



ELT406 with GPS Installation, Operation and Maintenance Manual

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Change	Date	Approval	Description
A	3/24/2010	J Johnson	Removal of 121.5 and FAA/Cospas update
B	8/12/2010	J Johnson	Clarification of Self-test Information
C	01/31/2010	J Johnson	Cospas/Sarsat Information updates
D	02/10/2014	J Johnson	Dimension Change and Administrative
E	06/01/2016	J Johnson	Installation updates

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Special Requirements of TSO 126A

The conditions and test for TSO approval of this article are minimum performance standards. Those installing this article, on or in a specific type or class of aircraft, must determine that the aircraft installation conditions are within the TSO standards. TSO articles must have separate approval for installation in an aircraft. The article may be installing only to CFR part 43 or the applicable airworthiness requirements.

Special Notice to Airman

The Emerging Lifesaving Technologies' ELT is equipped with an internal GPS receiver. This allows the ELT to report to COSPAS-SARSAT within 100 meters world-wide. **It is always important to check for NOTAMs along your route of flight for any situation that may be out of the ordinary.** Although extremely rare, the US Government can turn off the GPS system selectively. Caution should be taken to ensure that there are no NOTAM concerning degraded or inoperable GPS service during your proposed flight. In the advent of loss of GPS signal, the 406 portion of the ELT will continue to operate as normal.

Special Notice to Airman

The Emerging Lifesavings Technologies' ELT406GPS is not equipped with a 121.5MHz transmitter. COSPAS-SARSAT ceased monitoring the 121.5MHz frequency as of February 9, 2009. This unit provides exact Lat/Long to COSPAS-SARSAT using an internal GPS receiver within an accuracy of less than 100 meters.

1.1 Basic Information

How does it work?

The Emerging Lifesaving Technologies ELT406GPS is a self-contained Emergency Location Transmitter that combines the new standard digital 406.037 MHz radio distress beacon with GPS generated latitude/longitude location data. The signal is received by the Cospas/Sarsat satellite-based search and rescue (SAR) system. In flight, the GPS unit automatically updates your present position every 1 second. Upon activation, a 5 watt signal bursts every 50 seconds to the Global Satellite System. Your location is known within 10 meters however the limitation of the Cospas Sarsat system requires that the unit “*average up*” into a small grid* and that information will then be transmitted to search and rescue personnel. * Note: Currently the Cospas Sarsat system only will receive Lat/Long in 4 sec increments. This represents about 100 meters on the equator.

Who’s in Control?

The International Cospas-Sarsat Program provides accurate, timely, and reliable distress alert and location data to help search and rescue authorities assist persons in distress.

COSPAS (КОСПАС) is an acronym for the Russian words "Cosmicheskaya Sistema Poiska Avariynyh Sudov" (Космическая Система Поиска Аварийных Судов), which translates to "Space System for the Search of Vessels in Distress". They maintain Low Earth Orbiting (LEO) satellites.

SARSAT is an acronym for Search And Rescue Satellite-Aided Tracking. The SARSAT system uses fixed Geosynchronous (GEO) satellites and was developed in a joint effort by the United States, Canada, and France. In the United States, the SARSAT system is under the authority of the National Oceanic and Atmospheric Administration (NOAA) which is a part of the U.S. Department of Commerce.

For more information, visit: <http://www.cospas-sarsat.org>
<http://www.sarsat.noaa.gov>

See Figure 1.1 provided by Cospas/Sarsat for more information.

1.2 Application

The 406 ELT is an AF (automatic fixed) emergency locator transponder that is designed for aircraft use. This manual provides “*acceptable data*” to support installation into certified aircraft. This installation requires that a certified person installs and completes the required paperwork. For US registered aircraft that may or may not require a (FAA Form 337). See section 4 of this manual for a more detailed explanation of required documentation.

For Canadian registered aircraft the requirements of Canadian Aviation Regulations Part V, CAR 551.104 applies.

Each country has their own requirements and you should contact the local authority for specific details in returning the aircraft to service.

ELT406 with GPS has met or exceeded the minimum performance standards required for TSO approval. A TSO (Technical Standard Order) provides minimum standards of operation and

safety for any given item. It is the installer’s responsibility of this equipment to ensure that the aircraft installation meets both the local governing authority and the airframe manufacturers’ instructions.

The TSO was issued to the ELT406 w/GPS as a system and this system was designed, tested and certified as a unit. All four components are required to meet the TSO. Substitution of any part is strictly prohibited. They will include in some variant:

- ELT Transmitter w/ Integral Battery
- ELT Mounting Tray
- ELT Antenna
- ELT Remote Switch

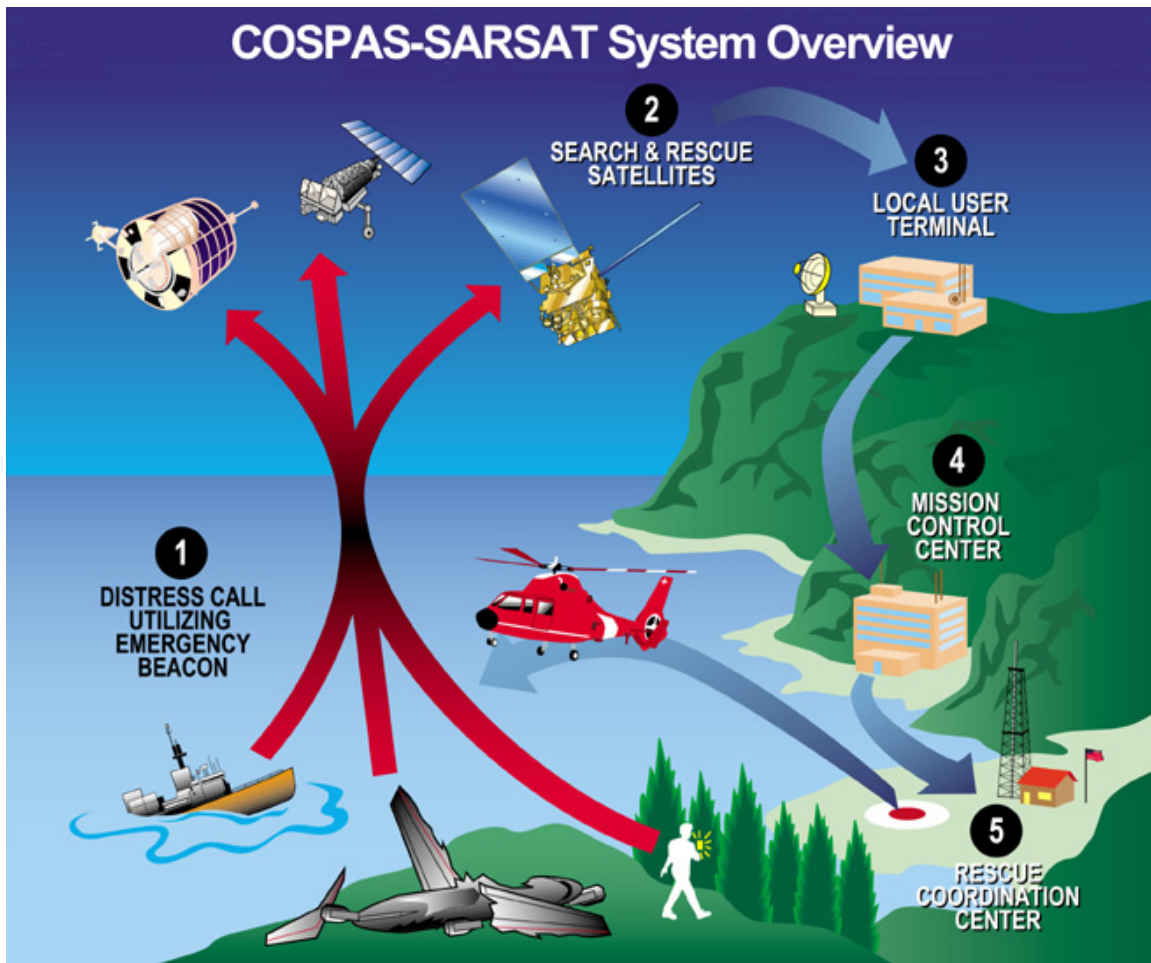


Figure 1.1 provided by Cospas/Sarsat

1.3 System Description

Model ELT406GPS PN 51220-042 products are type AF (automatic fixed beacons) and are equipped with an internal GPS and single axis activated. Model ELT406GPS-H, P/N 51220-H42 is equipped with a 5 axis G-switch module that allows the ELT to be activated in a multi axes.

Certain functions of the different variants are described by the FAA in Notice 8150.3. “Non-TSO’d functions”.

These “non-TSO’d” functions have the following characteristics:

- Due to the nature of helicopter operations it is important to note that there is normally operation in more than just the forward axis. The additional 5 axis “G” switch continues to provide crash sensing in the axes other than “forward” at a nominal 12 “G” threshold. This may change the performance specifications, software, hardware, environmental, or qualification levels of the standard ELT 406 i.e. vibration etc.
- A GPS receiver may be installed in the unit and will function independently of the base unit. External power is required to operate the GPS during normal flight conditions. When activated, the ELT406GPS’s internal battery will power the GPS engine.
- There are no changes to the installation and operating instructions or limitations. The instructions for continued airworthiness (ICA) remain unchanged, for these non-TSO’d functions.
- No additional failure modes or hazards introduced by use of the non-TSO’d functions have been noted or anticipated.
- None of these functions change any of the TSO’d functions of this unit.

The system has been designed to ensure that any inputs, whether shorts or opens in the harness or any effect of electrostatic discharge (ESD) and connections to +28V or ground can cause the unit to fail from automatic activation.


The only exception is the coax connected to the antenna. It must remain connected and undamaged to ensure proper functions after automatic activation. Any failure can be tested by the pilot using the cockpit controller. See section 6 for proper testing.

The RF output is through a single BNC connector. A second SMA connector is used between the antenna and the unit for receiving real-time GPS information. All functions are under microprocessor control. Software is approved per the requirements of RTCA/DO-178B .




The battery pack consists of three D-size, LiMnO₂ cells mounted on the rear cover of the unit. See Sec 7 for detail on battery replacement. These are 5 year life expectancy batteries. An internal clock keeps up with actual battery use and alerts the pilot when there is less than the minimum required battery life as specified by FAR 91.207(c).

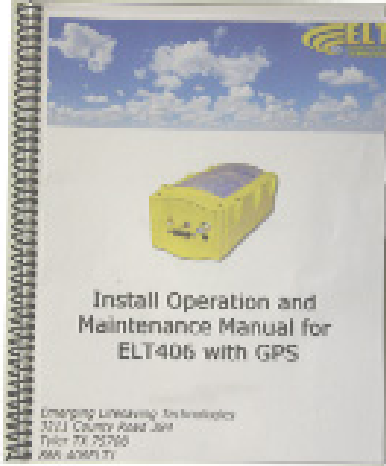

406ELTs with GPS come with an antenna, remote switch, mounting plate, coaxes, and install kits. Standard hardware and wiring are not supplied. See section 2.9 for details

1.4 Parts List

Product picture	Nomenclature	Description	Part Number
	406 ELT with GPS	AF ELT with Internal GPS	51220-042
	406 ELT 6 axis with GPS	Helicopter ELT with Internal GPS	51220-H42
	Battery Pack	Replaceable Battery Pack	217-406-001

	<p>Mounting Tray</p>	<p>Universal Mounting Tray</p>	<p>217-406-062</p>
	<p>406 GPS Dual Antenna</p>	<p>Dual Antenna that Transmits 406MHz and GPS data</p>	<p>114-042-600</p>
	<p>Remote Switch with Aural Alert</p>	<p>Self-test Remote Switch with Internal Aural alert</p>	<p>816-59-06</p>
	<p>406 Coaxial Cable BNC to BNC</p>	<p>6 Feet of RG58 Coax with BNC Connectors</p>	<p>315-12-06</p>

	<p>GPS Coaxial Cable SMA to SMA</p>	<p>6 Feet of RG316 Coax with SMA Connectors</p>	<p>315-17-06</p>
	<p>Shipping Plug</p>	<p>Plug to Prevent Accidental Activation During Shipping</p>	<p>41415</p>
	<p>ELT Install Kit</p>	<p>DB9 Male Plug DB9 Hood DB15 Male Plug DB15 Hood Self-test Card Mounting Template 8 Washers 8 nuts</p>	<p>60599-044</p>

 <p>Install Operation and Maintenance Manual for ELT406 with GPS</p> <p>Emerging Lifesaving Technologies 1211 County Road 204 Troy, TN 37760 888.408.9171</p>	<p>Manual Hard Copy</p>	<p>Paper Copy of Install, Operation and Maintenance Manual</p>	<p>4028-083</p>
	<p>Manual CD Format</p>	<p>CDROM Copy of Install Operation and Maintenance Manual with Test Data</p>	<p>4028-34</p>

1.5 Weights

Nomenclature	Part Number	Weight	CG
406 ELT w GPS	51220-042	2.7 lbs	4.0
406 ELT w GPS Helicopter	51220-H42	2.7 lbs	4.0
Universal Mounting Plate	217-406-062	.34 lbs	3.8
Remote Switch	816-59-06	.15 lbs	1.8
406 with GPS Antenna	114-042-250	.85 lbs	5.4
Replacement Battery	217-406-001	1.2 lbs	4.4
Typical System	Total Weight	4.04 lbs	

Note CG is measured in inches from the front of the box to the center of gravity of the item.

