

COBHAM



**DESCRIPTION, OPERATION, INSTALLATION AND
MAINTENANCE MANUAL
ME406 ELT**

570-1600 Rev. G

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1. Introduction, Description and Operation

1.1 Basic Information

This manual describes the operation, installation and maintenance of the Artex models ME406 and ME406HM emergency locator transmitters (ELTs). The information is provided to ensure initial and continued airworthiness. Information presented in this manual is accurate at time of printing, but is subject to change. Refer to the Artex web site at www.artex.net for the latest information and any updates to this manual.

Web links provided in this manual were accurate at time of printing but may be subject to change.

Artex reserves the right to add approved components to the ELT installation system including but not limited to antennas, remote switches and coaxial cables. These changes are approved as "minor changes" pursuant to FAR 21, Subpart O for TSO holders.

Regulatory references are aimed at FAA and EASA requirements. Consult your national aviation authority for requirements if you are located outside of a US or EASA member state.

This edition contains information specific to installations in Canada.

1.2 Application

This manual constitutes supporting data/documentation for installation.

See section 3.1 of this manual (FAA Form 337) for a more detailed explanation of required documentation.

Canadian users must follow the requirements of Canadian Aviation Regulations Part V, CAR 551.104. Other countries may have different requirements.

The conditions and tests required for TSO approval of this article are minimum performance standards. It is the responsibility of those installing this article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the standards applicable to the TSO article including the integrated non-TSO function. TSO articles must have separate approval for installation in an aircraft. The article may be installed only if performed under 14 CFR part 43 or the applicable airworthiness requirements.

The ME406 or ME406HM ELT described in this manual was designed, tested and certified as a complete system including the following components:

- ELT Transmitter w/ integral battery
- ELT Mounting Tray
- ELT Antenna
- ELT Remote Switch

Only Artex approved system components may be used for a TSO approved system.

1.3 Description

The ME406 and the ME406HM are type AF (automatic fixed) beacons.

The ME406HM also features an additional 5 axis G-switch module that allows the ELT to be activated in any of six axes. These 5 auxiliary "G" switches are a "non-TSO function" as described in FAA Notice 8150.3. This "non-TSO" function has the following characteristics:

1. The additional 5 auxiliary "G" switches provide crash sensing in the axes other than "forward" at a nominal 12 "G" threshold which may be encountered with rotor aircraft. There is no effect on any other performance specifications, software, hardware, environmental, or qualification levels.
2. There are no additional interface requirements for the non-TSO function.
3. There are no additional installation and operating instructions or limitations, or any additional instructions for continued airworthiness (ICA), for the non-TSO function.
4. Artex has determined that there are no additional failure modes or hazards introduced by use of the non-TSO function.

Inputs and outputs are protected against electrostatic discharge (ESD) and connections to +28V or ground. If a terminal is inadvertently misconnected or a wire shorted, the ME406 will operate normally after the condition has been corrected. The RF output is through a single BNC connector.

All functions of the ME406 or ME406HM are under microprocessor control. A self-test routine checks ELT operation and installation, then presents the results as visual and auditory 'error codes' to aid in troubleshooting and to indicate status. Software is approved per the requirements of RTCA/DO-178B for Level D software.

The battery pack consists of two D-size, lithium cells mounted in a cover assembly and is field replaceable. Rated life is 6 years or one hour of use, whichever ever comes first, as specified by FAR 91.207(c).

Installation kits are available containing all major components needed to install the beacon.

1.4 Certification

The ME406 (P/N 453-6603) and ME406HM (P/N 453-6604) are certified to the following:

- TSO C126
- TSO C91a in the 121.5/406 MHz configuration as referenced in TSO-C126, paragraph (e)
- FAR Part 91 – mandatory automatic ELT requirements
- ETSO 2C126
- Transport Canada
- Industry Canada (IC:121.5B-ME406AF)

- COSPAS-SARSAT T.001 and T.007
- 47 CFR Part 87 (FCC requirements)

Note: Per FCC regulations 47 CFR § 2.902, the ELT is tested per "Verification" method, the FCC does not issue certificates for ELTs. The FCC identifier grantee code for Artex is H4K.

1.5 Programming

The ME406 or ME406HM is pre-programmed at the factory using a short message format. The following User Protocols are supported:

- Serial Number
- Tail Number
- 24-Bit Aircraft Address
- Aircraft Operator Designator/Serial Number

The ME406 does not currently support long message format or Location Protocols. For a complete discussion of ELT programming protocols please see COSPAS-SARSAT documents G.005 and T.001 available at www.cospas-sarsat.org.

The United States accepts the above listed protocols. For use outside of the US, contact your local civil aviation authority for accepted or required programming protocols.

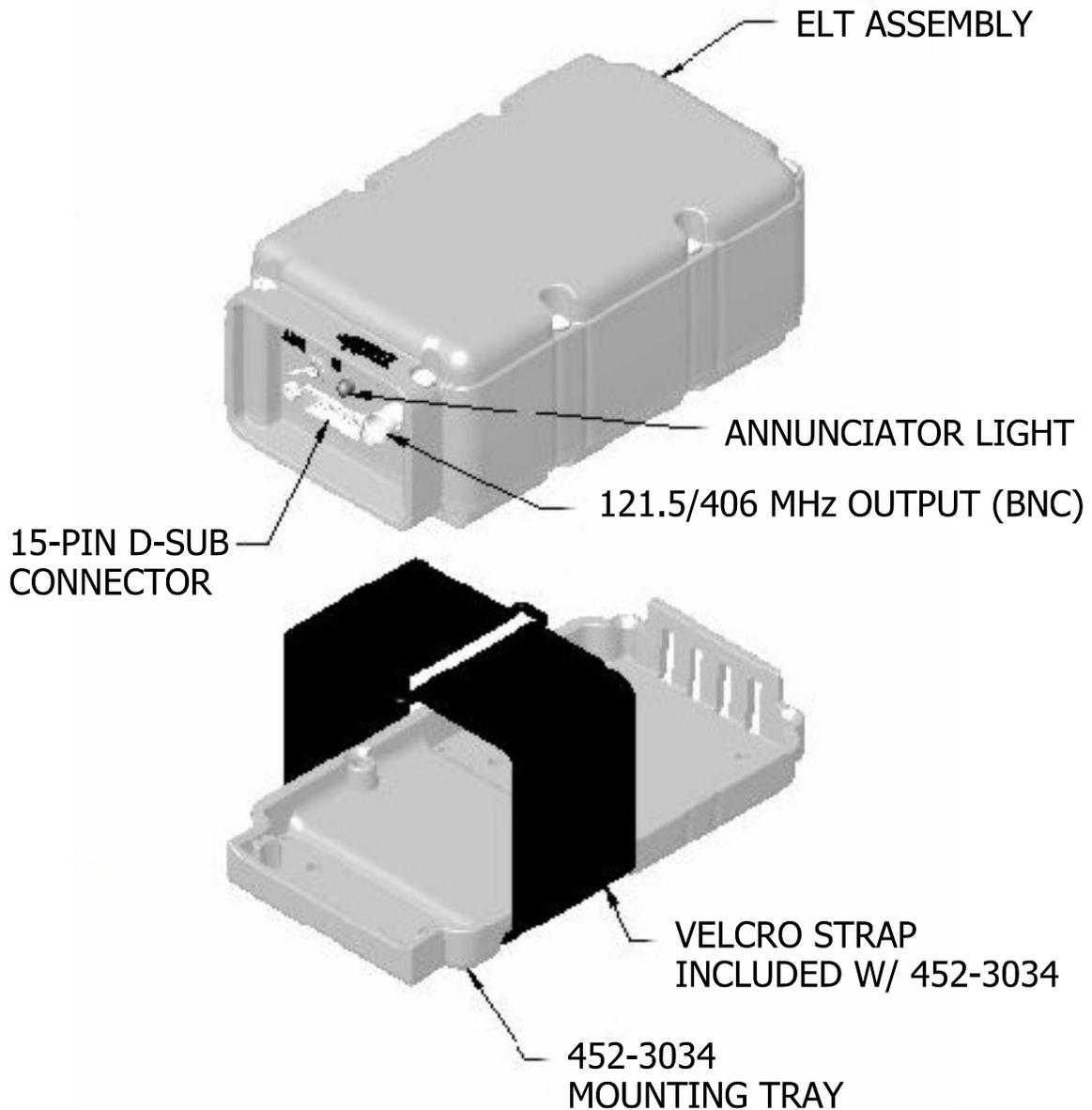


Figure 1 – ME406 Installed View

1.6 Operation

In the event of a crash, the ME406 or ME406HM activates automatically (automatic fixed "AF" configuration), and transmits the standard swept tone on 121.5 MHz lasting until battery power is gone. This 121.5 MHz signal is mainly used to pinpoint the beacon during search and rescue operations.

In addition, for the first 24 hours of operation, a 406 MHz signal is transmitting at 50-second intervals. This transmission lasts 440 ms and contains identification data programmed into the beacon and is received by COSPAS-SARSAT satellites. The transmitted data is referenced in a database (maintained by the national authority responsible for ELT registration) and used to identify the beacon and owner.

1.6.1 Accuracy

Doppler positioning is employed using both 121.5 MHz and 406 MHz signals. Position accuracy of the 121.5 MHz signal is within an area of approximately 15-20 km radius about the transmitter. Due to the better signal integrity of the 406 MHz, its location accuracy is within a 3 km radius.

1.6.2 Switch Operation

In a crash, an acceleration activated crash sensor (G-switch) turns the ELT 'ON' automatically when the ELT experiences a change in velocity (or deceleration) of $4.5 \text{ fps} \pm 0.5 \text{ fps}$. Activation is also accomplished by means of the cockpit mounted remote switch or the switch on the ELT. To deactivate the ELT set either switch to the 'ON' position, then back to 'ARM'.

The ELT does not have an 'OFF' position. Instead, a jumper between two pins on the front D-sub connector must be in place for the G-switch to activate the unit. The jumper is installed on the mating half of the connector so that when the connector is installed, the beacon is armed. This allows the beacon to be handled or shipped without 'nuisance' activation (front connector removed).

NOTE: The ELT can still be manually activated using the local switch on the front of the ELT. Care should be taken when transporting or shipping the ELT to not move the switch or allow packing material to become lodged such as to toggle the switch.

In the ME406HM, activation is also accomplished by any of the 5 auxiliary "G" switches at a nominal 12 "G" level.

1.6.3 Self-Test mode

Upon turn-off, the ELT automatically enters a self-test mode that transmits a 406 MHz test coded transmission that monitors certain system functions before returning to the 'ARM' mode. The transmission is ignored by any satellite that receives this signal, but the ELT requires it to check output power and correct frequency. If the ELT is left activated for approximately 50 seconds or greater, a distress signal is generated that is accepted by the satellites.

In addition to 121.5 and 406 MHz signal integrity, other operating parameters are checked during the self-test. Error codes are then generated if other problems are found. The error codes are displayed by a series of "blinks" of the ELT LED, remote LED and audio indicator. See paragraph 4.4.9, *Installed Transmitter Test*, for more details and a description of the error codes.

NOTE: Any time the ELT is activated, it is transmitting a 121.5 MHz distress signal. Therefore, all activations of the ELT should be kept to a minimum. Local or national regulations may limit testing of the ELT or impose special requirements or conditions to perform testing. For the "Self-Test," Artex recommends the ELT be "ON" for no more than 5 seconds. Testing should occur during the first 5 minutes after the hour.

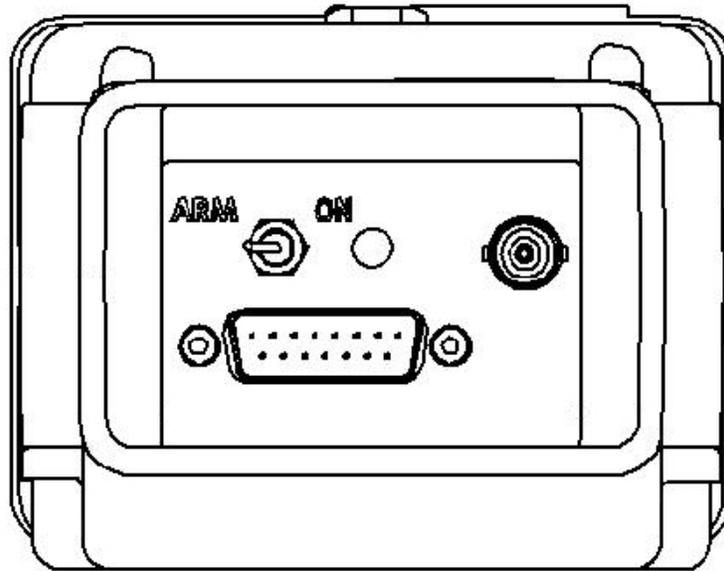


Figure 2 – ELT Front View

2. Installation for the United States

2.1 Introduction to Installation

Installations must be made by qualified personnel in accordance with FAA regulations. Duplicating a previous installation may not be acceptable. Refer to the following:

- FAA – Advisory Circular (AC) 43.13 (Acceptable Methods, Techniques, and Practices – Aircraft Alterations), specifically, Chapters 1 through 3, 11 and 13.
Found at www.faa.gov, or specifically:
http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/E533BB05389C90E486256A54006E47B2?OpenDocument
- 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."

Found at www.faa.gov/certification/aircraft/

- RTCA DO-182 recommends:

"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."

RTCA documents may be obtained from:

RTCA, Inc.
1828 L Street, NW
Suite 805
Washington, DC 20036
Tel: 202-833-9339
Fax: 202-833-9434
Web site: www.rtca.org
E-mail: info@rtca.org

NOTE 1: Installation in a pressurized aircraft constitutes a major modification. Consult the Department of Transportation Regional Officer before proceeding.

NOTE 2: Aircraft manufacturers may also have guidance on ELT installation; refer to and follow any applicable Type Approval or STC data for your aircraft. If located outside of the US, follow all applicable regulations for your national authority.

2.2 Parts List

Installation kits offered for the ME406 include the necessary ELT-related components. The table below lists typical options. Parts can be ordered separately. Additional parts may also be available. Contact Artex at 1-800-547-8901 for details, pricing and availability.

Item	Option / Notes	P/N
ELT w/ battery pack	ME406	453-6603 (standard model)
	ME406HM	453-6604 (helicopter model)
Battery Pack	Kit, see Battery Replacement section of this manual	455-0012
Mounting tray	One option available	452-3034
Antenna	Wire whip (15")	110-773 rev B (Figure 21, supersedes 110-773 rev A)
	Rod	110-338 (Figure 22)
Antenna cable, coaxial, BNC to BNC	6' (Other lengths available upon request)	611-6013-04
ELT Installation Kit for use with standard cock-pit remote switch	Mounting hardware & Connector kit	455-7423
Standard Model Cockpit Remote Switch	Switch only	345-6196-04 (Figures 9 & 20)
	Switch Installation kit	455-6196
Audio indicator	One option available	452-6505 (Figure 19)
Manual	Latest version available for download at www.artex.net	570-1600
Current measurement adapter	Available to aid Canadian maintenance requirements	500-0057
D-subminiature connector – 15-pin, receptacle	For: - harness plug replacement - G-switch loop test fixture	150-1130

Table 1 – Parts List

Additional items required. In addition to the kit, the following are examples of parts and tools that may be required, but are not provided:

- Miscellaneous tools: Drill, Phillips screwdriver (#2 bit), center punch, wire stripper, wrenches for aircraft disassembly/assembly
- Soldering iron & solder
- Metal & fabricating tools/equipment to fabricate ELT and audio indicator mounts
- 1/2 A slow-blow fuse and holder (or comparable circuit breaker) for cockpit remote indicator
- Shielded cable for remote switch harness
- Harness securing fasteners / materials
- Miscellaneous hookup wire – 22 AWG (typical)
- Molex connector pin crimp tool P/N HTR1719C (generic P/N 11-01-0008) or equivalent
- Terminal extraction tool – Molex P/N 11-03-0002 or equivalent
- Electronics grade RTV for sealing connector pins
- Tools to install antenna, ELT
- Mounting brackets

2.3 Mount ELT

Three separate mounting-hole patterns are provided so that, if the ME406 or ME406HM is replacing an existing ELT indicated on the list below, the original mounting holes can be used. Remove the old ELT holder or tray and install the ME406 mounting tray in its place. Use the 8-32 X 5/8" Phillips, pan-head screws, nuts and flat washers provided. You may provide your own hardware so long as the correct size and type is used. Mounting screws are English 8-32 or M4 x length as required. Stainless steel hardware is recommended. Use hardware conforming to an accepted standard such as AN or Mil-Spec.

