• "The mounts shall have maximum static local deflection no greater than 2.5 mm (0.1 in) when a force of 450 newtons (100 lbs) is applied to the mount in the most flexible direction. Deflection measurements shall be made with reference to another part of the airframe not less than 0.3 meters (1 foot) nor more than 1.0 meters (3 feet) from the mounting location."

• In addition, RTCA Document Number DO-182 recommends that "all ELT system components which must survive a crash intact, ...should be attached to the airframe in such a manner that the attachment system can support a 100g load...in the plus and minus directions of the three principal axes of the aircraft."


Mount the ELT unit horizontally so that the rigidity requirements are met and the arrow on the mounting tray is aligned within 10 degrees of the longitudinal axis of the aircraft and pointed in the direction of flight.

Finally, in selecting a location for the ELT installation, the following cautionary advice should be taken into consideration:

---

**CAUTION:**

Avoid locating the ELT where it will be subjected to unprotected exposure to harsh chemical fluids such as deicing compounds. They can promote cracking and fracturing of the ELT mounting frame and housing components by degrading and weakening the structural integrity of the housing and tray material. These same chemical agents can also cause corrosion on electrical connections.

---

**3.2. Antenna Mounting Locations**

Locate a position where the antenna can be installed **VERTICALLY** (up to 15° off the vertical plane is acceptable) with at least 30 inches clearance from other antennas (especially VHF) mounted on the aircraft.

The coax cable should not cross any production breaks (major structural sections) in the aircraft so that in the event of a crash the ELT and the antenna are in same aircraft section. This usually requires placing the antenna directly above the ELT unit. Do not bundle the ELT antenna coax with any other VHF radio coax, power harness or the ELT remote switch harness.

If the ELT transmitter and external antenna are on opposite sides of an airframe production break, the components should be secured to each other by a tether which can support a 100 G load (ELT weight x 100). The interconnecting antenna-to-ELT coax cable should have sufficient slack on both ends that it will not be subjected to any tensile load and should be tied loosely to the tether.

Use only the ARTEX approved antennas. The ELT will not operate properly without being connected to the antenna for which it was designed.
FIGURE 3-7 REMOTE SWITCH OUTLINE DIMENSIONS

FAA Advisory Circular 43.13-2A, Chapter 3, paragraphs 36 through 38 provides additional guidance for antenna installations.

NOTE: Although the Top Cover also has 4 holes, do not use for mounting the ELT.

3.3. Installing the Mounting Tray

Refer to figures 3-2 & 3-3

Before installing the tray, be sure the mounting location meets the requirements established in ELT Mounting Locations.

Mark the 4 holes needed for the tray using the tray as a guide. Be sure the arrow, on the tray, aligns within 10 degrees of the longitudinal axis of the aircraft (and in direction of flight).

Also make sure there is sufficient room in front of the tray to easily remove the front cap (at least 5" is recommended).
If a reinforcement (doubler) plate is needed to meet the rigidity requirements, fabricate one using the tray as a guide.

Drill the 4 marked holes with the #19 (.1660) drill bit and install the tray with the 8-32 X 5/8" pan head phillips screws, nuts, flat washers and lock washers provided.

3.4. Installing the Antenna

Ensure that the antenna mounting location meets the requirements as described in Antenna Mounting Locations.

A doubler plate will most likely be necessary for the antenna to meet rigidity specifications in Antenna Mounting Locations.

A 20 pound force applied in all directions should not cause an appreciable distortion in the aircraft skin.

Use the antenna outline drawings (figures 3-4 through 3-6) to determine the hole size.

Two coax cables are provided with the G406-4. The BNC to BNC cable is for the 121.5/243.0 MHz transmitter and the TPS (ELT end) to TNC (antenna end) coax cable is used for the 406.025 MHz transmitter. To eliminate confusion caused by wrong connections the coax cables were designed to connect only one way ensuring proper operation of the G406-4. Longer coax cables (up to 20 feet) may be constructed if the six foot cables provided are too short for the installation. RG-400 or RG-142 may be used for fabricating these cables.

3.5. Mounting the Cockpit Light/ Switch Assembly

The switch assembly must be mounted in the cockpit where the pilot can easily

CAUTION: Incorrect wiring of the Molex connector may damage the ELT; cause continuous transmission; or result in no remote reset. Verify wiring against Figure 3-9. A continuity check is recommended to ensure good connections and proper pin location.
reach the switch and see the light. The remote switch is required for the ELT to be TSO C126 approved. It is not optional.

The switch assembly requires a space about 2" high by about 1" wide both on the panel surface and behind the panel. Refer to figure 3-7.

Mark a cutout for the cockpit panel switch with the dimensions shown in Figure 3-9.

Install the switch assembly by fitting it into the cutout, marking the 4 screw holes and drilling them with a #28 (.1405) drill bit. Use the 4-40 X 1/2" pan head phillips screws, nuts & lock washers provided.

Apply the "For Aviation Emergency Use Only /Unauthorized Use Prohibited" placard that is supplied in the Installation Kit as near the switch installation as practical.

3.6. Wiring the 406 System

CAUTION:

Prior to installing the harness in the 12-pin receptacle, feed the wire bundle through the rectangular hole in the mounting frame cap. The receptacle will not fit through the mounting frame cap harness entrance if the harness is installed prior to doing this.

3.6.1. Fabricate the Cable

NOTE: If the ELT is to be used with an Artex ELT/NAV Interface (P/N 453-6500) refer to the ARTEX ELT/NAV Interface Installation and Operation Manual (570-4602) for wiring instructions. Wires will need to be run which connect pins 9, 10, 11 and 12 of the ELT to the ELT/NAV Interface unit.

Fabricate a 5 wire harness (22 Gauge minimum) long enough to reach between the ELT installation location and the cockpit panel switch location. See figure 3-8.

Strip about .150" of insulation from the ends of each of the 5 cable wires. Dress and tin the bare wires to prevent the strands from fraying during the crimp terminal installation.

Fabricate an additional wire long enough to reach from pin 11 of the ELT connector to an aircraft ground point. Strip and prepare as described above. This wire will be crimped in the same terminal as the wire running from pin 11 of the ELT connector to the cockpit remote switch (i.e. 2 wires terminated at the same point). Refer to the depiction of pin 11 on figure 3-9. As an alternative, this wire may be spliced as described in AC 43.13-1A, Section 445 ("Splices in Electric Wire") if crimping both wires in a single terminal is not practical.

Remember - the wires at the 12-pin connector end of the harness must be fed through the End Cap Assembly prior to installing the connector. Refer to Figure 3-10 and Section 3.6.2

On one end of the cable, use a Molex crimp tool (Molex Tool # 11-001-0008) or equivalent tool for .062 terminal pins and crimp the male terminal pins provided (ARTEX P/N 151-6627) to each of the cable wires which will mate with the 12-pin receptacle which connects to the ELT. Remember, there will be 2 wires at pin 11. This end will join to the Molex connector on the ELT unit.

On the other end of the cable, crimp the female terminal pins provided (ARTEX P/N 151-6628), using Molex Tool (or equivalent) cited above, to each of the 5 cable wires. This end will join with the Molex connector on the cockpit panel switch assembly.
NOTE: USE 22 GAUGE WIRE MINIMUM.

PIN INSERTION VIEW OF MOLEX CONNECTOR FOR ELT UNIT. HOLE NUMBERING IS IDENTICAL TO THAT INSCRIBED ON ACTUAL CONNECTOR. ORIENTATION SHOWN IS SAME AS INSTALLATION ORIENTATION.

PIN INSERTION END OF MOLEX CONNECTOR FOR COCKPIT SWITCH ASSEMBLY. HOLE NUMBERING IS IDENTICAL TO THAT INSCRIBED ON ACTUAL CONNECTOR. ORIENTATION SHOWN IS SAME AS INSERTION ORIENTATION FOR INSTALLED SWITCH.

NOTE: BYPASS THE AIRCRAFT AND AVIONICS MASTER SWITCHES AND CONNECT POWER WIRE DIRECTLY TO BATTERY WITH A 1 AMP FUSE IN LINE OR CONNECT TO AIRCRAFT CLOCK CIRCUITRY. MAXIMUM CURRENT REQUIRED IS ABOUT 100mA. LINE MUST BE FUSED.

APPLY EITHER +14V TO PIN 1 OR +28V TO PIN 3, BUT NOT BOTH

NOTE: PINS 6 & 9 OF REMOTE SWITCH ARE INTERNALLY TIED. IF AIRCRAFT GROUND INTEGRITY BETWEEN THE ELT AND REMOTE SWITCH CANNOT BE GUARANTEED, REMOTE SWITCH PIN 6 IS WIRER TO ELT PIN 11, OTHERWISE THE CONNECTION IS OPTIONAL.

Figure 3-9 WIRING DIAGRAM
NOTE CONFIGURATION OF MOUNTING TRAY, TOP COVER AND END CAP

END CAP

NOTE: TIGHTEN THUMB SCREWS NO MORE THAN 18 IN. LBS.

REMOTE SWITCH

USE FEMALE CRIMP PINS (P/N 151-6028)

USER FABRICATED INTERCONNECT WIRING (22 AWG MINIMUM)

FIGURE 3-10 ELT-TO-REMOTE SWITCH INTERFACE DIAGRAM
For installations using ELT/NAV Interface: Crimp a male terminal pin (ARTEX P/N 151-6627) to one end of each of the wires which will run to the ELT/NAV Interface unit (P/N 453-6500).

