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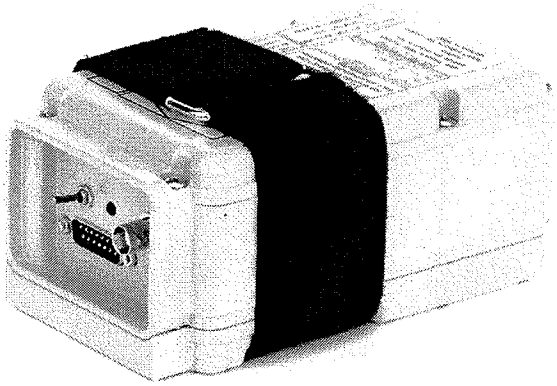

# DESCRIPTION, OPERATION, INSTALLATION AND MAINTENANCE MANUAL FOR THE ME406 AND ME406HM ELT

## 570-1600 Rev. C



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# TABLE OF CONTENTS

# Introduction

This manual contains all necessary information to describe, operate, install and maintain the ME406 and ME406HM ELT. The manual contains all necessary information to ensure 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. Unless otherwise specified, all references to ME406 in this manual apply to both the ME406 and ME406HM.

Web links provided in this manual were accurate at time of printing but are 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 the US or EASA member state.

## *Application*

This manual constitutes FAA approved data as described in AC 43.9-1E, paragraph (h)(2) and AC 43-210, chapter 2, paragraph 201(a)(6) for major alterations. Not all installations are "major"; consult an FAA designee or regional office for clarification.

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 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.

# Description:

In looking to the future, Artex recognizes the need for a reduced cost, 406 MHz ELT for general aviation. These beacons are gaining significance with the planned termination of 121.5 MHz satellite support after February 01, 2009. Weighing only two lbs, the ME406 is designed and manufactured as an economical, yet fully certified TSO-C126 beacon for new installations or as an upgrade for the private pilot who currently has a TSO-C91 or C91a beacon installed.

Both the ME406 and the ME406HM are type AF (automatic fixed) beacons. The ME406HM was developed for helicopter installations and features an additional 5 G-Switch module that allows the ELT to be activated in any of six axes. Note: 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 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 5 years or one hour of use, which ever comes first, as specified by FAR 91.207(c).

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

## *Certification:*

The **ME406 (453-6603)** has been certified to the following:

- TSO C126
- TSO C91a in the 121.5/406 MHz configuration as referenced in TSO-C126, paragraph (e).
- ETSO-2C126 per European Aviation Safety Agency (EASA)
- FAR Part 91 – mandatory automatic ELT requirements
- Cospas-Sarsat T.001
- 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 ELT's. The FCC identifier grantee code for Artex is **H4K**.

**NOTE:** The ME406 is certified to meet the requirements of FAA TSO C126 and EASA ETSO-2C126 per ED-62. This ELT is not certified in Canada. For use outside of the US or EASA member states, contact your local civil aviation authority for ELT requirements.

The **ME406HM (453-6604)** has been certified to the following:

- **PENDING** - TSO C126
- **PENDING** - TSO C91a in the 121.5/406 MHz configuration as referenced in TSO-C126, paragraph (e).
- FAR Part 91 – mandatory automatic ELT requirements
- Cospas-Sarsat T.001
- 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 ELT's. The FCC identifier grantee code for Artex is **H4K**.

**NOTE:** The ME406HM ELT is not certified in Canada. For use outside of the US, contact your local civil aviation authority for ELT requirements.

## Programming:

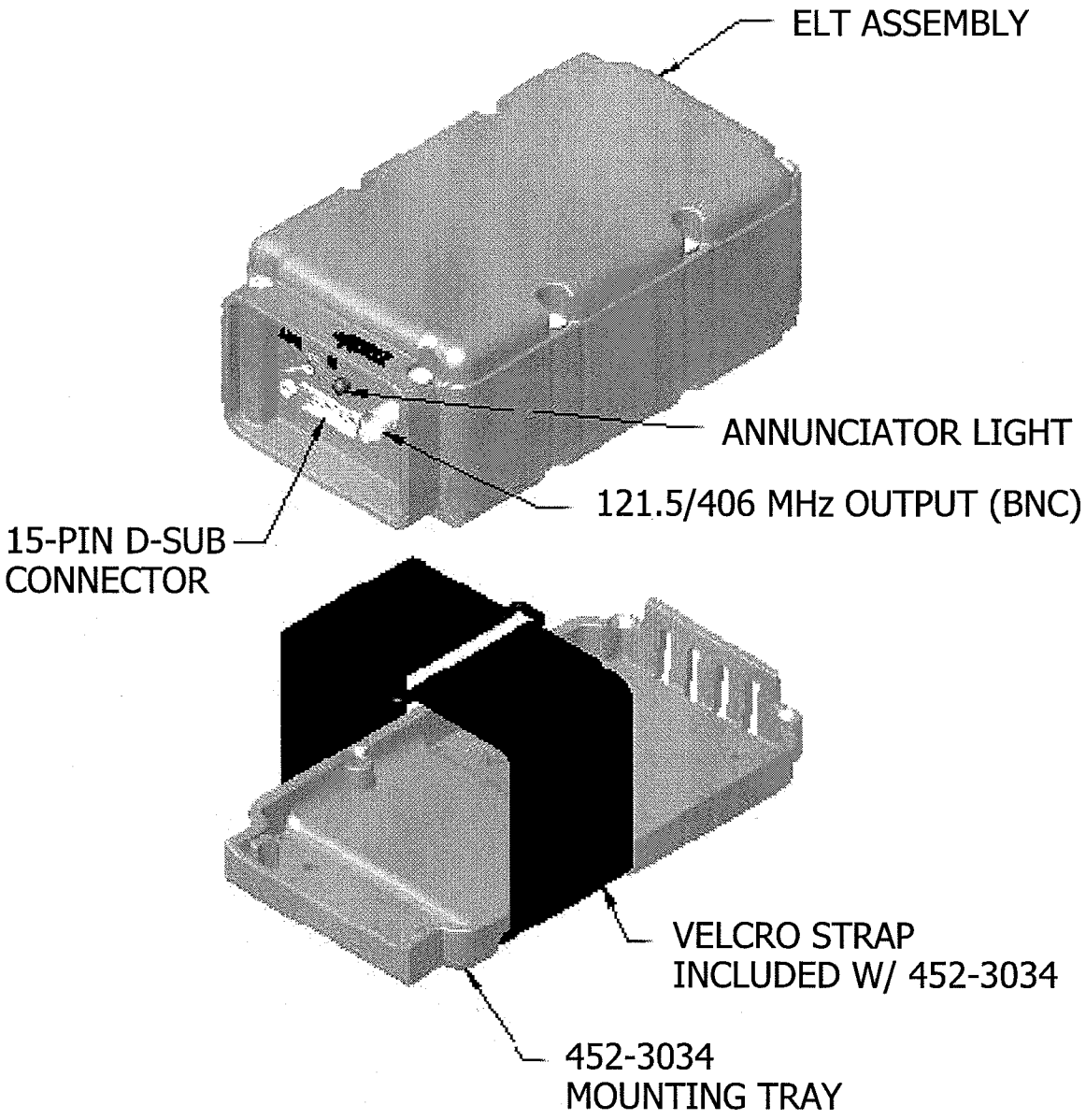
The ME406 is pre-programmed at the factory using a short message format. The following User Protocols are supported:

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

The ME406 does not 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**



# Operation:

In the event of a crash, the ME406 activates automatically, 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.

***NOTE**: In October 2000 the International Cospas-Sarsat Program, announced at its 25th Council Session held in London, UK that it plans to terminate satellite processing of distress signals from 121.5 and 243 MHz emergency beacons on February 1, 2009.*

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.

## 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 about a 3 km radius.

## 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 fps ±0.5 fps. Activation is also accomplished by means of the cockpit mounted remote switch or the panel (local) 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 not to 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.

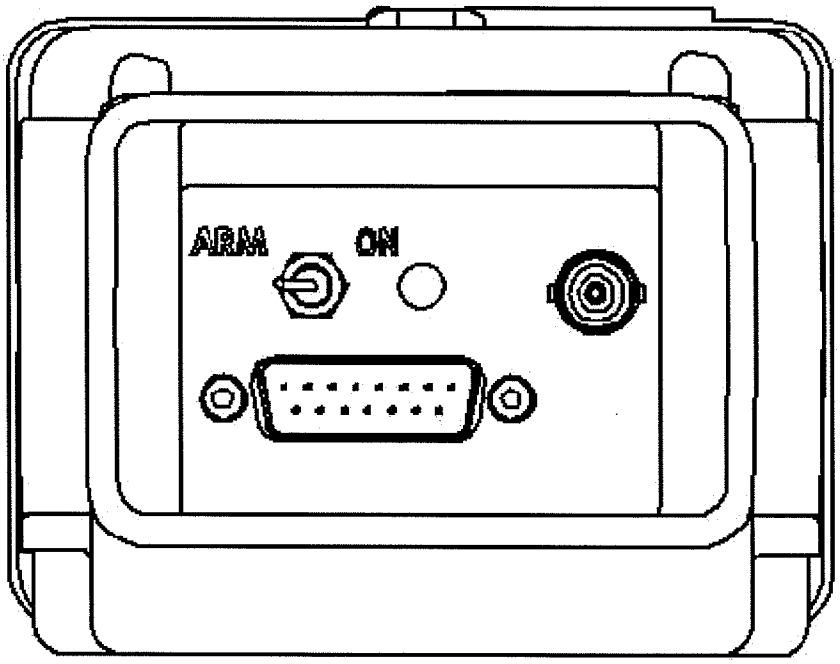
## Self Test mode:

Upon turn-off, the ELT automatically enters a self-test mode that transmits a 406 MHz test coded pulse that monitors certain system functions before returning to the 'ARM'ed mode. The 406 MHz test pulse is ignored by any satellite that receives the signal, but the ELT uses this output 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 one

or more SAR satellites. Therefore, when the self-test mode is required, the ELT must be activated, then, returned to 'ARM' within about 45 seconds otherwise a "live" distress message will be transmitted. ***NOTE:*** *All activations of the ELT should be kept to a minimum. Local or national regulations may limit testing of the ELT or special requirements or conditions to perform testing. For the "self test", Artex recommends that the ELT be "ON" for no more than 5 seconds during the first 5 minutes after the hour.*

In addition to output power of the 121.5/406 MHz signals and 406 MHz frequency, other parameters of the ELT are checked and a set of error codes generated if a problem is found. The error codes are displayed by a series of pulses of the ELT LED, remote LED and alert buzzer. See "Installed Transmitter Test" section on page 38 for more details and a description of the error codes.