1.6 Unpacking and preliminary inspection

Remove the units from the box and inspect for any physical damage. Notify the shipper and dealer immediately if it is determined that the unit might have been damaged in transit.

Emerging Lifesaving Technologies has developed proprietary software to avoid inadvertent activations. Only once fully installed will the beacon be able to be activated.

Caution should always be taken not to send out a false emergency signal to Cospas/Sarsat. A false signal unduly activates precious SAR resources.

1.7 Special Shipping Instructions

If for any reason this unit must be shipped, please call and receive special shipping instructions to ensure warranty.

Note: To prevent damage or battery consumption the shipping plug should be installed any time the ELT is out of the aircraft.

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2.1 Operational Mode

The normal operational mode for the ELT406GPS is with the beacon in the armed position and with ships power supplied.

2.2 Out Put Power

The ELT406GPS transmits on 406.037 MHz which is monitored by the Cospas/Sarsat system. The 406.037 will transmit a 5W pulse (520ms) every 50 seconds. An internal battery clock will inform the pilot during normal self-test if the available transmit power drops below 36 hours.

2.3 Activation

The pilot has control of a remote that has been installed on the aircraft instrument panel. The remote is equipped with an ON/ARM/RESET-Test switch, a tri-color (red/yellow/green) LED, and an aural alert. With this remote you can run the ELT self-test, GNSS Self-test or activate the unit if conditions warrant.* The unit’s LED will flash green every ½ second and the aural alert will go off every 5 seconds.

*Note: Currently it is not permitted to activate the unit in flight by Cospas Sarsat. **This is under review.**

Fault Indications		
Color	Flashes	Disposition
Green	Continuous Flashing	ELT is Transmitting.
Red	2	Antenna Fault. System not Correctly installed
See Appendix D for Troubleshooting Tips		

Each flash has duration of ½ second. See Trouble shooting guide Appendix D for details.

In the event of a crash the unit has an automatic activation accelerometer or G-Switch. Accelerometer changes of 4.5ft./sec (2.3G) senses a dramatic change in speed and activates the 406 transmitter. In the case of a helicopter unit it has a multi-axis accelerometer to compensate for the different attitudes of flight that might occur.

When the unit is activated by the G-Switch an aural alert (85db) will go off in the cockpit. The aural alert can be reset by momentarily going to the on position for 1 second and then back to arm. The 406 signal can be reset by holding the Reset-Test switch for one second and then will automatically go back to ARM, either the remote switch or the transmitter controls mounted on the front of the unit can be used for these functions.

To fully deactivate the ELT system, ships power should be eliminated and the shipping strap must be reinstalled.

Do not ship or store the transmitter without the Shipping Strap installed. This may cause the unit to activate. It will not transmit without the antenna but will consume internal battery power.

2.4 Temperature

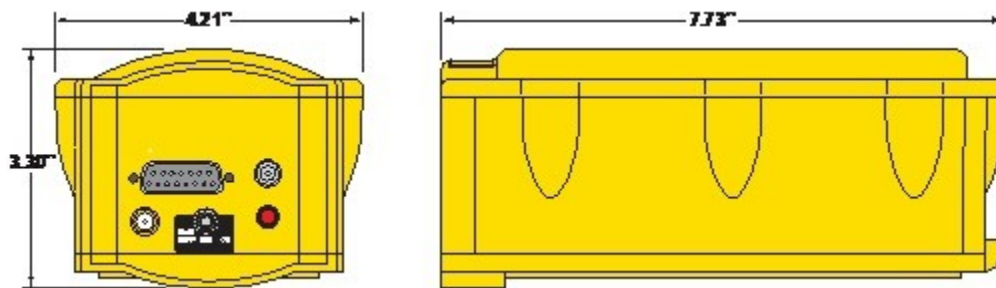
The 406 has gone through extensive Cospas/ Sarsat, TSO, and Environmental testing and is a Class II beacon with an operating range of -20°C and +55° C.

2.5 Aircraft Power Requirements

The 406 ELT is completely self-contained for normal operations. In order to maintain an accurate and updated GPS information and to preserve internal battery power a 1/2 amp circuit should be provided for the GPS function. This should be connected to the main power buss. When the unit is activated the GPS is powered by the internal ELT battery.

2.6 Mechanical Characteristics

The 406 ELT is made of high impact polycarbonate that has been especially designed for Emerging Lifesaving Technologies. With this design the 406ELT far exceeds the minimum performance standards. It has a base unit that is made of the same material and is secured to the base plate using a Velcro material. This allows for easy removal and reinstallation.



2.6.1 Minimum Clearance

In order to remove and service the transmitter you must maintain a 1 ½” clearance on the top and both sides to disconnect the retaining strap. 10” clearance of any obstruction is required to remove the unit from the front.

2.7 Electrical Characteristics

The 406 ELT will work without any outside inputs. A remote switch is installed to give the pilot control of the unit from the cockpit. Additionally, a 1/2 amp circuit should be installed to operate the GPS. The system will accept between 10 to 33vdc.

Pre-made harnesses are available in various lengths. Contact the manufacturer for more information.

2.8 Coaxes

A coax is supplied with each 406 ELT with BNC fittings. They are pre-made and are (6) six feet long. This is considered to be the optimum length. Excess should be stored as prescribed in AC43.13-1B/2A. If you require longer coaxes please contact the manufacturer.



Note: DO not shorten this coax as damage may occur to the transmitter. Do not run in close proximity to any other wiring. Crossing wire existing wire harness should be at 90 degree angels. Minimum bend radius of the wire is 18” for 360 degree bend.

2.9 Minimum Wiring Requirements

406ELTs are manufactured for both certified and non-certified aircraft. It is important to note that there are many types of wires that are used in aircraft today. Some are airworthy and some are not.

Generally no PVC wiring or off-the-shelf phone cords meet the requirements found in AC43.13-1B/2A. They must be strong enough and have the durability to withstand normal operations. A minimum of 19 strands is required and to be made of a material that does not produce excessive line loss and be on the Qualified Products List.

Emerging Lifesaving Technologies requires the wires meet the current FAA requirements. We require that the wire be Mil Spec 22759/24, MIL-W-16878, M27500 or their commercial equivalent. Either 24 or 22ga is acceptable. An 8-conductor bundled wire of Mil Spec 22759/18-24 is also acceptable.

Pre-made harnesses are available in various lengths. Contact the manufacturer for more information.

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3.1 Accuracy

To locate a specific beacon the satellites, upon sensing 406 ELT activation, determines position by calculating differential Doppler shift. LEO (Low Earth Orbiting) satellites pass overhead and chart the position as it passes over the beacon.

The time required to listen to the *short message format* and make this calculation using the initial detection of the orbiting satellites is about 45 minutes, maximum 90 minutes. Subsequent satellite passes every 60 minutes will refine the position, with a maximum time of 90 minutes for each pass. A rough position estimate is now calculated to be 4 to 8 hours and then a 121.5 beacon search can begin.

Cospas/Sarsat reports that a 1-3 nm (2-5 km) accuracy on average is determined this way. This makes the search area approximately 25 sq. nm (65 sq. km) or about 11,000 square acres. The accuracy is increased by multiple passes over your position by the satellite.

406 ELTs equipped with GPS send a *long message format* to the US GEO system that includes the current Lat and Long averaged to within a 4 sec of the location. This gives you an accurate position of better than 300 feet at the equator.

GPS position that is sent on the *first burst* or initial alert provides a near-instantaneous accurate fix using the SARSAT geostationary satellites. This constitutes a high accuracy position and first responders are contacted for immediate deployment.

Proprietary software allows the GPS to be updated every second and that information is cached for analysis and “trend monitoring”. This allow for any “*nominal*” signal information that is out of norm to be discounted and thereby insuring a high degree of reliability. Each 15 seconds the ELT buffer is updated with the latest combined data. After the first burst the data is only updated each 5 minutes per Cospas/Sarsat requirements.

Each 406 beacon sends a specific ID combined with registration data provides for point of contact information. This allows for a potential near real-time immediate launch of SAR assets to your exact location. There is no need to wait for LEO to come around and check your position over and over to provide a manageable search area for SAR.

Emerging Lifesaving Technologies 406 ELT with GPS can be activated while still in the air but is currently prohibited by Cospas/Sarsat. After the system is activated the data is only updated each 5 minutes per Cospas/Sarsat requirements. In 5 minutes you can be miles from you initial activation point and reduce the capabilities of SAR

***Note: Currently it is not permitted to activate the unit in flight by Cospas Sarsat. This is under review.**

3.2 Remote Switch Operation

If required, the pilot can activate the system by using the remote switch. The unit can be reset from the cockpit should the crew determine an emergency no longer exists.

***Note: Currently it is not permitted to activate the unit in flight by Cospas Sarsat. This is under review.**

3.3 Operation

In the event of a crash the unit has an automatic activation accelerometer or G-Switch. Accelerometer by 4.5ft./sec (2.3G) senses the dramatic change in speed and activates the 406 transmitter. In the case of a helicopter unit it has a multi-axis accelerometer to compensate for the different attitudes of flight that might occur.

When the unit is activated by the G-Switch an aural alert (85db) will go off in the cockpit along with a visual alert of a flashing green LED located on the Remote switch. The unit can be reset using the remote switch or the redundant switch mounted on the front of the unit by holding the Test/Reset switch for one second, automatically returning to the ARM position.

3.4 Self-Test modes

There are two separate and distinct Self-tests. The first is a System Self-test and the second is a GNSS Self-test. The pilot using the remote can initiate either test. The remote is equipped with an ON/ARM/RESET/Test switch, a tri-color (red/yellow/green) LED, and an aural alert. The Self-test will indicate go/no go status.

Caution: THESE TESTS SHOULD ONLY BE DONE ON THE GROUND.

* The system has been designed to restrict continuous self testing. Once a Self-test has been activated the microprocessor restricts any further activation until the appropriate wait time of one minute has been achieved.

See Sec 6.1 for full details on Self-test and fault annunciation.

Caution: The life of the battery has been computed to give maximum activation time in case of an emergency. No more than one Self-test of the system and GPS should be accomplished per month. Excessive testing will reduce the transmission time in the event of an accident.

This is a requirement of Cospas Sarsat

The GNSS Self-test are restricted to no more than 60 tests (one per month) for the life of the battery. The systems microprocessor records each event and once the maximum has been reached no other GNSS Self-test can be accomplished, If more than the maximum test are initiated the unit will indicate six (6) red lights on the remote or front of the unit.