Compatible patterns include:

- Artex 100/110, G406, C406 and B406 series and Narco ELT-910, ELT-10
- Artex ELT-200 series
- Pointer model ELT 3000-series

If this is a new installation or if the current installation is unacceptable, find a location per the following:

- RTCA suggests the aft section of the fuselage. Statistically, this is least likely to receive damage in a crash. It is also near the antenna connection, minimizing cable length between the transmitter and antenna.
- Maintain access for maintenance.
- If possible, avoid locating the ELT where it will be subjected to chemical fluids such as deicing compounds, cleaning fluids, etc. Over time, these chemicals may attack the plastic and metal components.

The mounting location must conform to the requirements of RTCA DO-204 and AC 43.13. DO-204 Sec 3.1.8 states:

"The ELT shall be mounted to primary aircraft load carrying structures such as trusses, bulkheads, longerons, spars, or floor beams (not aircraft skin). The mounts shall have a 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 m (three feet) from the mounting location."

Mount the ELT so that the longitudinal axis of the ELT (the axis extending through the longest dimension) is aligned with that of the aircraft within 10°. The ELT mount can be rotated about the longitudinal axis, i.e., the ELT can be mounted on the floor, walls or overhead, so long as it 'points' to the front of the aircraft.

Using the template provided, mark and drill four mounting holes using a #19 (0.1660"/ 4.2mm) drill bit. Install the mounting tray. Artex suggests using the outermost mounting hole-pattern on the template for minimum flexure of the mounting tray. Use the 8-32 X 5/8" Phillips, pan-head screws, nuts and flat washers provided.

Refer to paragraph 2.10 (page 28) for specific information regarding helicopter installations.

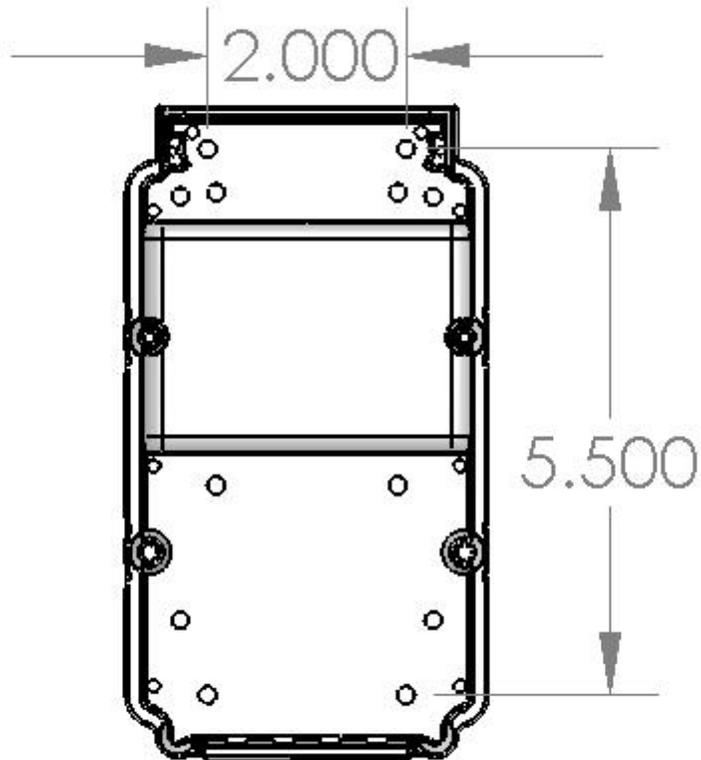


Figure 3 – Mounting Hole Diagram for Artex 110 Series and Narco ELT

NOTE: DRAWING IS NOT TO SCALE. DO NOT USE AS A TEMPLATE FOR DRILLING HOLES.

Metric Dimensions 50.8mm X 139.5mm

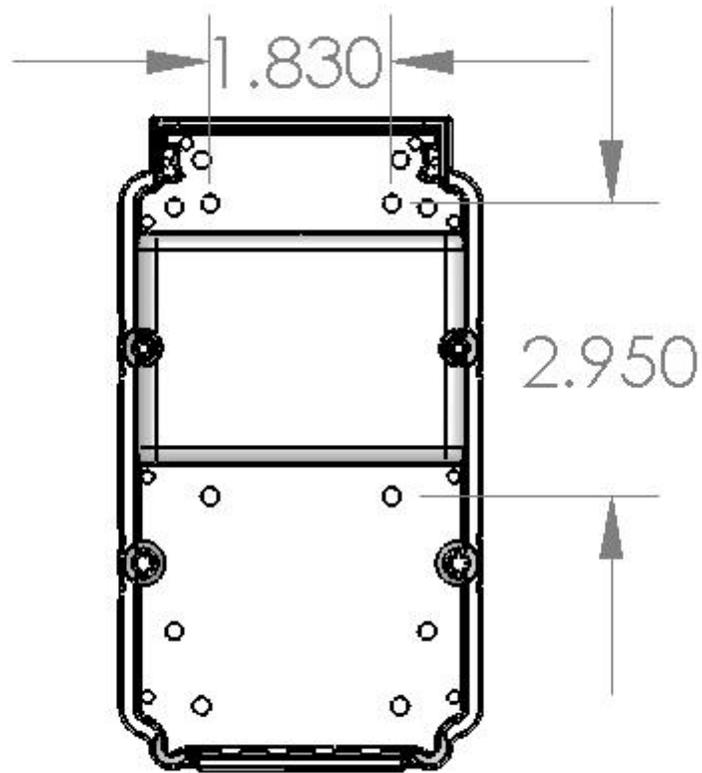


Figure 4 – Mounting Hole Diagram for Artex 200 Series

NOTE: DRAWING IS NOT IS SCALE – DO NOT USE AS A TEMPLATE FOR DRILLING HOLES

Metric Dimensions 46.4mm X 74.8mm

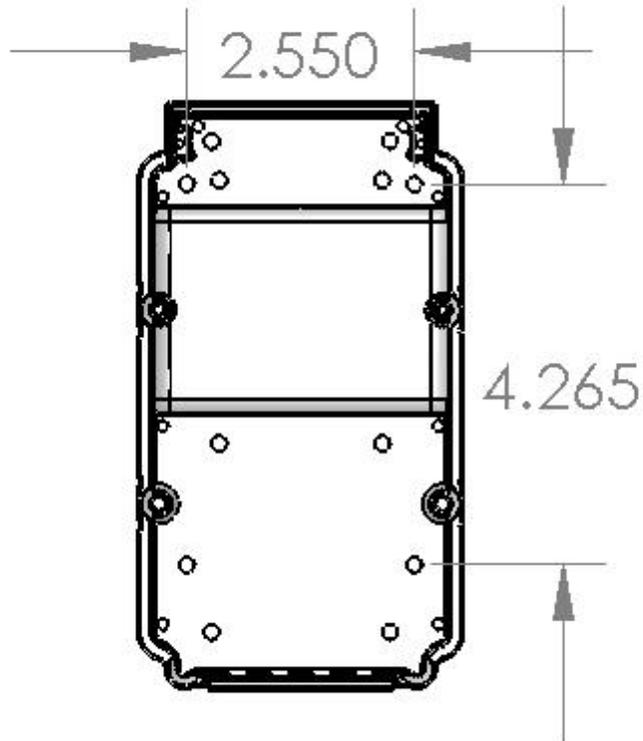


Figure 5 – Mounting Hole Diagram for Pointer

NOTE: DRAWING IS NOT TO SCALE – DO NOT USE AS A TEMPLATE FOR DRILLING HOLES

Metric Dimensions 64.7mm X 108.2mm

2.4 Mount Antenna

The ELT antenna must be mounted in accordance with the requirements of RTCA/DO-204, Section 3.1.10 and RTCA/DO-183 Section 3.1.10. Locate the antenna at least 30 inches (75 cm) away from other antennas, wires, vertical stabilizer, etc. to minimize distortion of the radiated field and interference with other equipment. The antenna must be installed **VERTICALLY** (within $\pm 15^\circ$ of the vertical plane is acceptable). Artex has no performance data for installations that deviate from the stated requirements.

The ME406 is certified to be used with the following antennas (automatic fixed "AF" configuration):

- Artex Whip Antenna, 121.5/406 MHz, P/N 110-773
- Artex Rod Antenna, 121.5/406 MHz, P/N 110-338

The antenna requires a ground plane. On aircraft constructed with non-conductive materials, such as composite materials or fiberglass, a ground plane must be added. Ideally, the ground plane should extend out from the antenna mounting point at least 24 inches (60cm) in every direction. Many times this is not possible, but an effective plane can be constructed as follows:

A 'doubler' layer of sheet metal, such as aluminum, can be mounted under the aircraft skin. Alternatively, four or more 'radials' fastened to the underside of the fuselage skin can be used to fashion a ground plane. Each radial can be metallic tape, 22 AWG wire, etc. Tape should be at least 1 inch (25.4 mm) wide and each radial 24 inches (60 cm), minimum. The ground plane connects to the shield of the RF antenna connector. Resistance between the ground plane and shield connection should be maintained at 0.003Ω maximum. A star washer should be used between the antenna connector housing and ground plane. Take precautions to guard against corrosion, loosening, etc. See diagram below:

An effective, light-weight, ground plane can be formed from radial strips of copper foil. A doubler may be required to strengthen resistance to impact, vibration, ice, etc. and can serve as connection points for the radials.

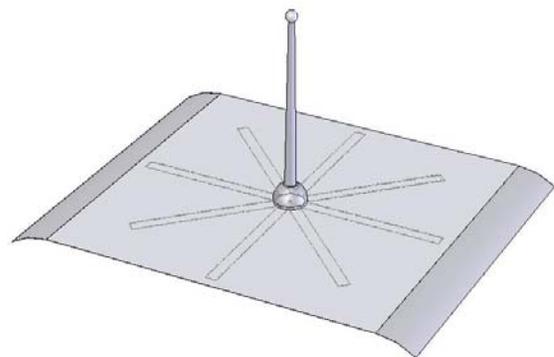


Figure 6 – Antenna Ground Plane

Specific antenna installation instructions follow. AC 43.13 provides additional guidance for antenna installations.

2.4.1 'Whip' Antenna – P/N 110-773

See Figure 21. Refer to AC 43.13 for guidance. It is the responsibility of the installer to determine the appropriate and adequate antenna installation.

To ensure adequate support for associated air loading during flight, use of a backing plate or doubler (not supplied) may be required.

2.4.1.1 Type of Aircraft

The Whip Antenna (P/N 110-773) is designed for installation on fixed wing subsonic aircraft and is rated for a maximum airspeed of 200 KIAS (Knots Indicated Airspeed at Sea Level).

NOTE: Artex does not recommend the use of the Whip Antenna for helicopter installations.

2.4.1.2 Location

The antenna must be mounted on the top of the aircraft to assure maximum 'visibility' of satellites (406 MHz). The best location is the upper aft portion of the fuselage. It should be mounted vertically and away from projections such as a propeller, tail surfaces, or the shadow of larger antennas.

2.4.1.3 Preparation

1. Prepare the surface for antenna installations in such a manner to ensure a ground contact of less than 0.003Ω . If bare metal surfaces are needed for surface preparation they should be treated with Alodine[®] 1200 (or similar compound) to eliminate aluminum oxidation.
2. Drill 0.562" (14.3 mm) hole in aircraft skin.

2.4.1.4 Installation

- 1) Metal adapter plates should be used if the curvature or compound radius of the aircraft skin is such that antennas cannot be directly installed vertically with their plates mounted flat to the aircraft outer surface.
- 2) Backing plates or doublers should be installed to ensure adequate support for associated air loading during flight. Refer to AC 43.13 for complete information.
- 3) Remove the 1/2-28 hex nut and external tooth lock washer from the base of the antenna.
- 4) Insert antenna connector through mounting hole, make sure the "O" ring remains in the base of the antenna connector flange groove and that the connector has sufficient clearance through the aircraft skin.
- 5) Place the lock washer and the hex nut on the inside of the aircraft and sandwich the aircraft skin between the base of the antenna and lock washer followed by the hex nut. Tighten the hex nut to between 25 to 30 inch lbs (280 to 340 Newton-cm).

- 6) Apply a small, smooth fillet with RTV sealant around the periphery of the antenna base to seal out moisture.
- 7) For maximum signal strength, the length of the antenna coax to the ELT should be as short as possible (use of the standard 6-foot (1.8 M) coax is recommended when possible).

2.4.1.5 Composite Aircraft Installation

Except for preparation instructions and installation of a ground plane, installation is the same. Refer to AC 43.13 for complete information.

2.4.2 Rod Antenna – P/N 110-338

See Figure 22. Refer to AC 43.13 for guidance. It is the responsibility of the installation agency to determine the appropriate and adequate antenna installation. To ensure adequate support for associated air loading during flight, use of a backing plate or doubler (not supplied) may be required. The Rod Antenna (P/N 110-338) connector is a single BNC female.

2.4.2.1 Location

The Rod Antenna must be mounted on the top of the aircraft to assure maximum 'visibility' of satellites (406 MHz). The best location is the upper aft portion of the fuselage. It should be mounted vertically and away from projections such as a propeller, tail surfaces, or the shadow of larger antennas.

2.4.2.2 Installation Preparation

- 1) Prepare the surface for antenna installations in such a manner to ensure a ground contact of less than 0.003Ω . If bare metal surfaces are needed for surface preparation they should be treated with Alodine[®]1200 (or similar application) to eliminate aluminum oxidation.
- 2) Refer to Outline Drawing (P/N 110-338, page 55) for hole pattern and drill size.

2.4.2.3 Type of Aircraft

The Rod Antenna is designed for installation on fixed or rotor wing subsonic aircraft and is rated for a maximum airspeed of 350 KTAS (Knots True Airspeed at 25,000 feet).

2.4.2.4 Installation

- 1) Metal adapter plates should be used if the curvature or compound radius of the aircraft skin is such that antennas cannot be directly installed vertically with their plates mounted flat to the aircraft outer surface.
- 2) Backing plates or doublers should be installed to ensure adequate strength for associated air loading during flight. Refer to AC 43.13 for complete information.
- 3) Coat the contact surfaces with a corrosion inhibitor, e.g., Alodine[®]1200.

- 4) Mount the antenna using four 100° countersink #8-32 (M5) stainless steel machine screws and associated hardware. Tighten to 20 inch-lbs (226 Newton-cm) max.
- 5) Apply a small, smooth fillet with RTV sealant around the periphery of the antenna base to seal out moisture.
- 6) Install the antenna cable. Artex suggests using the standard 6-foot (1.8M) antenna cable (supplied with most kits).

2.4.2.5 Composite Aircraft Installation

Except for preparation instructions and installation of a ground plane, installation is the same. Refer to AC 43.13 for complete information.

2.5 Mount Remote Switch

TSO C126 requires the installation of a remote switch. This switch is **NOT** optional. The specific requirement is found in RTCA/DO-204, Section 2.2.6.

The Artex standard remote switch is designed so that if its wires are cut or shorted together the emergency operation of the ELT is unhampered although the ELT may activate and not “reset” if the wires are shorted together.