## Figure 2 ELT Front View



# 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 43.13-2A (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
www.rtca.org
info@rtca.org

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

**Note:** 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.

## *Parts List:*

### Included in standard kit:

The ME406 is offered as a complete kit. Please review the components included in a standard kit. The following parts should be included. Contact Artex Aircraft Supplies if shortages are found. Depending on kit configurations ordered, additional or optional parts may also be present.

- ME406 ELT P/N 453-6603 (includes battery pack)
- ME406HM ELT P/N 453-6604 (includes battery pack)
- Battery pack Artex P/N 452-6504 (Li/SO2) (included with ELT above)
- Mounting tray – Artex P/N 452-3034
- Fasteners to assemble ELT mount
- Antenna – Artex P/N 110-338 or 110-773
- Coaxial antenna cable, BNC connectors – length determined by kit P/N
- Remote switch mounting kit – Artex P/N 455-6196
- Installation Kit – 455-7423 – includes all required hardware and the following connectors:
    - 15-pin mating D-sub connector – Artex P/N 150-1130
    - D-sub connector housing w/strain relief grommet tree/hardware – Artex P/N 150-1127
- Buzzer – Artex P/N 452-6505
- This Manual (570-1600) – also available for download at www.artex.net

All of the above parts may also be purchased separately. Additional approved parts (system components) may be available, contact Artex at 1-800-547-8901 for details, pricing and availability.

Additional Required Parts and Tools (not provided or available from Artex):

- 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 buzzer mount
- 1/4 A slow-blow fuse and holder (or comparable circuit breaker) for cockpit remote indicator
- Shielded cable – 22 AWG (typical), 5-conductor
- Harness securing fasteners / materials
- Misc 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

**NOTE:** The use of 22 or 24 AWG is suggested but larger diameter wire may be used. All Artex testing and qualification was done using 22 and 24 AWG wire. Use a high quality wire such as MIL-W-16878 or M22759 or their commercial equivalent.

## *Mount ELT*

Three separate mounting-hole patterns are provided so that, if the ME406 is replacing an existing ELT listed 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. 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-XX

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 the least likely section of the aircraft 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 may attack the plastic and metal components.

The mounting location must conform to the requirements of RTCA DO-204 and AC 43.13-2A. DO-204 Sec 3.1.8 states:

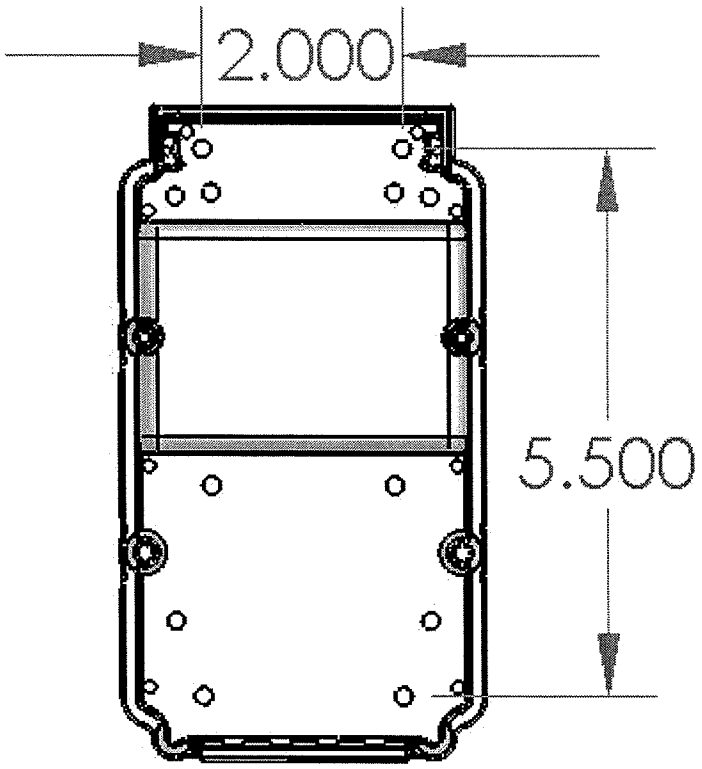
> "The ELT shall be mounted to primary aircraft load carrying structures such as trusses, bulkheads, longerons, spars, or floor beams (not aircraft skin). The mounts shall have a maximum static local deflection no greater than 2.5 mm (0.1 in.) when a force of 450 Newton's (100 lbs) is applied to the 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 horizontally so that the longitudinal axes of the ELT and aircraft are aligned within 10°.

Using the template provided, mark and drill four mounting holes using a #19 (0.1660") drill bit, and then 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.

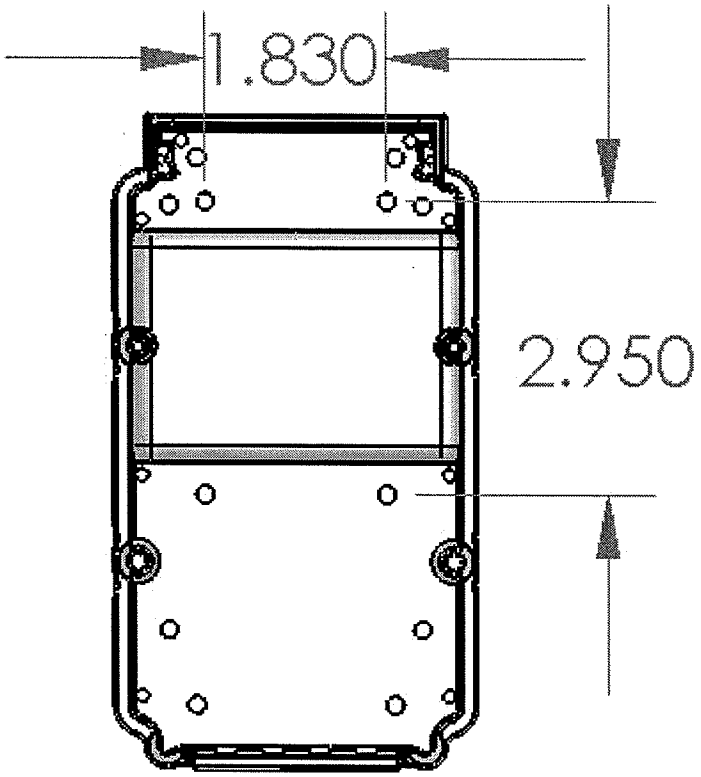
Refer to page 28 for specific information regarding helicopter installations.

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



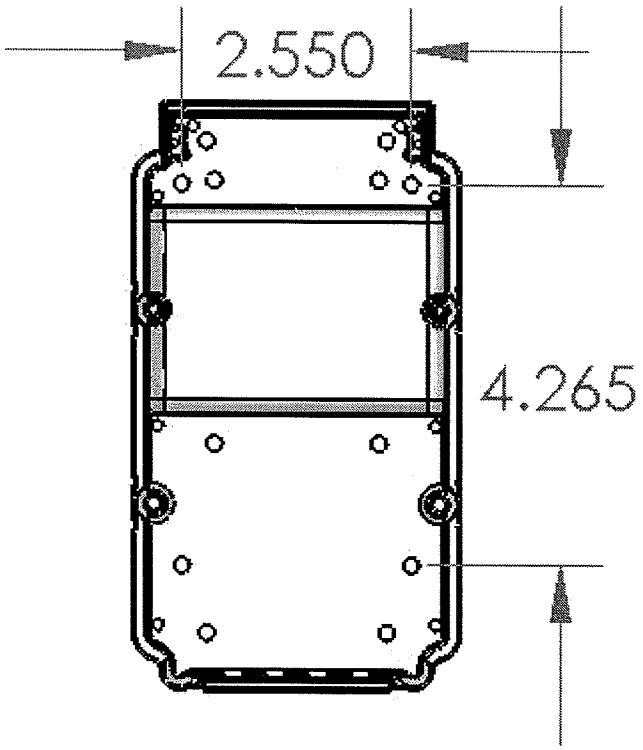

**NOTE: DRAWING IS NOT TO SCALE – DO NOT USE AS A TEMPLATE FOR DRILLING HOLES**

**Figure 4 - Mounting Hole Diagram for Artex 200 Series**




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

**Figure 5 - Mounting Hole Diagram for Pointer**




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

## *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 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 ±15° 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 either of the following antennas:

- Artex whip antenna, 121.5/406 MHz, P/N 110-773
- Artex rod antenna, 121.5/406 MHz, P/N 110-338

Each of the above listed antennas 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 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 wide and each radial 24", 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:

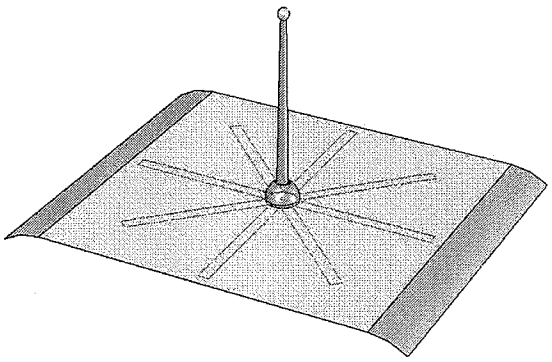


**Figure 6 - Antenna Ground Plane:**
An effective, light-weight, ground plane formed from radial strips of copper foil. A doubler may be required to reinforce the installation for resistance to impact, vibration, ice, washing, etc., and can serve as connection points for the radials.