This is a requirement of Cospas Sarsat

3.5 Programming

The 406ELT has a great deal of embedded firmware that is set at production. There is no open source code for that information. Read only functions have been removed from the software code. Only the country code can be re-programmed using a GUI based program that is available to dealers only. The HEX code can never be changed in the field, or parameters that ensure the safe operation of the ELT.

The 406 ELT and all its variants are pre-programmed at the factory during the manufacture. The programming includes the use of the long message format. All units are delivered with STANDARD LOCATION PROTOCOL. This allows for additional information to be transmitted to Cospas Sarsat.

The United States accepts the following protocols:

- Serial Number
- Tail Number
- 24-Bit Aircraft Address
- Aircraft Operator Designator/Serial Number
- Latitude and Longitude

All countries may not accept the same protocols. Check with your local authorities for their specific protocol regimens.

For a complete discussion of ELT programming protocols please see COSPAS-SARSAT documents G.005 and T.001 available at www.cospas-sarsat.org.

Contact your dealer or the manufacturer for any programming updates you require.

3.6 Certification

- The 406 ELT has been certified by Cospas/Sarsat for operation with the world wide detections system by complying with COSPAS-SARSAT T.001 and TESTED TO T.007
- The FAA has certified that the 406 ELT meets the requirements of TSO 126a – mandatory automatic ELT requirements
- 47 CFR Part 87 (FCC requirements) The FCC does not issue certificates for ELTs
- 47 CFR § 2.902, the ELTs were tested using the Verification Method.

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4.1 Cospas Registration

All 406 transmitters must be registered. You can register online by going to www.beaconregistration.noaa.gov/ You must have your hex code available to register online. The install CD-ROM will also have a link.

4.2 Warranty Registration

There is a three-year warranty which must be activated at the time of Cospas registration. You will be able to complete and send the registration form from the install CD-ROM. A confirmation copy of your registration will be emailed to you. Please retain for your records. You can fax this document to 903-597-9996 to activate the warranty.

Emerging Lifesaving Technologies
Warranty Activation

Name _____ Date _____
Address _____

Phone _____ E-Mail _____
Aircraft Make _____ Model _____
N-Number _____ Total Time _____
Model Number _____ Serial # _____
ELT Hex code _____
Name of Installer _____
Organization _____
Certification _____
Phone _____ E-Mail _____

A confirmation copy of your registration will be sent to you. Please retain for your records.
ELT Doc-4.1 Dated 12-1-2009

4.3 FAA Form 337

All 406 ELTs require that new antennas be installed on the aircraft. This function requires that an authorized A & P do the work and a FAA form 337 may be required. The installer should determine if this constitutes a major or minor alteration.

You can go online to the FAA website and fill out the form. See <http://forms.faa.gov/forms/faa337.pdf>

This website is generic in nature and does not contain any pertinent data for an ELT installation.

All information in the manual is considered to be “acceptable data” for the completion of all FAA documents, including any 337 or STCs.

4.4 Weight and Balance Report

You must modify your weight and balance anytime equipment is removed or new equipment is installed. The form should meet the basic requirements of: AC 43.13 (Acceptable Methods, Techniques, and Practices – Aircraft Alterations), specifically, Chapter 10

4.5 Radio Station License USA

The FCC does not require a radio station license for Emergency Locator Transmitters (ELTs).

The FCC web site <http://wireless.fcc.gov/aviation/fctsht4.html> now reads:

“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.”

FCC Form 605 replaced FCC Form 404 in 1999; however, it is not required to file one in order to use an ELT. For additional information you can 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

4.6 Canadian Registration

This system is approved under Transport Canada but not Industry Canada.

4.7 World Wide Registration

Each country maintains its own Search and Rescue (SAR) system. It is important to register your information with the appropriate Aviation Authority in your country. Your beacon must have your country's prefix programmed into the message. The label on the top of the unit will state the country code. If your country code is not on that label do not install until re-programming has been complete.

4.8 Log Book Entry

An entry in the permanent aircraft records is required when an ELT is installed. The entry should include a copy of the battery life-limit sticker. See your local aviation governing authority for guidance on record keeping.

4.9 Special Programming

Check the top of the ELT to insure the country code that matches the country of registry. See appendix C for to verify code.

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Installations must be made by qualified personnel in accordance with FAA regulations. Since aircraft rules regarding installation of equipment changes it is important to check the current FAA rules. Simply removing your old ELT and installing a new 406ELT may not meet today's minimum requirements. A good rule of thumb would be to 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
- TSO C126a paragraph D Requirements:

You can find this information at www.faa.gov

Every aircraft is different and these only represent general guidelines. It is also important to consult with the airframe manufacturer, Type Certificate Data Sheet, any STCs, or Service Bulletins for any specific information on ELT installations. The FAA requires the use of **approved data** for all aircraft installations and accepts AC 43.13 as approved data. The information in this manual is generally acceptable as **acceptable data** from which you can generate the proper documentation for this installation.

It is important for the installer to determine if this change constitutes a major or minor alteration. In most installations in non-pressurized areas ELT and their antenna systems are not considered as a major alteration by the FAA.

5.2 Special Considerations

Care must be made in planning the installation on any new piece of equipment on the aircraft. The control switch should be mounted in a location that is easily accessible to the pilot during normal operations. There are other important factors to consider when planning the installation. Remember the wise old sage that said,

“Those who fail to plan, plan to fail”.

5.2.1 Survivability

It has been reported by different agencies that an estimated 30 - 70% of all ELT's have failed during a real emergency. The reasons vary and no real long-term study has ever been done but here are some of the causes most often cited:

- Aircraft hit too hard. Excessive impacts break housing; wire harnesses, switches and antennas come off.
- Aircraft came to rest in unusual attitudes and the antenna is masked from satellite or SAR surveillance.
- Aircraft catches fire or lands in water.

What then can be done to make the unit more survivable?

Emerging Lifesaving Technologies examined this problem and designed many safety features into the unit. The most common internal failure appears to be loss of battery power. Some units use off-the-shelf alkaline batteries that corrode and dissipate quickly. They are installed like

flashlight batteries and have little if any shock absorption capabilities. Other batteries have solder tabs that seem to fail in the 3 to 4g range. Still others have deteriorated over time without any warning to the flight crew.

Emerging Lifesaving Technologies uses only welded-tabs batteries and testing has demonstrated survivability over 500g. In addition, the specific battery chemistry lends to long shelf life, no corrosion, and no natural decay. This battery pack has proven in lab results to provide over 110 hours of continuous operation. The battery pack is attached to the back plate with a shock absorber material to prevent them from rattling around during normal flight. A battery life monitor is installed to ensure at least 36 hours of operation. This is 50% more than the minimum 24 hours required by the FAA.

In addition, the PC board is mounted on shock absorbers and all loose wires and connections are sealed with a potting compound to reduce failures.

Emerging Lifesaving Technologies has tested far and above the minimum requirements and all of our units are capable of being installed in any aircraft or helicopter.

Our blade antennas are both vertically and horizontally polarized. This means that unless the aircraft is completely up-side-down it will not be masked from satellite surveillance. Mid speed (250 kts), and high speed (600 kts) antennas are available up to 50,000 ft.

Note: Helicopters require different G-switches due to different attitudes of flight but the basic unit is the same.

For a full list of environmental and operations tests check out our compliance to Cospas/Sarsat T007 and DO 160F testing.

In addition RTCA DO-204A 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, Inc.
1828 L Street, NW
Suite 805
Washington, DC 20036
Web site: www.rtca.org

5.2.2 Electrical Paths

When planning any wiring on an aircraft it should be done by a qualified person who is familiar with the latest rules and regulations of the FAA and the manufacturer of the aircraft. The standard acceptable data that is found in AC 43.13 (Acceptable Methods, Techniques, and Practices – Aircraft Alterations), specifically Chapters 11 and 12, will be of immense help in planning your installation. Care should be taken to ensure the cabling crosses high power cabling at 90⁰ to avoid introduction of RMI or EMI into the ELT system.

5.2.3 Electrical Loading

Emerging Lifesaving Technologies 406ELT with GPS requires that an external power source be used to power the GPS receiver during normal operations. Installation of new electrical or electronic equipment will change the load on the aircraft's power generating system. Although the 406ELT only draws 50 mw of power it is necessary to install a 1/2 amp fuse or fusible link to protect the wire harness and the integrity of the aircraft's electrical system. Detailed information can be found in:

AC) 43.13 (Acceptable Methods, Techniques, and Practices – Aircraft Alterations), specifically, Chapter 11 sec 3 Para. 11-36, and sec 4 Para. 11-47 thru 11-52

Changes to the electrical load require that an appropriately rated individual perform the analysis and make the needed connections to the ship's power distribution network. If possible, the ELT circuit breaker should be connected to the Main Buss.

5.2.4 Antenna Placement

The placement of the ELT has many important considerations such as:

- Location should be in keeping with Current Airframe Manufacturers Instructions
- Location should be in keeping with Current FAA rules and regulations
- Location should be designed to allow for the greatest possibility of survival
- Location should be kept away from structures that may mask the signal
- Location should be 3-5 ft to the ELT Transmitter but not closer than 3 ft
- Do not change the length of the supplied coaxes or add 90° adapters
- Location should also be aesthetically pleasing to the owner/operator

Remember the old antenna location may not be the best location

5.3 Elt Mounting

5.3.1 Existing Installations

ELT406s come with an interlocking base plate that holds the transmitter on with a Velcro strap. This allows for quick and easy removal of the unit if needed. The base plate has been designed to reuse many of the popular hole patterns of previously installed ELT's. A small "pilot" hole has been drilled for ease of alignment. The hole can be opened up to .250" for installation.

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

Remove the old ELT and its mounting rack. A close inspection is required to ensure the underlying structure is sufficient to mount the unit. You should consult the airframe manufacturer's structural repair manuals and AC) 43.13-2 (Acceptable Methods, Techniques, and Practices – Aircraft Alterations), specifically, Chapter 1 and 2 to determine if the structure meets the latest approved data.



In order to ensure a high rate of survivability it has been determined that the ELT must meet the current guidelines for loading in all three axes. The mounting location must conform to the requirements of RTCA DO-204A and AC 43.13. DO-204A Sec 3.1.8 reads:

“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) or more than 1.0 m (three feet) from the mounting location.”

The use of the 8-32 X 5/8" Phillips, pan-head screws, nuts and flat washers to a sufficient structure will provide the sufficient strength. Stainless steel hardware is acceptable because of its ability to resist corrosion; however, all hardware used should conform to an accepted standard such as AN or Mil-Spec.

5.3.2 New Installations

If this is a new installation or if the current installation is unacceptable, the following guidelines can help to find a suitable location:

- RTCA suggests the aft section of the fuselage. This gives the greatest rate of survivability as it is least likely to receive damage during a crash.
- Care should be taken in choosing a location that allows ease of maintenance.
- Accessibility in case of a crash.
- Locate the unit to minimize cable runs to the antenna (under six feet is optimum).
- Avoid locations that are subjected to chemical fluids such as de-icing compounds, cleaning fluids, and hydraulics. Although the unit has been designed to withstand most of these compounds, any long term exposure to these chemicals will damage aircraft wiring.

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.

A template has been provided to lay the basic hole pattern for installation. Make sure the pattern is laid out to ensure the forward mark is pointing toward the nose of the aircraft. Mark and drill four mounting holes using a #20 drill bit. Install the mounting tray. Use the 8-32 X 5/8" screws and fasteners provided.

5.3.3 Rotorcraft Installations

As with any installation it is important to adhere to all helicopter manufacturers' instructions and the latest FAA rules and regulations. For a non-US registered aircraft consult your local aviation authority for any specific requirements.

Traditional helicopter ELT installations required the unit be mounted at a 45° downward sloping angle to be most likely activated in the event of a crash. The existing 45° mount should not be re-used. Changes to TSO C91a and TSO C126a increased the sensitivity of the G-switch over the older TSO C91 requirements. The 45° mounting angle tends to preload the G-switch, and results in false activations from abrupt landings, severe maneuvers, etc.