Select a switch mounting location that is easily seen and reached by the pilot and out of direct sunlight. The Artex remote switch requires approximately 1.3” X 2.0” (33 X 50.8 mm) of panel area to mount. A space is also required for a warning placard, measuring 2.25” X 0.25” (57 X 6.5 mm), which should be placed close to the installed switch. Approximately 3 inches (75mm) of clearance behind the panel is required for the switch assembly, mating connector and harness.

Mark and remove the rectangular cutout for the remote switch assembly. Dimensions are shown in the Specifications. Fit the switch assembly into the cutout and mark the four mounting screw hole locations. Drill mounting screw holes with #31 (0.120”) (3.0 mm) drill. Mount using the 4-40 X ½” Phillips pan head screws, lock washers and nuts provided.

After switch is installed, apply “For Aviation Emergency Use Only / Unauthorized Use Prohibited” placard (supplied in kit) as close to the switch as practical.



FOR AVIATION EMERGENCY USE ONLY
UNAUTHORIZED OPERATION PROHIBITED

Figure 7 – Remote Switch Placard

If you are upgrading an older Artex installation, please note that most previously approved Artex remote switches may be used with the ME406 or ME406HM, contact Artex for details.

The standard remote switch provided with the ME406 or the ME406HM is P/N 345-6196-04. Other remote switches are available, contact Artex for details or see the web site at www.artex.net.

2.6 Mount Audio Indicator (“buzzer”)

An audio indicator is required for TSO-C126 approval. The indicator, i.e., “buzzer” (P/N 452-6505) is powered by the ELT and, therefore independent of the aircraft power system. When the ELT is activated, the buzzer ‘beeps’ periodically. The time between pulses lengthen after a predetermined transmitter ‘on’ time.

The buzzer may be located anywhere on the aircraft, however, it is recommended that it be placed near the ELT unit so it can be heard outside the aircraft when the engine(s) is (are) off. It is assumed that with a running engine the cockpit light will warn the pilot. Mounting the buzzer in the cockpit is not recommended due to the distracting sound it produces when the ELT is activated. This buzzer operates in tandem with the ELT panel indicator and serves as a redundant indicator.

NOTE: Although the wording of RTCA/DO-204 indicates installation in the cockpit, Artex recommends that the buzzer be placed aft or near the ELT unit. Artex holds an FAA deviation approval (FAA Reference #96-103S-522, dated September 10, 1996).

The buzzer can be mounted in two ways: either using the mounting ‘ears’ at its base or in a panel mount configuration using the plastic bezel nut. The mounting position of the buzzer should be such that the buzzer opening is not prone to collecting liquid or other material, as this buzzer is not sealed and not waterproof. Suggested mounting is with the buzzer orifice pointing down. The rear of the buzzer can be sealed with RTV; however, the front must be left open. Ground the black lead and connect the red lead to the ELT buzzer output (pin 8 of the D-sub).

2.7 Cable harness and Wiring

Artex recommends 22 or 24 AWG wires or shielded 4-wire cable for long cable runs where electrical noise (EMI) interference is a concern. Larger diameter wire may be used. All Artex testing and qualification was performed using 22 and 24 AWG wire. Use a high quality wire such as MIL-W-16878, M22759, M27500 or their commercial equivalent.

A ‘drip loop’ should be constructed in the harness near the ELT to divert moisture from the connector. This is extra cable length used to form a U-shaped bend just before the connector. Water or other fluids will flow down to the bottom of the loop and drip off, diverted away from the connector. Adjust length of harness to allow for the loop before installing connector.

Grounding:

Some installations use the airframe as a ground connection between the ELT and the remote switch. The ground resistance from the remote switch, through the airframe to the ELT ground connection should be less than 10Ω.

The shield of the 4-wire cable is used as the ground wire (see Figures 10 and 12).

A ground may be connected at either the 'panel end' or the 'ELT end' of the harness, but both locations should not be grounded. This prevents current flow through the shield from other equipment (ground loop). A convenient ground connection is pin 9 of the remote switch connector. This is connected internally to pin 6 (ground) and is provided for this purpose (see Figures 10 through 13).

NOTE: If ground or other harness wire connections are broken or disconnected, the ELT is still capable of automatic activation. However, the remote switch may be incapable of resetting the ELT or operation may not be indicated on the remote switch LED.

2.7.1 Harness Wiring – Remote switch end

- 1) If an Artex remote switch is already installed, verify contacts and ground and proceed to "Harness ELT End". For new installations, strip about 0.150" (3.8mm) of insulation from the ends of each of the wires of the cable harness.
- 2) Crimp a female receptacle (P/N 151-6628) onto each wire using crimp tool (Molex # 0638191300, Waldom or Sargent # HTR-1719C).
- 3) Insert wires into appropriate positions of housing (P/N 151-5009) per Figure 9.

Information: Molex pin extraction tool is # 11-03-0002

- 4) Fabricate a fused power supply lead that connects to either pin 1 (+14V) or pin 3 (+28V).
- 5) Crimp a female receptacle (P/N 151-6628) onto the connector end.

2.7.2 Harness Wiring – ELT End

- 1) Cut a ground wire to length that will connect the 15-pin D-sub mating connector (P/N 150-1130) to ground. Cut a wire for the buzzer that will connect to the D-sub.
- 2) From connector back-shell (P/N 150-1127) select grommet from grommet 'tree' that fits firmly around cable harness and the ground & buzzer wires. Slip grommet over these wires with the smaller diameter shoulder towards the connector. Slide it away from harness end so that it does not interfere when soldering the connector.
- 3) Solder a short jumper from pin 5 to pin 12 on the D-sub.
- 4) Solder the cable harness wires, buzzer wire and ground wires to D-sub pins. Pin 7 may require the attachment of two wires. It may be easier to splice wires, and then connect a single wire to the pin. Consult AC 43.13.
- 5) On a flat surface, fit the connector w/attached harness into one-half of connector housing positioning grommet so that it fits into recess at end of connector housing.
- 6) Install rectangular bracket washers onto thumbscrews, and then insert thumb screws into lower housing half.

- 7) Fit remaining housing half onto lower section taking care to align thumb screws, grommet and connector. Position the bracket washers outside of housing. Screw housing together using the long, fully-threaded screws and nuts supplied.
- 8) Extra screws and strain relief supplied with housing kit are not used.

2.7.3 Connect harness

- 1) With the harness installed, insert the crimped end of the fused power supply link into the appropriate position of the 9-pin remote switch housing. This will be either pin 1 (+14V system) or pin 3 (+28V system). Plug this end into the remote switch.
- 2) Install the ELT in its mounting tray, securing with the Velcro strap.
- 3) Place 2 each of the 850-0814 sealing strips (provided with install kit 455-7423) into ELT 15-pin D-sub connector. Plug mating D-sub from harness into ELT.
- 4) Connect the ground and buzzer wires. Splicing will be necessary on the buzzer wire.

Provide a "drip loop" on the cable when possible.

NOTE: In high humidity or damp environments Artex recommends sealing the connector with RTV after system has been tested. This helps prevent water intrusion from the back shell through the connector receptacle pins.

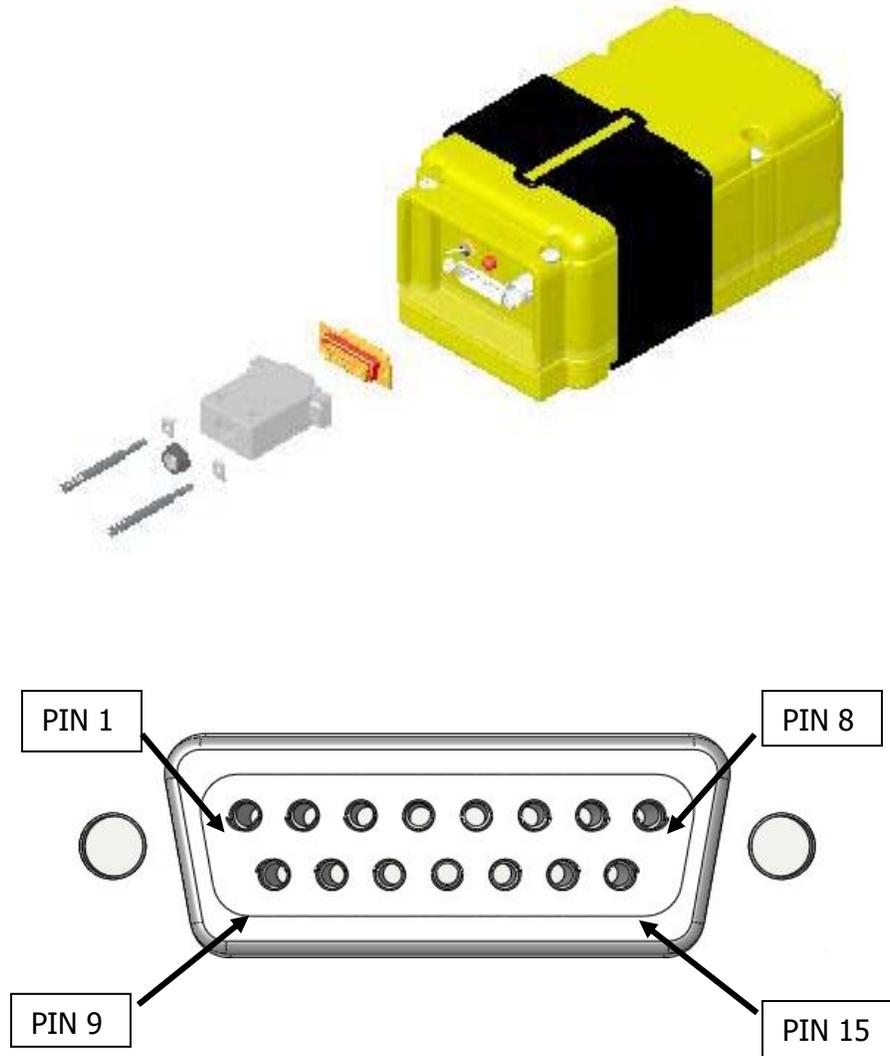
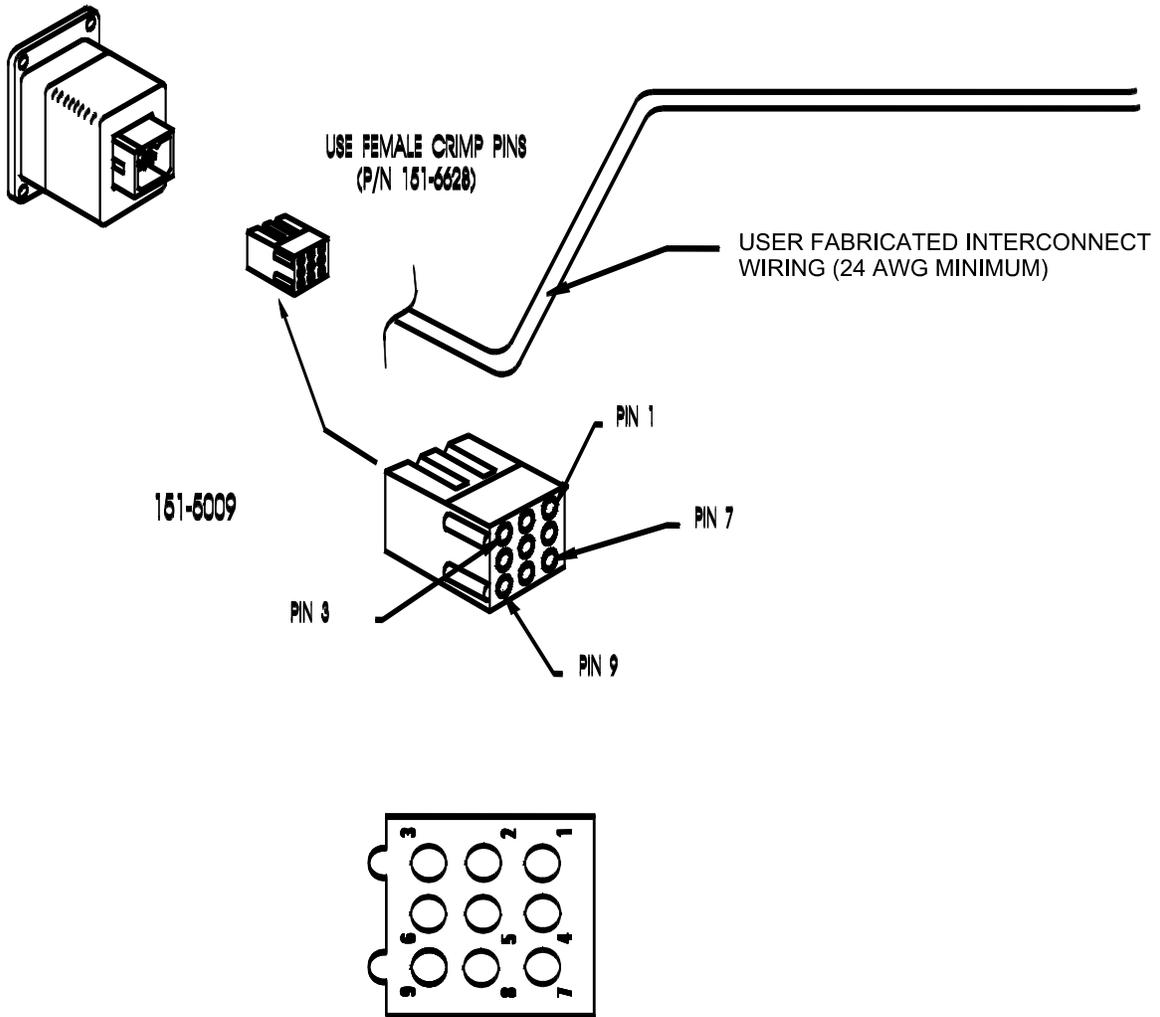


Figure 8 – ELT Connector (Front View of ELT)

REMOTE SWITCH



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.