On the other end of each of the wires which run to the ELT/NAV Interface unit solder a connector pin (ARTEX P/N 151-2100) as described in the ELT/NAV Interface Installation and Operation Manual (570-4602).

NOTE: This cable may be connected now or after installing either the ELT or the front panel switch assembly. All wiring must be installed in accordance with AC 43.13-1A.

3.6.2. Connecting the ELT

Refer to Figures 3-8,3-9 and 3-10

Feed the crimp terminated wires for the 12-pin connector through the rectangular hole in the mounting frame cap.

Fabricate a short jumper (about 1.5" long) and install male terminal pins on each end. Install the jumper between pins 5 and 8 in the 12-pin receptacle. Install the remaining wires into the 12-pin receptacle as shown in Figures 3-9 and 3-10. Push the connector into place inside the mounting tray cap. The mounting frame cap acts as a retainer for the connector once the cap is installed on the ELT.

Pin 1, as inscribed on the connector, must be in the lower left hand corner as shown in Figures 3-9 and 3-10.

3.6.3. Wiring Switch Assembly 9-pin Connector

Before inserting the cable pins into the 9-pin connector for the cockpit switch as-
semble, strip and crimp a female terminal pin to a separate shorter wire for connection between pin 9 of the cockpit switch and aircraft ground. Strip and crimp a female pin to a second wire for connection between aircraft power and the applicable power connection (pin 1 or 3) on the cockpit switch connector.

Insert each of the female pins into the switch 9-pin connector, which will connect to the cockpit remote switch, as shown in the wiring diagram (figure 3-9). Push the connector into place on the remote switch.

NOTE: Terminal pins may be removed by using Molex extraction tool #11-03-0002 or equivalent.

3.6.4. Power and Ground

The power source determines when the light functions but has no effect on the switch functions. It is preferable to bypass the aircraft and avionics master switches and connect the power wire directly to the battery with a 1 amp in-line fuse. A better solution is connecting to the aircraft clock circuitry.

If your ELT front panel indicator light is wired through either the aircraft master or the avionics master switch, make sure these switches are turned on during testing.

NOTE: If the aircraft does not have an electrical system (i.e. no battery), it is permissible to fabricate, using 3 alkaline 9 volt batteries in series, a substitute power source for the remote light. Connect the positive side of power source to the 28vdc pin of the remote switch. The alteration should be noted in the log book and the battery should be checked periodically and must be replaced every two years.

3.6.5. Buzzer Installation

A warning buzzer is required for TSO C126 approval. The buzzer (p/n 130-4004), is powered by the ELT unit and therefore is not dependent upon the aircraft battery for operation. It is not designed to operate continuously, but sounds at predetermined intervals, and runs for shorter periods toward the end of battery life.

While the buzzer may be located anywhere on the aircraft, it is recommended that the buzzer be placed near the ELT unit, as it is loud enough to be heard outside the aircraft when the engine(s) is (are) off. It is assumed that if the engine(s) is (are) running then the cockpit light will warn the pilot. Placing the buzzer in the cockpit is not recommended due to the very distracting, loud, siren-type sound it produces when the ELT is intentionally or inadvertently activated. Since the buzzer operates in tandem with the ELT cockpit switch panel light, it would only serve as a redundant warning indicator in the cockpit environment.

One way of mounting the buzzer is to fabricate a right angle bracket using .092 inch aluminum as shown in Figure 3-11.

Wire the buzzer to the ELT as shown in the wiring diagram (figure 3-9). Connect the positive (+) terminal to pin 2 of the ELT connector and the negative (-) terminal to ground.

3.6.6. Finishing Up

With its switch in the "OFF" position (down), insert the ELT into the mounting tray at an angle so that the locking ears at the end opposite the direction-of-flight arrow fit into the mounting tray locking slots. Press the ELT down into the mounting tray until fully seated.
Install the protective top cover on the ELT by fitting the cover locking slots over the locking ears on the ELT. Push the cover toward the connector end of the ELT and seat it down in place on the ELT.

Insert the antenna coax cables through the end cap access holes and connect to the ELT unit. Connect the 12-pin Molex connector to the ELT unit. Slide the end cap into place over the mounting tray and protective top cover and secure the end cap to the mounting tray using the two thumbscrews.

Tie up excess slack in the coax cables, yet leave enough slack so that the mounting tray cap can be easily removed.

Perform the tests as outlined herein.

It is **VERY** important that the cockpit switch panel light immediately begins flashing continuously when the ELT is activated. If the light fails to start flashing immediately, recheck the interface wiring between the ELT and the cockpit panel switch.

Brief the operator(s) of the aircraft on the contents of this "ELT Installation and Operation Manual" and demonstrate the described tests. The manual should be kept either in the aircraft or with the aircraft logbooks.

Make the appropriate logbook entries and fill out and submit FAA Form 337.

**NOTE:** The TSO approval of the ELT does not constitute installation approval. All ELT installations are subject to field approval for a given airframe by either an approved FAA DER or FSDO. For installations outside of the US, contact your local civil aviation authority representative for details.

**WARNING**

The signer of the FAA Form 337 is responsible for the accurate and complete installation of this ELT as defined previously.

Additional information regarding the completion of FAA Form 337 can be found in Advisory Circular AC 43.9-1E. Paragraph (2) of this advisory circular defines what is considered to be approved data for major alterations as follows:

"Data used as a basis for approving major repairs or alterations for return to service must be FAA-approved prior to its use for that purpose and includes: FAR (e.g., airworthiness directives), AC's (e.g., AC 43.13-1A under certain circumstances), TSO's, parts manufacturing approval (PMA), FAA-approved manufacturer's instructions, kits and service handbooks, type certificate data sheets and aircraft specifications. Other forms of approved data would be those approved by a designated engineering representative (DER), a manufacturer holding a delegation option authorization (DOA), STC's and, with certain limitations, previous FAA field approvals. Supporting data such as stress analyses, test reports, sketches, or photographs should be submitted with the FAA Form 337. These supporting data will be returned to the applicant by the local FAA district office since only FAA Form 337 is retained as a part of the aircraft records at Oklahoma City."

3.7. Transmitter Test

1. Always perform the tests within the first 5 minutes of the hour (UTC) as required by AC 43.13-1B, 12-21 & 12-22. Note 3. Be sure to notify any nearby control tower of your intentions.
2. **WARNING!**

Do not allow test duration to exceed 5 seconds. The ELT will transmit a 406.025 MHz signal after the ELT is active approximately 47 seconds, the satellite system considers the transmission to be a valid distress signal.

3. If your ELT front panel indicator light is wired through either the aircraft master or the avionics master switch, make sure these switches are turned on. **NOTE:** If the ELT is installed with an ELT/NAV Interface, ensure that both the Interface and the aircrafts navigational system are active at least 30 seconds prior to the ELT test.

4. Tune a receiver (usually the aircraft radio) to 121.5 MHz.

5. Turn the ELT aircraft panel switch to "ON," wait for 3 sweeps on the receiver, which takes about 1 second, and then turn the switch back to the "ARM" (OFF) position while paying special attention to the LED activity upon entering the "ARM" (OFF) condition.

The microprocessor in the ELT checks the G-switch (automatic activation switch) latching circuit, pins 5 & 8 on the 12-pin connector at the ELT; the 406.025 MHz transmitter for proper RF output; presence of valid navigation data (ELT/NAV Interface and navigation system must be active) and a battery check. If the ELT is working properly, the sequence following entry to the "ARMED" (OFF) condition will result in the panel LED staying ON for approximately 1 second then extinguishing.

If a problem is detected, the LED provides a coded signal following the initial 1 second pulse. The coded signal and related problem are as follows (the LED will flash in order of importance with approximately .5 to 1 second pause between each error code if multiple errors are present):

- a) 1 flash indicates a G-switch loop open failure.
- b) 3 flashes indicates a 406.025 MHz transmitter problem (i.e. bad or unconnected coax, an antenna problem, low power output or a programming error).
- c) 5 flashes indicates there is no navigation data present. This is most likely due to improper wiring between the system interface connections, improper programming, invalid navigation data (navigation system not powered up) or an ELT/NAV Interface unit (453-6500) is not being utilized.
- d) 7 flashes indicates a battery problem (i.e. battery usage time over an hour).

There is a sequence to the problem reporting which is the same order as listed above. That is, if the G-switch circuit has a failure, there will be a single flash then 3 flashes would appear if there was a transmitter problem and so on.

**NOTE:** For installations using the ELT/NAV Interface, there is an error condition where the LED on the ELT and remote switch will flash rapidly. This occurs 2 minutes after power is applied to the ELT/NAV Interface if the ELT is not responding because either 1) the ELT is programmed for a protocol other than 24 bit and the ELT/NAV Interface has been strapped for a 24 bit address or 2) the RS-232 TX line from the ELT (pin 12) to the ELT/NAV Interface (pin 10) is not connected.

After initial installation, Artex recommends a monthly "self test" of the ELT by following the steps outlined in this section. Testing of the ELT in excess of once a month is not recommended as
the battery life will be shortened by excessive activations.

3.8. Sealing the ELT Connector

Once all tests have satisfactorily been completed and all harness connections have been verified to be correct, the connector at the ELT end of the ELT-to-Remote Cockpit Switch harness should be sealed to prevent moisture from getting into the wire entry holes. This can be done by applying an electronic grade, non-corrosive RTV (i.e. GE RTV 162) around the wires entering the rear of the 12-pin connector 151-5012 (refer to Figure 3-10).