The Emerging Lifesaving Technology 406 ELT p/n 51228-H42 with internal GPS is equipped with multi axis G-switches. This allows the installation be made at any angle, but the standard has become +/- 10° of centerline. Always face the unit towards the nose of the aircraft.

5.4 Antenna Mounting

As in all installations it is important to follow aircraft manufacturers' instructions and the latest FAA Rules and Regulations. In some cases a FAA form 337 may be required to complete any antenna installation. (pressurized areas, structural changes, etc.)

It is important for the installer to determine if this change constitutes a major or minor alteration. In most installations in non-pressurized areas ELT and their antenna systems are not considered as a major alteration by the FAA.

The best location is the upper aft portion of the fuselage. In order to achieve maximum 'visibility' of satellites, the 406 MHz antenna must be mounted on the top of the aircraft. The antenna is equipped with an internal GPS antenna and must have as much of an unobstructed view of the GPS satellite constellation as possible. It should be mounted vertically and not be covered by other structures however, close proximity to the dorsal fin is acceptable.



RTCA/DO-204, Section 3.1.10 and RTCA/DO-183 Section 3.1.10 give the following guidelines:

- 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).

While the 30" rule is true of most antennas our unique design eliminates that requirement.

Emerging Lifesaving Technologies has data on file that the 406 portion transmits both vertically and horizontally. For Smith Charts contact our customer service division for full details. **We have not found any interference with other antennas closer than 30 inches.** Normal aircraft radios do not operate in this range or in the first harmonic.

The 406ELT is currently certified to be used with the automatic fixed "AF" configuration with following antennas:

406 GPS Dual High Speed Antenna	600 KTAS at 35k Feet	114-042-600
406 GPS Dual High Speed Antenna	250 KTAS at 35k Feet	114-042-250

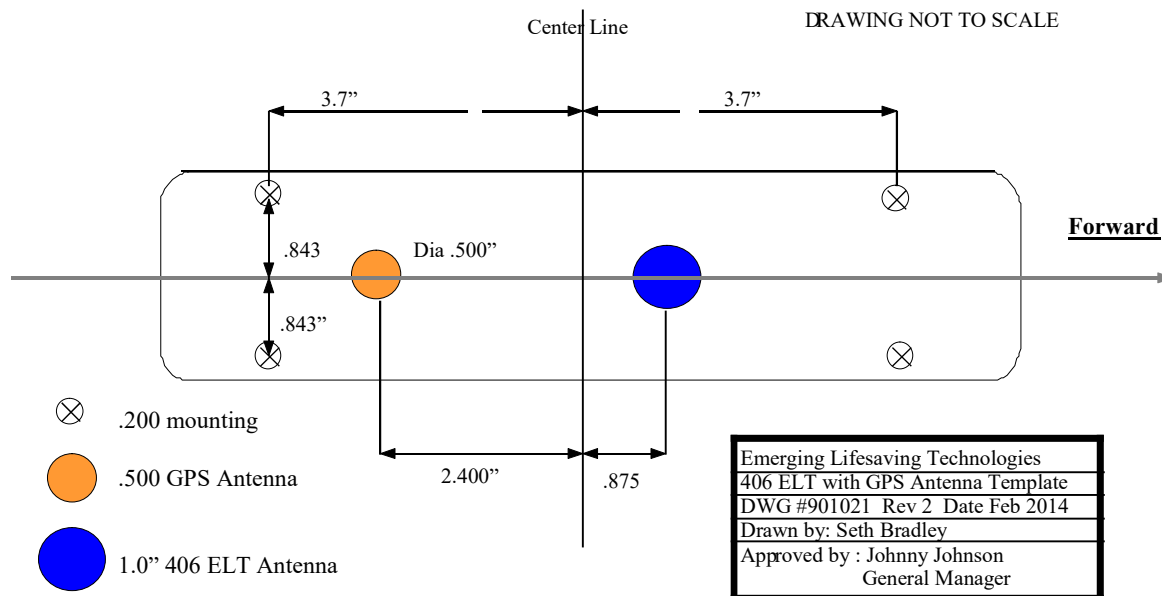
5.4.1 Metal Aircraft

AC 43.13-2A describes several different techniques to install antenna doublers. This is an extra layer of sheet metal, such as aluminum, that is mounted under the aircraft skin. It is important to anchor these doublers to other structures such as longerons or former rings to insure stability. See Fig 3.6 and 3.8 (reprints from AC 43.13-2A)

Use the template supplied to lay out the hole pattern. (Note: ensure the forward arrow of the template is pointed towards the nose of the aircraft). Drill the holes as indicated on the template. See Drawing 901021 for details.

Emerging Lifesaving Technologies

Antenna Template for P/N 114 -042-250



Determine the size and location of the doublers. If the antenna installation is to be made in a pressurized area then sealant is required.

It is a good idea to dry fit all the parts, then remove the antenna and clean all surfaces of any debris before continuing. Small metal chips or other foreign items can keep the antenna from properly seating to the fuselage.

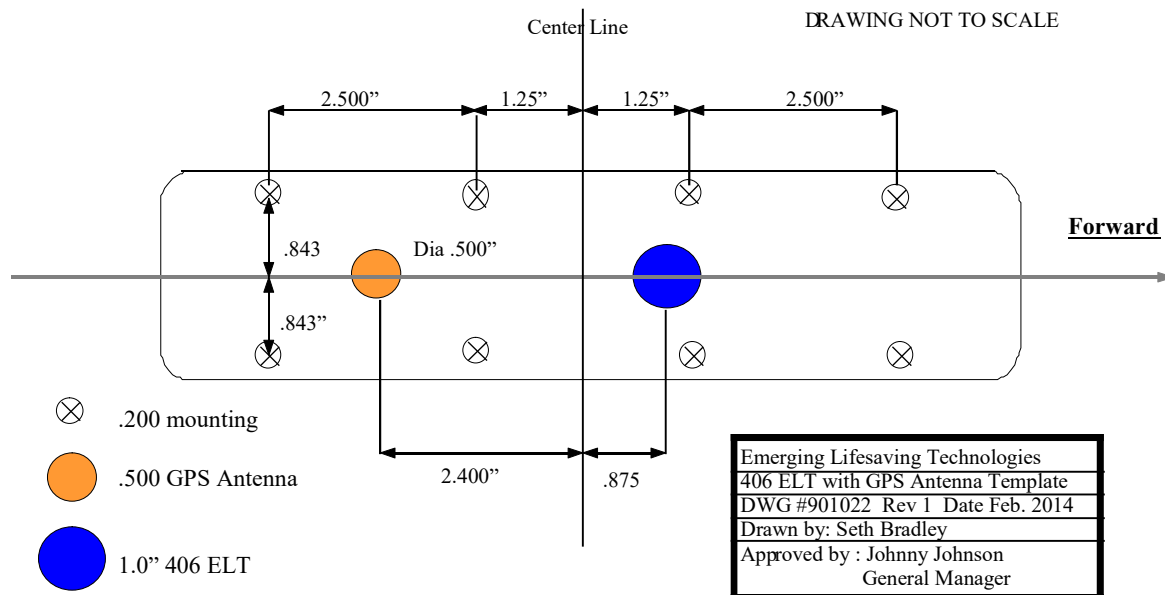
The antenna requires a ground plane of at least 120 square inches however 300 square inches is optimal. This can be achieved on metal aircraft if the surface is sufficiently clean of paint, dirt, or any oils to meet these requirements. Since the antenna uses a pin-based mounting system it is only necessary to clean the underside of the doublers approximately 1/2" around each hole. The outer paint should not be disturbed.

For installation on composite aircraft it is important to insure the ground plain is grounded to the aircraft. A 12 ga. Wire is sufficient.

Install the appropriate sealant to the mating edge of the antenna and fuselage to prevent any water damage.

Emerging Lifesaving Technologies

Antenna Template for P/N 114 -042-600



Determine the size and location of the doublers. If the antenna installation is to be made in a pressurized area then sealant is required.

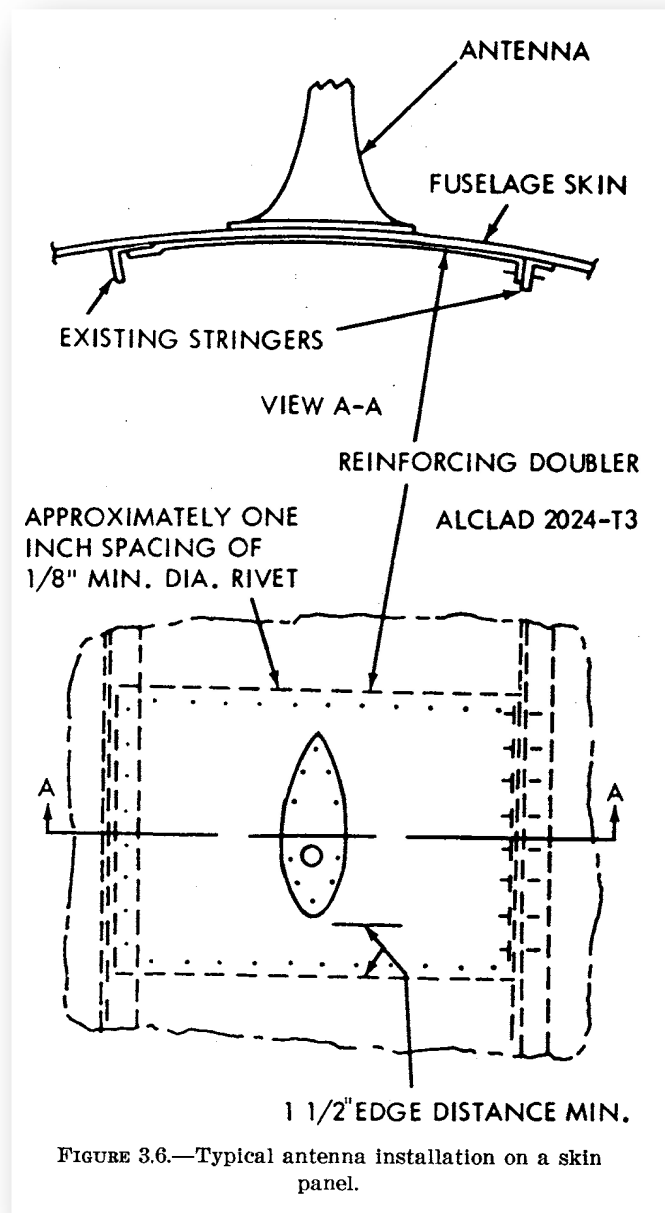
It is a good idea to dry fit all the parts, then remove the antenna and clean all surfaces of any debris before continuing. Small metal chips or other foreign items can keep the antenna from properly seating to the fuselage.

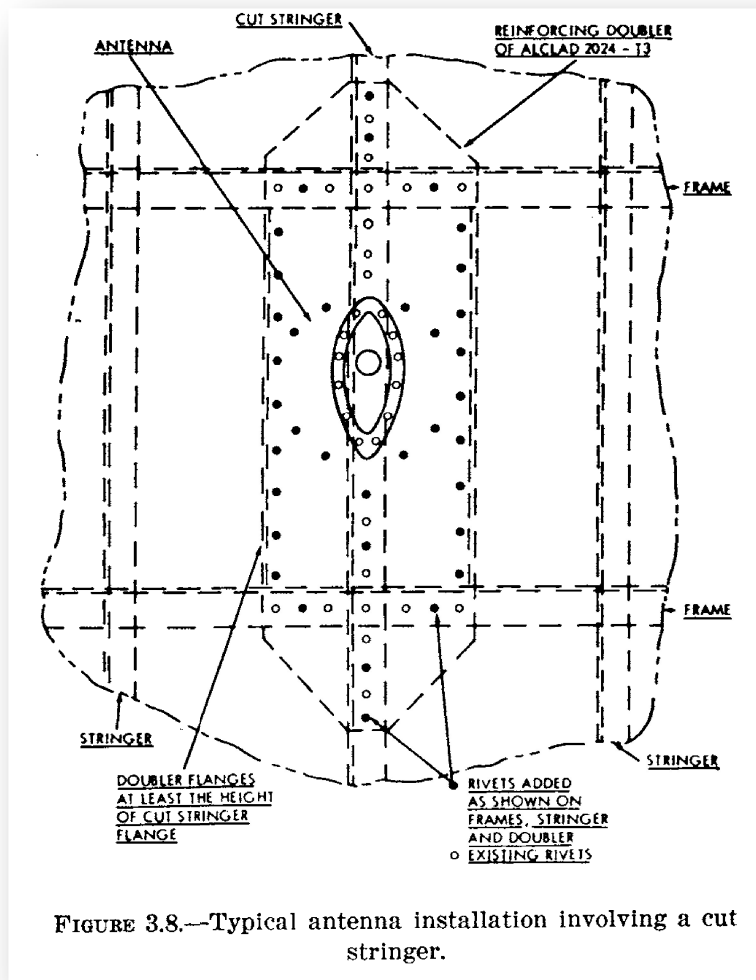
The antenna requires a ground plane of at least 300 square inches. This can be achieved on metal aircraft if the surface is sufficiently clean of paint, dirt, or any oils to meet these requirements. **Since the antenna uses a pin-based mounting system it is only necessary to clean the underside of the doublers approximately 1/2" around each hole.**

Install the appropriate sealant to the mating edge of the antenna and fuselage to prevent any water damage.