Figure 9 – Remote Switch Wiring

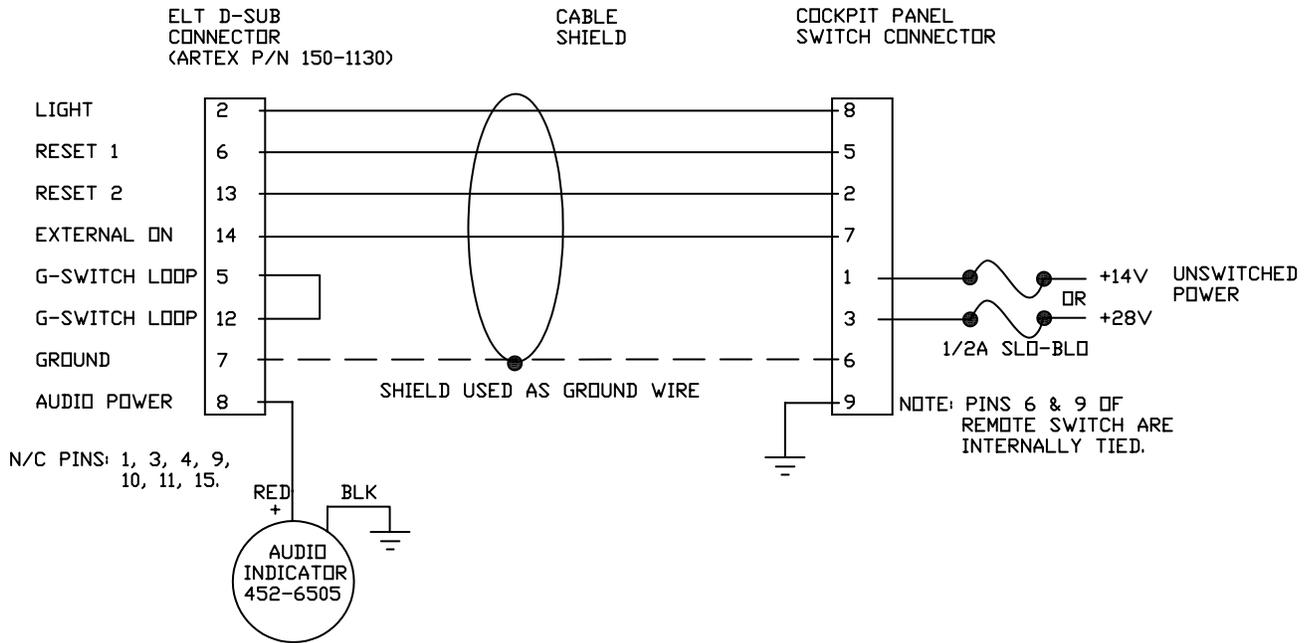


Figure 10 – Wiring Diagram: Metal Airframe

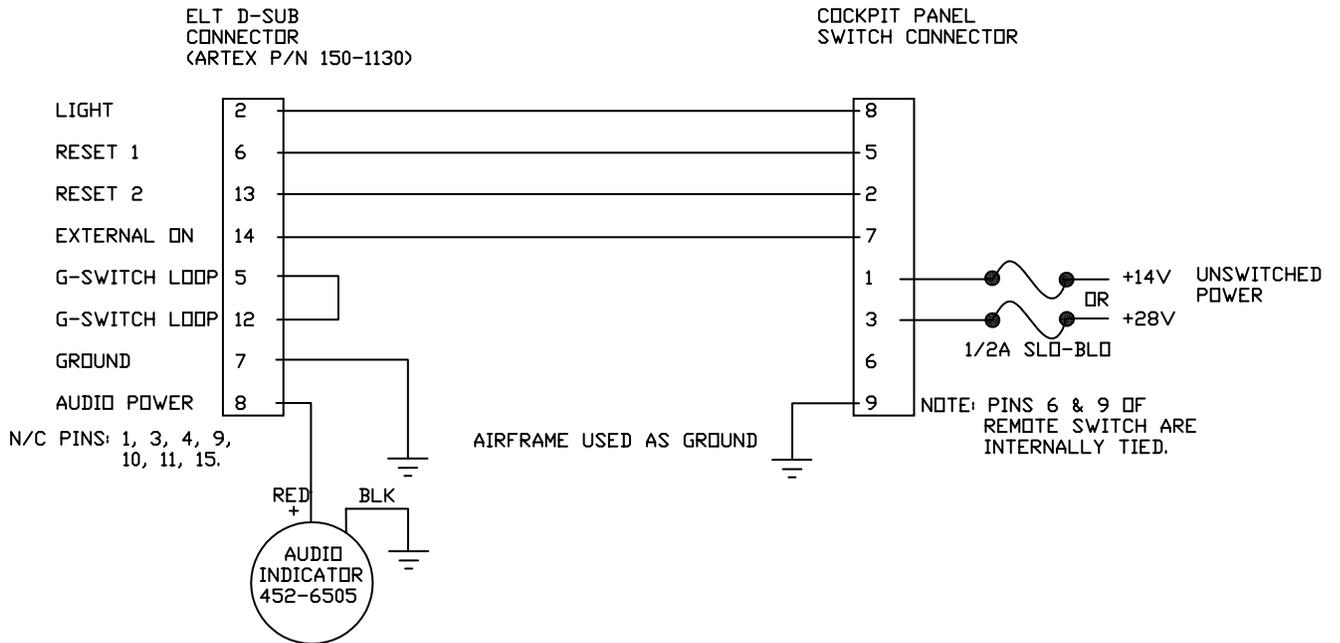


Figure 11 – Wiring Diagram: Metal Airframe

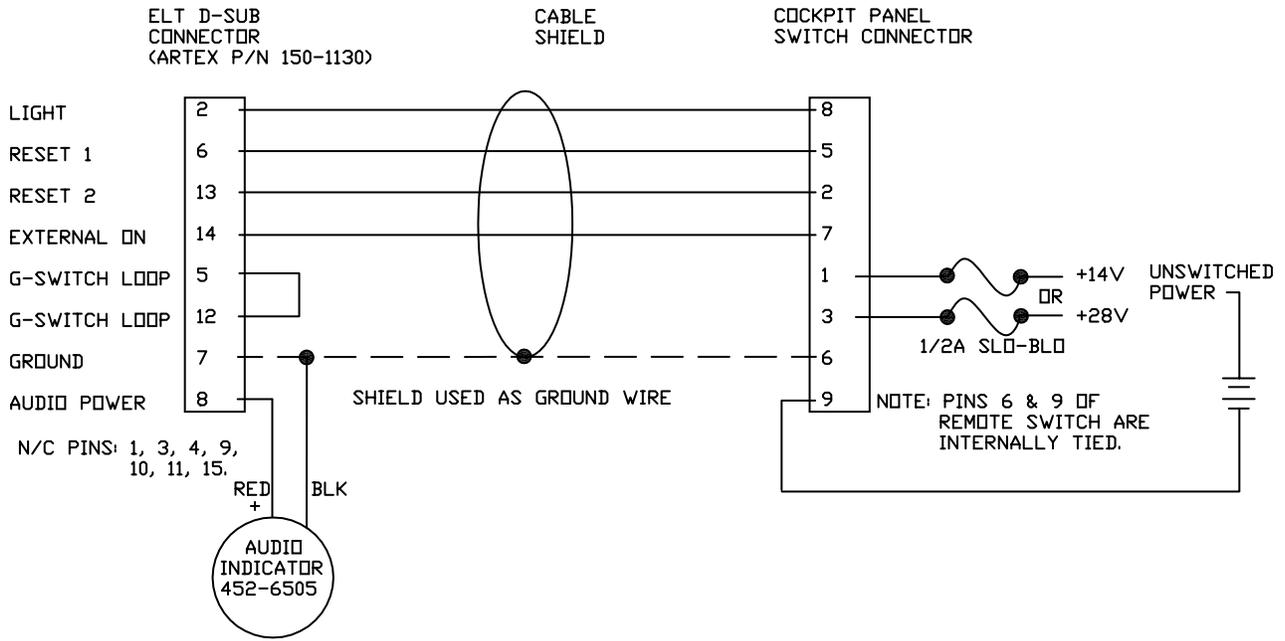


Figure 12 – Wiring Diagram: Composite Airframe

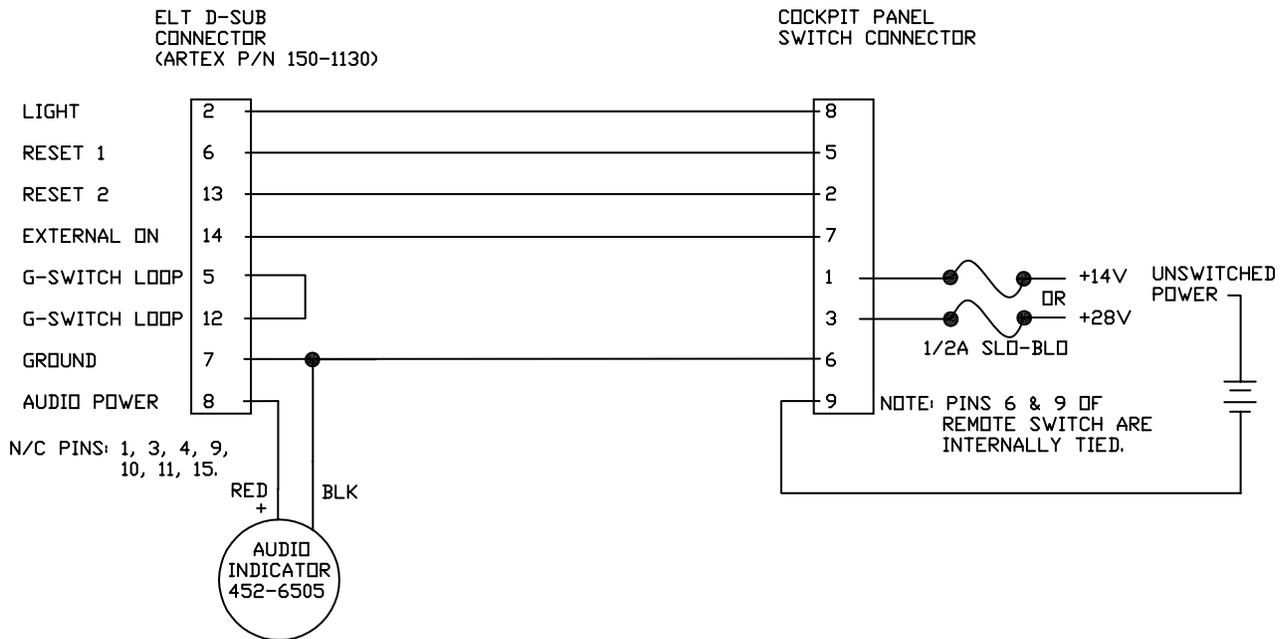


Figure 13 – Wiring Diagram: Composite Airframe

2.7.4 Connect RF Coaxial Cable

The BNC to BNC cable provided carries both the 121.5 MHz and 406 MHz outputs. The ME406 was certified using a 6-foot (1.8M) RG-142 (MIL-C-17) coax cable. Maximum cable loss should not exceed 1 dB. In all cases the coax must meet or exceed RG-142 specifications. Contact Artex if other lengths of coax are required for your installation. If low loss cable is required, see paragraph 2.7.5.1, *Low Loss Coax Cable*.

Precautions when working with coaxial cable:

Never kink coaxial cable.

Never drop anything on coaxial cable.

Never step on coaxial cable.

Never bend coaxial cable sharply.

Never loop coaxial cable tighter than the allowable bend radius. Industry rule-of-thumb:

Bend radius \geq 6 x Cable diameter

Never pull on coaxial cable except in a straight line.

Never use coaxial cable for a handle, lean on it, or to hang things on it (or any other wire).

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.

2.7.5 Coax Cable Assembly (Optional)

Although various coax cable lengths are available from Artex, you may fabricate your own cable. Use of RG-142 (or equivalent) coax is required. Appropriate BNC connectors must be used. If using RG-142, the applicable BNC connector is P/N 150-2118 which is commercially available from Kings (KC 59-162) or Amphenol (P/N 31-4427 or M39012/16-0503). For these connectors, Artex recommends the Kings Crimp Tool P/N KTH-1000 with the KTH-2001 die. Kings may be contacted in the United States at phone 803-909-5000.

Other commercially available connectors and tools may be available.

2.7.5.1 Low Loss Coax Cable (Optional)

Some installations that require longer runs of antenna coax (up to 20 feet) may require the use of low loss coax cable. Artex recommends ECS cable P/N 311201 with BNC connector P/N CBS122. Please note that Artex does not stock or sell these parts. Contact ECS at the following:

ECS
5300 West Franklin Drive
Franklin, Wisconsin 53132 USA
Toll Free: (800) 327-9473
Telephone: (414) 421-5300

Facsimile: (414) 421-5301

http://www.ecsdirect.com/ecs_home.html

2.8 Transmitter Test

Always perform the tests within the first 5 minutes of the hour. Notify any nearby control tower of your intentions, in accordance with AC 43.13. If outside of the US, always follow all local or national regulations for testing of ELTs.

Caution!

Do not allow test duration to exceed 5 seconds. A false alarm may be generated.

Any time the ELT is activated, it is transmitting a 121.5 MHz distress signal. After approximately 50 seconds, a "live" 406 MHz distress signal is transmitted and is considered valid by the satellite system.

Whenever the ELT is switched from "ON" to "ARM" a 406 MHz signal is transmitted, however, it is specially coded as a "Self-Test" signal that is ignored by the COSPAS-SARSAT satellites.

2.8.1 Self-Test

- Tune a receiver (usually the aircraft radio) to 121.5 MHz. Turn the ELT aircraft panel switch "ON" for about 1 second, then back to the "ARM" position. The receiver should voice about 3 audio sweeps.
- At turn-off (back to 'ARM' state) the panel LED should present 1 pulse (buzzer will not sound for 1 pulse). If more are displayed, determine the problem from the list below.

1 Flash – Indicates that the system is operational and that no error conditions were found.

3 Flashes – Bad load detected. Detects open or short condition on the antenna output or cable. These problems can probably be fixed by the installer.

- Check that the RF cable is connected and in good condition. Perform continuity check of center conductor and shield. Check for a shorted cable.
- Check for intermittent connection in the RF cable.
- If this error code persists there may be a problem with the antenna installation. This can be checked with a VSWR meter. Check the antenna for opens, shorts, resistive ground plane connection.

- 4 Flashes** - Low power detected. Occurs if output power is below approximately 33 dBm (2 watts) for the 406 signal or 17 dBm (50 mW) for the 121.5 MHz output.
- Check coax and connections
 - Check antenna installation
 - Check that the frequencies are within acceptable limits
- 5 Flashes** – Indicates the ELT was not programmed, or is incorrectly programmed. Does not indicate erroneous or corrupted programmed data.
- 6 Flashes** – Indicates the G-switch loop between pins 5 and 12 at the D-sub connector is not installed. ELT will not activate during a crash.
- Check that the harness D-sub jumper is installed by verifying less than 1 ohm of resistance between pins 5 and 12.
- 7 Flashes** – Indicates that the ELT battery has too much accumulated operation time (> 1hr, see below). Battery may still power ELT; however, it must be replaced to meet FAA specifications. May also indicate damage to the battery circuit.

2.8.2 Self-Test Schedule

Artex recommends that the ELT be tested every 1-2 months. Follow the steps outlined above.

NOTE: The self-test time is accumulated in a register on the battery pack. The register records activation time in 30 second increments so all activations will count as at least 30 seconds, even if the actual time is much less. Total allowable time is 60 minutes as determined by FAR 91.207 and RTCA DO-204. After this time has been accumulated a 7-flash error will be presented after the self-test. The battery must be replaced at this point for the ELT to remain in compliance. Always follow ELT testing requirements per local or national authorities.

2.9 Sealing Connectors in Wet Environments

This step is optional. Once all tests have satisfactorily been completed and all harness connections have been verified to be correct, the connectors at the remote cockpit switch and the ELT may be sealed to help prevent moisture from wicking into the connector pins.

Seal using an electronics grade ('neutral cure'), non-slumping RTV such as GE Silicones RTV162, Dow Corning 748RTV or Silastic 1080RTV. (Sourcing hint: Check pet stores that sell aquariums).

Caution

Non-electronics grade RTV may cause corrosion of the electrical wiring.

The curing chemicals of some types of RTV contain a type of acid which will corrode the copper wiring. This corrosion may cause failure of the wiring causing the remote switch to not work correctly.

Apply RTV to the rear of the 9-pin connector remote switch (P/N 151-5009), forcing the sealant into the wire holes and around exposed wire ends.

Disassemble the harness D-sub connector and cover exposed wire ends and all connector pins with RTV. Coat all exposed metal, taking care to keep away from the thumb screws. Reassemble after sealing.

2.10 Helicopter installations

The ME406HM incorporates six G-switches which sense a crash impulse along each of the three main (orthogonal) axes of the ELT. The 'direction of flight' arrow on the ELT product label represents the direction in which the primary crash sensor is oriented. Mount the ELT so that the arrow aligns with the longitudinal axis of the aircraft. If necessary, the ELT may be tilted forward up to 10 degrees, (see Figure 14). The ELT mount may be rotated about the aircraft center axis, i.e., the ELT can be mounted on the floor, walls or over head, so long as it 'points' to the front of the aircraft.

Also, refer to aircraft manufacturer's data (Type Approval or STC information) and/or national regulations regarding installation on helicopters.

There are few guidelines on installing an ELT in a helicopter. For an ELT containing only one G-switch, manufacturers have traditionally advised installing the ELT at a 45 degree angle to help account for the unique flight characteristics of helicopters. TSO C91a and TSO C126 increased the sensitivity of the G-switch over the older TSO C91 requirements. Because of this, the 45 degree mounting angle, which tends to preload the G-switch, can result in increased "nuisance" activations from severe maneuvers, abrupt landings, etc.