Specific antenna installation instructions follow. Also, AC 43.13-2A, paragraphs 36 through 38 provides additional guidance for antenna installations.

## *Whip Antenna*

The 110-773 Whip Antenna delivers optimum performance only when installed correctly. To ensure adequate structural strength of the aircraft for associated air loading during flight, use of a backing plate or doubler (not supplied) may be required. Refer to FAA Advisory Circular 43.13-2A for guidance. It is the responsibility of the installation agency to determine the appropriate and adequate antenna installation. The 110-773 Whip Antenna is designed to provide ELT transmissions from a single BNC Female coaxial connector.

## Location

The 110-773 Whip 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. Refer to page 48 for a drawing of the antenna.

## 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 compound) to eliminate aluminum oxidation.

2) Drill 0.562" hole in aircraft skin.

## Type of Aircraft

The 110-773 Whip Antenna is designed for installation on fixed wing subsonic aircraft with reciprocating engines and is rated for a maximum airspeed of 200 KIAS (Knots Indicated Airspeed at Sea Level). ***NOTE: The 110-773 Whip Antenna is not approved for helicopter installations.***

## Installation

1) Metal adapter plates are optional but they 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 structural strength for associated air loading during flight. Refer to FAA Advisory Circular 43.13-2A for complete information.
3) Remove the ½-28 hex nut and external tooth lock washer from the base of the antenna. 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. To mount the antenna, 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.

4) Apply a small, smooth fillet with RTV sealant around the periphery of the antenna base to seal out moisture.
5) 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 coax is recommended when possible).

## Composite Aircraft Installation

1) Except for preparation instructions and installation of a ground plane, installation is the same. Refer to FAA Advisory Circular 43.13-2A, Section 37.C for complete information.

## *Rod Antenna*

The 110-338 Rod Antenna delivers optimum performance only when installed correctly. To ensure adequate structural strength of the aircraft for associated air loading during flight, use of a backing plate or doubler (not supplied) may be required. Refer to FAA Advisory Circular 43.13-2A for guidance. It is the responsibility of the installation agency to determine the appropriate and adequate antenna installation. The 110-338 Rod Antenna is designed to provide ELT transmissions from a single BNC Female coaxial connector.

### Location

The 110-338 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.

### 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) Use the 110-338 outline drawing on page 50 to determine hole pattern and drill size.

### Type of Aircraft

The 110-338 Rod Antenna is designed for installation on fixed or rotor wing subsonic aircraft with reciprocating or turbine engines and is rated for a maximum airspeed of 350 KTAS (Knots True Airspeed at 25,000 feet).

### Installation

1) Metal adapter plates are optional but they 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 structural strength for associated air loading during flight. Refer to FAA Advisory Circular 43.13-2A for complete information.
3) Mount the antenna using four 100° countersink #8-32 stainless steel machine screws and associated hardware. Tighten to 20 inch lbs max.
4) Apply a layer of anti-corrosion bonding grease between aircraft skin and bottom of antenna.

5) Apply a small, smooth fillet with RTV sealant around the periphery of the antenna base to seal out moisture.
6) 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 coax is recommended when possible).

## Composite Aircraft Installation

1) Except for preparation instructions and installation of a ground plane, installation is the same. Refer to FAA Advisory Circular 43.13-2A, Section 37.C for complete information

## *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 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" of panel area to mount. A space is also required for a warning placard, measuring 2.25" X 0.25", which should be placed close to the installed switch. Approximately 3" 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 Specifications. Fit the switch assembly into the cutout and mark the four mounting screw hole locations. Drill mounting screw holes with #28 (0.1405") 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.

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

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

## *Mount Buzzer*

A warning buzzer is required for TSO-C126 approval. The buzzer (Artex 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.

While the buzzer may be located anywhere on the aircraft, it is recommended that the buzzer be placed near the ELT unit, as 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 would serve 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).

## *Cable harness and Wiring*

If the ME406 is a new installation (no previous ELT installed), use of shielded 5 wire cable is recommended, especially for long cable runs or where EMI is a concern. Ground one end of the shield (drain wire) at the ELT. Use high quality harness wire such as M27500 or equivalent. Shielded 4 wire cable may also be used where the shield is used as the ground wire. For installations where the ME406 is replacing a previously installed ELT, the existing 4 wire harness may be used.

Fabricate harness using 22 or 24 AWG shielded wire to connect the cockpit remote switch to the mounted ELT. Reference the Option A schematic of Figure 9. Artex recommends that a 'drip loop' be placed in the harness near the ELT to divert moisture from the D-sub connector. Adjust length of harness to allow for the loop before soldering to connector. If the cable harness isn't shielded or this is a retro-fit of an existing ELT installation using 4 wires, an alternative is to connect pin 9 of the remote switch to a local ground at the cockpit, as shown in Option B of Figure 9. The airframe then provides the required connection between the ELT and remote switch. Ground resistance from the remote switch (through the airframe) to the ELT ground connection should be less than 10 Ω. **Note:** In all cases, larger gauge wire may be used.

### Remote switch end:

**Note:** 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" of insulation from the ends of each of the wires of the cable harness.

Crimp a female receptacle (Artex P/N 151-6628) onto each wire using crimp tool (Molex P/N 11-01-0008 / HTR1719C). Insert wires into appropriate positions of housing (Artex P/N 151-5009) per Figure 8.

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

## Harness ELT End:

Cut a ground wire to length that will connect the 15-pin D-sub mating connector (Artex P/N 150-1130) to ground.

Cut a wire for the buzzer that will connect to the D-sub.

From connector back-shell (Artex 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.

Solder a short jumper from pin 5 to pin 12 on the D-sub.

Solder the cable harness wires, buzzer wire and ground wires to D-sub pins per Figure 9. Note that pin 7 may have two wires connected to it (Option A). As an alternative, one wire may be spliced as described in AC 43.13-1A, Section 445 ("Splices in Electric Wire") if soldering both wires to the single terminal is not practical.

On a flat surface, fit connector w/attached harness into one-half of connector housing positioning grommet so that it fits into recess at end of connector housing.

Install rectangular bracket washers onto thumbscrews, and then insert thumb screws into lower housing half.

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.

Extra screws and strain relief supplied with housing kit are not used.

## Connect harness

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.

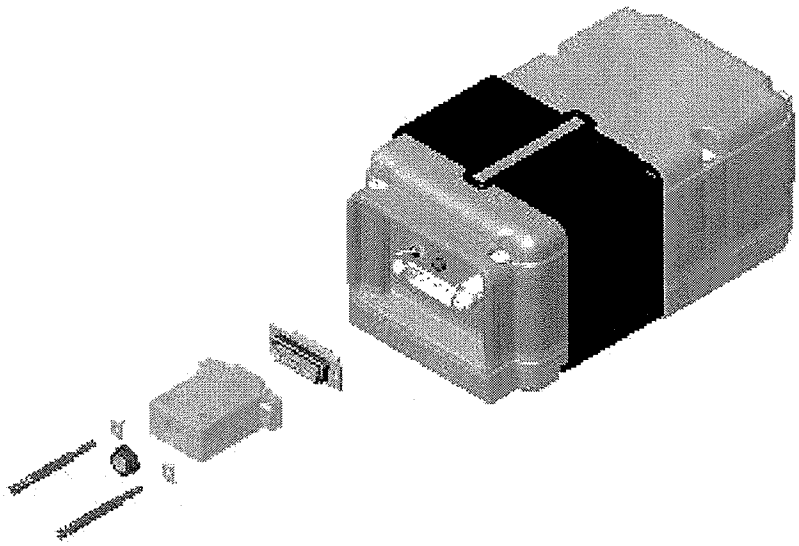
Install the ELT in its mounting tray, securing with the Velcro strap.