Ensure each of the entry holes are filled with RTV. This will prevent water from beading up and causing possible bridging between connector pins which could result in false activation of the ELT.

NOTE: Installation in a pressurized aircraft constitutes a major modification, consult the Department of Transportation Regional Officer before proceeding.
PERIODIC MAINTENANCE
4.1. In the United States

WHY? To ensure continued reliability of your ELT it must be inspected for damage and wear which could be caused by age, exposed elements, vibrations, etc. Even the best designed equipment, if not properly maintained and cared for, will eventually fail.

HOW OFTEN? At least once every year, unless required more frequently by FARs (e.g., 100 hour inspections)

IS IT REQUIRED? FAR Parts 91.207, 91.409 and 43 Appendix D make detailed ELT inspections mandatory.

HOW DETAILED? FAR 43, Appendix D(i) states in part that each person performing an annual or 100-hour inspection shall inspect the following components of (the ELT):

(1) (ELT unit and mount) for improper installation and insecure mounting.

(2) Wiring and conduits - for improper routing, insecure mounting, and obvious defects.

(3) Bonding and shielding - for improper installation and poor condition.

(4) Antenna, including trailing antenna-for poor condition, insecure mounting, and improper operation.

NOTE: All references to maintenance requirements for the United States shall also apply to all ELT users outside of the US unless otherwise required by the installer / aircraft maintenance procedures or the relevant national regulations

4.2. In Canada

WHY? To ensure continued reliability of your ELT it must be inspected for damage and wear which could be caused by age, exposed elements, vibration, etc. Even the best designed equipment, if not properly maintained and cared for, will eventually fail.

HOW OFTEN? The ELT must be “performance tested within the 12 month period preceding installation in an aircraft and within 12 month intervals thereafter…”

IS IT REQUIRED? Yes. For Canadian installations, all maintenance shall be performed in accordance with CAR’s Part V, Subpart 71 and Part VI, Subpart 5.

HOW DETAILED? The same reference quoted above states five essential tests:

(1) The measured peak power after 3 minutes of operation;

(2) The measured frequency after 3 minutes of operation;

(3) The audio modulation, which shall be recognizable as a typical ELT signal;

(4) The measured current draw in the "OFF" (ARM) position and in the “ON” position as specified by the ELT manufacturer; and

(5) The automatic activation system.

4.3. Periodic Maintenance Inspection Procedure

To comply with the above quoted FAA & Canadian DOT regulations, ARTEX Aircraft Supplies provides the following maintenance procedures (see Figure 4-1 “Periodic Maintenance Inspection Check list”). These procedures include checks which are mandatory in Canada. FAR
STEPS 5a THROUGH 5i ARE MANDATORY IN CANADA

STEP 1 - Remove Coaxial and Wiring Connections and Inspect

STEP 2 - Remove ELT and Inspect Mounting Hardware

STEP 3a - Remove ELT Battery Pack and Inspect

STEP 3b - Replace/Reinstall Battery Pack

STEP 4 - Activate Using “Football Throw” Method: Then Reset

STEP 5a - Activate ELT in Attenuating Container

STEP 5b - Measure 121.5 & 243.0 MHz Power Output

STEP 5c - Measure 121.5 MHz ELT Frequency

STEP 5d - Listen to the Audio Modulation

STEP 5e - Measure 406.025 MHz Power Output

STEP 5f - Measure 406.025 MHz Frequency

STEP 5g - Current Draw Tests

STEP 5h - Verification of Digital Message

STEP 5i - “Reset” ELT

STEP 6 - Reinstall ELT

STEP 7 - Perform Transmitter Tests

STEP 8 - Perform Antenna Tests

STEP 9 - Logbook Entry

NOTE: FAR 91.207(d) requires that the ELT be inspected within 12 calendar months after the last inspection for:
1. Proper installation
2. Battery corrosion
3. Operation of controls and crash sensor
4. The presence of a sufficient signal radiated from its antenna (See 4.3.17 [Step 8] Antenna Test)

FIGURE 4-1 PERIODIC MAINTENANCE CHECKLIST
91.207(d) states those inspection checks required in the United States. In addition to the maintenance checks described in this chapter a monthly "self test" of the ELT is recommended. Please refer to Section 3.7, page 3-16 of this manual for more information.

Note: the step numbers (i.e. Step 1, Step 2, etc.) which follow correspond to those listed in Figure 4-1.

4.3.1 (Step 1) Remove ELT Connections

Loosen the thumbscrews on the end cap. Pull the end cap away from the ELT. Lift up the Protective Top Cover and push away from the connector end of the ELT to remove. Lay Protective Top Cover aside. Remove all interconnections to the ELT unit and ELT antenna. Visually inspect and confirm proper seating of all connector pins. Special attention should be given to coaxial center conductor pins which are prone to retracting into the connector housing.

4.3.2 (Step 2) Remove ELT

Lift the ELT up from the connector end (careful use of a flat blade screw driver as a lever makes this step easier) to remove the ELT unit from its mounting tray. Inspect the mounting hardware. Ensure the hardware is free of cracks or other obvious damage. All required mounting hardware should be installed and secured and must meet the integrity requirements as defined herein.

4.3.3 (Step 3a) Remove Battery Pack

NOTE: The battery pack contains static sensitive parts, take ESD precautions before handling. Remove the four screws from the battery pack. Before proceeding further, read the following advisory to avoid damage to the ELT. For detailed instructions refer to Section 4.5 and Figure 4-4.

WARNING: The battery pack is connected to the ELT via short interconnect harnesses which limit the distance of separation between the two components prior to disconnecting the harnesses. Proceed as follows:

• Lay the ELT on its side.
• Carefully lift the battery pack away from the ELT and lay along side the ELT unit.
• Carefully disconnect the harness from the 8-pin connector on the small circuit board in the battery pack. Do not short connector pins.
• Disconnect 2-pin harness from the ELT body.

Inspect the battery pack and the underside of the ELT. The battery cells, components and connectors should be free of corrosion. The underside of the ELT should be corrosion free. Inspect for any broken wires or connections. Ensure the
battery housing is free of cracks or other visible damage.

Verify the battery expiration date. If the battery pack has not expired it may be reinstalled. However, for optimum performance, it is recommended that the battery be replaced if the voltage under load is less than 12.0 vdc. The battery pack must be replaced with a new one:

- After use in an emergency;
- After an inadvertent activation of unknown duration;
- When the total of all known transmissions exceeds one hour;
- On or before the battery replacement (expiration) date shown on battery label.

4.3.5 (Step 4) G-Switch Check

NOTE: The ELT cannot be activated this way unless pins 5 and 8 are jumpered (this happens automatically when the unit is locked into the mounting tray with the connector in place). Because of the potential physical damage which could occur through an improper jumper, it is recommended that this step be performed only by an experienced technician/mechanic. See “Installation” section of this manual for pin layout diagram. A test plug may be obtained from ARTEX (p/n 151-2012) to use in performing this test.

While monitoring 121.5 MHz on an AM receiver, and with the unit switch in the “OFF” (down) position, activate the ELT by using a rapid forward (throwing) motion, in the direction of the arrow, followed by a rapid reversing action. Verify activation via the aural swept tone on the receiver. Following activation, “RESET” the unit by toggling the “ON/OFF” switch to “ON” then back to “OFF”.

4.3.6 (Step 5a) Electrical Check

Activate the ELT. As the unit will be on for three minutes it is recommended that it be placed in a container capable of substantially attenuating RF signals. Remember that all tests must be performed within the first five minutes after the hour UTC (Universal Coordinated Time). Monitor the following performance criteria for three minutes (power output must be made at the end of the three minute period).

4.3.7 (Step 5b) 121.5/243 MHz Power Output

Connect the equipment as shown below:
4.3.8  (Step 5c) 121.5 MHz Frequency

The ELT transmitter frequency may be measured as follows:

Connect the frequency counter as shown below:

If the 121.5 MHz carrier frequency is within specified parameters, the 243.0 MHz frequency will also be within specified parameters.

The ELT should be within 50 ppm (+/- 6.075KHz) of 121.500000 MHz.

4.3.9  (Step 5d) Audio Modulation

During the swept tone portions the audio should “sound” like an ELT. Set the unit switch to the “OFF” position.

4.3.10  (Step 5e) Measure 406.025 MHz Power

Note: the power output is approximately 37 dBm @ 5 Watts. Ensure adequate attenuation is inserted in-line between the ELT’s 406.025 MHz output and the input to the spectrum analyzer to protect the analyzer’s input circuitry.

Connect the equipment as shown below:

Set the Spectrum Analyzer as follows:
• Center Freq: 406.025 MHz
• Span: 1 MHz
• Resolution Bandwidth: 1 MHz
• Vertical Display: 10dB/Div
• Sweep: Auto
• Peak/Avg: Peak
• Reference Level: 30 dBm
• Time/Div: 20ms
• Max Hold: On
• Attenuator (as required) on Input

Turn the ELT on and wait approximately 50 seconds for the 406.025 MHz transmitter to turn on (transmitter sends out first signal at 50 seconds then every 50 seconds thereafter). Determine the power output from the stored waveform. The 406.025 MHz power output should be 37 dBm +/- 2 dBm (3.16 W min to 7.94 W max).

**4.3.11 (Step 5f) Measure the 406.025 MHz Frequency**

Ensure that adequate attenuation rated for 406.025 MHz, 37 dBm and 5 Watts is installed between the ELT's 406.025 MHz output and the input to the frequency counter to prevent damaging the frequency counter's input circuitry.