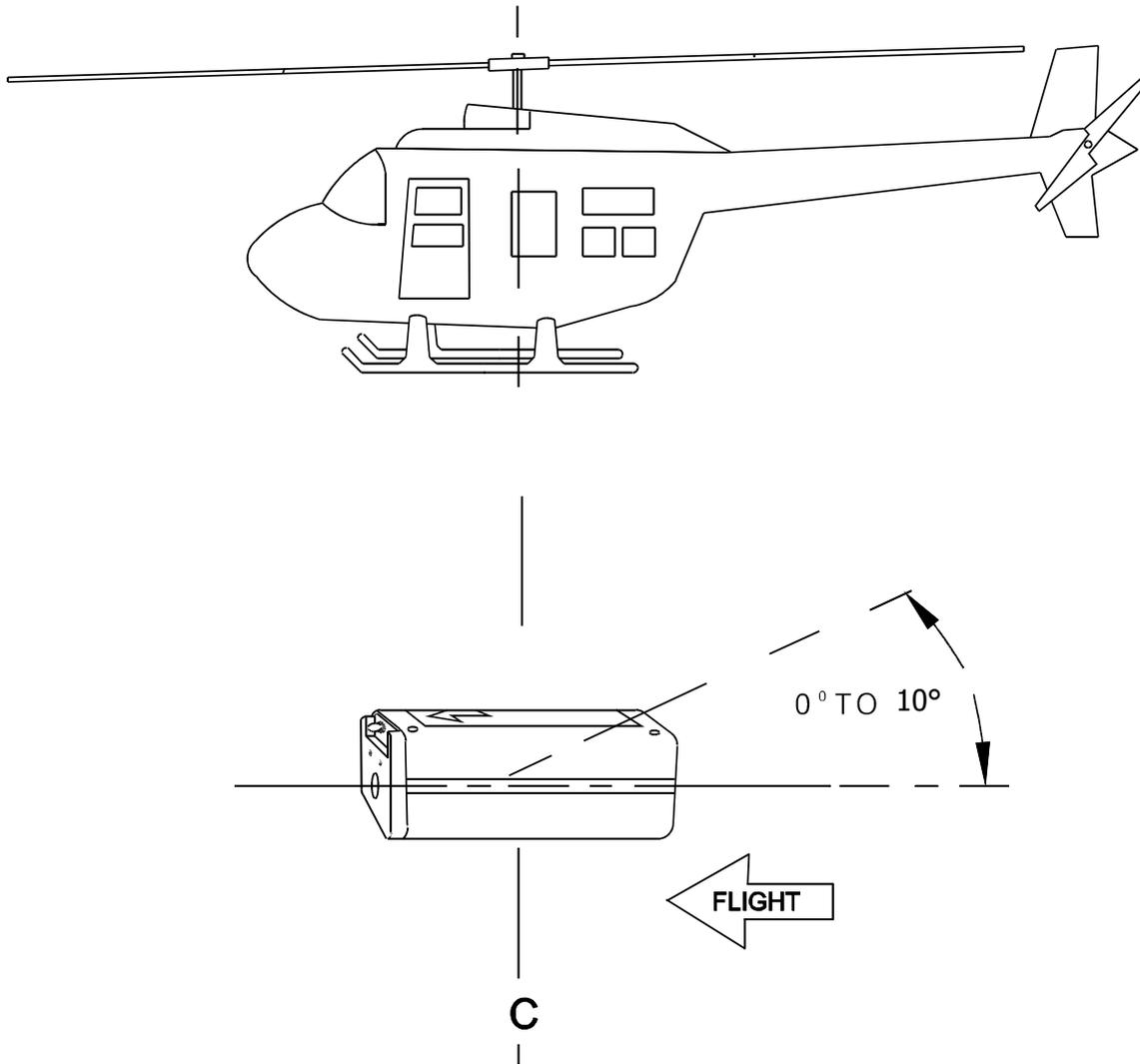


Figure 14 – ME406HM Helicopter Installation

3. Registration

3.1 FAA Form 337

For most installations an FAA Form 337 will be required for registration. Additional information regarding the completion of FAA Form 337 can be found in Advisory Circular AC 43.9-1 (Instructions for Completion of FAA Form 337). AC 43-210 (Standardized Procedures for Requesting Field Approval of Data, Major Alterations and Repairs) provides further guidance.

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), ACs (e.g., AC 43.13-1 and 43.13-2 under certain circumstances), TSOs, 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), STCs 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. The Artex Description, Operation, Installation and Maintenance Manual may be used as supporting data; however, it is not FAA approved data.

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.

3.2 Radio Station License - USA

The FCC does not require a radio station license for Emergency Locator Transmitters (ELTs). See the FCC web site at <http://wireless.fcc.gov/aviation/fctsht4.html> which states:

"On October 26, 1996, the FCC released a Report and Order in WT Docket No. 96-82, FCC 96-421 eliminating the individual licensing requirement for all aircraft operating domestically. This means that you do not need a license to operate a two-way VHF radio, radar, or ELT aboard aircraft operating domestically. All other aircraft radio stations must be licensed by the FCC either individually or by fleet."

FCC Form 605 which replaced FCC Form 404 in 1999 is not required for ELTs.

For more information, contact the FCC at:

Federal Communications Commission
445 12th Street SW
Washington, DC 20554
1-888-CALL-FCC (1-888-225-5322)
E-mail: fccinfo@fcc.gov

3.3 U.S.A.A Registration

**Registration forms (or links to them)
are provided on the Artex web site at**

www.artex.net

When a 406 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 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.).

Important Notice

Please Read Before Completing Registration

The information you furnish is **mandatory** and is intended to assist search and rescue teams in locating you or your craft in the event of beacon activation. The information will be provided to the United States Coast Guard, United States Air Force, and other Search and Rescue (SAR) teams as appropriate in the event of beacon activation. It will also be used to conserve SAR resources by helping to eliminate false alert deployments, e.g. an inadvertent activation can be resolved with a phone call.

Failure to register, re-register (which occurs every two years) or to notify NOAA of a change in the status for a 406 MHz beacon could result in penalties and/or fines being issued to the owner. An owner is required to notify NOAA of any changes to the registration information. Please note, due to the critical need for up-to-date registration information, NOAA will update the database accordingly if a beacon owner's registration has expired and credible information is provided from SAR sources. NOAA will also seek information from other databases to update and/or complement the existing information for a beacon registration. Solicitation of this information is authorized by Parts 80, 87, and 95 of Title 47 of the US Code of Federal Regulations (CFRs).

***There is no charge for beacon registration.
This is a service provided by the US Government.***

All online registrations will be entered into the National 406 MHz Beacon Registration Database on the same day of entry. Registration forms received via the postal mail service will be entered into the National 406 MHz Beacon Registration Database within 2 business days of receipt. For online registrations, a letter with an attached registration information sheet will be sent immediately via e-mail or fax (if provided), or via postal mail within two weeks. Once your registration confirmation is received, please review all information. Any changes or updates to your registration information can be done via the internet, fax, e-mail or postal mail. If you do not receive your registration confirmation from NOAA on the same day you submit it over the internet or within two weeks if you submit it by postal mail, please call NOAA toll-free at:

1-888-212-SAVE (7283) or 301-817-4515 for assistance.

After initial registration (or re-registration) you will receive a NOAA Proof of Registration Decal by postal mail. It is required that you affix the registration decal to your beacon. If for some reason you do not receive the registration decal within two weeks, please call NOAA at the above number for assistance. Registration forms can be found on the NOAA SARSAT website at: www.sarsat.noaa.gov or at: www.beaconregistration.noaa.gov.

Although the information provided will become a matter of public record, there is no intent to circulate the data furnished beyond its intended purpose, i.e., to assist SAR forces in carrying out their mission of rescue assistance and false alert abatement. Public reporting burden for the collection of this information is estimated to average 15 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden should be sent to:

NOAA SARSAT
NSOF, E/SP3
4231 Suitland Road
Suitland, MD 20746
Or call: 1-888-212-SAVE (7283) or 301-817-4515

Caution

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 an alarm was necessary, the incorrectly registered ELT would cause a false alarm for the former owner.

3.4 Canadian Registration

The ELT must be registered with the National Search and Rescue Secretariat (NSS). Refer to Industry Canada Regulations RSP100. At the writing, the latest issue is Issue 9, dated June 2007.

Canadian Beacon Register
National Search and Rescue Secretariat
275 Slater Street, 4th Floor
Ottawa, Ontario
K1A 0K2
Telephone: 1-800-727-9414
Fax: 613-996-3746
E-mail: beacons@nss.gc.ca

3.5 Other Country Registration

For ELTs that will have a country of registration other than the US, please contact the appropriate Civil Aviation Authority in that country for guidelines and documentation needed to assure proper registration. Always follow the national procedures.

Most countries that maintain beacon registration databases require that ELTs be registered with COSPAS-SARSAT, the international agency responsible for the 406 MHz Search and Rescue program. Direct registration may be allowed using the International 406 MHz Beacon Registration Database (IBRD). Information can be found online at www.cospas-sarsat.org.

Also refer to COSPAS/SARSAT Documents G.005 and S.007 for information regarding ELT programming and registration.

Links to all referenced web sites are available at www.artex.net

4. Maintenance

4.1 Periodic Maintenance for the United States

Artex suggests testing of the ELT every 1 to 2 months. This provides an indication of the integrity of the ELT and antenna system. If performed at this rate, the accumulated operating time will not reduce the 6-year life rating of the battery pack.

In the United States, minimum maintenance requirements for ELTs are stated in FAR 91.207 paragraph (d):

(d)Each emergency locator transmitter required by paragraph (a) of this section must be inspected within 12 calendar months after the last inspection for--

- (1) Proper installation;***
- (2) Battery corrosion;***
- (3) Operation of the controls and crash sensor; and***
- (4) The presence of a sufficient signal radiated from its antenna.***

To ensure continued reliability and airworthiness, your ELT must be inspected for damage and wear caused by age, exposed elements, vibration, etc. Inspections are also to take place annually per FAR Part 91.409. 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.***

All testing of the ELT referenced in this section may be performed by limiting the transmission of the ELT to 3 sweeps of the 121.5 MHz audio tone. Only transmit within the first 5 minutes after the hour or as specified by local or national regulations. See "Self-test" section.

4.2 Canadian Maintenance Requirements

4.2.1 Regulations

Canadian Aviation Regulations (CAR) Part V, Chapter 571, Appendix G documents maintenance requirements for ELT use in Canada. The complete text is available at:

<http://www.tc.gc.ca/CivilAviation/Regserv/Affairs/cars/Part5/Standards/a571sg.htm>

Maintenance steps for Canada include:

- Performance Test, paragraph 4.2.2
- Corrosion Inspection, paragraph 4.4.3
- Installed Transmitter Test (Self-Test), paragraph 4.4.9
- Battery Removal and Replacement, paragraphs. 4.4.4 and 4.4.5 respectively
 - The battery pack is NOT rechargeable. The reference to recharging in the Canadian regulation is NOT applicable to Artex products.
 - The battery pack must be replaced if a seven flash error occurs when the ELT is set to "ARM".
- Shipping Instructions, paragraph 4.4.14

A complete maintenance program must be part of the annual checks for the aircraft. Artex encourages aircraft users to perform simple checks including steps in paragraphs 4.4.1 to 4.4.3, 4.4.6 and 4.4.7 on a monthly basis.

4.2.2 Performance Test

A performance test is required for all Canadian installations during the annual maintenance. A performance test can only be done by a certified avionics shop with proper equipment. The avionics shop will test per CAR Part V, Standard 571, appendix G for the following:

NOTE: The following annual checks are a requirement of Canada. However, the accumulated time of the tests will add significantly to the battery in use time. This may cause a seven flash error due to exceeding the one hour limit. Testing should minimize the "ON" time required. Replacing the battery is required if the seven flash error occurs.

4.2.2.1 Peak Power Check

Measure the peak power after 3 minutes of operation

Remove the ELT from the aircraft per paragraphs 4.4.1 and 4.4.2. This test requires an RF screen room or attenuator chamber. Output power may be measured using a suitable Spectrum Analyzer connected to the output BNC connector of the ELT. Use a suitable impedance matching device and/or attenuator in line with the ELT. Refer to Specifications, paragraph 6.0 for output power minimum acceptable limits. The output contains two active frequencies. The signal at 121.5 MHz is active except when the 406 MHz signal is active. The two power output levels are different.

4.2.2.2 Frequency Check

Measure the frequency after 3 minutes of operation.

This test is best performed using a tester designed specifically for beacons of this type. A spectrum analyzer can be used to measure frequency, but typically, will not be as accurate. Keep in mind the 406 MHz signal bursts approximately every 50 seconds and is 440 ms in duration. The amplitude is 37 ± 2 dBm.

4.2.2.3 Audio Modulation Check

The audio modulation shall be recognizable as a typical ELT signal, and shall meet the specifications of the ELT manufacturer.

Refer to paragraph 4.4.9, *Antenna Test* (page 46), to check the 121.5 MHz audio modulation sweep.

Refer to paragraph 4.4.10, *Verification of Digital Message* (page 48), to check the 406 MHz coded message.

4.2.2.4 Current Draw Check

Measure the current draw in the "ARM" or "Auto" position, and in the "ON" position as specified by the ELT manufacturer.

Antenna connection must be terminated in 50Ω for current measurements to be accurate. Tests require an adapter to measure the battery voltage and current. Contact Artex technical support to order adapter P/N 500-0057.

Battery current in the "ARM" mode must be $\leq 2\mu\text{A}$. When the ELT is "ON" and between 406 MHz bursts, the current will stabilize to approximately 78mA to 88mA (121.5 MHz only). The 406 MHz burst will draw approximately 3 to 4A. Burst current should not exceed 5 Amps.

4.2.2.5 Automatic Activation System Check

Paragraph 4.4.6, *G-Switch Check*, provides a simple method of checking the automatic activation system.

4.3 Periodic Maintenance – Other Countries

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

4.4 Maintenance Steps

4.4.1 Remove ELT Connections

Loosen the thumbscrews and remove the D-sub and RF connectors. 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.

4.4.2 Remove ELT

Remove the ELT from its mounting tray. Inspect the mounting hardware. Ensure the hardware is free of cracks or other obvious damage.

4.4.3 Corrosion Inspection

Inspect all metal parts of the ELT exterior, its mounting tray, RF coax cable, remote switch and cable, and the antenna and its hardware for signs of corrosion. This includes mounting screws, electrical connectors, antenna base mount, etc.

4.4.4 Battery Removal

CAUTION:

**The battery pack contains electrostatic sensitive parts.
Take ESD precautions before handling.**

Damage may happen to the exposed electronic parts and prevent correct operation of the ELT. Refer to paragraph 5.1 for methods of preventing an Electrostatic Discharge (ESD).

- 1) Remove the 8 securing screws from the battery-side cover. Battery pack is identified by the embossed text: "BATTERY ACCESS ON THIS SIDE".
- 2) Carefully lift the battery cover (battery pack) away from the ELT and unplug the flex-cable connected to the pack. Do not pull on the flexible portion of the cable - use the rigid section of the flex circuit at the connector as a handle.
- 3) Inspect the battery pack and ELT chassis. The battery cells, components and connectors should be free of corrosion. Inspect flex-circuit for broken connections or damage. Ensure the battery housing is free of cracks or other visible damage.
- 4) Verify the battery expiration date. If the battery pack has not expired it may be reinstalled. The battery pack must be replaced with a new one:
 - After use in an emergency.
 - When the transmitter has been in use for more than 1 cumulative hour; (7 flash error)
 - After an inadvertent activation of unknown duration.
 - On or before the battery replacement (expiration) date.
 - There is any evidence of corrosion or leakage of any cell or on the small interface board and connector.