For installation on composite aircraft it is important to insure the ground plain is grounded to the aircraft. A 12 ga. Wire is sufficient.

This information is supplied as approved data.





This information is supplied as approved data.

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

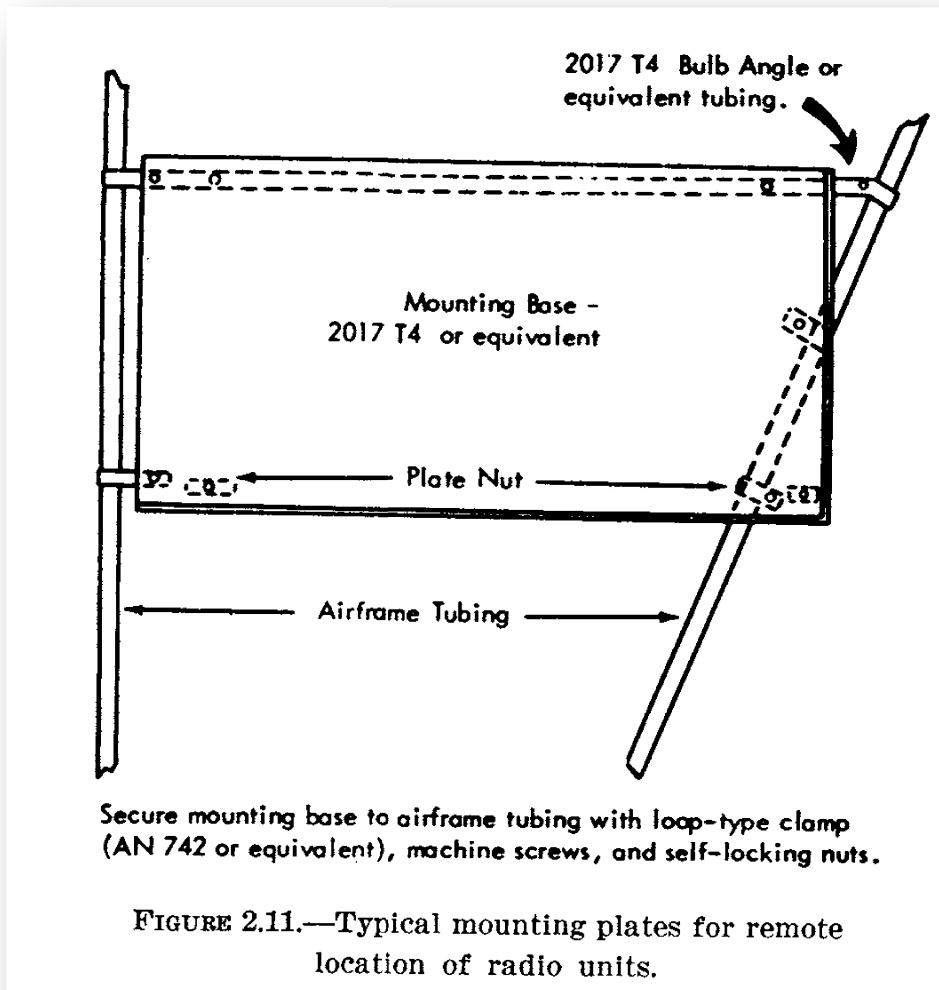
5.4.2 Composite or Fabric Aircraft

The antenna requires a ground plane of at least 300 square inches. On aircraft constructed with non-conductive materials, such as composite materials or fiberglass, a ground plane must be added.

One method is to install the antenna inside the fuselage. The signal will radiate through the composite or fabric. It is important, however, to choose the location carefully. The same restrictions, not shadowing or masking the signal by metal obstructions, still apply. Aircraft structures such as tubing or ribs do not generally constitute an obstruction.

Note: the ground plane must be grounded to the aircraft ground.

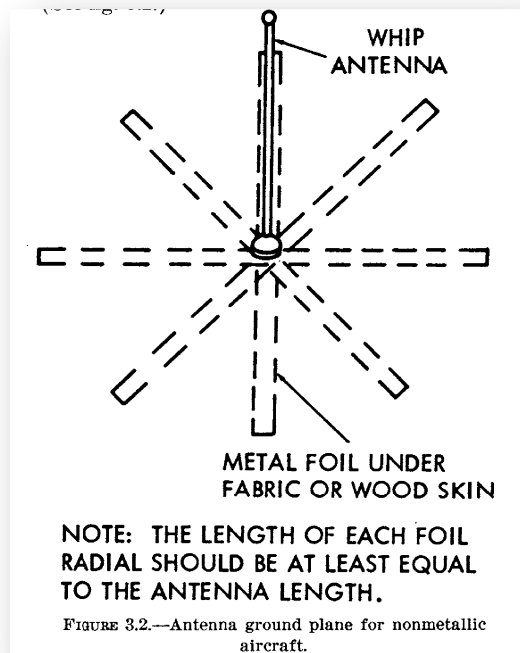
The ground plane may be installed as described in AC 43.13-2a fig 2.11. See Below



This information is supplied as approved data.

Due to the size of the antennas, it is questionable if mounting on fabric is a good idea. Depending on the type of composite it is acceptable to mount the antenna on the surface. Care should be taken to ensure the structural integrity of the site and an electrical ground plane must be provided.

In order to achieve the proper size ground plane it is important to have radial conductive material from the antenna mounting point at least 24 inches in every direction. Eight (8) radials will be sufficient. See the example in AC 4313-2A figure 3.2

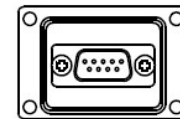
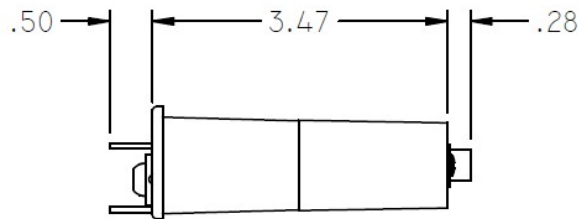
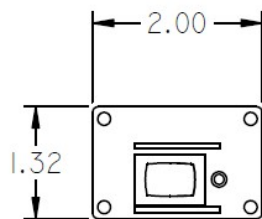
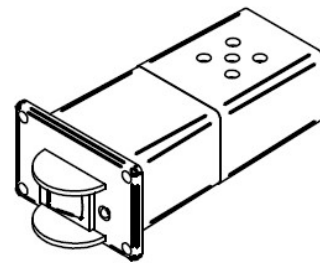
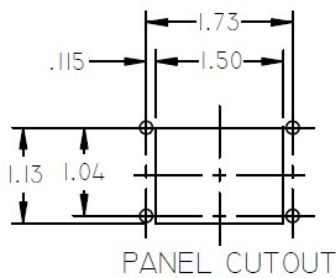


This information is supplied as approved data.

5.5 Mount Remote Switch

The pilot's controller (remote switch) is designed to give the pilot control over the functions of the ELT. It should be installed on the instrument panel or any other location that easily accessible to the pilot. The shape and size is consistent with many other model ELT's

The unit can be mounted vertically or horizontally. Two decals are included in the install kit which will allow you to mount the controller either way.



REMOTE SWITCH
PART NO. 816-59-06-001

5.6 Aircraft Wiring

We do not recommend or approve of anything other than wiring that is approved for certified aircraft. If a previous installation used PVC or telephone wire it is **not acceptable to re-use** those harnesses for this installation.

Generally, no PVC wiring or off-the-shelf phone cords meet the requirements found in AC43.13-1B/2A. Wiring must be strong enough and have the durability to withstand normal operations. A minimum of 19 strands is required and must be made of a material that does not have excessive line loss and must be on the Qualified Products List.

Emerging Lifesaving Technologies requires the wires meet the current FAA requirements. We require that the wire be Mil Spec 22759/24 or MIL-W-16878, or M27500 or their commercial equivalent. Either 24 or 22ga is acceptable. An eight (8)-conductor bundled wire of Mil Spec 22759/18-24 is also acceptable.

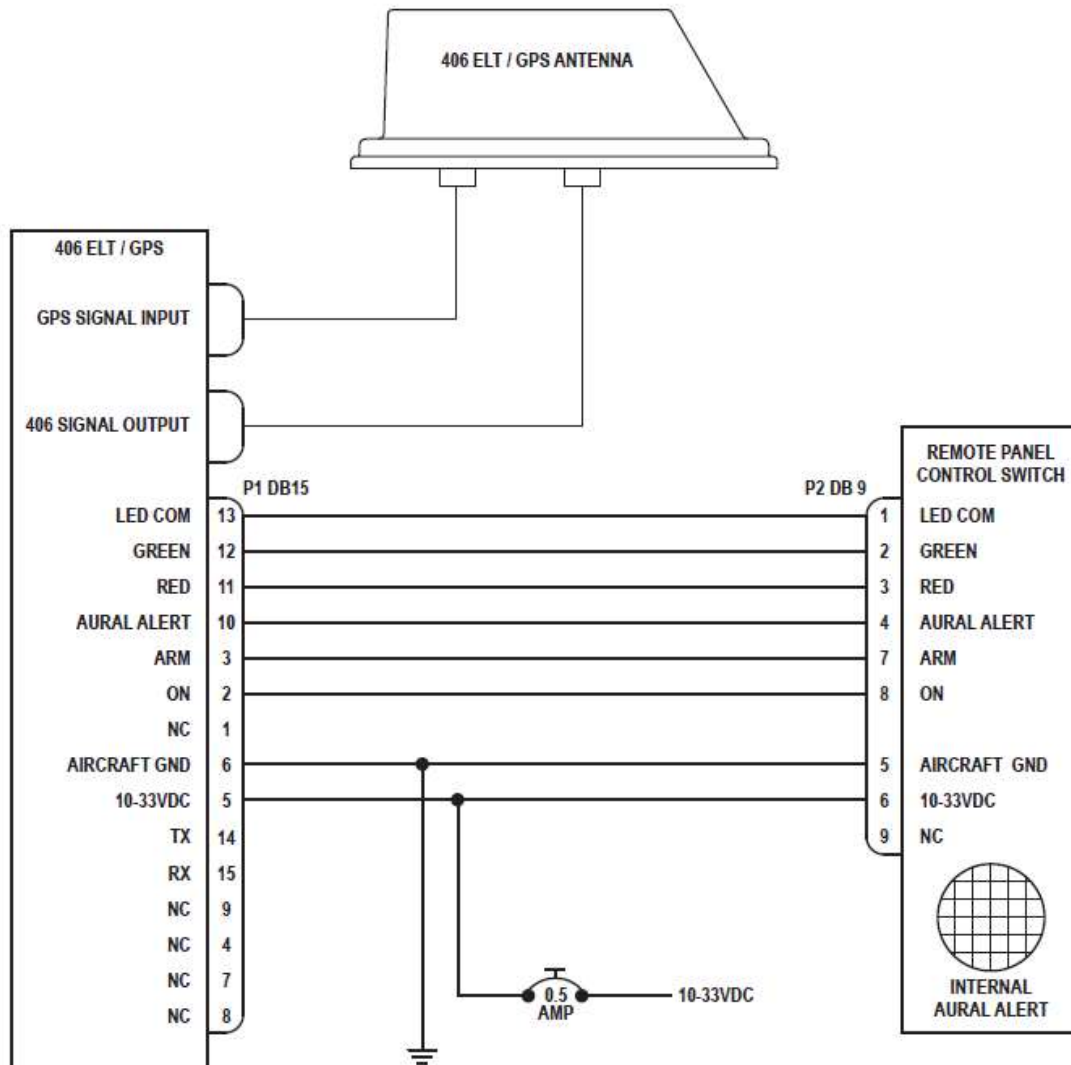
All aircraft wiring must adhere to the aircraft manufacturer's instructions, current FAA rules and regulations, and any advisory circulars that may be applicable, e.g. AC 43.13

It is important that anyone changing or altering an aircraft's electrical system be appropriately trained and certified to do those functions.