Set up the equipment as shown below:

![ELT TPS (Bottom) Connector](image)

Verify an initial frequency of 406.025 MHz +/- 2 KHz.

**NOTE:** Allow the unit to run 30 seconds before making the measurement to allow the oscillator to stabilize.

**4.3.12 (Step 5g) Current Draw Tests**

**CAUTION:** The following tests involve measurements of the lithium battery pack. Exercise extreme caution to avoid causing a short circuit condition which will blow the fuses on the battery pack. It is recommended that only an experienced technician perform these tests.

A test harness (p/n 611-0024) may be ordered from ARTEX Aircraft Supplies at 1-800-547-8901.

All tests must be performed in an RF screen room or with the ELT in a shielded container that will substantially attenuate the RF signal.

All "ON" state current measurements must be made with the RF outputs loaded with 50 ohms rated for 5 Watts (either a resistive load or equipment with 50 ohm impedance padded with 10 dB/ 5 Watt attenuator, i.e. a spectrum analyzer).

**NOTE:** The ELT may activate (turn "ON") when the various connections are initially made during the following current tests. This is normal. Reset the unit to "OFF", if this happens, by toggling the ON/OFF switch to "ON" and back to "OFF".

**“ARM” ("OFF") State Current Measurement:**

- Remove the battery pack as described in Section 4.3.3
- Disconnect the 2-pin harness
- Install the test harness 611-0024 and an in-line ammeter as shown in Figure 4-2
- Ensure the ELT is "OFF".
TEST HARNESS
P/N 611-0024

TO ELT

+ AMMETER

CIRCUIT BOARD IN BATTERY PACK

FIGURE 4-2 TEST HARNESS CONNECTION
• Measure the current with the ammeter. The measured current should be 0 microamps (μA) and not more than 6 μA.

“ON” State Current Measurement:

NOTE: Current draw during this test may exceed 3.5 Amps during the 406.025 MHz burst. Ensure the ammeter is set on the appropriate range to accommodate this level of current.

• Activate the ELT, allow to stabilize.
• The measured steady state current should not exceed 200 milliamps (mA). When the 406.025 MHz module is on (generating the 406.025 MHz burst) the current may exceed 3.5 Amps.
• Turn the ELT “OFF”.
• Disconnect the test harness 611-0024.
• Reconnect the 2-pin module power harness.
• Reinstall the battery pack as described in Section 4.3.4

4.3.13 (Step 5h) Verification of Digital Message

Set up the equipment as shown below:

| ELT TPS (Bottom) Connector | 30 dB min. Attenuator | SARSAT Beacon Test Set |

NOTE: If checking the latitude/longitude, ensure that the aircraft’s navigation system and ELT/NAV Interface are connected and powered on at least 30 seconds prior to activation of the ELT.

Activate the ELT and allow the ELT to transmit 2 to 3 seconds but not more than 5 seconds. The SARSAT Beacon Tester will receive the “test message” transmitted at turn off. If the 406.025 MHz oscillator is not warmed up and stabilized, a “BAD FRAME” message may occur, which could be construed as a problem when, in fact, the message was generated because the oscillator had not warmed up. If a “BAD FRAME” is received, repeat the activation and turn off procedure again. For all testing of the 406 MHz output, only the “test message” that is transmitted at turn off is required to verify the ELT and ELT/NAV Interface function. The test message contains all the information contained in the actual distress message except there is a special digital test prefix that tells the COSPAS/SARSSAT satellites to ignore the message.

Note: The initial display on the SARSAT Beacon Test Set can flag several problems prior to advancing into the individual Page displays described later.

a) if a “BAD FRAME” message appears after the 3rd or 4th transmit attempt, the Beacon Test Set is not receiving transmit data. Verify that the SARSAT Beacon Test Set does not have a low battery. Check the coax connection between the ELT’s TPS connector and the SARSAT Beacon Test Set. Check the internal ELT coax connection between the TPS connector and the 406.025 MHz module. Finally, try a different battery pack.

b) if a “S’ TEST BAD” or “DATA ERROR” message appears, there is a problem with the ELT (i.e. a programming problem or a problem with the transmitter module) or the battery pack.

c) if there is no 406.025 MHz transmitter burst present, check the 3.0 Amp fuse on the circuit board in the battery pack for an open condition. If the fuse is good, there is most likely a problem with the 406.025 MHz module or its interconnections.
NOTE: The example pages shown represent the long message format with 24 bit protocol. Serialized protocol and other possible formats are not shown.

PAGE 2 (VIEW MODE)

VERIFY MESSAGE
RECEIVED "S' TEST OK"

PAGE 3 (VIEW MODE)

VERIFY FREQUENCY AND COUNTRY CODE

PAGE 4 (VIEW MODE)

VERIFY HEX CODE ID: 2DC75B534AFFBFF

PAGE 5 (VIEW MODE)

VERIFY AIRCRAFT ID ADA9A5

FIGURE 4-3A BEACON TEST SET DISPLAYS
PAGE 6 (VIEW MODE)

<table>
<thead>
<tr>
<th>Up</th>
<th>Down</th>
<th>Left</th>
<th>Right</th>
<th>F</th>
<th>L</th>
<th>Q</th>
<th>EP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mesg #1</td>
<td>STD LOC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homing: 121.5 MHz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>BCH: 19A1D7</td>
<td>VALID</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

VERIFY HOMING FREQUENCY

PAGE 7 (VIEW MODE)

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<tr>
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<th>Down</th>
<th>Left</th>
<th>Right</th>
<th>F</th>
<th>L</th>
<th>Q</th>
<th>EP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mesg #1</td>
<td>Other info:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long Mesg.</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

VERIFY LONG MESSAGE

PAGE 8 (VIEW MODE)

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<tr>
<th>Up</th>
<th>Down</th>
<th>Left</th>
<th>Right</th>
<th>F</th>
<th>L</th>
<th>Q</th>
<th>EP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mesg #1</td>
<td>Other info:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lat: 45N23.4</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long: 122W15.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

VERIFY LATITUDE AND LONGITUDE OF 45 DEGREES 23.4 MINUTES NORTH, 122 DEGREES 15.1 MINUTES WEST

PAGE 9 (MENU OPTIONS)

<table>
<thead>
<tr>
<th>SARSAT BEACON TESTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receive</td>
</tr>
<tr>
<td>Erase</td>
</tr>
</tbody>
</table>

PRESS "Q" TO RETURN TO MAIN SCREEN PAGE

FIGURE 4-3B BEACON TEST SET DISPLAYS
24 Bit Address Protocol (Long Message)

Refer to Figure 4-3A and 4-3B for the Beacon Test Set display contents of each specific page described below.

Page 1 is the main menu screen. Press "V" for view to see received message or scroll using "up" and "down" arrow keys to view other messages. Use "left" and "right" arrow keys to scroll between pages.

Page 2 contains the Date and Time that the message was received. Also included is an indication of whether the message was received properly. Verify that the third or bottom line reads "S' TEST OK".

Page 3 is a frequency and country code page. The frequency must read between 406.030 and 406.020 MHz to pass. The programmed country code must be the same country as the aircraft's home base. Verify that the second line of the display reads "PASS". Verify that the country code is the same as the aircraft's home base.

Page 4 contains the complete message in Hexadecimal notation. The third line is an ID string that is unique to the beacon being tested. Verify that ID string on the third line matches the ID printed on the product label of the 406 ELT. NOTE: For ELT's installed with an ELT/NAV Interface where the Interface is used to encode the 24 bit aircraft address, the ELT will be automatically re-programmed by the Interface and will need to be re-labeled with the new 15 digit hex ID string.

Page 5 describes the protocol type, the type of beacon, and the aircraft ID or unit serial number. Verify that the aircraft ID matches the 24 bit address of the aircraft (you will need to convert the aircraft's Octal code to Hex).

Page 6 contains information on the homing transmitter and error checking.

Page 7 contains information confirming that the long message (position data) is present.

Page 8 contains the position data as received from the navigation system. Verify that the position data is present for latitude and longitude if using ELT/NAV Interface.

Page 9 is the main menu screen which is reached by pressing "Q".

Serialized Protocol (Long Message)

For ELT's that are programmed with serialized protocol verify that "S' TEST OK" is displayed on Page 2, verify on Page 3 that the frequency passes and that the correct country is displayed. Verify that the 15 digit hex code displayed on the bottom line of Page 4 matches the 15 digit hex code printed on the ELT product label. If verifying received latitude/longitude, check Page 8. All other information displayed may be disregarded.

Short Message Programmed ELT's

For ELT's that have been programmed for a Short Message protocol verify that "S' TEST OK" is displayed on Page 2, verify on Page 3 that the frequency passes and that the correct country is displayed. Verify that the 15 digit hex code displayed on the bottom line of Page 4 matches the 15 digit hex code printed on the ELT product label. All other information displayed may be disregarded.

NOTE: Contact your local Artex dealer for availability of Portable SARSAT Beacon Test Sets (ARTEX p/n 453-0131) or call Artex direct at 1-800-547-8901.
4.3.14 (Step 5i) Reset ELT

To "RESET" the ELT, move the switch to the "ON" position then back to the "OFF" position.