4.4.5 Battery replacement

For replacement battery pack order battery pack kit 455-0012. This kit contains:

- Battery pack (452-6499, Li/MnO₂, yellow)
- Replacement gasket (183-0050, 1 ea.)
- Log book entry label (200-01-0006, 1 ea.)

- Extra mounting screws (201-0402, Philips, truss-head, 6-32x7/8, 2 ea.)
- Battery pack installation instruction, ME406 lithium battery packs (571-6504, 1 ea.)
- Label, ME406 lithium battery pack (591-6499, 1 ea.)

Replacement: See Figure 16

- 5) Lay the battery pack on the work surface with the cells facing up.
- 6) Install the replacement seal in the slot along the perimeter of the housing.
- 7) Align the ELT with the new battery pack, holding it slightly above the pack with one hand, and then plug the flex-cable connector into the battery assembly using the other. The cable should not be twisted and the connector should 'click' into place. The battery connector is keyed to prevent incorrect installation.
- 8) Mate the ELT to the battery, making sure that the seal is positioned correctly during the process.
- 9) Replace the 8 securing screws and torque to 10 – 12 inch-lbs (113 -136 Newton-cm).
- 10) Enter pertinent battery replacement information in the aircraft log book and fill out any other documentation required by local authority.
- 11) Install the duplicate copy of the expiration date label to a smooth clean surface that allows the label to be viewed while the ELT is installed.

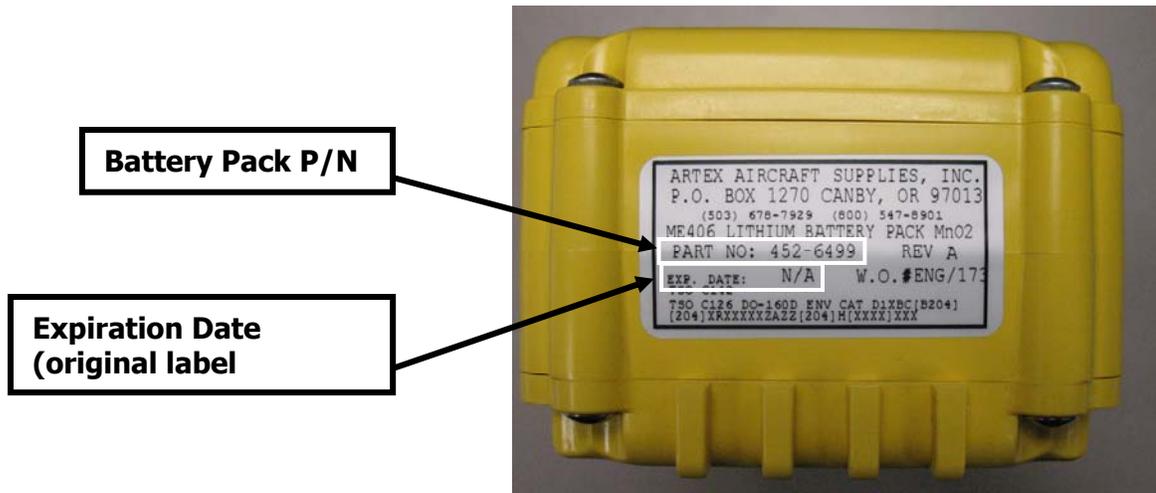


Figure 15 – Spare Battery Pack Label

Approved batteries available from Artex or any Artex dealer

Artex Aircraft Supplies, Inc.
14405 Keil Road NE, Aurora, Oregon 97002
or
Artex Aircraft Supplies, Inc.
P.O. Box 1270, Canby, Oregon 97013

(800)-547-8901
(503)-678-7929
FAX (503)-678-7930
web site: www.artex.net
e-mail: info@artex.net

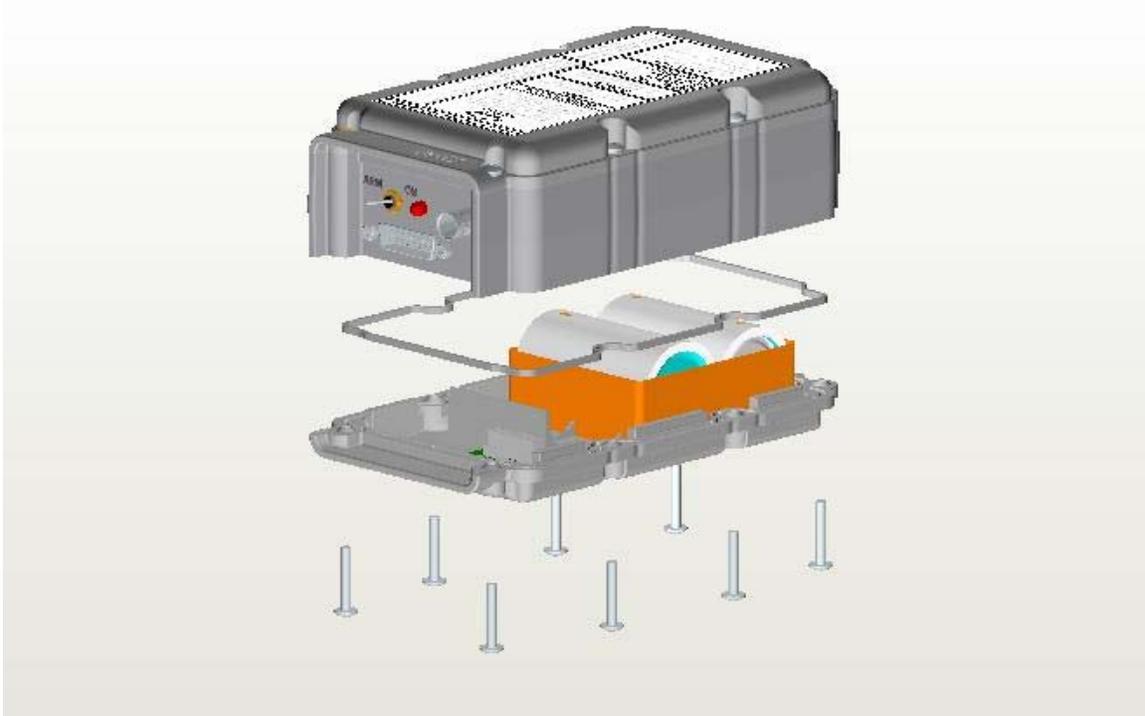


Figure 16 – ELT Battery Installation/Removal Exploded View



Figure 17 – Sample Battery Pack Labels

4.4.6 G-Switch Check

The G-switch is a specially made, momentary switch which closes when acceleration is applied to one of the switch axes. A basic test of the G-switch operation can be performed using the procedure outlined below.

Caution

**Do not allow test duration to exceed 5 seconds.
A false alarm may be generated.**

Any time the ELT is activated it is transmitting a 121.5 MHz distress signal. If the unit operates for approximately 50 seconds, a "live" 406 MHz distress signal is transmitted and is considered valid by the satellite system. Any time that the ELT is cycled from "ARM" to "ON" and then back to "ARM", a 406 MHz signal is transmitted, however it is specially coded as a "Self-Test" signal that is ignored by the COSPAS-SARSAT satellites.

NOTE: Even with the antenna cable removed, the ELT is capable of transmitting a significant distance. This test should be performed with the same precautions as described in the "Transmitter test" section of this manual, i.e., the test should be performed within the first 5 minutes of the hour and any local control tower is to be advised of this test.

Procedure:

1. Disconnect the antenna cable and remote switch harness connector from the ELT. Remove the ELT from the mounting tray.
2. Electrically 'short' pins 5 and 12 with a jumper wire on the D-sub connector of the ELT. Use Artex mating connector (P/N 150-1130) or equivalent 15-pin D-sub connector to fabricate a "shorting plug".
3. Apply acceleration greater than 4.5 ft/sec by using what Artex refers to as the "football throw." Hold the ELT like a football and use a rapid forward (throwing) motion in the direction of the label arrow, then rapidly reverse direction.
4. A click should be heard within the ELT and the active light should begin to blink. Monitor ELT activation by observing the ELT LED. For a more thorough test, monitor the transmission with an AM receiver tuned to 121.5 MHz, as described in 'Transmitter test' section.

Operation: The ELT should remain 'off' until an acceleration of 4.5 ft/sec or more is applied axially in the forward, then rearward direction. This action should activate the unit, transmitting immediately on 121.5MHz. Allow ELT to transmit only long enough to verify operation.

Reset ELT by turning ELT switch to "ON" then to "ARM" position.

NOTES:

- Be sure the correct pins are shorted (D-sub pins 5 and 12). Some connections will force the ELT to activate when made. No combination of shorts will cause permanent damage to the ELT, however wrong pin combinations can erroneously indicate a faulty ELT.
- If the ELT activates without any pins shorted it is defective and should be returned for repair.
- As with all beacon-testing, this test should be performed within the first 5 minutes of the hour, and any local control tower is to be advised of this test.
- The RF cable can be left disconnected to reduce the level of transmitted signal. This should still allow reception within a few hundred feet (or more).

4.4.7 Reinstall ELT

Reinstall the ELT into aircraft by inserting the ELT into the mounting tray at an angle so that the locking ears at the end fit into the mounting tray locking slots. Fasten the Velcro strap around the ELT so that it is firmly held in place. Visually inspect connections ensuring that they are seated properly.

4.4.8 Antenna Test

AC 43.13 advises:

"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."

NOTE: All ELT "ON" tests should be performed within the first five minutes after the hour UTC or as required by local or national authorities.

4.4.9 Installed Transmitter Test (Self-Test)

1. Tune a receiver (usually the aircraft radio) to 121.5 MHz.
2. 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.

3. To pass the test, you must hear the 3 sweeps on the radio AND see the front panel light immediately begin to flash continuously. During the ON to ARM transition, the microprocessor in the ELT checks the "G-switch" (automatic activation switch) latching circuit, pins 5 & 12 on the D-sub connector at the ELT; the 406 MHz transmitter for proper RF output 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.
4. Always perform the tests within the first 5 minutes after the hour. Notify any nearby control tower of your intentions, in accordance with AC 43.13. If outside of the US, always follow all local or national regulations for testing of ELTs.

Caution

**Do not allow test duration to exceed 5 seconds.
A false alarm may be generated.**

Any time the ELT is activated it is transmitting a 121.5 MHz distress signal. If the unit operates for approximately 50 seconds, a "live" 406 MHz distress signal is transmitted and is considered valid by the satellite system. Any time that the ELT is cycled from "ARM" to "ON" and then back to "ARM", a 406 MHz signal is transmitted, however it is specially coded as a "Self-Test" signal that is ignored by the COSPAS-SARSAT satellites.

121.5 MHz Test

Tune a receiver (usually the aircraft radio) to 121.5 MHz. Turn the ELT aircraft panel switch "ON" for about 1 second, then back to the "ARM" position. The receiver should voice about 3 audio sweeps.

At turn-off (back to 'ARM' state) the panel LED should present 1 pulse. If more are displayed, determine the problem from the list below.

Codes displayed with the associated conditions are as follows:

- 1 Flash** – Indicates the system is operational and no error conditions were found.
- 3 Flashes** – Bad load detect. Detects open or short condition on the antenna output or cable. These problems can probably be fixed by the installer.
 - Check that the RF cable is connected and in good condition. Perform continuity check of center conductor and shield. Check for a shorted cable.
 - Check for intermittent connection in the RF cable.

- If this error code persists there may be a problem with the antenna installation. This can be checked with a VSWR meter. Check the antenna for opens, shorts, resistive ground plane connection.

4 Flashes - Low power detected. Occurs if output power is below approximately 33 dBm (2 watts) for the 406 signal or 17 dBm (50 mW) for the 121.5 MHz output.

- Check coax and connections
- Check antenna installation
- Check that the frequencies are within acceptable limits

5 Flashes – Indicates that the ELT has not been programmed or is incorrectly programmed. Does not indicate erroneous or corrupted programmed data.

6 Flashes – Indicates that G-switch loop between pins 5 and 12 at the D-sub connector is not installed. ELT will not activate during a crash.

- Check that the harness D-sub jumper is installed by verifying less than 1 ohm of resistance between pins 5 and 12.

7 Flashes – Indicates that the ELT battery has too much accumulated operation time (> 1hr). Battery may still power ELT; however, it must be replaced to meet FAA specifications. May also indicate damage to the battery circuit.

4.4.10 Verification of Digital Message

This test is not mandatory in the United States (FAR 91.207(d)); however, Artex strongly recommends that it be performed as part of annual maintenance.

This test **is mandatory** in Canada

Verify the 406 MHz digital message using a test set capable of receiving and decoding the message. Artex suggests the ELT Test Set (ETS) P/N 453-1000. Contact your local Artex dealer for availability of the ETS or call Artex direct at 1-800-547-8901. Other beacon testers can be used for the digital message verification. Follow instructions provided with the test set.

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 ELTs.

NOTE: For the following example, the programming protocol is assumed to be Tail Number, Short Message (Aviation User Protocol). Other protocols are possible and the exact read-outs of the test set may vary. Refer to the applicable operation manual included with the test set or contact Artex for assistance.

To verify the digital message, perform the following steps:

- 1) Disconnect the antenna coax cable at the ELT, connect test set or terminate as applicable.
- 2) Perform all necessary steps to prepare Test Set to receive 406 MHz signal including (but not limited to) turning on power, activating program or any other steps required for the particular Test Set being used.
- 3) Perform the *Installed Transmitter Test (Self-Test)* (page 47) by cycling local or remote switch from "ARM/OFF" to "ON" and back to "ARM/OFF".
- 4) Watch the screen on the Test Set to ensure a message has been received. Repeat "Self-Test" if necessary.
- 5) View message, ensure that all applicable information is correct (country code, aircraft ID, etc.).
- 6) The 15 digit ID hex ID (for example "ADC6492640D3411") should match that shown on the ELT product label. This is the 15 digit hex ID (Unique Identification Number or "UIN") that is used to register the ELT.

4.4.11 Verify Registration

Check ELT for signs of registration. In the US, NOAA supplies a beacon registration label that is applied to the ELT when it is registered. The following address should be used to register and obtain information on how to register 406 MHz ELTs in the United States:

NOAA SARSAT Beacon Registration
NSOF, E/SP3
4231 Suitland Road
Suitland, MD 20746
<http://www.sarsat.noaa.gov/>

The Artex website also contains information on registering beacons in other countries at:
<http://www.artex.net/support-resources/ELT-registration-requirements.php>.

NOTE: For ELTs that will have a country of registration other than the US, please contact the appropriate Civil Aviation Authority in that country for guidelines and documentation needed to assure proper registration. Always follow the national procedures. The correct information for registering the radio transmitter may require including the following information:

4.4.12 Logbook Entry

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

4.4.13 Shipping Instructions

Artex strongly encourages that the battery be disconnected from the ELT for shipping purposes. If this cannot be done, the switch must be secured in the "ARM" position to prevent accidental activation during transport.

5. Troubleshooting Guide

SYMPTOM	LIKELY CAUSE	ACTION
3 Flash Error after performing Self-Test	Bad load detect. Detects open or short condition on the antenna output or cable.	<ol style="list-style-type: none"> 1) Check that the RF cable is connected and in good condition. Perform continuity check of center conductor and shield. Check for a shorted cable. Check for intermittent connection in the RF cable. 2) Check the antenna for opens, shorts, resistive ground plane connection. 3) If this error code persists there may be a problem with the antenna installation. This can be checked with a VSWR meter.
	Antenna mismatch causes cable length to affect sensitivity of load detector circuit. Also refer to PAN012 at http://www.artex.net/support-resources/documents.php?folderid=8 .	<ol style="list-style-type: none"> 1) Change cable length by about 5". Contact Artex Technical Assistance to request extension cable P/N 611-0001.
4 Flash Error after performing Self-Test	406 MHz or 121.5 MHz output power too low. Also may indicate 406 MHz frequency not correct.	<ol style="list-style-type: none"> 1) Check coax cable and connections. 2) Check antenna installation. 3) Check that the frequencies are within acceptable limits. 4) Change cable length by about 5".
5 Flash Error after performing Self-Test	Indicates that the ELT has not been programmed, or has been programmed improperly.	<ol style="list-style-type: none"> 1) Verify 406 MHz programming. Reprogram to short message.
6 Flash Error after performing Self-Test	G-switch loop between pins 5 and 12 at the D-sub connector not installed – ELT will not activate during a crash.	<ol style="list-style-type: none"> 1) Check that the harness D-sub jumper is installed by verifying less than 1 ohm of resistance between pins 5 and 12. 2) Install jumper wire if missing.