**CAUTION: MISTAKES IN INSTALLATION MIGHT KEEP
HELP FROM EVEN KNOWING YOU ARE IN TROUBLE**

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5.6.1 Harness Wiring – 406 ELT With GPS



NOTE

1. All wires to be 24 ga. or larger.
2. All wires to be Mil Spec 22759/24, MIL-W-16878, M27500 or their commercial equivalent.
3. 8-conductor bundled wire of Mil Spec 22759/18-24 is also acceptable.
4. Use 0.5 Amp fuse, Circuit Breaker, or Fusible Link.
5. Connectors must have Strain Relief Backshells installed.
6. Use Coax cable supplied by manufacturer.

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5.7 Connect RF Coaxial Cable

Coaxes have been supplied with the installation kit. It is critical to the function and accuracy of this unit that both the 406 and the GPS signals are not impeded in any way. If the cables are not of sufficient length for your application please contact customer service for further instructions.

Coaxes should never be bent at 90° angles. You can stow extra harnesses by coiling the coax in rings of no less than a 6" diameter. Avoid over-tightening clamps or tie-wraps as this will change the electrical characteristics of any coax. See AC 43-13-1B Chapter 11.



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6. Post installation Testing

It is important to note that as of December 2009, the FAA has not given any clear guidelines to testing the 406 portion of the C126a TSO'd units. They have left it up to the manufacturers to set up what tests they require.

During the INITIAL tests Emerging Lifesaving Technologies suggests but do not require that a complete and comprehensive test be done using a WST or equivalent, however the unit self test does contain the minimum level of testing. External test should include but not be limited to:

- Power Output
- Frequency Stability
- GPS Information for Accuracy
- Hex Coding
- Country Coding

6.1 Self-Test

There are two separate and distinct Self-tests. The first is a System Self-test and the second is a GNSS Self-test. The pilot using the remote can initiate either test. This test can be done at the remote or the unit itself. They are both equipped with an ON/ARM/RESET/Test switch, a tri-color (red/yellow/green) LED, and an aural alert. These Self-tests will indicate go/no go status.

Caution: THESE TESTS SHOULD ONLY BE DONE ON THE GROUND. There is no restriction as to the timing of the test.

* The system has been designed to restrict continuous self testing. Once a Self-test has been activated the microprocessor restricts any further activation until the appropriate wait time of one minute has been achieved.

Caution: The life of the battery has been computed to give maximum activation time in case of an emergency. Unlimited amounts of self-tests of the 406 system are allowed. No more than one GPS self test per month should be accomplished. Excessive testing will reduce the transmission time in the event of an accident.

System Self-Test		
Color	Flashes	Disposition
Yellow	5	ELT Test Good No GPS Data
Red	4	Battery Odometer less than 36 hours
Red	3	Transmitter Chain Failure
Red	2	Antenna Fault
<ol style="list-style-type: none"> 1 No external power applied 2 Press the Test button twice for one second each and release 3 The switch will return to the ARM position. 4 A green light will illuminate for 10 seconds 5 Light will go out for three seconds. 6 Note the fault legend for systems status 		

(Fig. 16)

The GNSS system is tested separately.

GNSS Self-test		
Color	Flashes	Disposition
Green	5	ELT Good GPS Data Present
Yellow	5	ELT Good No GPS Data Present
Red	6	Maximum GNSS Self-test exceeded
Red	4	Battery Odometer less than 36 hours
Red	3	Transmitter Chain Failure
Red	2	Antenna Fault

1. Apply External Power to ELT
2. Move the aircraft to a location that has clear access to the GPS signal
3. Allow 10 minutes to acquire a GPS signal.
4. *Press the Test button (3) times for one second each and release
5. The switch will return to the ARM position.
6. A green light will illuminate for 10 seconds after the second activation.
7. Light will go out for three seconds.
8. Note the fault legend for systems status
9. Insure reported GPS signal is within 2 NM range (Average is 100 meters)

(Fig 17)

* Alternative test initiation. Press and release test function twice for one second. After green light comes on within three seconds press test function for third time for one second. This will insure a GNSS systems test has been initiated.

Caution: The life of the battery has been computed to give maximum activation time in case of an emergency. Unlimited amounts of self-tests of the 406 system are allowed. No more than one GPS self test per month should be accomplished. Excessive testing will reduce the transmission time in the event of an accident.

The GNSS Self-test are restricted to no more than 60 tests (one per month) for the life of the battery. The systems microprocessor records each event and once the maximum has been reached no other GNSS Self-tests can be accomplished, If more than the maximum test are initiated the unit will indicate six (6) red lights on the remote or front of the unit.

6.2 Self-Test Failure Chart

See the Systems Self-Test (fig 16) and GPS (fig 17) in sec 6.1 for fault test charts.

6.3 Transmitter Test

The 406.037 frequency is tested by using the Self-test feature on either the front switch or the remote switch. Unit status can be measured by the indication of light flashes. See Sec 6.1 for details. A troubleshooting guide in App. D is available.

Only one Self-test can be accomplished at a time. The design of this unit prevents continuous testing. See Sec. 2.3 for details. These precautions will reduce the likelihood of false alerts and reduce the demand on the overburdened SAR system.

6.4 Record of Inspections

A.C. 43.13-1B Para. 12-23 (f) suggests the following sign-off after inspection:

I inspected the 406ELT system in this aircraft according to applicable Aircraft and Manufacturer's instructions and applicable FAA guidance and found that it meets the requirements of section 91.207(d)

Signed _____ Certificate # _____ Date _____

Owner/Operator can perform this test. Pilot's license goes in place of certificate#.

7. Instructions for Continuing Airworthiness and Maintenance

The following are considered to be minimum requirements and shall be supplemented by the owner/operator, aircraft manufacturer, and the local aviation authority as they deem necessary.

7.1 Regulations

The minimum FAA standards for annual inspection are found in FAR 91.207(d) which states
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.

As part of the annual/100 hour inspections FAR 43, Appendix D the FAA guidelines include:

- (i) Each person performing an annual or 100-hour inspection shall inspect the following components of the radio group which includes 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.

7.2 Battery Service

No rechargeable batteries are installed in Emerging Lifesaving Technologies ELT.

Emerging Lifesaving Technologies 406 ELT batteries have a life limit. That limit (or replacement date) is marked on the outside of the battery pack and a sticker is supplied for the aircraft records. The type, make, model of ELT, the battery chemistry, and the expiration date are indicated on the battery pack.

The internal battery clock will indicate during Self-test if a minimum of 36 hours of normal operations is still available.



Only Emerging Lifesaving Technologies approved batteries with the appropriate stickers can be used in Emerging Lifesaving Technologies ELTs. See section 4.4.1 for battery replacement and section 6.1 for Self-test.

FAA requires Batteries Must be Replaced.

- After use of the ELT in an emergency
- After an inadvertent activation of unknown duration
- When the cumulative time of all known transmissions exceeds one hour
- On or before the proposed battery replacement date

ELT also provides that a battery must be replaced when the Battery life-monitor indicates less than 36 hours. This is indicated by four (4) red flashes during normal testing.

7.3 Bi-Monthly Test

It is suggested that the pilot perform a Bi-monthly ELT Self-test.

See Sec. 6.1 for complete details

7.4 Annual Test

Caution

Self-test changes the HEX code to notify SAR that this is a test. To ensure that a false alarm is not generated, make sure the flashing green light illuminates five (5) times. If the light flashes lasts longer than 50 seconds then the 406 is active and will burst a live signal to the satellites. Self- test will invert the data but caution should be taken to insure the SAR process will not be activated.

An annual test must be performed annually as described by FAR 91.207d

1. Check that the unit is properly installed and secure
2. See section 8.5 for detailed corrosion inspection
3. See section 3.4 for Self-test information
4. See section 8.1 for radiated signal test

FAR 91.207d

(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.

Testing done by transmitting a full power burst to a satellite and being reported by a non-government vendor in of itself does not eliminate the requirement to complete all sections of 7.1 It can be used as supplemental data to insure the all information transmitted is correct. i.e. Hex code, position, serial number, etc.

7.5 Corrosion Inspection

Emerging Lifesaving Technologies ELT is designed and tested to the highest environmental testing standards. The unit is made out of a specially designed polycarbonate that is resistant to the harshest applications in aviation today. The unit is sealed and should not allow moisture or most chemicals or fluids to infiltrate the system.

While it is very unlikely, caution should be made to ensure that regular (annual) inspections are made of the **outside of the units.** IF ANY deterioration or corrosion is found, a more detailed inspection is warranted. Return the unit to the manufacturer for inspection.

Special Inspection During Battery Replacement

During routine battery replacement, an inspection should be made inside the battery cavity for signs of corrosion or any residue that is out of place. Should any be found contact the manufacturer for further instructions.

7.6 Battery Replacement

The batteries are manufactured with a ten (10) year life expectancy; however, the FAA requires that no more than 50% of the life of the battery be used. Each unit will have a sticker installed,

noting when the battery must be replaced. An identical sticker is supplied with the unit to be placed in the log book as a reminder.

All batteries should be replaced in the event of any one of the following:

- After use of the ELT in an emergency;
- After an inadvertent activation of unknown duration;
- When the cumulative time of all known transmissions exceeds one hour; and,
- On or before the proposed battery replacement date.

The owner/operator or any A&P can change the batteries. A new pack comes mounted to the new bottom cover of the unit. Before removing the unit you must first install the shipping plug to insure the system is not activated during maintenance. Unscrew the bottom cover marked “Replacement Battery” and install the new battery unit. A two pin Quick Disconnect Plug makes installation easy. Replace the gasket with the new one that will be provided.

NO SPECIAL TOOLING IS REQUIRED.

The quick disconnect will not allow for the polarity of the batteries to be reversed.

Reversing the polarity will permanently destroy the transmitter and void the warranty.



Special note: While it is always important to be careful with Electro-Static-Discharge ESD, there are no exposed circuits to be concerned with during normal battery replacement. Never remove the top cover of the unit without ESD protection. There are no user replaceable parts or service items under the top cover of the ELT.

7.7 Battery Disposal

Always use caution when disposing of batteries. Check with your local waste management authority for their guidelines.

NEVER BURY OR BURN OLD ELECTRONICS OR BATTERIES

7.8 Verification of Digital Message

It is highly recommended but not required to check the digital format on the initial installation of the unit. This is done with the use of a WST or equivalent tester. There are no requirements

for annual retest of this information. That information is programmed at the factory and a normal self test will insure that it has not changed.

7.9 Antenna Test

It is highly recommended but not required to check the antenna for proper operation on the initial installation of the unit. This is done with the use of a WST or equivalent tester. There are no requirements for annual retest of this information.