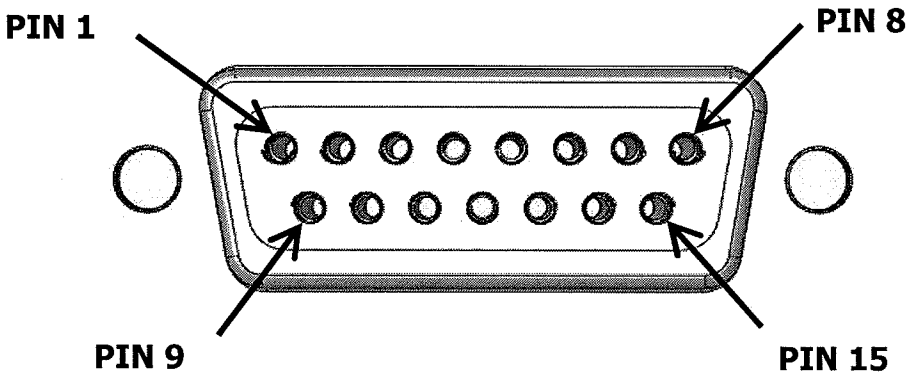
Place 2 each of the 850-0814 sealing strips (provided with install kit 455-7423) into ELT 15-pin D-sub connector. Plug mating D-sub from harness into ELT.

Connect the ground and buzzer wires. Splicing will be necessary on the buzzer wire.

NOTE: Connector is to be sealed with RTV after system has been tested.

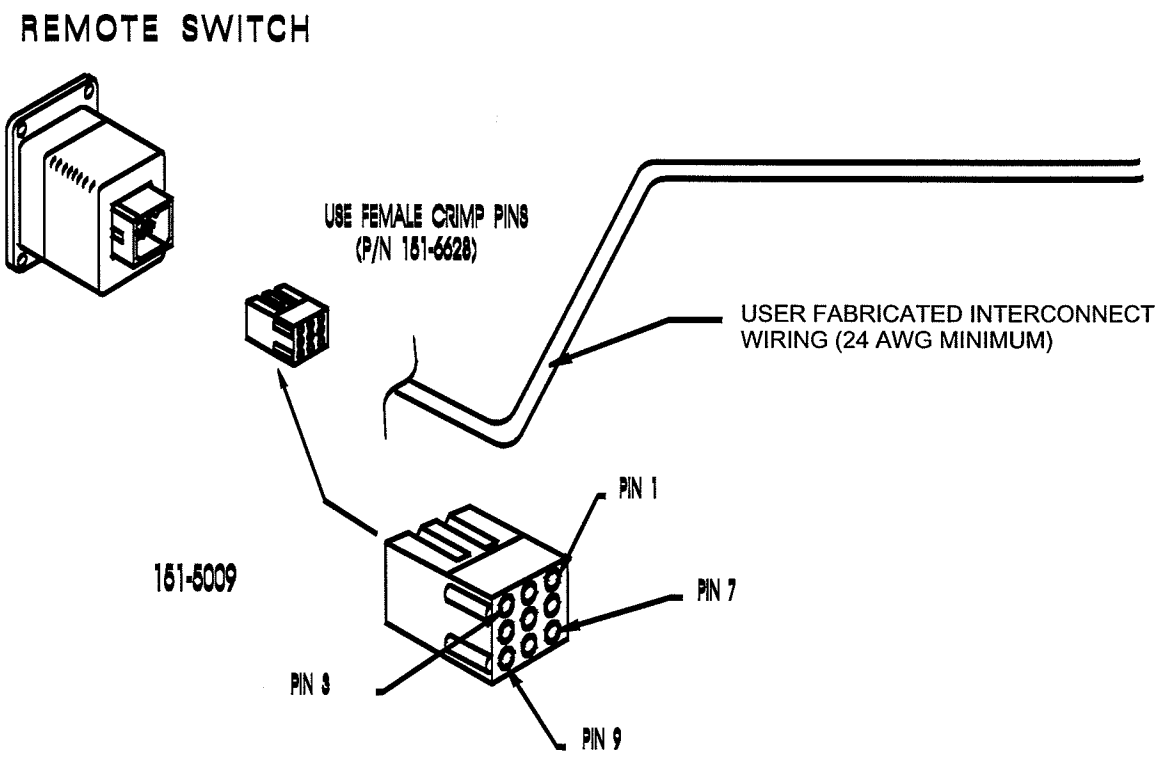
**Figure 7 - ME406 Connector Detail**

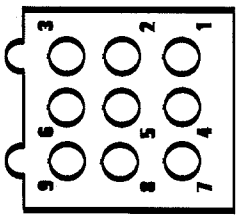





**DETAIL VIEW OF ELT DB15 CONNECTOR**
**(AS LOOKING AT ELT)**

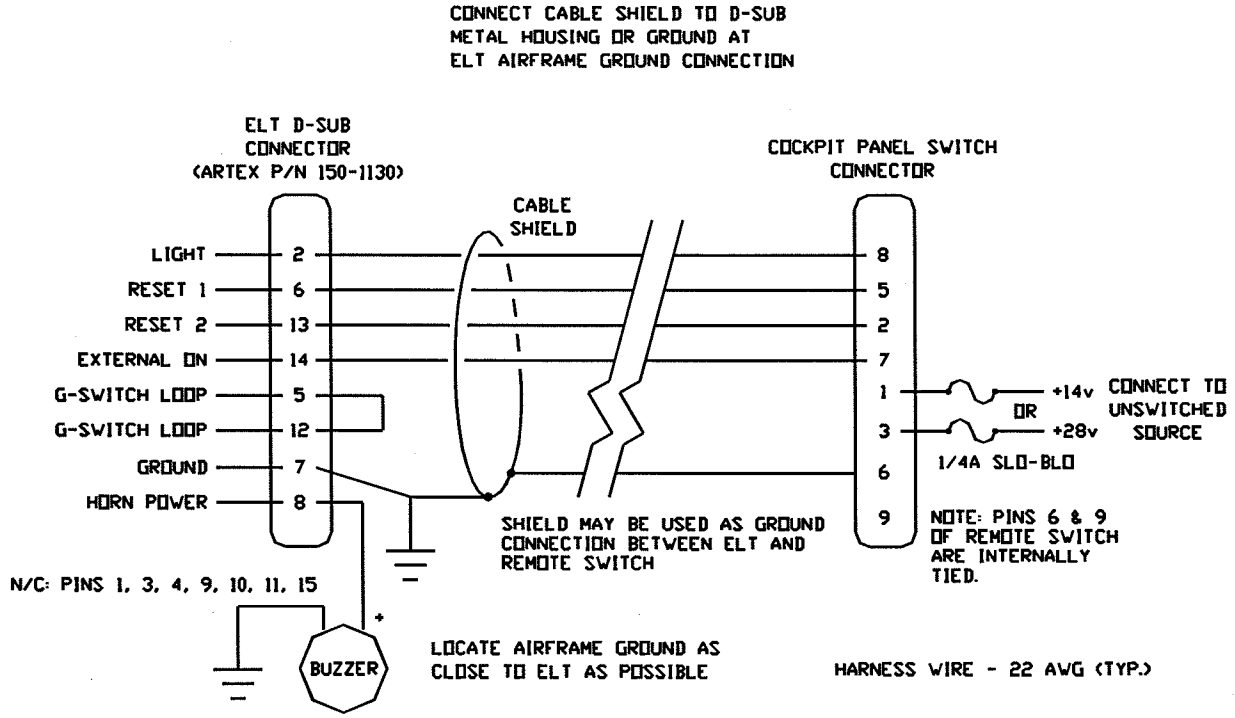
## Figure 8 - Remote Switch Wiring



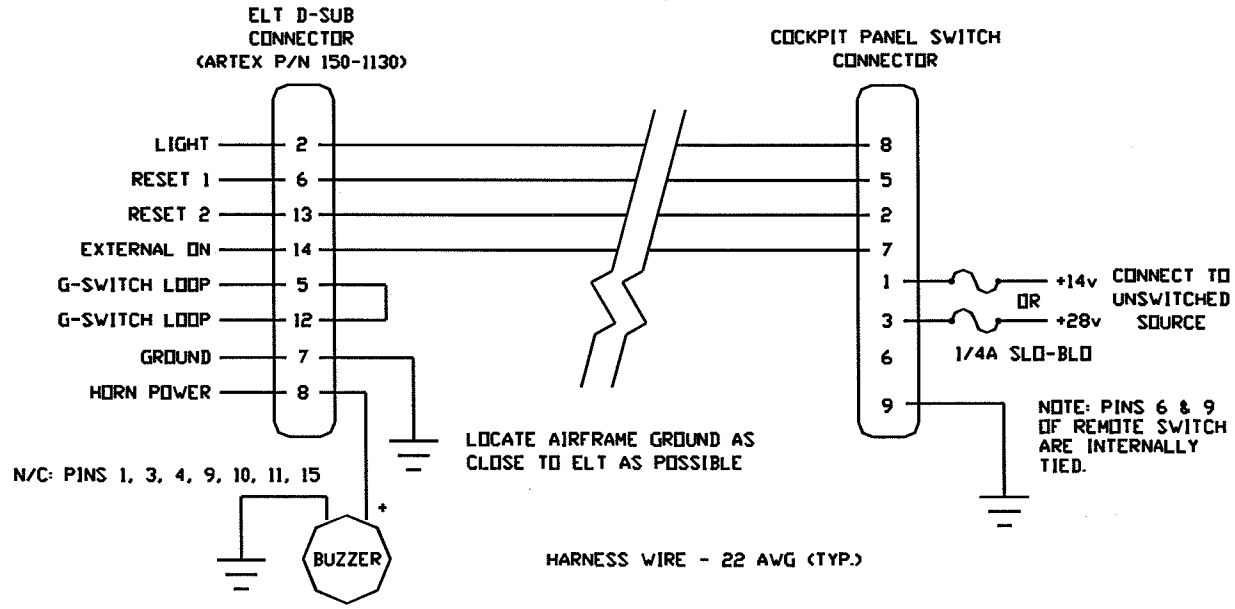




**PIN INSERTION END OF MOLEX CONNECTOR FOR COCKPIT SWITCH ASSEMBLY. HOLE NUMBERING IS IDENTICAL TO THAT INSCRIBED ON ACTUAL CONNECTOR. ORIENTATION SHOWN IS SAME AS INSERTION ORIENTATION FOR INSTALLED SWITCH.**

## Figure 9 - Wiring Diagram




OPTION A




OPTION B

## Connect RF coaxial cable

The BNC to BNC cable provided with the ME406 is for both the 121.5 MHz and 406.028 MHz transmitters. The ME406 was certified using a 6 foot RG-142 (MIL-C-17) coax cable. Maximum cable loss should not exceed 0.5 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 following section.