Table 2 – Troubleshooting Guide

SYMPTOM	LIKELY CAUSE	ACTION
7 Flash Error after performing Self-Test	ELT battery counter has accumulated >1 hr operating time. Battery may still power ELT, but must be replaced to meet FAA requirements. May also indicate damage to the battery circuit.	1) Replace battery.
Remote Switch LED always on (steady)	Wiring error or frayed wires shorting out pins on back of Remote Switch	1) Verify wiring. 2) Verify integrity of all crimp or solder connections on harness.
ELT will not turn 'OFF'	Battery too low to support 406 burst – causes circuit to reset.	1) Remove battery pack to disable. 5) Replace battery pack.

Table 3 – Troubleshooting Guide (continued)

5.1 Special Precautions for Electro-Static Discharges (ESD)

Artex ELTs are tested to make sure that the complete ELT is safe from damage from most ESD events. However, when the battery pack is being replaced, some components are more vulnerable to damage from ESD.

ESD is defined as any discharge of static electricity. The spark generated from walking across a carpet and touching a door knob is an example of an ESD event. The level of ESD discharge that can damage a circuit is much smaller and not normally felt. To protect the circuits of the ELT when you are replacing the battery please do the following:

- 1) Only disassemble the ELT on a workbench that has been electrically grounded. This may be a metal bench with a ground wire tied to earth ground or a workbench with a special 'ESD' mat connected to earth ground.
- 2) Touch the ground surface momentarily to 'discharge' yourself before touching the ELT or battery. During the battery replacement process, frequently contact with the grounded surface to minimize static buildup. Electronics workers wear special body contact straps with a grounding cable. If available, one should be used.
- 3) Low humidity in the air allows static charges to build up easier than when the humidity is high. On days when static sparks are frequently experienced and no facilities are available (ground strap, grounded work bench, etc.) do not attempt to replace the battery.

6. Specifications

6.1 Operating Frequencies

406.028 or 406.037 MHz +/- 1kHz (consult product label for frequency)

Modulation: Bi-phase L (emission designator G1D)

121.5 MHz +/-6.075 kHz

Modulation: AM (emission designator A3X)

6.2 Output Power

406 MHz: 37 dBm \pm 2 dBm (3.2W Min to 7.9 W Max) (440 ms / 50 sec period) PERP or EIRP for 24 hours @ -20°C to +55°C

121.5 MHz: \geq 17.0 dBm (50mW Min) PERP for 50 hours @ -20°C to +55°C or \geq 20.0 dBm (100mW Min) EIRP for 48 hours @ -20°C to +55°C

6.3 Activation

Crash sensor (G-switch) velocity change of 4.5 ft/sec (2.3Gs)

NOTE: The crash activation level specified by RTCA/DO-204 §2.2.3 is 3.5 ft/sec (2.0 Gs); Artex has specified the higher threshold of 4.5 ft/sec (2.3 G) in accordance with Eurocae ED-62. The use of the 4.5 ft/sec (2.3 G) crash sensor has been approved by the FAA as a deviation (FAA Reference # 98-130S-108, dated February 6, 1998).

5 Auxiliary G-switches activate at 12 Gs in addition to the main G-switch for the ME406HM.

NOTE: It is possible that either the primary or the 5 auxiliary G-switches may activate as the result of a very hard landing of a fixed or rotor wing aircraft.

6.4 Temperature

Storage: -55°C to +85°C

Operational: -20°C to +55°C

6.5 Input Power

ELT: none

Remote Switch: +28VDC, 30 mA (max) or +14 VDC, 30 mA (max)

The remote switch will function without aircraft power but the LED requires voltage.

6.6 Mechanical Characteristics

Vibration:	10 Gs, 5Hz to 2000Hz
Shock:	500 Gs for 4 ms
Crashworthiness:	100 Gs for 23ms
Humidity:	95% for 50 hours
Penetration:	55 LBS from 6 inches
Crush:	1,000 LBS

6.7 Electrical Characteristics

Spurious Emissions per CFR 47 Part 87 for 121.5 MHz; per RTCA/DO-204 for 406 MHz	
Impedance:	50 ohms (nominal) at 121.5/406 MHz

6.8 Coax

Type:	RG-142 (MIL-C-17) or equivalent
Connectors:	BNC

6.9 Software

RTCA/DO-178B, Level D

6.10 Weights

PART NUMBER	DESCRIPTION	WEIGHT
453-6603	ME406 ELT (w/ Battery)	2 LBS 1 oz (936 g) Maximum
453-6604	ME406HM ELT (w/battery)	2 LBS 1 oz (936 g) Maximum
452-6499 (must be ordered as kit # 455-0012)	Battery Pack	12 oz (340g) Max
452-3034	Mounting Tray	3.5 oz (100 g) Max
110-773	Whip Antenna	4 oz (114 g) Max
110-338	Rod Antenna	7.5 oz (213 g) Max
452-6505	Audio Indicator	.34 oz (9.5 g) Max
455-6196	Remote Switch Kit	1.6 oz (46 g) Max
455-7423	Installation Kit	2.5 oz (71 g) Max
611-6013-04	Coax Cable (6 FT)	5 oz (142 g) Max

Table 4 – Weights

6.11 Electrical Loading of Aircraft System

Component	Aircraft Power (+28VDC)		
	Continuous	5 Minutes	5 Seconds
ELT	0 A	0 A	0 A
Remote Switch*	30 mA	30 mA	30 mA
Audio Indicator**	0 A	0 A	0 A

Table 5 - Electrical Loading of Aircraft System

***NOTE:** Remote Switch only draws current when ELT is active for Self-Test or Emergency use.

****NOTE:** Audio indicator is powered by internal ELT battery.



Figure 18 – Battery Pack 452-6499

Chemistry:	Lithium Manganese Dioxide (Li/MnO ₂)
Lithium metal content:	4.4 grams
Voltage:	6.0 VDC (open cell)
Amp-hour rating:	11.1 Ah
Certification:	TSO C126, COSPAS/SARSAT, DOT (T1-T8 testing for Class 9 Hazardous Goods)

For battery replacement, order Kit 455-0012 which contains:

- Battery pack
- Replacement gasket
- Hardware
- Labels

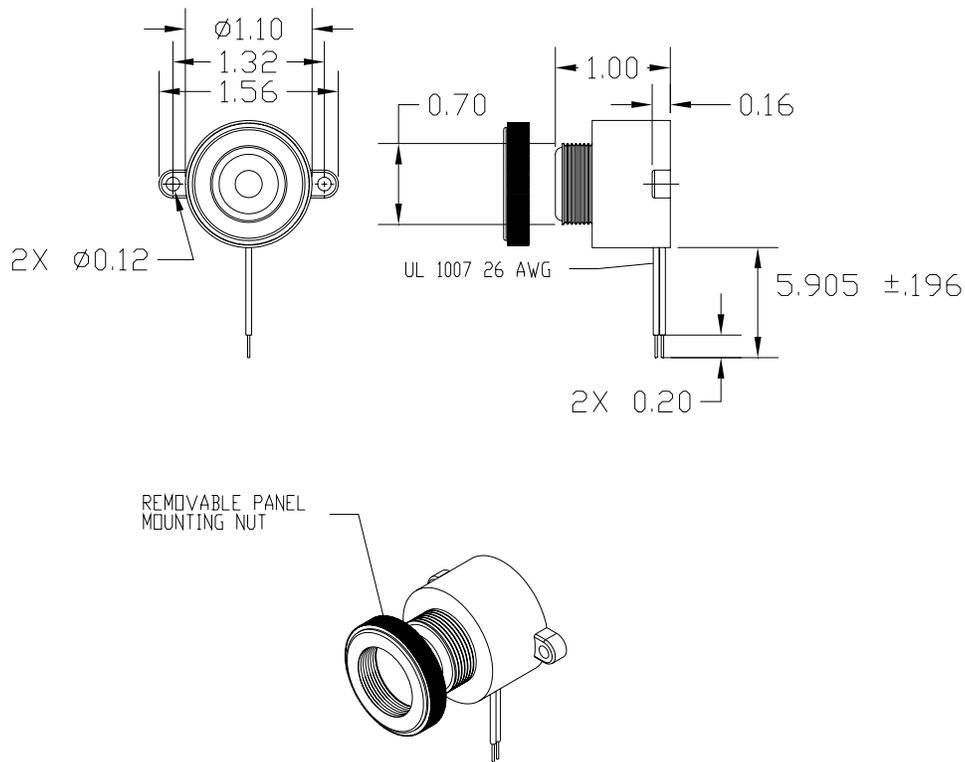


Figure 19 – Audio Indicator (“buzzer”) 452-6505

Specifications @ +25°C ±2°C, Relative Humidity=65±5%

Operating Frequency:	3.5±0.5 kHz
Operating Voltage Range:	3~28VDC
Operating Current:	Max 6 mA @ 12VDC
Sound Pressure Level:	Min 85 dB @ 30 cm / 12VDC
Rated Voltage:	12VDC
Tone:	Continuous
Operating Temp.:	-30~+85°C
Storage Temp.:	-40~+95°C
Dimensions:	Ø28.0 x H25.4 mm
Weight (Max):	9.5 grams
Material:	ABS UL-94 1/16" HB High Heat (Black)
Positive Terminal:	Red Wire
Negative Terminal:	Black Wire

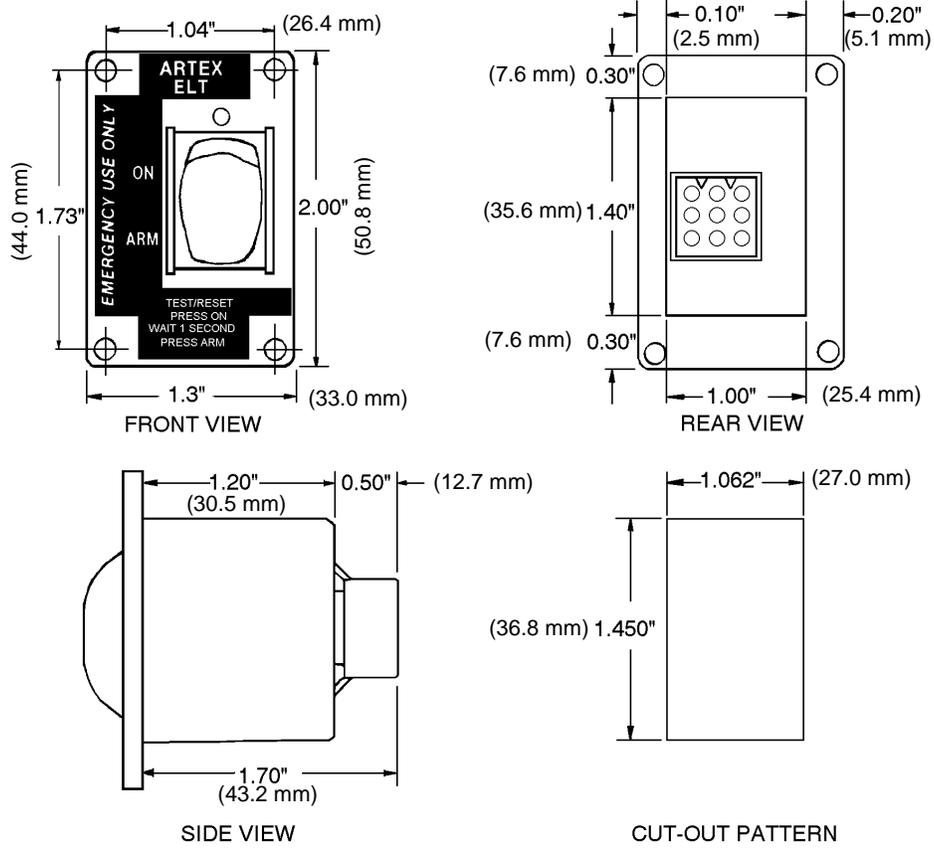


Figure 20 – Remote Switch 345-6196-04

Specifications:

Supply voltage:	14VDC or 28VDC
Current draw:	35 mA Max.
Connector type:	Molex
Light:	Red LED
Switch type:	Rocker
Weight:	1 oz (switch only)

NOTES AND SPECIFICATIONS:

1. ANTENNA CHARACTERISTICS (TA-20°C ± 5°C)

FREQUENCY: 121.5MHZ VSWR: 2.0:1 MAX
FREQUENCY: 406.028MHZ VSWR: 1.5:1 MAX
POLARIZATION: VERTICAL
RADIATION PATTERN: OMNIDIRECTIONAL
POWER RATING: 5 WATTS
IMPEDANCE: 50 OHMS