As part of the annual type inspection:

- Ensure that the antenna is securely fastened to the aircraft
- Check for cracks or abrasions in the surface of the antenna
- Ensure the antenna has proper sealing around the base to skin
- Ensure that coaxes are properly secured with strain-relief provided
- Ensure that coaxes are not interfering with any moving parts

7.10 G-Switch Check

Emerging lifesavings Technology provide instructions to activate the G-Switch for test purposes. A rapid forward motion that comes to an abrupt stop (football pass method) will usually set off the G-switch. The antenna must not be installed during this procedure. The unit will go into fault mode as indicated by two flashing red lights. This indicates that the unit was activated by the G-switch but failed to transmit because no antenna was detected. These or any other method approved by the local aviation governing authority is acceptable.

It is never acceptable to just drop in on the floor

7.11 Records Keeping

ICA that is performed on US registered aircraft is required to be annotated in the permanent records of the aircraft. The annual check should be incorporated into the annual-type inspection and include reference to 91.207d. It is not required to annotate the bi-monthly inspection.

A.C. 43.13-1B Para. 12-23 (f) suggests the following sign off after inspection:

I inspected the 406ELT system in this aircraft according to applicable Aircraft and Manufacturer's instruction and applicable FAA guidance and found that it meets the requirements of section 91.207(d)

Signed _____ Certificate# _____ Date _____

Owner/Operator can perform this test. Pilot's license goes in place of certificate#.

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Currently this unit is approved by Transport Canada but not Industry Canada

8. Special Canadian Maintenance Requirements

NOTE: Canada requires the following checks during the annual inspection. These tests use the internal battery and should be limited to 12 a year. The unit has been internally tested in our lab to have an optimal life of 110 hours. These tests, over time, will reduce the life expectancy of the battery. Emerging Lifesaving Technologies has an internal battery counter that will ensure a minimum of 36 hours of use. During the normal Self-test cycle (see section 7.1) if the battery life falls below minimum standards the light will flash red four (4) times. Replacing the battery is required once the “four flashes” error occurs.

8.1 Performance Test

To ensure the SAR system is not activated, these tests should be done in such a manner that no radiated signal escapes. Use of an RF screen room or attenuator chamber is required. A WST tester or equivalent is required.

All 406 ELTs that are installed in Canadian aircraft require a performance test during the annual maintenance. A performance test must be done by a ratings certified avionics shop and proper equipment. The avionics shop will test per CAR Part V, Standard 571, appendix G for the following: ELT operational tests only provide the aircraft operator with an indication that the ELT is transmitting; however, a positive result cannot be interpreted as meaning that the ELT meets all operational parameters.

The periodicity of operational checks is at the operator’s discretion, but the check shall only be conducted during the first five minutes of any UTC, (co-ordinated universal time) hour, and restricted in duration to not more than five seconds.

© Performance Testing

- (1) Testing of any ELT shall be conducted in a screen room or metal enclosure, or, the transmitter power output shall be connected to a suitable dummy load to minimize radiation.
- (2) For ELTs powered by other than water activated batteries, the performance test shall be performed using the ELT’s own battery. An alternate power source can be used where lengthy servicing, other than the performance test, is anticipated.

An acceptable procedure for operational tests is to activate the Self-test on the front of the panel or the remote switch and Note any failures of the Self-test by RED flashing lights. The Self-test looks at eight different functions but will only indicate four during the pilots’ self-test.

See section 6.1 for full details

8.2 Frequency Check

To ensure the SAR system is not activated, these tests should be done in such a manner that no radiated signal escapes. Use of an RF screen room or attenuator chamber is required. A WST tester or equivalent is required.

Measure the frequency after three (3) minutes of operation. The use of a WST tester or equivalent is required. A spectrum analyzer can be used to measure frequency, but usually the accuracy is less than required.

- Check to ensure the 406.037 MHz signal for accuracy
- The frequency tolerance is .001Mhz

8.3 Peak Power Test

To ensure the SAR system is not activated these tests should be done in such a manner that no radiated signal escapes. Use of an RF screen room or attenuator chamber is required. A WST tester or equivalent is required.

Measure the output power after 3 minutes of operation. The use of a WST tester or a suitable Spectrum Analyzer is required. Use a suitable impedance matching device and/or attenuator in line with the ELT

- Check to ensure the 406 MHz signal bursts approximately every 50 seconds
- Ensure the duration is 520 ms in duration
- Ensure the output power of the 406 is equal to 37 ± 2 dBm (5 watts)

8.4 Message Verification

Ensure the information transmitted on the long message is accurate. If GPS is installed you must power the system for 10 minutes. This should be done in the aircraft using a WST or equivalent. Information received should include:

- Check to ensure the 406 MHz signal bursts approximately every 50 seconds
- Ensure the duration is 520 ms in duration
- Serial Number or
- Tail Number or
- 24-Bit Aircraft

Perform the basic Test as follows:

- This test is performed without external power being applied
- Install test coax from transmitter to test set
- Turn on the 406 ELT by cycling local or remote switch from ARM to ON
- After first burst reset system by holding the reset button for three seconds
- Verify that the information being transmitted matches information on the tag
 - Country Code
 - Hex Code
- Reconnect Aircraft antenna and make the appropriate entry into the maintenance records

Perform the ELT/GPS test as follows:

- Move aircraft outside to allow GPS to receive GPS satellite information
- Install test coax from transmitter to test set
- Turn on aircraft power and allow GPS 10 minutes to stabilize
- Turn on the 406 ELT by cycling local or remote switch from ARM to On

- After first burst reset system by holding the Reset button for three seconds
- Verify that the information being transmitted matches information on the tag
 - Country Code
 - Hex Code
- Verify GPS information is correct to a known standard within 500 meters
- Reconnect Aircraft antenna and make the appropriate entry into the maintenance records

8.5 Corrosion Inspection

Emerging Lifesaving Technologies ELT is designed and tested to the highest environmental testing standards. The unit is made out of a specially designed polycarbonate that is resistant to the harshest applications in aviation today. The unit is sealed and should not allow moisture or most chemical or fluids to infiltrate the system.

While it is very unlikely, caution should be made to ensure that regular (annual) inspections are made of the outside of the units. IF ANY deterioration or corrosion is found a more detailed inspection is warranted. Return the unit to the manufacturer for inspection.

Special Inspection During Battery Replacement

During routine battery replacement, an inspection should be made inside the battery cavity for signs of corrosion or any residue that is out of place. Should any be found contact the manufacturer for further instructions.

Transport Canada IAW CAR V Standard 571 Appendix G:

2... **Corrosion Inspection**

ELTs installed in aircraft are subject to extreme environmental conditions which may cause corrosion to develop in circuit boards and battery compartments. As a minimum, corrosion inspection shall be performed during each required battery replacement and performance test.

8.6 Battery Replacement

No rechargeable batteries are installed in Emerging Lifesaving Technologies ELT s; therefore, CAR V Standard 571 Appendix G part 4 does not apply.

Transport Canada CAR V Standard 571 Appendix G states:

2... Capacity tests and recharging shall be accomplished at the time intervals, and in

accordance with the procedures established by the manufacturer.

Emerging Lifesaving Technologies 406 ELT batteries have a life limit. That limit (or replacement date) is marked on the outside of the battery pack and a sticker is supplied for the aircraft records. The internal battery clock will indicate during Self-test if a minimum of 36 hours of normal operation is still available.

The type, make, model of ELT and the expiration date is indicated on the battery pack. Only Emerging Lifesaving Technologies approved batteries with the appropriate sticker can be used in Emerging Lifesaving Technologies ELTs. See section 4.4.1 for battery replacement and section 6.1 for Self test.

Transport Canada CAR V Standard 571 Appendix G

(d) Battery Replacement and Recharging

- (1) Battery manufacturers are required to indicate the type, model, part number, ELT type & model for which the battery has been approved and the battery's expiry date.
- (2) The following general guidelines relate to the replacement of ELT batteries:
 - (a) only batteries approved for the particular ELT type are to be installed;
 - (b) following each battery replacement, recharge or capacity test, the date when the next replacement, recharge or capacity test becomes due shall be marked in a legible and permanent manner on the external casing of the ELT and, where the ELT is installed on a life raft, on the outside of the life raft;
 - © an operational test shall be performed following reinstallation in an aircraft of an ELT which has been removed for any reason.

Transport Canada has required that the battery pack must be replaced in the event of any of the following:

CAR V Standard 571 Appendix G :

- (3) Non-rechargeable batteries shall be replaced by serviceable batteries:
 - (a) After use of the ELT in an emergency;
 - (b) After an inadvertent activation of unknown duration;
 - © When the cumulative time of all known transmissions exceeds one hour; and,
 - (d) On or before the proposed battery replacement date.

8.7 Audio Modulation Check

There is no audio modulation check available to the ELT406GPS units.

8.8 Current Draw Check

Remove ELT from aircraft and remove battery. Install test adapter P/N 217-406-005 at the quick disconnect. Check the following:

- In the ARM position the current draw does not exceed $\leq 2\mu\text{A}$.
- In the ON position the current draw does not exceed 2A during 406 burst

Transport Canada CAR V Standard 571 Appendix G

(d) the measured current draw in the “Arm” or “Auto” position, and in the “On” position as specified

by the ELT manufacturer; and

8.9 Automatic Activation System Check

Transport Canada has required this test be done IAW CAR V Standard 571 Appendix G which states:

(e) a test of the automatic activation system.

Emerging lifesavings Technology provide instructions to activate the G-Switch for test purposes. A rapid forward motion that comes to an abrupt stop (football pass method) will usually set of the G-switch. The antenna must be installed during this procedure. The unit will go into fault mode as indicated by rapid green light on the unit if it is activated with a 50 ohm load applied or an antenna installed. Always check to insure the green light comes on and then reset the unit with 30 seconds of the test. These or any other method approved by the local aviation governing authority is acceptable.

It is never acceptable to just drop it on the floor

8.10 Digital Message Verification

The FAA does not require this check under FAR 91.207d but it is highly recommended that at the initial installation all units are checked.

In Canada this test is mandatory.

During the INITIAL tests Emerging Lifesaving Technologies strongly recommends that a complete and comprehensive test be done using a WST or equivalent. Test should include but not limited to:

- Power Output
- Frequency Stability
- GPS Information for Accuracy
- Hex Coding
- Country Coding

See Section 8.4 for details on this test

8.11 Documentation of Inspection

All maintenance performed on aircraft or their sub-systems must be documented in the appropriate records. See the applicable CARs for the format and sign off of these records.

Transport Canada CAR V Standard 571 Appendix G

- 2... Following satisfactory completion of a performance test, the date on which the test was performed shall be marked on the external casing in a legible and permanent manner.

8.12 Special Shipping Instructions

If for any reason this unit must be shipped, it is important to prevent any inadvertent activation of the unit. All 406 ELTs are shipped with a strapping plug that will make the unit dormant.

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9. Installation and Instructions for Continuing Airworthiness and Maintenance Typical (Other Countries)

Each country has its own aviation authority. It is important to ensure the right people are notified in the event of an accident, and to contact the appropriate Civil Aviation Authority in that country for guidelines and documentation needed to assure proper registration.