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 ≥ 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).

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

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.

## 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 BCN connector is Artex 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.

## 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

## *Transmitter Test*

Always perform the tests within the first 5 minutes of the hour. Notify any nearby control tower of your intensions, in accordance with AC 43.13-1B, Section 12-22, Note 3. If outside of the US, always follow all local or national regulations for testing of ELT's.

## Warning!

**Do not allow test duration to exceed 5 seconds.** 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.

### 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 and buzzer 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 that the system is operational and that 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 about 33 dBm (2 watts) for the 406 signal or 17 dBm (50 mW) for the 121.5 MHz output. Also may indicate that 406 signal is off frequency. For this error code the ELT must be sent back for repair or replacement.

**5 Flashes** – Indicates that the ELT has not been 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.

## 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.

## *Seal remote switch and D-sub connectors*

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 should be sealed to prevent moisture from getting into the wire entry holes.

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.*

Apply RTV to the rear of the 9-pin connector remote switch (Artex 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.

## *Helicopter installations*

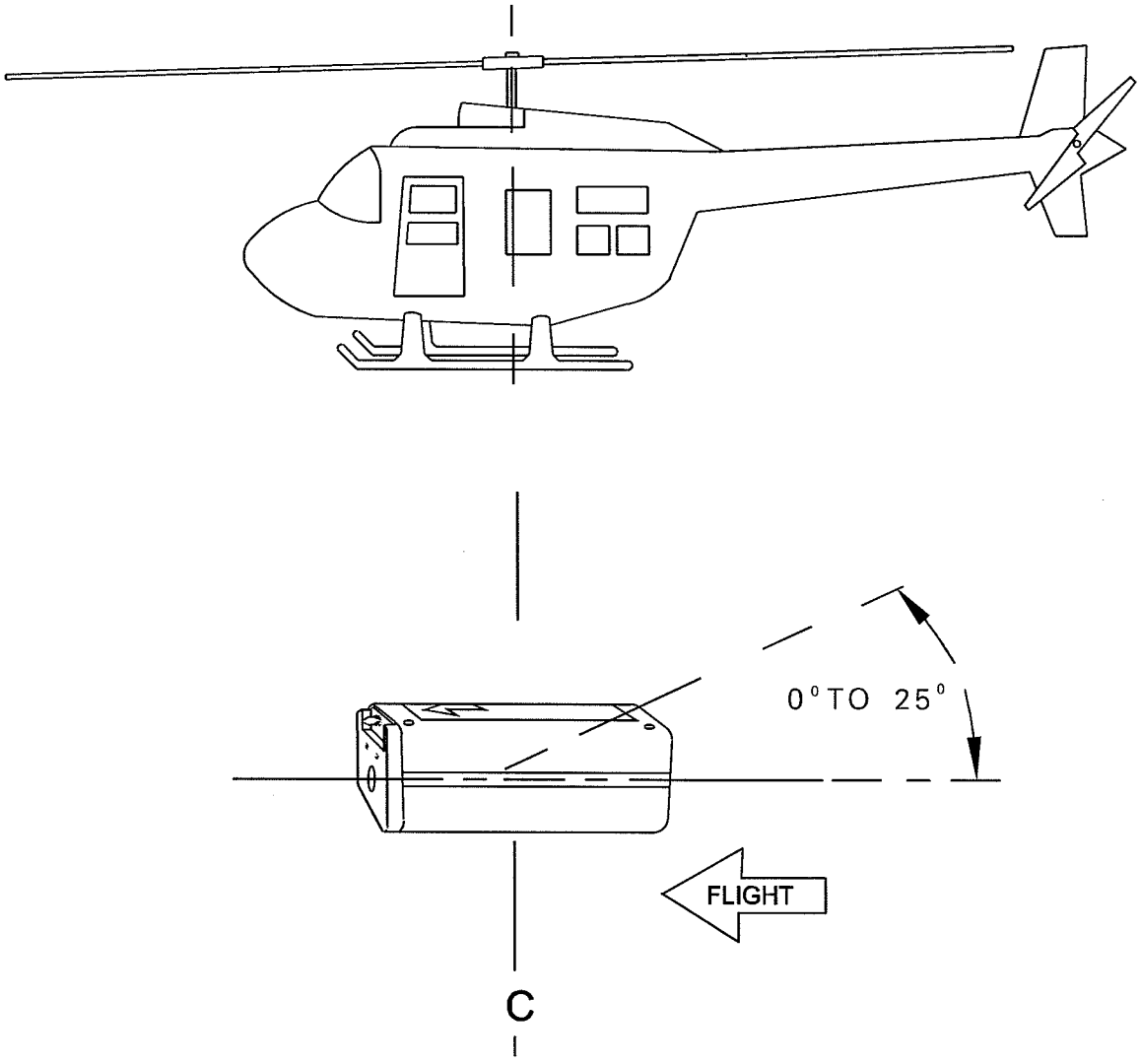
The primary consideration to remember is that RTCA 168 ("Minimum Performance Standards - Emergency Locator Transmitters") paragraph 2.3.1 states that the primary sensor (Delta V switch in the case of the ARTEX ELTs) is intended to respond to crash accelerations parallel to or coincidental with the longitudinal axis of the aircraft, moving generally in a forward direction.

There are few guidelines, aside from experience, as to the best way to install an ELT in a helicopter. The manufacturers have traditionally advised installing the ELT at a 45 degree angle relative to the longitudinal plane of the helicopter. This was assumed to be the best mounting position given the unique flight characteristics of helicopters. Experience has shown, however, that the mounting angle tends to preload the G force level on the G-switch. The Delta V switch is required by TSO C91a to be far more sensitive and activate at a significantly lower sustained G force than older TSO C91 ELTs. ARTEX has found that in many cases the 45 degree mounting angle can result in false activation of the ELT depending on the type and severity of the aircraft maneuvers. The same can be true of abrupt takeoffs and landings.

**ARTEX highly recommends use of the ME406HM for helicopter installations.** These ELT's were especially designed for rotary aircraft and contain an additional five G-Switch module in addition to the primary crash sensor. This feature allows for six axes of coverage. ARTEX recommends that when installing a ME406 series ELT whenever possible, the ELT should be mounted parallel with the floor in Figure 10. If space constraints do not permit mounting the ELT parallel with the floor, the ELT may be tilted forward as much as 25 degrees. The direction of flight arrow on the ELT's product label represents the direction in which the primary crash sensor is oriented.

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

## *Figure 10 – ME406HM Helicopter Installation*




## *FAA Form 337*

For installations that are considered a "major alteration", an FAA Form 337 will be required. Information regarding the completion of Form 337 can be found in Advisory Circular AC 43.9-1E. This Manual constitutes FAA approved data as described in AC 43.9-1E, paragraph (h)(2) and AC 43-210, chapter 2, paragraph 201(a)(6) for major alterations. Not all installations are "major"; consult an FAA designee or regional office for clarification.

## *Radio Station License*

A Radio Station License is not required by the FCC 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

## *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 U.S. Code of Federal Regulations (CFRs).

***There is no charge for beacon registration. This is a service provided by the U.S. 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 301-457-5678 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
E/SP3, FB4, Room 3320
5200 Auth Rd
Suitland, MD 20746-4304
Or call: 1-888-212-SAVE (7283) or 301-457-5678

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.

**NOTICE; FOR ELTS THAT WILL HAVE A COUNTRY OF REGISTRATION OTHER THAN USA , PLEASE CONTACT THE APPROPRIATE CIVIL AVIATION AUTHORITY IN THAT COUNTRY FOR GUIDELINES AND DOCUMENTATION NEEDED TO ASSURE PROPER REGISTRATION**

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

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

# Maintenance

## *Periodic maintenance*

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.

**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.

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 5-year life rating of the battery pack.

***NOTE: 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.***

## 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.

## Remove ELT

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

## Battery removal

**NOTE: The battery pack contains static sensitive parts, take ESD precautions before handling.**

Remove the 8 securing screws from the battery-side cover. Battery pack is identified by the embossed text: "BATTERY ACCESS ON THIS SIDE".

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.

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.