2. WEIGHT: .18LB. MAX

3. ANTENNA SPEED RATING: 200 KIAS AT SEA LEVEL

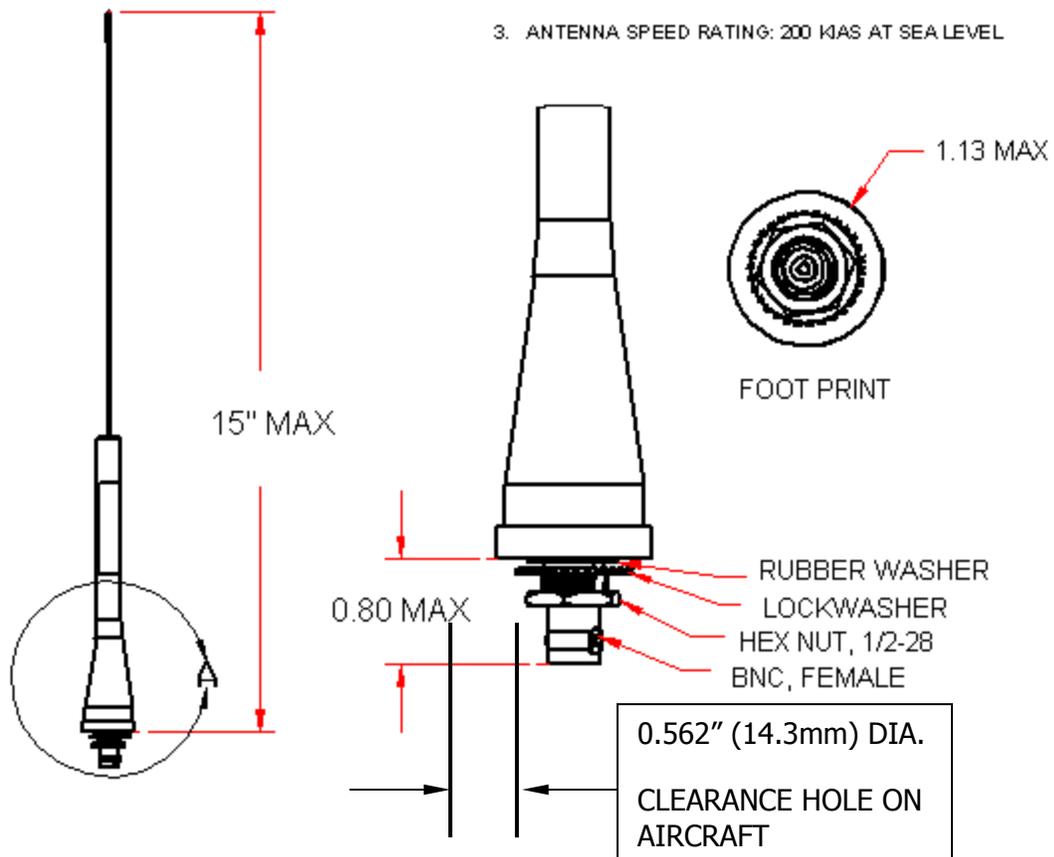
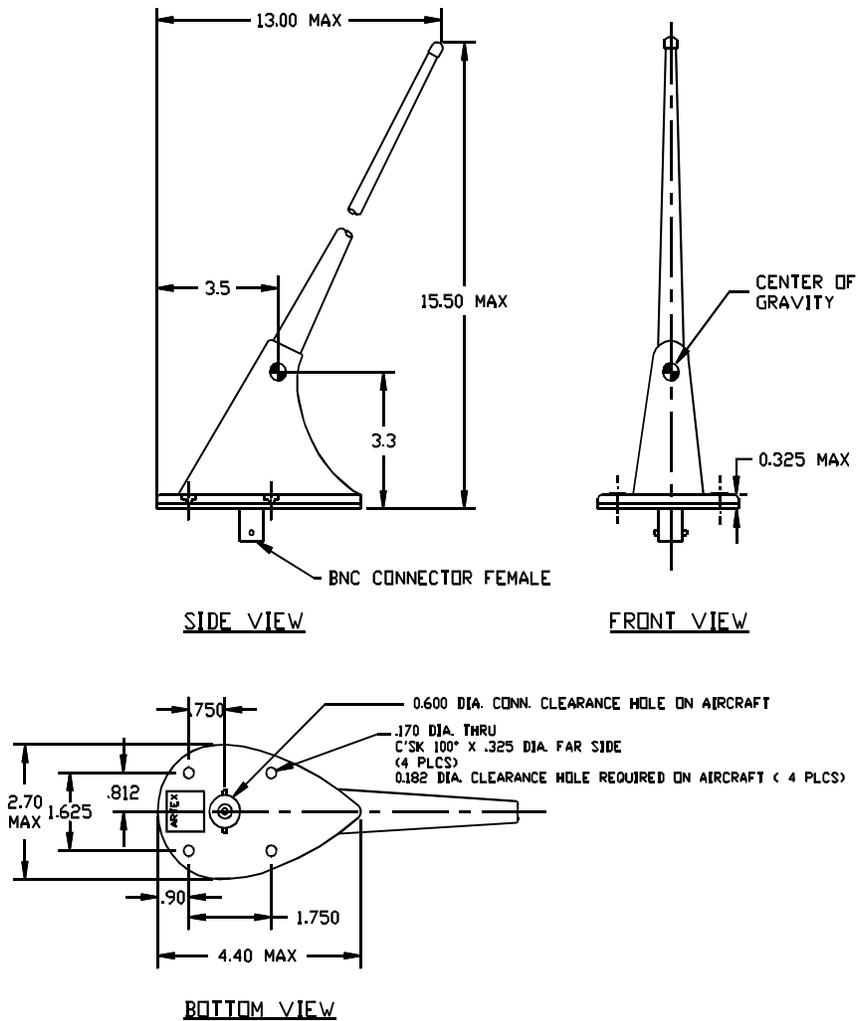


Figure 21 – Whip Antenna 110-773



NOTES:

1. RF CHARACTERISTICS:

1.1 FREQUENCY	121.5, 243, AND 406 MHz
1.2 VSWR	2.0:1 MAX FOR 121.5/243 MHz 1.5:1 MAX FOR 406 MHz
1.3 POLARIZATION	VERTICAL
1.4 POWER RATING	25 WATTS
1.5 RADIATION PATTERN	OMNI DIRECTIONAL
1.6 IMPEDANCE	50 OHMS NOMINAL
2. FINISH: WHITE POLYURETHANE PAINT OVER INTUMESCENT BASE COAT.
3. WEIGHT: .45 LB.
4. AIR SPEED RATING: 350 KNOTS TAS @ 25,000 FT.
5. MAXIMUM TORQUE ON MOUNTING FASTENERS: 20 IN.-LBS.
6. CONNECTOR: BNC(F) FOR 121.5, 243 AND 406 MHz
7. DRAG: 2.9LBS MAX @ 350 KNOTS, 25,000FT.

INSTALLATION NOTES:

1. MOUNT ANTENNA USING FOUR 100° CSK #8-32 SS MACHINE SCREWS AND ASSOCIATED HARDWARE AND TORQUE TO 20 IN./LBS.
2. A LAYER OF ANTI-CORROSION BONDING GREASE SHOULD BE APPLIED BETWEEN THE AIRCRAFT AND THE BASE OF THE ANTENNA.
3. GASKET IS NOT SUPPLIED AND USE IS OPTIONAL. CONTACT ARTEX AND REQUEST PART #280-0320 IF ONE IS DESIRED.

Figure 22 – Rod Antenna 110-338

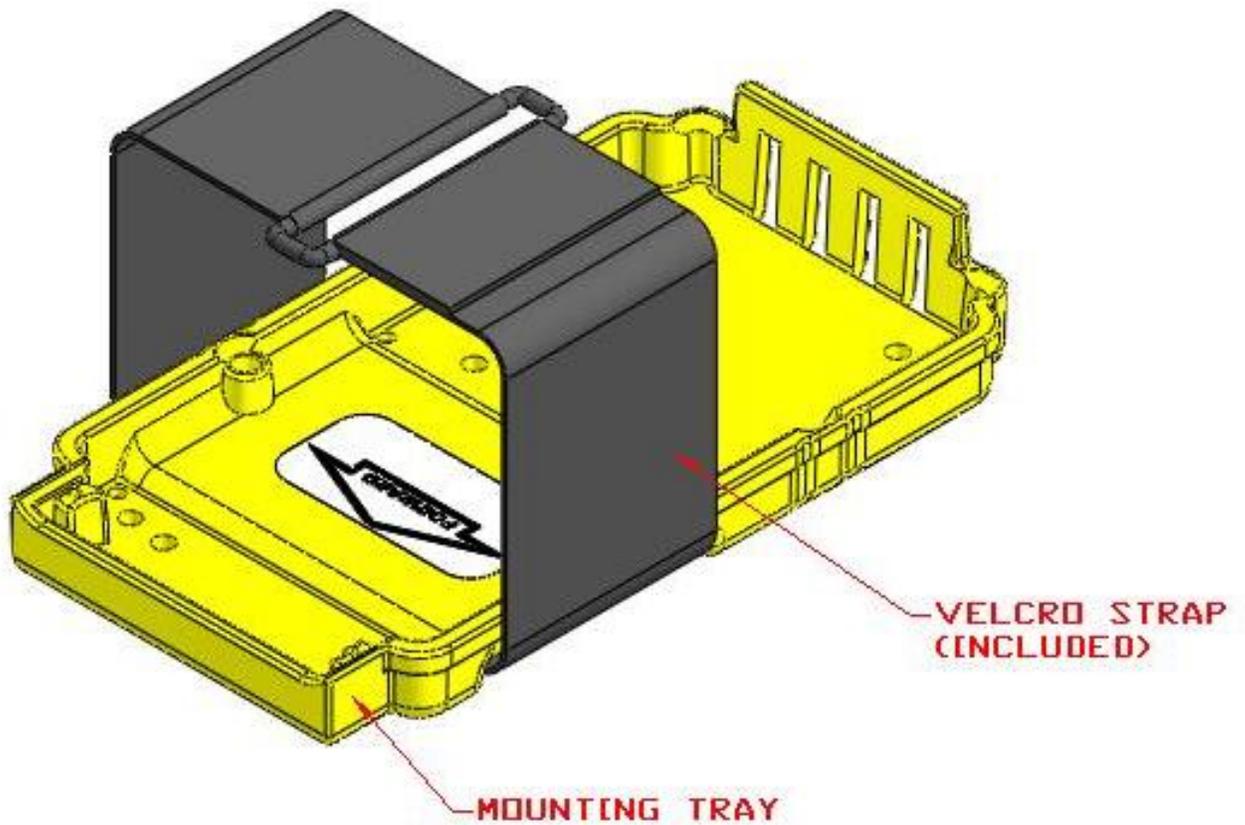


Figure 23 – Mounting Tray (452-3034)

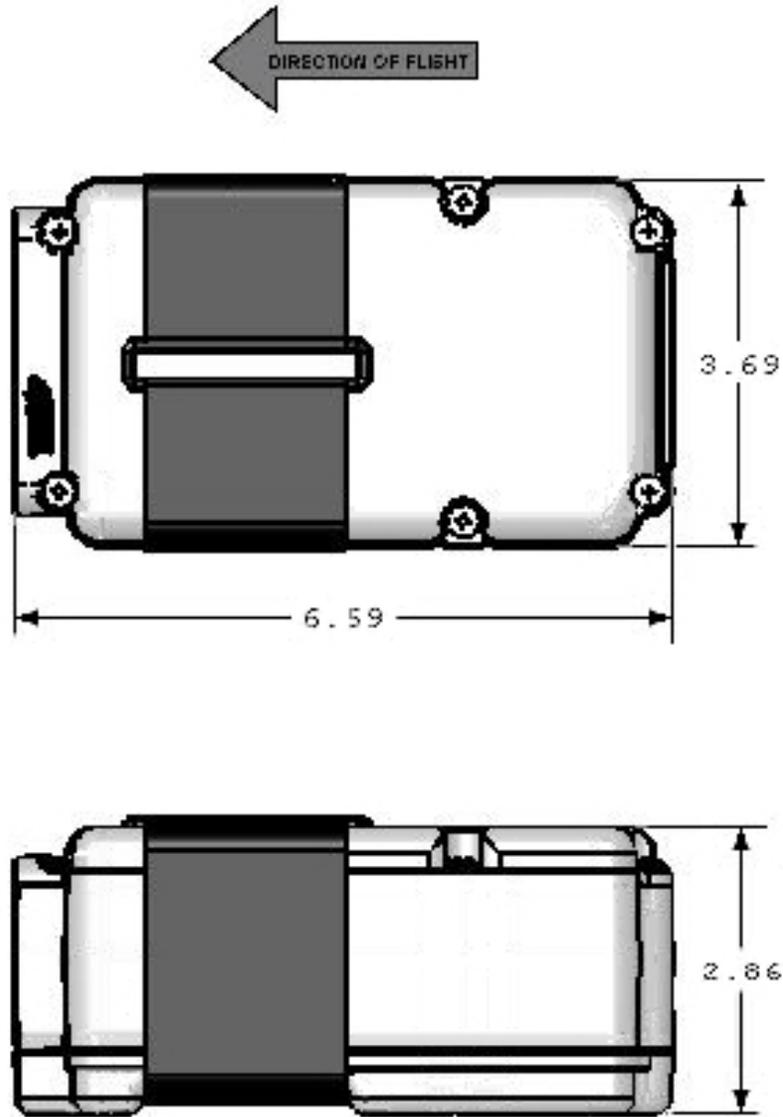


Figure 24 – ME406 Series Outline Drawing

NOTE: Labels on ELT are not shown

6.12 ME406 Series DO-160D Environmental Qualification Form

CATEGORY	SECTION	DESCRIPTION
D1	4.0	TEMPERATURE ALTITUDE
X	4.5.4	IN FLIGHT LOSS OF COOLING
B	5.0	TEMPERATURE VARIATION
C	6.0	HUMIDITY
Per DO-204	7.0	SHOCK
Per DO-204	8.0	VIBRATION
X	9.0	EXPLOSION PROOFNESS
R	10.0	WATERPROOFNESS
X	11.0	FLUIDS SUSCEPTIBILITY
X	12.0	SAND & DUST
F	13.0	FUNGUS RESISTANCE
X	14.0	SALT SPRAY
X	15.0	MAGNETIC EFFECT
Z	16.0	POWER INPUT
A	17.0	VOLTAGE SPIKE
Z	18.0	AUDIO FREQUENCY CONDUCTED SUSCEPTIBILITY
A	19.0	INDUCED SIGNAL SUSCEPTIBILITY
Per DO-204	20.0	RADIO FREQUENCY SUSCEPTIBILITY
H	21.0	EMISSION OF RF ENERGY
XXXX	22.0	LIGHTNING
X	23.0	LIGHTNING DIRECT EFFECTS
X	24.0	ICING
A	25.0	ESD

Table 6 – Environmental Qualification

Environmental Categories: D1XBC[204][204]XRXXFXXZAZA[204]H[XXXX]XXA

See RTCA/DO-160D, Appendix A for a complete explanation of Environmental Categories. References to "Per DO-204" are for tests performed in accordance with RTCA/DO-204.

7. Glossary

NOTE: Some of the following definitions have been deliberately simplified to make them more easily understood by those who do not speak English as their first language.

- AC.....Advisory Circular – Can also refer to Alternating Current electricity but in this manual it refers to a Federal Aviation Administration (FAA) bulletin with special information.
- ANAmerican National – Is usually part of a part number for hardware.
- AWGAmerican Wire Gauge – Look for this in front of a wire size number.
- ArtexArtex Aircraft Supplies, Inc.
- BNC Connector.....BNC is the name for a connector specially made for radio frequency cable connections.
- CFR.....Code of Federal Regulations – The book of regulations for the USA. (It is not a single book. It would fill a small library).
- COSPAS-SARSAT..International search and rescue consortium – For a complete description go to the website at www.cospas-sarsat.org.
- D-sub connector ..D-shaped, subminiature connectors – common type of connector for small signals and electrical currents.
- Drip loopExtra wire length used to form a U-shaped bend in a wire or cable – Water or other fluids will flow down to the bottom of the loop and drip off. Electrical connections are made at the top of the loop.
- EASA.....European Aviation Safety Agency – See www.easa.eu.int.
- EMIElectromagnetic Interference – Unwanted electronic radio type noise.
- ELTEmergency Locating Transmitter – ELTs are used on aircraft. The type of emergency beacon used on boats or by people has a different name.
- FAA.....Federal Aviation Administration – The US government agency for aircraft safety and regulation within the USA.
- FAR.....Federal Administration Regulations – The rule books that apply to just about everything the US government regulates.
- FCC.....Federal Communications Commission – The US government agency that regulates all radio frequency transmissions within the USA.

- Flex circuitA flex circuit is a printed wiring board that is made on a heavy gauge flexible tape.
- G-switchA special type of switch that momentarily closes during a sudden acceleration or deceleration. Switch is calibrated at a specified threshold.
- LanyardA short string or wire that connects two items together so that they do not become separated.
- LEDLight Emitting Diode – Semiconductor device that emits light when current is passed through it. Most common colors are red, green and blue. White and yellow are also possible.
- Mil-SpecThe US military specifications that apply to wire, hardware, electronic components, etc. Quality is usually very high.
- P/NArtex part number.
- Retrofit.....To install new parts or equipment into an existing system.
- RFRadio Frequency – Usually means the actual transmission of energy, e.g. “The radio transmits RF”.
- RTCA.....Radio Technical Commission for Aeronautics – Organization that makes recommendations for airworthiness. Refer to <http://www.rtca.org/aboutrtca.asp> for more information.
- RTV.....A rubbery silicon-based adhesive, typically used to prevent vibration problems and water intrusion.
- STC.....Supplemental Type Certificate – A type certificate (TC) issued when an applicant has received FAA approval to modify an aircraft from its original design. The STC, which incorporates by reference the related TC, approves not only the modification but also how that modification affects the original design.
- TSO.....Technical Standard Order – The Federal Aviation Administration issues TSOs to indicate approval for use on aircraft of a manufactured item.
- VHF.....Very High Frequency – A band of the radio frequency spectrum. It is the frequency range from 30 MHz to 300 MHz.
- VSWR.....Voltage Standing Wave Ratio – Electrical signals will “echo” back on the wire if the load impedance is not matched to the impedance of the wire. The VSWR is a measurement of the amount of voltage being “echoed,” compared to the original signal.