4.3.15 Step 6 Reinstall ELT

Reinstall the ELT into aircraft as follows:

Insert the ELT into the mounting tray at an angle so that the locking ears at the end opposite the direction-of-flight arrow fit into the mounting tray locking slots. Fit the protective top cover onto the ELT. Ensure that the slots at the end of cover fit over the locking ears on the ELT prior to fitting cover into place at the connector end. Feed the two coax cables through the holes in the end cap and connect them to their respective connections on the ELT. Position the end cap and connector assembly onto the ELT and tighten the two thumbscrews securely. Visually inspect connections ensuring that they are seated properly.

4.3.16 (Step 7) Installed Transmitter Test (Self Test)

Perform the transmitter tests by activating the ELT and listening on 121.5 MHz. Be sure to follow the procedures as outlined under "Transmitter Test" in Section 3.7, page 3-17 of this manual.

- If your ELT front panel indicator light is wired through either the aircraft master or the avionics master switch, make sure these switches are turned on.
- Tune a receiver (usually the aircraft radio) to 121.5 MHz.
- Turn the ELT aircraft panel switch to "ON", wait for 3 sweeps on the receiver, which takes about 1 second, and then turn the switch back to the "ARM" (OFF) position while paying special attention of the LED activity upon entering the "ARM" (OFF) condition.

To pass the test, you must hear the 3 sweeps AND see the front panel light immediately begin to flash continuously. During the ON to OFF transition, the microprocessor in the ELT checks the "G-Switch" (automatic activation switch) latching circuit, pins 5 & 8 on the 12-pin connector at the ELT; the 406.025 MHz transmitter for proper RF output; that position data is present and a battery check. If the ELT is working properly, the sequence following entry to the "ARMED" (OFF) condition will result in the panel LED staying illuminated for approximately 1 second, then extinguishing.

If a problem is detected, the LED provides a coded signal following the initial 1 second pulse. The coded signal and related problem are as follows:

- a) 1 flash indicates a G-switch loop open failure.
- b) 3 flashes indicates a 406.025 MHz transmitter problem (i.e. bad or unconnected coax cable, an antenna problem, low power output or a programming error).
- c) 5 flashes indicates there is no navigation data present. This is most likely due to improper wiring between the system interface connections, improper programming, invalid navigation data or an ELT/NAV Interface unit (453-6500) is not being utilized.
- d) 7 flashes indicates a battery problem (i.e. battery usage time over an hour).

There is a sequence assigned to the problem report which is the same order as listed above. If the G-switch circuit has a failure, there will be a single flash. If there also is a 406.025 MHz transmitt-
IF INSTALLING A NEW BATTERY PACK, REPLACE THE OLD EXPIRATION DATE LABEL WITH THE EXPIRATION DATE LABEL SUPPLIED WITH THE NEW BATTERY PACK. PLACE THE NEW LABEL ON THE EXTERIOR OF THE END CAP WHERE THE ORIGINAL LABEL WAS PlACED, OR WHERE PRACTICAL TO PROVIDE EXTERNAL VISIBILITY.

NOTE: PLUG IS RECESSED IN ELT ASSEMBLY RTV PUDDLE.

BATTERY PACK

REMOVE THE PAPER BACKING FROM THE GASKET STRIP. APPLY A THIN COATING OF SILICONE GREASE (GE G635 OR EQUIVALENT) TO GASKET PRIOR TO INSTALLATION.

SCREW WITH O-RING
PART NUMBER: 217-0606
(4 PLCS)

FIGURE 4-4 ELT/BATTERY PACK EXPLODED VIEW
ter problem then after the single flash and a 1 second pause, 3 flashes would appear.

NOTE: For installations using the ELT/NAV Interface, there is an error condition where the LED on the ELT and remote switch will flash rapidly. This occurs 2 minutes after power is applied to the ELT/NAV Interface if the ELT is not responding because either 1) the ELT is programmed for a protocol other than 24 bit and the ELT/NAV Interface has been strapped for a 24 bit address or 2) the RS-232 TX line from the ELT (pin 12) to the ELT/NAV Interface (pin 10) is not connected.

4.3.17 (Step 8) Antenna Test

Action Notice A 8150.3 advises that:

"A low quality AM broadcast receiver should be used to determine if energy is being transmitted from the antenna. When the antenna of the radio (tuning dial on any setting) is held about 6 inches from the activated ELT antenna, the ELT aural tone will be heard on the AM broadcast receiver. This is not a measured check, but it does provide confidence that the antenna is radiating sufficient power to aid search and rescue. The aircraft's VHF receiver, tuned to 121.5 MHz, may also be used. This receiver, however, is more sensitive and could pick up a weak signal even if the radiating ELT's antenna is disconnected. Thus it does not check the integrity of the ELT system or provide the same level of confidence as does an AM radio."

4.3.18 (Step 9) Logbook Entry

Enter the date the test technician's initials and whether the ELT passed or failed into the aircraft's logbook.

4.4. Summary of Minimum Requirements

4.4.1 Specifications @ 121.5 MHz

- Frequency: 121.5 MHz
- Frequency Tolerance: +/- 6.075 KHz
- Modulation: AM
- Power Output: >= 23.0 dBm

4.4.2 Specifications @ 243.0 MHz

- Frequency: 243.0 MHz
- Frequency Tolerance: +/- 12.15 KHz
- Modulation: AM
- Power Output: >= 23.0 dBm

4.4.3 Specifications @ 406.025 MHz

- Frequency: 406.025 MHz
- Frequency Tolerance: +/- 2 KHz
- Modulation: Bi-phase L
- Power Output: 37.0 dBm +/- 2 dBm

4.4.4 Transmitter Test

Perform the transmitter tests by activating the ELT and listening on 121.5 MHz.

An amplitude modulation (AM) broadcast radio receiver should be used to determine if energy is being transmitted from the antenna (see section 4.3.17).

NOTE: All ELT "ON" tests should be performed within the first five minutes after the hour UTC.
• Carefully disconnect the harness from the 8-pin connector on the small circuit board in the battery pack. Do not short connector pins.
• Disconnect 2-pin harness.

Inspect the battery pack and underside of ELT. Battery cells, components and connectors should be corrosion free. The underside of ELT should be corrosion free. Inspect for any broken wires or connections. Ensure the battery housing is free of cracks or other visible damage.

The battery pack must be replaced with a new one:

• After use in an emergency;
• After an inadvertent activation of unknown duration;
• When the total of all known transmissions exceeds one hour;
• The battery pack must be replaced on or before the battery expiration date shown on the battery label.

When installing a new battery pack, remove the paper backing from the rubber seal at the connector end of the battery pack. It is recommended that this seal be coated with a non-petroleum based silicone grease (i.e. GE G-635) to provide a moisture resistant seal once the battery is installed.

To replace/reinstall the battery pack, connect the 8-pin connector to the header on the circuit board in the battery pack.

Connect the 2-pin connector to the recessed connector inside the ELT body. This step will cause the ELT to activate. Reset the ELT by toggling the "ON/OFF" switch on the ELT from "ON" to "OFF". Reseat the battery pack on the ELT, dressing the harness wires away from the standoffs to avoid pinching the wires between the battery pack and the standoffs.

Connect the SARSAT Beacon Test Set, through a 30 dB (minimum) attenuator, to the ELT's TPS connector. Activate the ELT and allow the ELT to transmit 3 to 4 406.025 MHz bursts. Thereupon, verify that there is not a "BAD FRAME" or NORMAL BAD* message on the Test Set display which would indicate a problem with the battery pack (i.e. a bad IC on the battery circuit board).

Install the four Phillips head screws and tighten securely. Do not over torque the screws.

Once the ELT has been tested, as applicable, and reinstalled in the aircraft as described in this chapter, apply the battery expiration date label provided with the battery pack to the exterior of the ELT (i.e. on the end cap or other visible location).

Enter pertinent battery replacement information in the aircraft log book and fill out any other documentation required by local authority.

If you have any questions regarding the Battery Pack Replacement Procedure, please contact Artex Aircraft Supplies at 1-800-547-8901.
the battery pack to the exterior of the ELT (i.e. on the end cap or other visible location).

Enter pertinent battery replacement information in the aircraft log book and fill out any other documentation required by local authority.