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

## Battery replacement

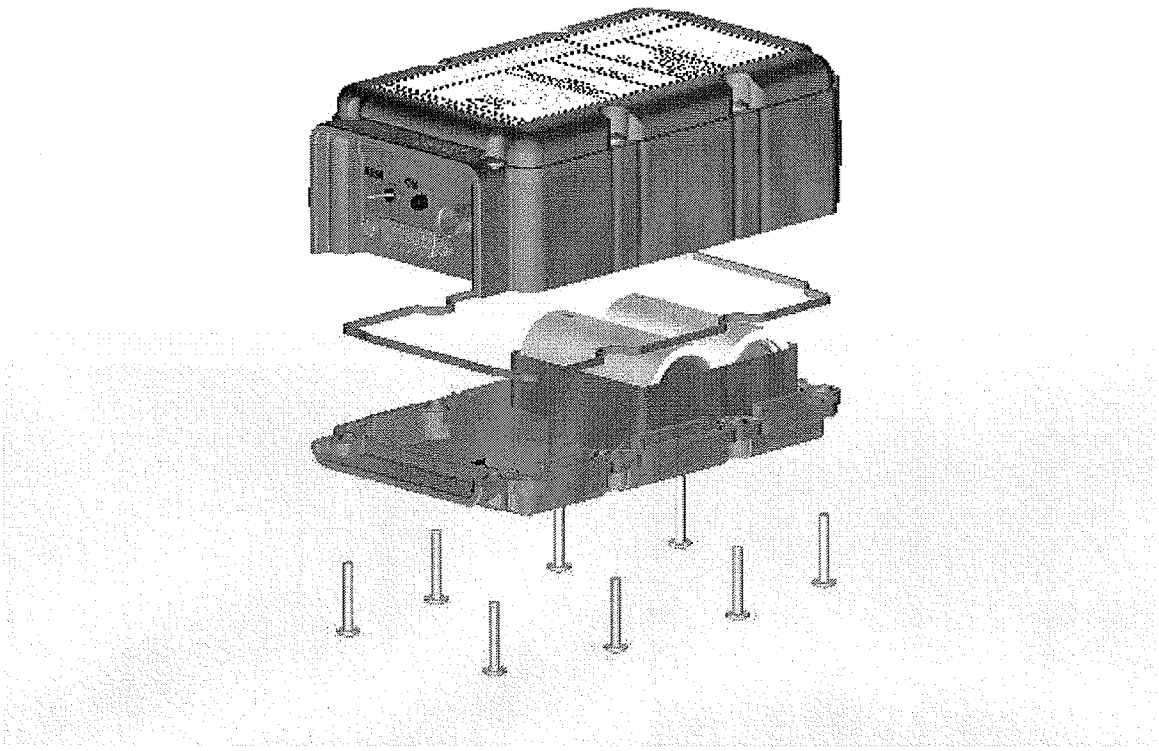
If replacing the battery pack, order replacement kit 455-0012 which contains the battery pack (452-6504), replacement gasket, hardware and labels.

Lay the battery pack on the work surface with the batteries facing up.
Install a replacement seal in the slot along the perimeter of the housing.
Leaving the battery as it is, position the ELT over the battery pack with one hand and 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. **Note:** The battery connector is keyed to prevent incorrect installation.
**Note:** Mate the ELT to the battery, making sure that the seal is positioned correctly during the process. Replace the 8 securing screws and torque to 10 - 12 inch-lbs. Enter pertinent battery replacement information in the aircraft log book and fill out any other documentation required by local authority.

APPROVED BATTERIES AVAILABLE FROM ARTEX OR ANY ARTEX DEALER
ARTEX AIRCRAFT SUPPLIES, INC.
14405 KEIL ROAD NE, AURORA, OREGON 97002

P.O. BOX 1270, CANBY, OREGON 97013
(503)-678-7929, (800)-547-8901, FAX (503)-678-7930
web site: www.artex.net
e-mail: info@artex.net

**Figure 11 - ELT Battery Installation/Removal Exploded View**



## G-switch check

A basic test of the G-switch operation can be performed by removing the ELT from the mounting tray and applying acceleration greater than 3Gs to the ELT, in the rearward direction. This can be achieved by using a rapid forward (throwing) motion in the direction of the label arrow, then rapidly reversing the direction.

The RF and D-sub cables will probably require removal for this operation. D-sub pins 5 and 12 must be connected (shorted) together for the ELT to activate. Use Artex mating connector (150-1130) or equivalent 15-pin D-sub connector to fabricate a "shorting plug".

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 3 Gs or more is applied axially, in the 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. Some connections will force the ELT to activate when made. Others will keep the unit from activating in any circumstance. No combination of shorts will cause permanent damage to the ELT, however all wrong pin combinations 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).

  **Warning:** Even without an antenna it is possible that the signal will be received by a satellite.

## 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 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.

## Antenna Test

AC 43.13-1B 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."

**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.**

## Installed Transmitter Test (Self Test)

- 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 & 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.

Always perform the tests within the first 5 minutes of the hour. Notify any nearby control tower of your intensions, in accordance with AC 43.13-1B, Section 12-22, Note 3. If outside of the US, always follow all local or national regulations for testing of ELTs.

## Warning!

**Do not allow test duration to exceed 5 seconds.** Any time the ELT is activated it is transmitting a 121.5 MHz distress signal. If the unit operates for approximately 50 seconds, a 406 MHz distress signal is transmitted and is considered valid by the satellite system.

### 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 and buzzer 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 that the system is operational and that 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 about 33 dBm (2 watts) for the 406 signal or 17 dBm (50 mW) for the 121.5 MHz output. Also may indicate that 406 signal is off frequency. For this error code the ELT must be sent back for repair or replacement.

**5 Flashes** – Indicates that the ELT has not been 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.

## Verification of Digital Message

***NOTE:*** *This test is not mandatory per FAR 91.207(d) however Artex strongly recommends that it be performed as part of annual maintenance.*

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 ELT's. **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" as described on page 38 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 that 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 "ADC6492640D3411F") should match what is 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.

## Reset ELT

To "RESET" (deactivate) the ELT, move the switch from the "ARM/OFF" position to the "ON" position then back to the "ARM/OFF" position.

## 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 ELT's in the United States:

NOAA/NESDIS
SARSAT Operations Division
Code E/SP3
Federal Building 4
Washington, DC 20233

http://www.sarsat.noaa.gov/

The artex website also contains information on registering beacons in other countries
http://www.artex.net/servicescontents.html

**NOTICE; FOR ELTS THAT HAVE A COUNTRY OF REGISTRATION OTHER THAN THE USA , PLEASE CONTACT THE APPROPRIATE CIVIL AVIATION AUTHORITY IN THAT COUNTRY FOR GUIDELINES AND DOCUMENTATION NEEDED TO ASSURE PROPER REGISTRATION**

## Logbook Entry

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

# 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. | 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.<br>2) Check for intermittent connection in the RF cable.<br>3) 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 Flash Error after performing Self Test | Low power detected. Occurs if output power is below about 33 dBm (2 watts) for the 406 signal or 17 dBm (50 mW) for the 121.5 MHz output. Also may indicate that 406 signal is off frequency. | Verify battery voltage. Replace battery if low voltage (<5.6 VDC) or if 7 Flash error is also present.<br>If possible, verify 406 MHz frequency – if bad, the ELT must be sent back for repair or replacement. |
| 5 Flash Error after performing Self Test | Indicates that the ELT has not been programmed. | If possible, read ELT 406 MHz signal to verify programming. |
| 6 Flash Error after performing Self Test | 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.<br>Install jumper wire if missing. |
| 7 Flash Error after performing Self Test | 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. | Replace battery. |
| Remote Switch LED always on (steady) | Wiring error or frayed wires shorting out pins on back of Remote Switch | Verify wiring.<br>Verify integrity of all crimp or solder connections on harness. |

# Specifications

## *Summary of Minimum Requirements*

### Operating Frequencies

- 406.028 MHz +/- 2 kHz Bi-phase L; Emission designator G1D
- 121.5 MHz +/-6.075 kHz AM; Emission designator A3X

### Output Power

- 406 MHz: 37 dBm ± 2 dBm (3.16W Min to 7.94 W Max) (440 ms / 50 sec) PERP or EIRP for 24 hours @ -20°C to +55°C
- 121.5 MHz: >/= 17.0 dBm (50mW Min) PERP for 50 hours @ -20°C to +55°C or >/= 20.0 dBm (100mW Min) EIRP for 48 hours @ -20°C to +55°C

### Activation

Crash sensor (G-switch) velocity change of 4.5 ft/sec (2.3G's) *Note: The crash activation level specified by RTCA/DO-204 §2.2.3 is 3.5 ft/sec (2.0 G's); Artex has specified the higher threshold of 4.5 ft/sec (2.3G) in accordance with Eurocae ED-62. The use of the 4.5 ft/sec (2.3G) 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 G's in addition to the main G-Switch for ME406HM only.

### Temperature

Storage: -55°C to +85°C
Operational: -20°C to +55°C

### Input Power

ELT: none

Remote Switch: +28VDC, 30 mA (max) or +14 VDC, 30 mA (max) Note: The remote switch will function without aircraft power but the LED light requires voltage.