406ELTs are programmed with the country code in which the aircraft has been registered. Always follow the national procedures. The correct information for registering the radio transmitter may require including the following information:

- Serial Number of ELT
- Tail Number
- 24-Bit Aircraft Address
- Owner/Operator Contact Information
- Aircraft Operator Designator/Serial Number

APPENDIX A- Glossary and Abbreviations

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	<i>Advisory Circular</i> Federal Aviation Administration (FAA) bulletins that contain specific information on specific subjects. This does not reference alternating current type of electricity
AN	<i>American National Standard</i> For aircraft approved hardware
AU	<i>Aural Alert</i> 85db signal to alert the crew if G-Switch activation has triggered the 406 ELT
AF	<i>Automatic Fixed</i> Type of ELT that is designed for aviation use
AWG	<i>American Wire Gauge</i> Look for this in front of a wire size number
BNC	<i>Coax Connector</i> BNC is the type of connector used to attach the 406 transmitter to the 406 antenna MHz
CAR	<i>Canadian Aviation Regulation</i> Transport Canada's rules for aircraft modifications and airworthiness.
CFR	<i>Code of Federal Regulations</i> The library of rules and regulations for all US rules and regulations. Title 14 is specific to aviation
COSPAS-SARSAT	<i>International search and rescue consortium</i> – For more information see www.cospas-sarsat.org .
EASA	<i>European Aviation Safety Agency</i> See www.easa.eu.int
EMI	<i>Electromagnetic Interference</i> Electronic-type noise that introduces spurious interference in other systems
ELT	<i>Emergency Locating Transmitter</i> ELTs are installed on aircraft to alert SAR of an accident or emergency
FAA	<i>Federal Aviation Administration</i> The US government agency responsible for aircraft safety and regulation
FAR	<i>Federal Administration Regulations</i> The rule books that FAA personnel use to regulate aviation

FCC	<u>Federal Communications Commission</u> – The US government agency that regulates the public use of the radio airwaves
G-switch	An <u>accelerometer</u> that senses sudden changes in speed. This is used to active the ELT after a crash
LED	<u>Light Emitting Diode</u> Semiconductor device that emits light when activated. This unit uses both red and green
LEO	<u>Low Earth Orbiting</u> One of the satellite constellations used for detecting 406 beacons
Mil-Spec	The US <u>military specifications</u> that apply to wire, hardware, electronic components, etc. Quality is usually very high
P/N	<u>Part Number</u> The identifier for each part that has been assigned by the manufacturer
PVC	<u>Poly-Vinyl- Chloride</u> A type of exterior coating for some wires. It is not generally accepted as airworthy as some variants release poly-cyanide gases when burned
Retrofit	To remove old systems and install ones in their place
RMI	<u>Radio Magnetic Interference</u> Electrical noise generated by Radio Frequencies that are transmitted into other electronic devices
RF	<u>Radio Frequency</u> The energy that is transmitted from the device
RTCA	<u>Radio Technical Commission for Aeronautics</u> US agency that sets standards for airworthiness. See http://www.rtca.org/aboutrtca.asp
SAR	<u>Search and Rescue</u> The system, usually government controlled, for locating and rendering aid to those in distress.
SMA	The <u>special type of connectors</u> for the GPS Antenna Connectors
STC	<u>Supplemental Type Certificate</u> A change in the original type certificate (TC) that allows for modification from the original design. This guarantees the airworthiness of the aircraft after modification
Sub-D	<u>Sub-miniature electrical connector</u> Used for electrical interface between the ELT and remote switch (looks like a D)
TSO	<u>Technical Standard Order</u> The Federal Aviation Administration issues

TSOs to indicate approval of a manufactured item for use on aircraft.



Appendix B

ELT406GPS 406MHz Emergency Locator Transmitter with Internal GPS Environmental Qualification Form

Nomenclature: ELT406GPS 406MHz Emergency Locator Transmitter with Internal GPS

Type/Model/Part Number:

ELT406GPS	E.L.T. Part Number 51220-042
ANT406GPS-Mid/Low	E.L.T. Part Number 114-042-250
REM-AUR	E.L.T. Part Number 816-59-06
RG316	E.L.T. Part Number 315-17-06
RG56	E.L.T. Part Number 315-12-06
Mounting Tray	E.L.T. Part Number 217-406-062

TSO Number: TSO-C126a 406MHz Emergency Locator Transmitter (ELT)

Manufacturer's Specification and/or Other Application Specification PSN 09-1220

Manufacturer Emerging Lifesaving Technologies
Address: 3211 County Road 384
 Tyler, TX 75708

Revision & Change Number of DO-160: RTCA DO-160F Environmental Conditions and Test Procedures for Airborne Equipment

Date Tested: February 6, 2010 to March 10, 2010

CONDITIONS	SECTION	DESCRIPTION OF TEST CONDUCTED
Temperature and Altitude	4.0	Equipment Identified as Category D2
Low Temperature	4.5.1	
High Temperature	4.5.2 &	
In-Flight Loss of Cooling	4.5.3	
Altitude	4.5.4	
Decompression	4.6.1	
Overpressure	4.6.2 4.6.3	
Temperature Variation	5.0	Equipment Tested to DO204A section 2.3.2
Humidity	6.0	Equipment Tested to Category A
Operational Shock and Crash Safety	7.0	Equipment Tested to DO204A section 2.3.4
Vibration	8.0	Equipment Identified as Category U2, Robust Vibration test Using test curves F and F1
Explosive Atmosphere	9.0	Equipment Identified as Category X no test performed
Waterproofness	10.0	Equipment Tested to DO204A section 2.3.8
Fluids Susceptibility	11.0	Equipment Identified as Category X no test performed
Sand and Dust	12.0	Equipment Identified as Category X no test performed
Fungus	13.0	Equipment Identified as Category X no test performed
Salt Fog Test	14.0	Equipment Identified as Category S
Magnetic Effect	15.0	Equipment Identified as Category Z
Power Input	16.0	Equipment Identified as Category RBZ
Voltage Spike	17.0	Equipment Identified as Category X
Audio Frequency Susceptibility	18.0	Equipment Identified as Category X

Induced Frequency Susceptibility	19.0	Equipment Identified as Category ZC
Radio Frequency Susceptibility	20.0	Equipment Identified as Category S For Conducted Susceptibility and Category S for Radiated Susceptibility
Radio Frequency Emission	21.	Equipment Identified as Category L
Lightning Induced Transient Susceptibility	22.0	Equipment Identified as Category X
Lightning Direct Effects	23.0	Equipment Identified as Category X
Icing	24.0	Equipment Identified as Category X
Electrostatic Discharge	25.0	Equipment Identified as Category X
Fire, Flammability	26.0	Equipment Tested to DO204A section 2.3.7.1
Other Tests: High Temperature Battery Life Low Temperature Battery Life Frequency Stability with Temperature Gradient Thermal Shock VSWR Self Test Low Temperature Activation High Temperature Activation Altitude Decompression Overpressure		Equipment Tested to DO204A section 2.3.2.1 Equipment Tested to DO204A section 2.3.2.2 Equipment Tested to DO204A section 2.3.2.3 Equipment Tested to DO204A section 2.3.2.4 Equipment Tested to DO204A section 2.3.2.5 Equipment Tested to DO204A section 2.3.2.6 Equipment Tested to DO204A section 2.3.1.1 Equipment Tested to DO204A section 2.3.1.2 Equipment Tested to DO204A section 2.3.1.3 Equipment Tested to DO204A section 2.3.1.4 Equipment Tested to DO204A section 2.3.1.5

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334	Honduras (Republic of)
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514, 515	Cambodia (Kingdom of)

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518	Cook Islands
520	Fiji (Republic of)
523	Cocos (Keeling) Islands
525	Indonesia (Republic of)
529	Kiribati (Republic of)
531	Lao People's Democratic Republic
533	Malaysia
536	Northern Mariana Islands (Commonwealth of the)
538	Marshall Islands (Republic of the)
540	New Caledonia
542	Niue
544	Nauru (Republic of)
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574	Viet Nam (Socialist Republic of)
576	Vanuatu (Republic of)
578	Wallis and Futuna Islands
601	South Africa (Republic of)
603	Angola (Republic of)

605	Algeria (People's Democratic Republic of)
607	Saint Paul and Amsterdam Islands
608	Ascension Island
609	Burundi (Republic of)
610	Benin (Republic of)
611	Botswana (Republic of)
612	Central African Republic
613	Cameroon (Republic of)
615	Congo (Republic of the)
616	Comoros (Union of the)
617	Cape Verde (Republic of)
618	Crozet Archipelago
619	Côte d'Ivoire (Republic of)
621	Djibouti (Republic of)
622	Egypt (Arab Republic of)
624	Ethiopia (Federal Democratic Republic of)
625	Eritrea
626	Gabonese Republic
627	Ghana
629	Gambia (Republic of the)
630	Guinea-Bissau (Republic of)
631	Equatorial Guinea (Republic of)
632	Guinea (Republic of)
633	Burkina Faso
634	Kenya (Republic of)
635	Kerguelen Islands
636, 637	Liberia (Republic of)
642	Socialist People's Libyan Arab Jamahiriya
644	Lesotho (Kingdom of)

645	Mauritius (Republic of)
647	Madagascar (Republic of)
649	Mali (Republic of)
650	Mozambique (Republic of)
654	Mauritania (Islamic Republic of)
655	Malawi
656	Niger (Republic of the)
657	Nigeria (Federal Republic of)
659	Namibia (Republic of)
660	Reunion (French Department of)
661	Rwanda (Republic of)
662	Sudan (Republic of the)
663	Senegal (Republic of)
664	Seychelles (Republic of)
665	Saint Helena
666	Somali Democratic Republic
667	Sierra Leone
668	Sao Tome and Principe (Democratic Republic of)
669	Swaziland (Kingdom of)
670	Chad (Republic of)
671	Togolese Republic
672	Tunisia
674	Tanzania (United Republic of)
675	Uganda (Republic of)
676	Democratic Republic of the Congo
677	Tanzania (United Republic of)
678	Zambia (Republic of)
679	Zimbabwe (Republic of)
701	Argentine Republic

710	Brazil (Federative Republic of)
720	Bolivia (Plurinational State of)
725	Chile
730	Colombia (Republic of)
735	Ecuador
740	Falkland Islands (Malvinas)
745	Guiana (French Department of)
750	Guyana
755	Paraguay (Republic of)
760	Peru
765	Suriname (Republic of)
770	Uruguay (Eastern Republic of)
775	Venezuela (Bolivarian Republic of)

Appendix D Troubleshooting Guide

Emerging Lifesavings Technologies were designed to be as worry free as possible but with any complex electronic system faults can occur. A large array of tests were performed during the manufacturing and certification process of each unit. The use of the Self-Test feature will help identify any aircraft maintenance that will maintain the airworthiness of the ELT.

Indication	Status	Action	Corrective Action
Green Light Flashing ½ second intervals	System has been activated either by the G-switch or by Pilot’s remote switch	Reset system by pressing Reset for one full second. The System should reset	If light fails to go remove battery and return to manufacture for repair
5 Green Flashing Lights	System Checks good	No further action is required	
5 Yellow Flashing Lights	406 Tests are good but no GPS is being encoded	Insure clear and unobstructed view of the GPS constellation. Run for a warm-up time of 10 minutes.	There are no field repairable items during this test. Return to manufacture for repair.

2 Red Flashes	406 Antenna Failure	Check to insure Antenna cable is properly connected. Insure the ground plane is of sufficient size	Reinstall Cable. Check for corrosion around the antenna and re-establish a good bond with ground plane. If problem continues contact service department for further instructions
3 Red Flashes	Transmitter chain failure	This test looks at a number of internal test that verify the accuracy of the ELT and its ability to send out a completed code within the parameters as set forth by Cospas/Sarsat	Check to insure the coax is not cut or has hard bends in the coax. There are no field repairable items during this test. Return to manufacture for repair.
4 Red Flashes	Low Battery	This indicates that the system no longer has enough store power in the internal batteries to operate for at least 36 hours	Replace battery pack.
6 Red Flashes	GNSS Self-test	The Systems prevents excessive testing of the GPS in order to preserve battery power for use in an emergency. (60 test max)	Replace battery pack
Rapid Green Flashes ¼ second interval	The system has been installed incorrectly or the configuration is incorrect	This is an auto-fault mode that prevents permanent damage to the unit in the event of a miss-wire or cable failure.	Remove the battery pack. After 30 sec reconnect battery. Before retesting insure all cables and wiring are installed properly and the antenna or 50 ohm load has been installed



Aural Alert	Constant beeping	The aural alert only goes off when the G-Switch has been activated and the ELT is transmitting	Reset the unit by pressing the Reset switch for one full second. If the green light stays on disconnect the ELT harness and try to reset at the unit. If the system does not Return to manufacture for repair.
No Self-Test	No Lights after test	Check harness to insure good connections between the unit and remote controller. Try the Self- test at the ELT box.	If the ELT test good replace the remote switch. If the system does not test Return to manufacture for repair.