If you have any questions regarding the Battery Pack Replacement Procedure, please contact Artex Aircraft Supplies at 1-800-547-8901.
SPECIFICATIONS & APPROVALS
<table>
<thead>
<tr>
<th>ELECTRICAL CHARACTERISTICS</th>
<th>121.5/243.0 MHz</th>
<th>406.025 MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPERATING FREQUENCIES</td>
<td>121.5 &amp; 243.0 MHz +/- 0.005%</td>
<td>406.025 MHz +/- 2 KHz (initial) +/- 5 KHz (5 years) 2 parts/10E9 in 100ms</td>
</tr>
<tr>
<td>MODULATION</td>
<td>AMPLITUDE MODULATION (A3X)</td>
<td>BI-PHASE L (G1D)</td>
</tr>
<tr>
<td>TRANSMITTER DUTY CYCLE</td>
<td>CONTINUOUS</td>
<td>440 mSec (+/-1%) or 520 mSec (+/-1%) every 50 seconds (+/- 5%)</td>
</tr>
<tr>
<td>PEAK EFFECTIVE RADIATED POWER (PERP)</td>
<td>Minimum 50mW (17dBm) PERP for 50 hours at -20C or 100mW EIRP (20dBm) for 48 hours at -20C</td>
<td>5 Watts (37 dBm +/- 2dBm) PERP or EIRP for 24 hours at -20 C</td>
</tr>
<tr>
<td>OCCUPIED BANDWIDTH</td>
<td>25 KHz Maximum</td>
<td>20 KHz Maximum</td>
</tr>
<tr>
<td>OPERATING TEMPERATURE</td>
<td>-20°C TO +70°C</td>
<td>-20°C TO +70°C</td>
</tr>
<tr>
<td>AUTOMATIC ACTIVATION</td>
<td>VELOCITY CHANGE OF 4.5 FT./SECOND</td>
<td>VELOCITY CHANGE OF 4.5 FT./SECOND</td>
</tr>
<tr>
<td>ENVIRONMENTAL CHARACTERISTICS</td>
<td>121.5/243.0 MHz</td>
<td>406.025 MHz</td>
</tr>
<tr>
<td>TEMP (STORAGE)</td>
<td>-55°C TO +85°C</td>
<td>-55°C TO +85°C</td>
</tr>
<tr>
<td>TEMP (OPERATING)</td>
<td>-20°C TO +70°C</td>
<td>-20°C TO +70°C</td>
</tr>
<tr>
<td>ALTITUDE,</td>
<td>55,000 FEET</td>
<td>55,000 FEET</td>
</tr>
<tr>
<td>VIBRATION</td>
<td>10G's, 5Hz TO 2,000 Hz</td>
<td>10G's, 5Hz TO 2,000 Hz</td>
</tr>
<tr>
<td>SHOCK TEST</td>
<td>500Gs FOR 4 mSec</td>
<td>500Gs FOR 4 mSec</td>
</tr>
<tr>
<td>-----------------</td>
<td>------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>CRASHWORTHINESS</td>
<td>100Gs FOR 23 mSec</td>
<td>100Gs FOR 23 mSec</td>
</tr>
<tr>
<td>HUMIDITY</td>
<td>95% FOR 50 HOURS</td>
<td>95% FOR 50 HOURS</td>
</tr>
<tr>
<td>PENETRATOR DROP</td>
<td>55LBS FROM 6 INCHES</td>
<td>55LBS FROM 6 INCHES</td>
</tr>
<tr>
<td>CRUSH TEST</td>
<td>1,000 LBS</td>
<td>1,000 LBS</td>
</tr>
<tr>
<td>SPURIOUS EMISSIONS</td>
<td>AS PER CFR TITLE 47 (FCC) PART 87</td>
<td>AS PER RTCA/DO-204</td>
</tr>
<tr>
<td>ANTENNA</td>
<td>121.5/243.0 MHz</td>
<td>406.025 MHz</td>
</tr>
<tr>
<td>TYPE</td>
<td>VERTICAL MONOPOLE</td>
<td>VERTICAL MONOPOLE</td>
</tr>
<tr>
<td>RADIATION PATTERN</td>
<td>OMNIDIRECTIONAL</td>
<td>HEMISPHERICAL</td>
</tr>
<tr>
<td>IMPEDANCE</td>
<td>50 OHMS NOMINAL AT 121.5 AND 243.0 MHz</td>
<td>50 OHMS NOMINAL/VSWR LESS THAN 1.5:1</td>
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<tr>
<td>CABLE</td>
<td>RG-400 WITH BNC CONNECTORS</td>
<td>RG-400 WITH TPS AND TNC CONNECTORS</td>
</tr>
<tr>
<td>WEIGHTS</td>
<td>G406-4</td>
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<tr>
<td>ELT UNIT</td>
<td>3 LB 5.8 OZ. Max.</td>
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<tr>
<td>MOUNTING TRAY</td>
<td>7.68 OZ.</td>
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</tr>
<tr>
<td>PROTECTIVE TOP COVER</td>
<td>7.36 OZ.</td>
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</tr>
<tr>
<td>END CAP</td>
<td>4.16 OZ.</td>
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<tr>
<td>ANTE NNA</td>
<td>PART# 110-320 - 7.5 OZ. MAXIMUM</td>
<td>PART# 110-324 - 2.5 OZ. MAXIMUM</td>
</tr>
<tr>
<td>------------------</td>
<td>--------------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>MEASUREMENTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELT WITH MOUNTING TRAY, PROTECTIVE TOP COVER AND END CAP INSTALLED</td>
<td>11.625&quot; L x 3.90&quot; H x 3.76&quot; W</td>
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<tr>
<td>ANTENNA</td>
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<td></td>
</tr>
<tr>
<td>110-320</td>
<td></td>
<td></td>
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<tr>
<td>110-324</td>
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<td></td>
</tr>
<tr>
<td>110-329</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HEIGHT (MAXIMUM)</td>
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</tr>
<tr>
<td>16.50&quot; (BASE-TO-TIP HEIGHT)</td>
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<td></td>
</tr>
<tr>
<td>19.11&quot; (BASE-TO-TIP HEIGHT)</td>
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<td></td>
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<tr>
<td>7.83&quot; (BASE-TO-TIP HEIGHT)</td>
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<td></td>
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<tr>
<td>BATTERY SPECIFICATIONS</td>
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<td></td>
</tr>
<tr>
<td>TYPE OF CELL</td>
<td>LITHIUM MANGANESE DIOXIDE</td>
<td></td>
</tr>
<tr>
<td>VOLTAGE</td>
<td>12.0 VOLTS</td>
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</tr>
<tr>
<td>AMP HOUR RATING</td>
<td>10.0 AMP/HOURS</td>
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</tr>
<tr>
<td>REPLACEMENT BATTERY PACK NUMBER</td>
<td>PART NUMBER: 452-0222 - G406 LITHIUM BATTERY PACK (YELLOW PLASTIC)</td>
<td></td>
</tr>
</tbody>
</table>
5.1 G406-4 MODEL
DESCRIPTION

Note: The G406-4 ELT is directly compatible with the ELT/NAV Interface Unit (453-6500) when programmed with Long Message Standard Location protocol.

G406-4: The G406-4 is a Type AF (Automatic Fixed) ELT which transmits on 121.5, 243.0 and 406.025 MHz. The ELT is enclosed within a multi-piece housing consisting of a mounting tray, a protective top cover and an end cap. It is available as a complete system which includes an installation kit, a remote cockpit panel, two coax cables, an audible buzzer and an antenna.
5.2 APPROVALS:

G406-4

- FAA TSO C126 (Environmental Categories: C1-BA204XRXXXXXZZAZZ204BXXX) TYPE AF ELT
- COSPAS/SARSAT (Certificate No. 112)
- Transport Canada Type Certificate AP-47
- Industry Canada Approval Certification Number 1215873110AF
- ETSO-2C126
G406-4

RTCA/DO-160D ENVIRONMENTAL QUALIFICATION FORM

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>SECTION</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>C1</td>
<td>4.0</td>
<td>TEMP/ALT</td>
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<td></td>
<td>4.5.4</td>
<td>IN-FLIGHT LOSS OF COOLING</td>
</tr>
<tr>
<td>B</td>
<td>5.0</td>
<td>TEMPERATURE VARIATION</td>
</tr>
<tr>
<td>A</td>
<td>6.0</td>
<td>HUMIDITY</td>
</tr>
<tr>
<td>204</td>
<td>7.0</td>
<td>OPERATIONAL SHOCK AND CRASH SAFETY</td>
</tr>
<tr>
<td>204</td>
<td>8.0</td>
<td>VIBRATION</td>
</tr>
<tr>
<td>X</td>
<td>9.0</td>
<td>EXPLOSION</td>
</tr>
<tr>
<td>R</td>
<td>10.0</td>
<td>WATERPROOFNESS</td>
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<tr>
<td>X</td>
<td>11.0</td>
<td>FLUIDS SUSCEPTIBILITY</td>
</tr>
<tr>
<td>X</td>
<td>12.0</td>
<td>SAND AND DUST</td>
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<tr>
<td>X</td>
<td>13.0</td>
<td>FUNGUS</td>
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<tr>
<td>X</td>
<td>14.0</td>
<td>SALT SPRAY</td>
</tr>
<tr>
<td>X</td>
<td>15.0</td>
<td>MAGNETIC EFFECT</td>
</tr>
<tr>
<td>Z</td>
<td>16.0</td>
<td>POWER INPUT</td>
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<tr>
<td>A</td>
<td>17.0</td>
<td>VOLTAGE SPIKE</td>
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<tr>
<td>Z</td>
<td>18.0</td>
<td>AUDIO FREQUENCY SUSCEPTIBILITY</td>
</tr>
<tr>
<td>Z</td>
<td>19.0</td>
<td>INDUCED SIGNAL SUSCEPTIBILITY</td>
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<tr>
<td>204</td>
<td>20.0</td>
<td>RADIO FREQUENCY SUSCEPTIBILITY</td>
</tr>
<tr>
<td>B</td>
<td>21.0</td>
<td>EMISSION OF RF ENERGY</td>
</tr>
<tr>
<td>X</td>
<td>22.0</td>
<td>LIGHTNING</td>
</tr>
<tr>
<td>X</td>
<td>23.0</td>
<td>LIGHTNING DIRECT EFFECTS</td>
</tr>
<tr>
<td>X</td>
<td>24.0</td>
<td>ICING</td>
</tr>
</tbody>
</table>

DO-160D Environmental Category for Nameplate:

C1-BA204XRXXXXXZAZ204BXXX
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APPENDIX A

DOCUMENTATION & LICENSE DATA
A.1. Available Documentation

An available document, which is highly recommended but not required, is Document No. RTCA/DO-182 entitled “Emergency Locator Transmitter (ELT) Equipment Installation and Performance” and may be obtained from:

RTCA Secretariat  
1140 Connecticut Avenue, N.W.  
Suite 1020  
Washington, D.C. 20036-4001  
(202) 833-9339

CAUTION:

Installation in a pressurized aircraft constitutes a major modification, consult the Department of Transport Regional Officer before proceeding.