### Mechanical Characteristics

Vibration: 10 G's, 5Hz to 2000Hz

Shock: 500 G's for 4 ms

Crashworthiness: 100 G's for 23ms

Humidity: 95% for 50 hours

Penetration: 55 LBS from 6 inches

Crush: 1,000 LBS

## 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

## Coax

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

Connectors: BNC

## Software

RTCA/DO-178B, Level D

## *Weight Table*

| PART NUMBER | DESCRIPTION | WEIGHT |
|---|---|---|
| 453-6603 | ME406 ELT (w/ Battery) | 2 LBS 1 oz (936 g) Max |
| 453-6604 | ME406HM (w/ Battery) | 2 LBS 1 oz (936 g) Max |
| 452-6504 | 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 | Buzzer | .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 |

## *Electrical Load Analysis (Current Draw) Table*

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

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

**NOTE: Buzzer is powered by internal ELT battery.

## *452-6504 Battery Pack*

Chemistry: Lithium-Sulfur Dioxide ($Li/SO_2$)

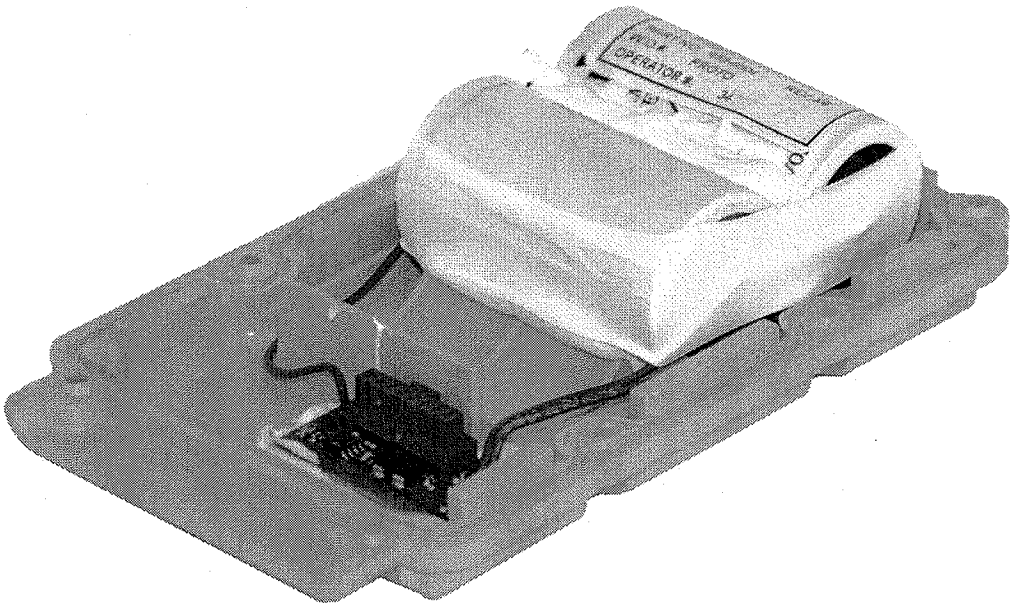
Lithium metal content: 4.4 grams

Voltage: 6.0 VDC (open cell)

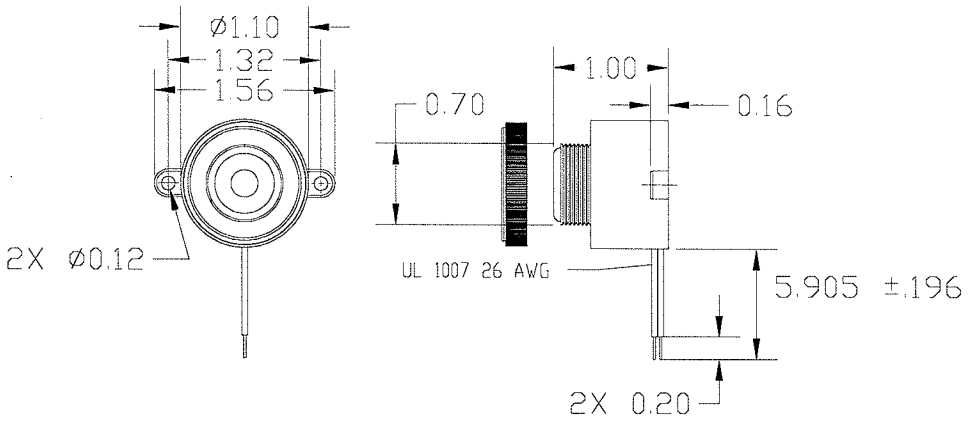
Amp-hour rating: 7.5 Ah

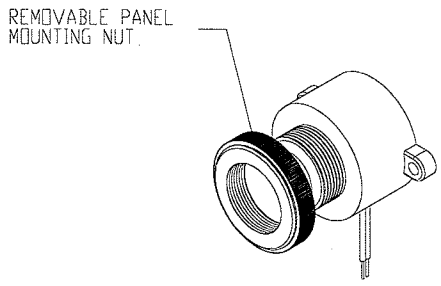
Certification: TSO C142, Cospas/Sarsat, DOT (T1-T8 testing for Class 9 Hazardous Goods)

For battery replacement, order Kit 455-0012 which contains the battery pack, replacement gasket, hardware and labels.



## *452-6505 Buzzer*

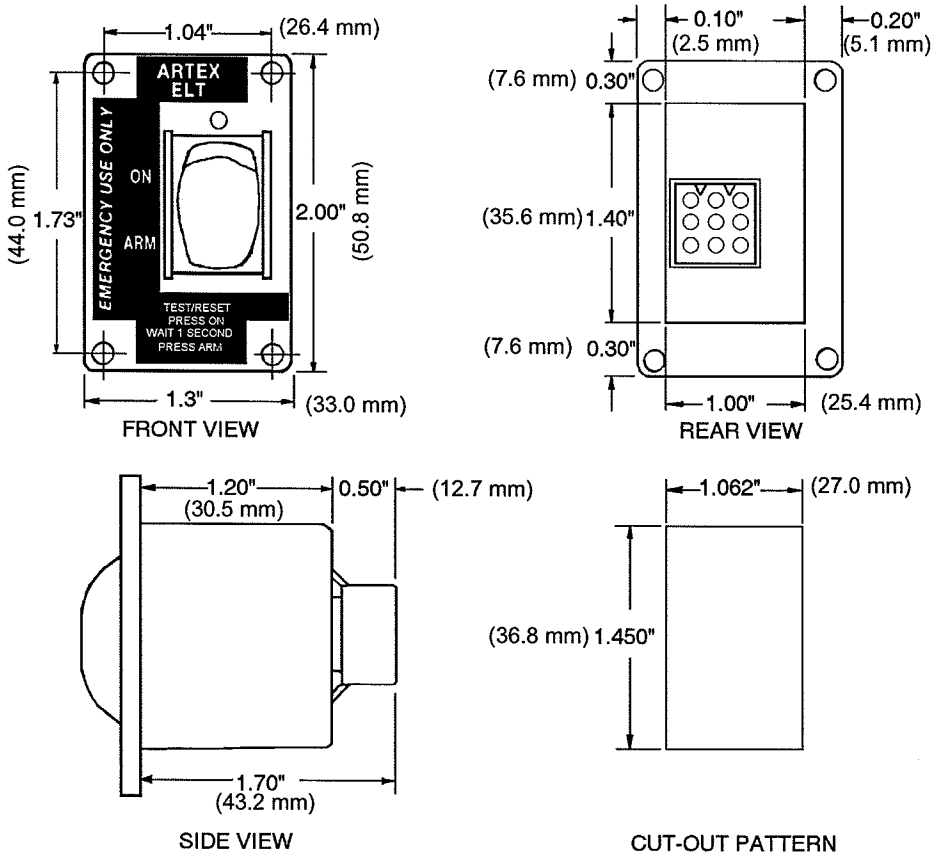



Specifications @ +25°C ±2°C, Relative Humidity=65±5%

| | |
|---|---|
| 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 |

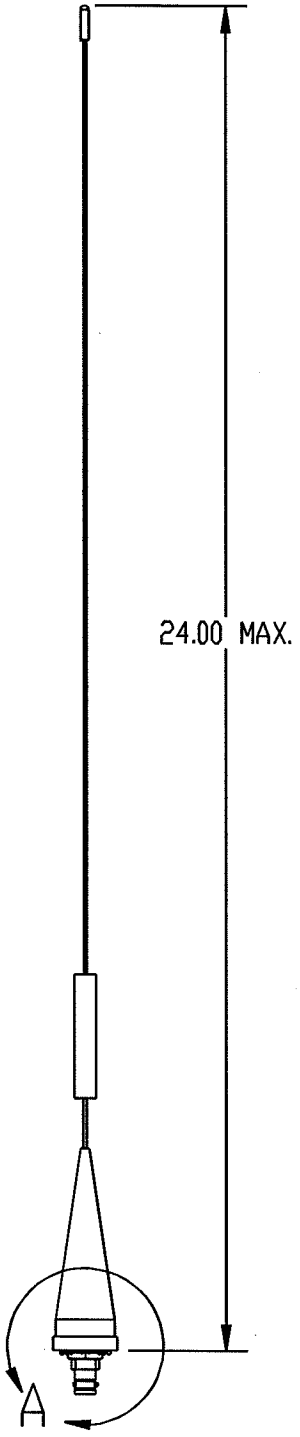
## *345-6196-04 Remote Switch*




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)