A.2. Radio Station License Data

With a current Private Aircraft Radio Station License, no further station licensing is required for the ELT installation.

A Private Aircraft Radio Station license may be obtained by filing FCC form 404.

The ELT may be installed, used and tested for up to 30 days without a station license after submittal of the FCC Form 404 and while awaiting receipt of the station license, provided a copy of the submitted FCC Form 404 is kept in the aircraft.

Installation and use in countries other than the U.S.A. shall be in accordance with that country’s licensing regulations and in conjunction with the manual.
APPENDIX B

REGISTRATION REQUIREMENTS
B.1. REGISTRATION

When a 406.025 MHz ELT is installed in an aircraft, it is imperative that the aircraft owner register the ELT. In the United States the National Oceanic and Atmospheric Administration (NOAA) is the registration agency. Each 406.025 MHz ELT contains a unique identification code that is transmitted to the satellite. This helps the “Rescue Coordination Center” (RCC) determine whether an emergency actually has occurred. The unique identification permits accessing a data base. In the United States the data base contains the following:

- Owner's Name
- Address
- Telephone Number
- Aircraft Type
- Aircraft Registration Number

This data facilitates inquiries as to the whereabouts of the aircraft, the existence of a flight plan and so forth. The above information should be kept up to date, with any changes to the data corrected (i.e. change of address, phone numbers, etc.).

The following address should be used to register and obtain information on how to register 406 MHz ELT's in the United States:

NOAA/SARSAT
E/SP3/FB4, Room 3320
5200 Auth Rd.
Suitland, MD 20746-4304
or: 1-888-212-SAVE (7283) or 301-457-5678

Registration forms are available at www.sarsat.noaa.gov.

**WARNING:** If the ELT is moved to a different aircraft than which it was originally registered with, the ELT must be re-registered and the product label re-marked to indicate the new programming and/or new country of registry.

If the 406.028 Mhz ELT is to be used in a country other than the United States or Canada, the Civil Aviation Authority in the applicable country must be contacted to obtain the correct registration form.

Refer to Cospas/Sarsat Documents G.005 and S.007 for information regarding ELT programming and registration, available at www.cospas-sarsat.org.
APPENDIX C

SYSTEM COMPONENT PART NUMBERS
C.1. SYSTEM & SUB-COMPONENT PART NUMBERS

The G406-4 series ELT's are available in three basic versions:

<table>
<thead>
<tr>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The G406-4 Base Pack List</td>
<td>455-5018-___</td>
</tr>
<tr>
<td>The G406-4 with Rod Antenna</td>
<td>455-5019-___</td>
</tr>
<tr>
<td>The G406-4 with Whip Antennas</td>
<td>455-5044-___</td>
</tr>
</tbody>
</table>

The above part numbers are for complete systems which include the ELT; a mounting tray; a protective top cover; an end cap; a remote switch kit; an antenna; an installation kit; a 6 foot BNC to BNC coax cable; a 6 foot TNC to TPS coax cable; an audible alert (buzzer); an Installation & Operation Manual; a warranty card; and an applicable beacon registration card.

The bracketed extension following the part number is a variable three digit number that signifies the Country Code. This identifies the county in which the ELT will be registered and for which the ELT is programmed. The Country Code designations are established by the COSPAS/SARSAT Secretariat. When ordering a G406 system or main assembly, it is necessary to inform ARTEX of the country of registry and the programming format required, so that the ELT can be programmed accordingly.

The part numbers for individual Line Replaceable components are listed below:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>PART NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>G406-4</td>
<td>Main Assembly, G406-4</td>
<td>453-5012-___</td>
</tr>
<tr>
<td>Rod Antenna</td>
<td>Antenna, 406 Rod</td>
<td>110-320</td>
</tr>
<tr>
<td>Whip Antenna</td>
<td>Antenna, Whip w/ Inductor</td>
<td>110-324</td>
</tr>
<tr>
<td>Whip Antenna</td>
<td>Antenna, 406 Whip</td>
<td>110-329</td>
</tr>
<tr>
<td>Battery Pack</td>
<td>Lithium Battery Pack, Yellow</td>
<td>452-0222</td>
</tr>
<tr>
<td>End Cap</td>
<td>Mounting Cap Assy, Yellow</td>
<td>452-0228</td>
</tr>
<tr>
<td>Protective Top</td>
<td>Protective Top Cover Assy, Yellow</td>
<td>452-0224</td>
</tr>
<tr>
<td>Mounting Tray</td>
<td>Mounting Tray Assy, Yellow</td>
<td>452-0227</td>
</tr>
<tr>
<td>Remote Switch</td>
<td>406 Remote Switch Kit</td>
<td>345-6196-04</td>
</tr>
<tr>
<td>BNC-BNC Coax Cable</td>
<td>Cable, Coax BNC-BNC 6 Ft</td>
<td>611-6013-04</td>
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<td>TNC-TPS Coax Cable</td>
<td>Cable, Coax TNC-TPS 6 Ft</td>
<td>611-6052</td>
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<td>Buzzer</td>
<td>Buzzer</td>
<td>130-4004</td>
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<tr>
<td>Installation Kit</td>
<td>Installation Kit, ELT</td>
<td>455-7421</td>
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<tr>
<td>Install Kit</td>
<td>Install Kit, Standard Remote Switch</td>
<td>455-6196</td>
</tr>
<tr>
<td>Manual</td>
<td>Installation and Operation Manual</td>
<td>570-5012</td>
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APPENDIX D

ELT/NAV INTERFACE OPERATION
D.1. ELT/NAV Interface Capability

ARTEX has enhanced 406 MHz ELT operation by giving the G406-4 the capability of interfacing with an aircraft navigation system.

The G406-4 has the ability to receive position data (longitude and latitude) from the aircraft's on-board navigation system. The communication process between the ELT and the aircraft navigation system is made possible by installing an ARTEX ELT to NAV Interface unit (453-6500).

The Interface unit also allows the ELT to be programmed with the aircraft's 24 bit address. When used with ELT's that are programmed for long message 24 bit protocol, the Interface unit may be wired with the 24 bit address or may be connected to a 24 bit address switch block which is set up to match the 24 bit address parity of the Mode S surveillance and communications system switch block. **Note:** There is no electronic connection between TCAS or Mode S systems and the ELT/NAV Interface, only the ID number is common. This feature was implemented in the ELT/NAV Interface unit with fleet operators in mind.

ELT's are programmed with either a serialized or 24 bit protocol. Both will interface with the ELT/NAV Interface to provide position data as part of the 406.025 MHz distress message however, only ELT's programmed with 24 bit protocol may be used with the 24 bit address function of the ELT/NAV Interface.

In the event of a crash, the ELT will transmit the converted position information from the navigation system, such as the GPS flight management computer, Ioran, etc. Geostationary satellites constantly monitor the 406.025 MHz transmissions. The crash site is instantly known due to the aircraft's navigation system position data communication with the ELT via the Interface unit. Without the position data being transmitted, it is necessary for the polar orbiting satellites to pass overhead, using Doppler Shift technology to determine position. In a worst case scenario this could be a 3 to 4 hour wait for a polar orbiting satellite to pass over. In addition, the accuracy of the position fix is much better (i.e. 100 meters versus 1 to 2 kilometers for the standard 406.025 MHz system without interface coupling). The Interface unit supports either ARINC 429 or RS-232 data bus formats. An additional feature of the Interface unit is the ability to automatically reprogram the ELT with the aircraft's 24 bit identification (long message format). This facilitates moving the ELT from one aircraft to another when performing routine maintenance, etc.

**WARNING:** The programming and labeling of the ELT must match the aircraft it is installed in. The product label will need to be re-marked to reflect the new programming and/or country of registry if a 24-Bit address long message protocol ELT is reprogrammed by an ELT/NAV Interface. Re-registration may not be required if the contact information does not change, however, contact your local civil aviation or beacon registration authority when in doubt. A serialized long message programmed ELT that is moved to another aircraft will only need to be re-registered.

The Interface unit will automatically reprogram an ELT (if programmed for long message 24 bit protocol), overwriting previously stored data, every time the Interface unit determines that a new ELT with a different 24 bit aircraft address has been placed in the aircraft.

The standard choice of programming which ARTEX Aircraft Supplies, Inc. provides is serialized long message protocol. The serialized long message protocol can
be used with or without the ELT/NAV Interface unit. The ELT/NAV Interface unit is required to interface with the aircraft navigation system and enables the ELT to transmit position data. The ELT can be used without the ELT/NAV Interface unit, however, the serialized long message will not have position data included.

The 24 bit address long message protocol allows the ELT (when used with the ELT/NAV Interface) to be automatically programmed with the aircraft's 24 bit address as well as transmission of position data. The Interface unit should be wired for the 24 bit address (binary "1" to ground) or connected to a 24 bit address switch block which is configured to match the 24 bit address for the aircraft's Mode S transponder system. The 24 bit wiring will allow the ELT to automatically program itself to the aircraft's 24 bit address. This feature will allow the ELT to be transferred between aircraft without having to reprogram or re-register the ELT with the Search and Rescue authority provided that the contact information remains the same and the aircraft previously was installed with an Artex 24 bit address long message ELT). This makes maintenance of the ELT a simple matter of replacing the ELT.