## *110-773 Whip Antenna*



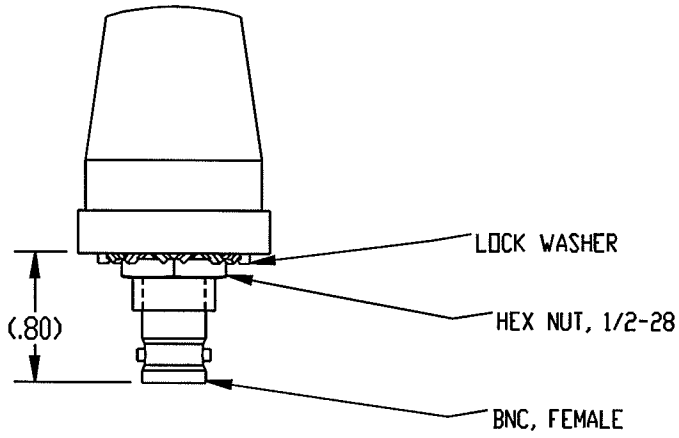

NOTES AND SPECIFICATIONS:

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 | |

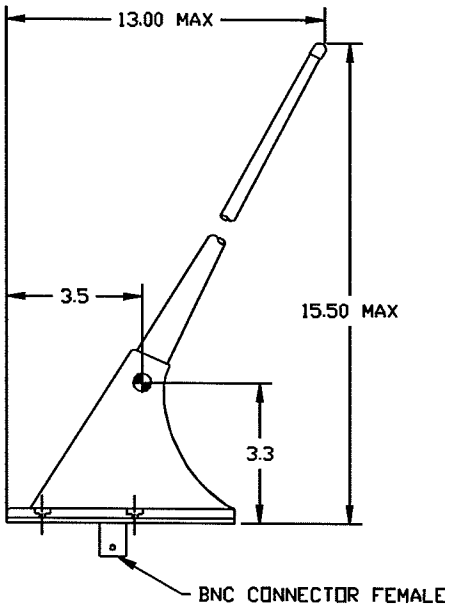
2. WEIGHT: .25LB. MAX

3. ANTENNA SPEED RATING: 200 KIAS AT SEA LEVEL.

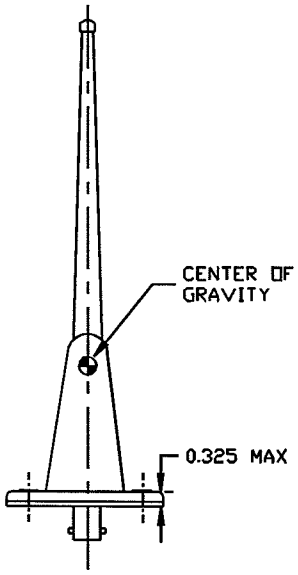



DETAIL A

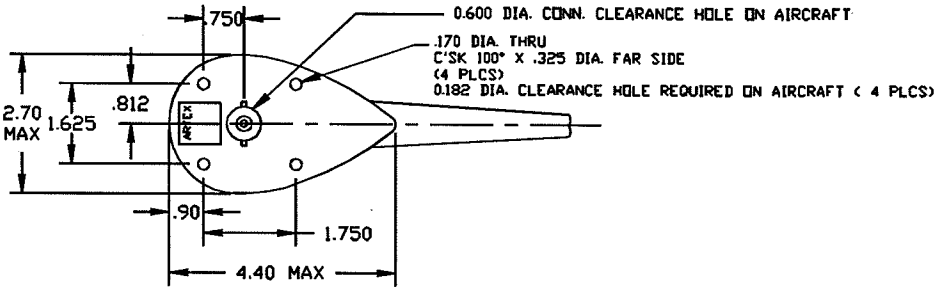
# *110-338 Rod Antenna*




SIDE VIEW




FRONT VIEW




BOTTOM VIEW

NOTES:

1. RF CHARACTERISTICS:

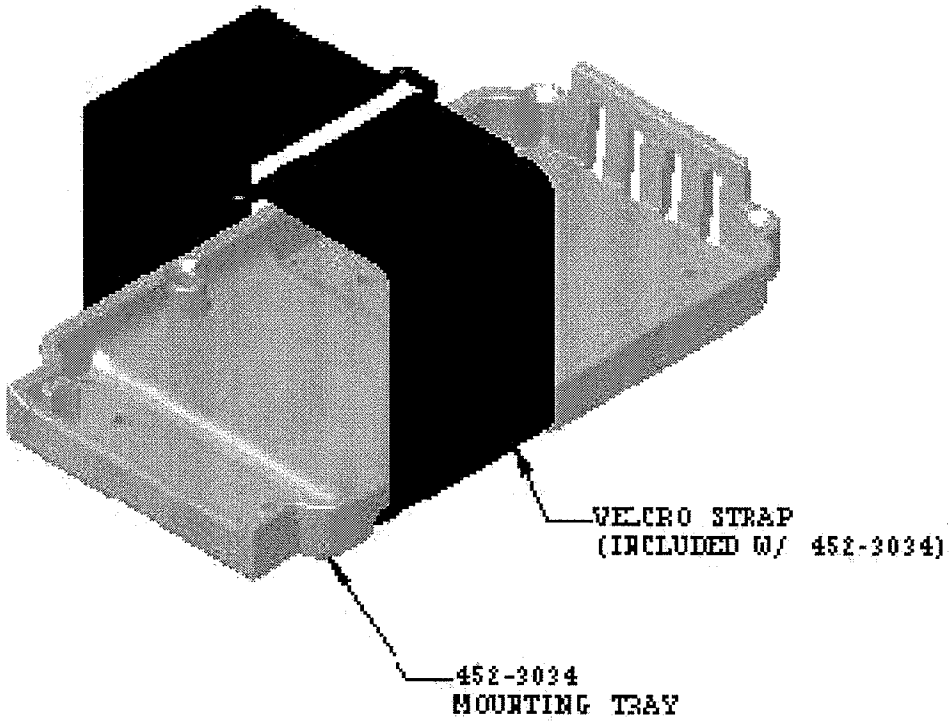
| | | |
|---|---|---|
| 1.1 | FREQUENCY | 121.5, 243, AND 406 MHz |
| 1.2 | VSWR | 2.0:1 MAX FOR 121.5/243 MHz<br>1.5:1 MAX FOR 406 MHz |
| 1.3 | POLARIZATION | VERTICAL |
| 1.4 | POWER RATING | 25 WATTS |
| 1.5 | RADIATION PATTERN | OMNI DIRECTIONAL |
| 1.6 | IMPEDANCE | 50 OHMS NOMINAL |

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:

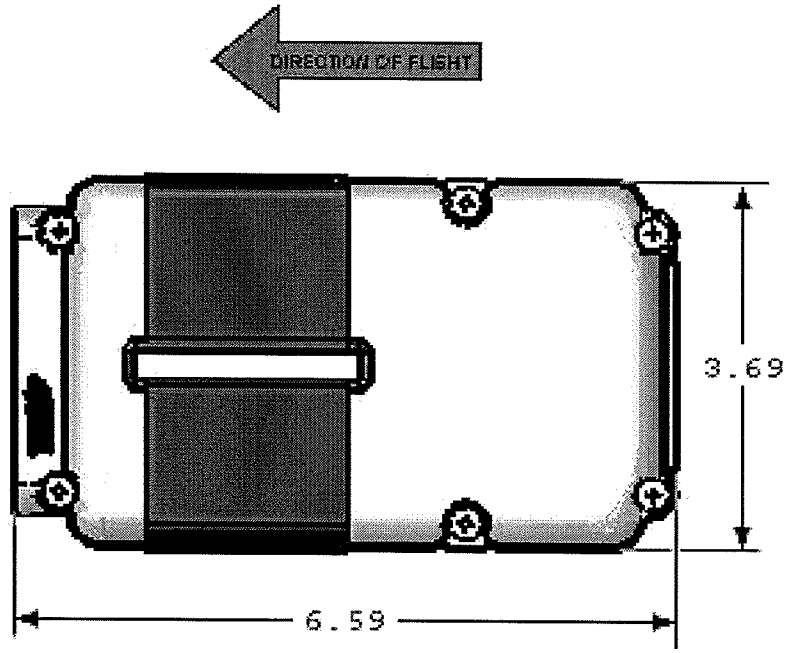
1. MOUNT ANTENNA USING FOUR 100° CSK #8-32 SS MACHINE SCREWS AND ASSOSIATED HARDWARE AND TORQUE TO 20 IN/LBS.
2. A LAYER OF ANTI-CORROSION BONDING GREASE SHOULD BE APPLIED BETWEEN THE AIRCRAFT AND THE BASE OF THE ANTENNA.
3. GASKET IS NOT SUPPLIED AND USE IS OPTIONAL. CONTACT ARTEX AND REQUEST PART #280-0320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

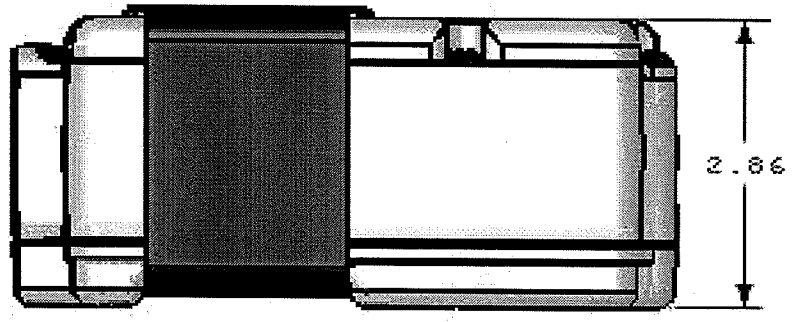
## *452-3034 Mounting Tray*



## *ME406 Overall Dimensions*

Note: Labels on ELT are not shown.



## *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 |

**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.

# INDEX