The user must specify 24-bit long message programming when ordering the ELT. Changing the programming protocol of the ELT can only be done at Artex or an authorized Artex Repair Station.

Figure D-1 depicts the typical installation configuration of the ELT, ELT/NAV Interface and related interconnections. Figure D-2 shows the wiring interconnection for the ELT with an ELT/NAV Interface.

D.2. ELT/NAV Interface Communication Formats

The ELT/NAV Interface unit supports ARINC 429 and RS-232 data bus formats.

All ARINC 429 Standard and GAMA (high or low speed) serial bus formats are supported. Labels 310 (latitude) and 311 (longitude) are required. Other data formats such as RS-485 are not supported.

The only RS-232 format which is supported is limited to the following conditions:

- Baud Rate (fixed): 9600
- Parity: None
- Data Bits: 8
- Stop Bits: 1

In addition the RS-232 format must have a Start of Text (STX): an "A" identifier for latitude; a "B" identifier for longitude and END of Text (ETX). The format expects carriage returns but will not operate if there are line feeds.

The following manufacturer's navigation systems are known to interface with the ELT/NAV Interface system:

**ARNAV SYSTEMS INC.:**
- R50, R50i, STAR 5000, FMS 5000, MFD (Multi-Functional Display).

**II MORROW:**
- FLYBUDDY, 2001 NMS

**BENDIX-KING:**
- KLN 88, KLN 90

**TRIMBLE:**
- NAV 1000, NAV 2000, TNL 2100, and TNL3100. The following Trimble systems all require a RS-422 to RS-232 adapter: NAV 3000, TNL 1000, TNL

For other equipment models contact that equipment manufacturer to determine if their equipment supports the ARINC 429 or RS-232 format specified above.

D.3. Installation and Checkout Process

All installation processes and interconnections to navigation systems should adhere to the guidelines set forth in the FAA Advisory Circulars AC43.13-1A, 43.13-2A, 20-130A and 20-138, or later revisions of these documents. It is very important that the Global Positioning System/Flight Management Computer (GPS/FMC) manufacturer's installation instructions be consulted regarding installation details that may be specific to the GPS/FMC. Refer to the installation instructions specific to the GPS/FMC that you are connecting the ARTEX ELT/NAV Interface unit to for specific instructions.

For all testing of the 406 MHz output, only the "test message" that is transmitted at turn off is required to verify the ELT and ELT/NAV Interface function.

Follow the installation instructions provided in the ARTEX ELT/NAV Interface Installation and Operation Manual (570-4602) for details regarding the installation of the applicable ELT/NAV Interface unit (453-6500).

It is extremely important that the ELT/NAV Interface installation not be in conflict with the GPS/FMC manufacturer's installation instructions in order to avoid an installation that may degrade the GPS/FMC performance. As a result, the Post Installation checkout in the GPS/FMC Installation Manual must be followed after installing the ELT/NAV Interface box.

D.4. 24 Bit Address Installation Test (mandatory for installations using the 24 bit address auto reprogramming feature)

The following test sequence is required for new installations using the 24-bit address auto-reprogramming feature to test the wiring of the 24-bit address and to re-label the ELT. A Sartech 406 MHz beacon test set (Artex part number 453-0131, available as part of Kit 455-9010-01 which contains the coax cable and attenuator required for testing) is required to complete this test. First, locate the steps described in section 4.3.13 "Verification of Digital Message". This will instruct you how to extract the 15 digit hex code. Realize that the Artex 406 MHz ELT transmits a 406 MHz message upon reset, which is encoded such that it will be ignored by the SAR satellite system. This 15-digit number is used to register the ELT with the appropriate 406 MHz ELT registration authority. In the US, the National Oceanic and Atmospheric Administration (NOAA) maintains the database of registered ELT's. Although a typical 15 digit hex code can contain position data, the 15-digit ID used for registration purposes shall contain the "default" value of no position data instead (this is indicated by the last 5 digits of the 15 digit hex code being "FFBFF").

1. After the ELT/NAV Interface installation is complete and all wiring has been checked, apply power (+28 Vdc) to the
ELT/NAV Interface (the ELT will remain OFF). The aircraft address will be automatically programmed into the ELT within the next 30 seconds. Monitor the ELT for the next 2 minutes. If the ELT/NAV Interface is unable to program the address to the ELT, the light on the ELT will begin to flash rapidly after 2 minutes. If this error occurs, clear the ELT by cycling the switch from OFF to ON and back to OFF. This error occurs when either of these two conditions exists:

- 1) The ELT is not a "long message 24 bit address" programmed unit and is not able to accept the aircraft address. Verify that "999" follows the part number on the ELT product label.
- 2) There is a wiring error between the ELT/NAV Interface and the ELT. Verify the wiring.

2. If no error occurs, the ELT has been programmed with the new aircraft ID. The ELT now needs to be checked to determine the new 15 digit Hex ID that needs to be labeled and registered. The following should be performed with either the ELT/NAV Interface or navigation source powered OFF at least 30 seconds prior to testing. Latitude and longitude are not being checked at this time.

3. Disconnect both antenna coax cables at the ELT. Although part of the kit, the antenna provided with the SARSAT 406MHz test set must not be used because the ELT transmission will reach the SAR satellite and could cause a false alarm.

4. Terminate 121.5 MHz (BNC) output with a 50-ohm terminator.

5. Connect Test Coax (611-9010) to 406 MHz (TPS) output.

6. Connect 30-dB attenuator (500-3000) to input of SARSAT Tester.

7. Connect BNC end of Test Coax to 30-dB attenuator. WARNING: Use of Test Set without 30-dB attenuator may damage Test Set.

8. Press "ON" button on Test Set keypad. Main menu will appear. Press "R" to receive.

9. Reset the ELT by turning the switch to "OFF". Watch the screen on the SARSAT Tester. When a 406 MHz signal is received the tester will beep and the screen will show "Decoding Message".

10. If the SARSAT Tester receives a good signal the receiver will beep again and show "OK" and then return to the original screen.

11. If the Tester doesn't receive a good signal, it may display a message saying "BAD FRAME". Repeat transmission sequence over again from step 9.

12. Press "V" for View on the SARSAT Tester.

13. Press the "right" arrow key twice to show the 15 digit ID. The 15 digit ID will be the last line on the screen (for this example "2DC75B534AFFBFF"). This is what needs to be on the label that is placed on the ELT and what is registered. Please note that the last 5 digits should always be "FFBFF".

14. Press the "right" arrow key again to check the 24-bit address. The Aircraft # displayed on the last line is the Hexadecimal equivalent of the 24-bit address that the ELT/NAV Interface is wired for (for this example "ADA9A5" is the same as octal 53324645).

15. There are additional screens that can be viewed but they are not required for purposes of this exercise and should be ignored.
16. To turn off the SARSAT Tester, press "Q" to get back to the main menu and then "Q" (for Quit).

Please note that the 15 digit hex code received ends with "FFBFF". This indicates the default value of "no position data", which is desired by the registration authority.

After obtaining the new 15 digit hex code from the steps performed above it is essential that the ELT be registered. Registration forms for the US can be obtained from Artex or by calling NOAA at 1-888-212-SAVE or visit the NOAA website at www.sarsat.noaa.gov and click on "Beacon Registration Forms". The ELT will also need to be labeled with this new 15 digit hex code. Enter the number in the space provided on the ELT product label or use the label (591-0999) provided in the install kit.

**NOTE:** Additional detailed information is contained in Instruction Sheet 571-0999-01 available from Artex and supplied with new Sarotech Test Sets (sales and rentals).

**D.5. ELT to NAV Interface Information**

For details on the installation and use of the ELT/NAV Interface unit, please contact ARTEX Aircraft Supplies, Inc., at the following: Tel: (503) 678-7929, 1-(800) 547-8901 or FAX: (503) 678-7930 to request the brochures and Installation and Operation Manual (570-4602) for the applicable ELT/NAV Interface unit.

**D.6. DGL-1 "Dongle"**

For installations where the position data function of the ELT/NAV Interface is not desired but only the ability to program the ELT the aircraft’s 24 bit address, Artex offers the DGL-1 "Dongle". When used with ELT's that are programmed for Standard Location 24 bit protocol, the DGL-1 (P/N 453-4010) will allow the ELT to automatically program itself to the aircraft’s 24 bit address. This feature will allow the ELT to be transferred between aircraft without having to reprogram or re-register the ELT with the Search and Rescue authority. This makes maintenance of the ELT a simple matter of replacing the ELT. **Note:** There is no electronic connection between TCAS or Mode S systems and the DGL-1, only the ID number is common; also there is no position data function supported by the DGL-1.

The DGL-1 is available as a complete kit (P/N 455-4010). For more details on the installation and use of the DGL-1, please contact ARTEX Aircraft Supplies, Inc., at the following: Tel: (503) 678-7929 1-(800) 547-8901 or FAX: (503) 678-7930 to request a brochure and the Installation and Operation Manual (570-4010) for the DGL-1.
TO ELT ANTENNA'S

ELT

ELT/NAV INTERFACE

OPTIONAL 24 BIT ADDRESS WIRED HERE

TO REMOTE PANEL AND ARINC-429 OR RS-232

FIGURE D-1 ELT/NAV INTERFACE INSTALLATION OVERVIEW
FIGURE D-2 ELT/NAV INTERFACE TO ELT WIRING DIAGRAM