



Emergency Locator Transmitters

Presentation of the changes in the
range of ELTs



Changes in the 406 MHz industry

- Smaller beacons on the market in 1987
- Easy programming
- Better distribution and Service Network
- Worldwide type approvals
- An Improved range of beacons





The Aviation Challenge

- Obtaining the experience and expertise in 406 MHz industry
- Similar mandatory carriage requirements... 15 years after the marine industry
- Obtaining a complete range of JAA/FAA/DGAC/CAA... approved ELTs





Specification documents

- Early 70's: first regulation (TSO-C91)
- 1983 : RTCA DO183 (TSO-C91a)
MOPS for ELTs operating on 121.5 and 243 MHz
- 1989 : RTCA DO204 (TSO-C126)
MOPS for ELTs operating on COSPAS-SARSAT
406 MHz
- 1990 : EUROCAE ED62
European equivalent for both TSO-C91a and
TSO-C126
(Different G-Switch activation curve)





Beacon limitations-Problems

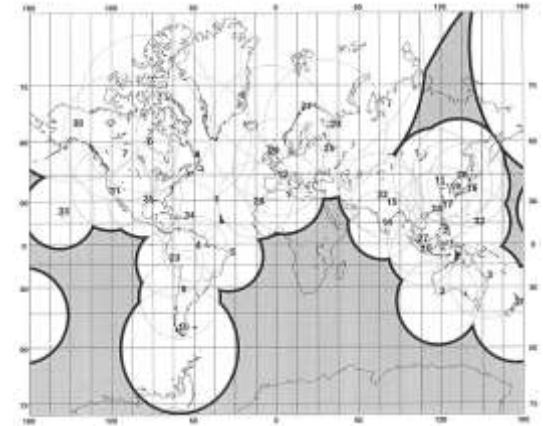
- Resistance of the housing not compatible with the environmental constraints of a crash
- Improper mounting and location in the aircraft
- Too many false alarms due to
 - Poor specifications for the shock detector
 - No warning to the pilot in case of activation (***no remote control in the cockpit***)
 - Inadequate sequence of functioning test





Current System limitations

- The aircraft monitor on 121.5 MHz
- The 121.5 MHz signal can be relayed by the COSPAS-SARSAT satellites but within local range
- No global coverage



- No precise positioning
- No identification of the aircraft in distress





COSPAS-SARSAT

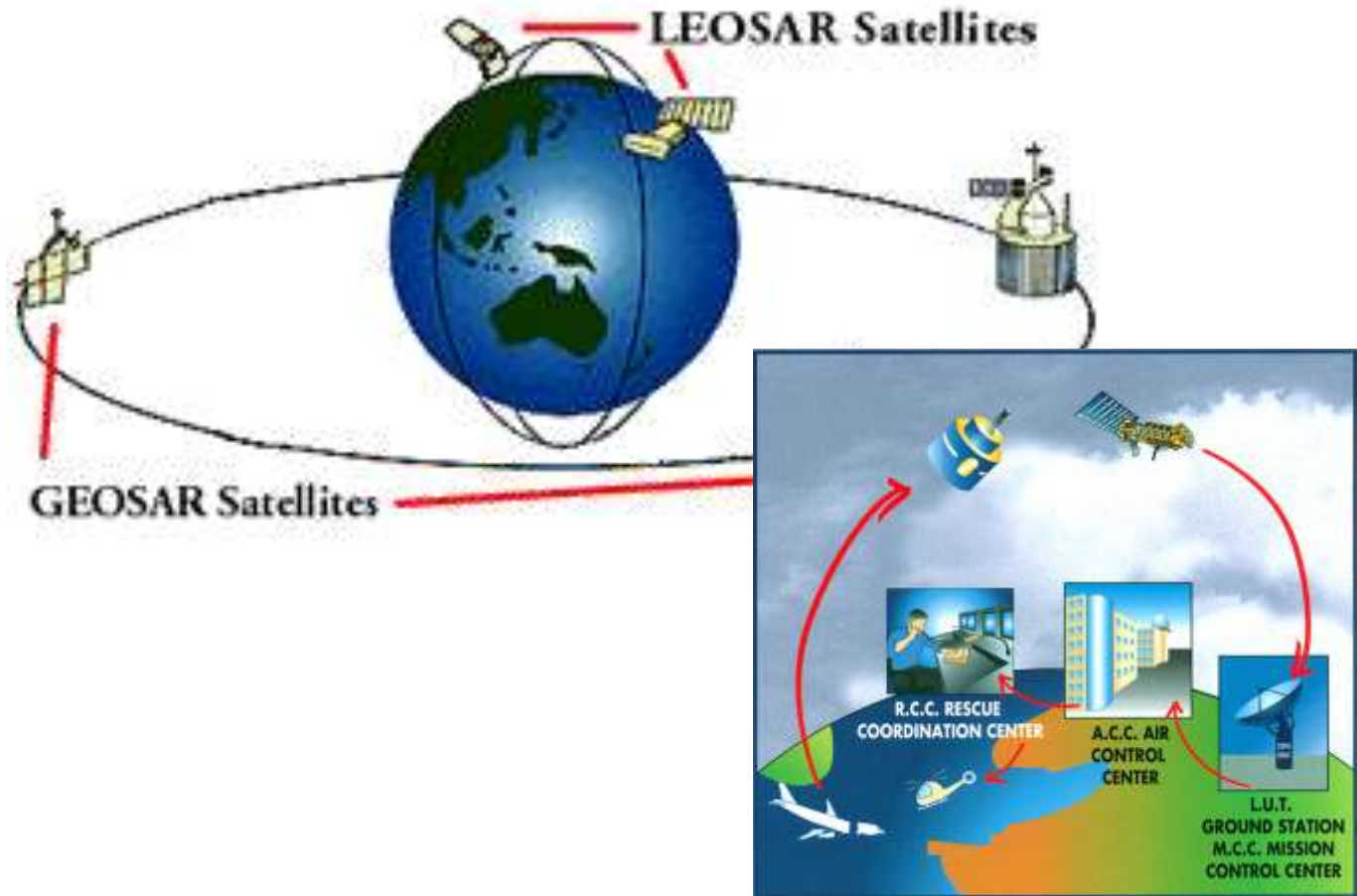


- Global coverage
- Precise positioning
- Identification of the Aircraft in distress





Global coverage





Precise pinpointing

- Thanks to an Ultra-Stable signal, the COSPAS-SARSAT satellites can pinpoint a 406Mhz ELT by doppler effect within 2 Nautical Miles (according to COSPAS-SARSAT spec).
- Test carried out with **KANNAD** ELTs show an accuracy better than **500 meters**
- The position of the aircraft can be added in the “long” digital message with an accuracy of 4” (<125 meters). A special “NAV-ELT” interface is required.





Aircraft identification

- Why aircraft identification is important to SAR ?
 - Thanks to a shared database, SAR headquarters know the type of aircraft in distress as well as the color of the fuselage, the number of passengers...
 - To bring efficient solution to false alarms
- This is the reason why it is essential that the ELT is registered with the local COSPAS-SARSAT authority (SPOC) prior to its installation on board the aircraft.
- Registration should occur at the time of sale





Improvements

	TSO-C91
Improved mechanical resistance	N
Improved G-Switch	N
Remote control panel in the cockpit	N
Outside antenna	N
5 Watt transmission power	N
Global coverage	N
Identification of the aircraft	N





Improvements

	TSO-C91	TSO-C91a
Improved mechanical resistance	N	Y
Improved G-Switch	N	Y
Remote control panel in the cockpit	N	Y
Outside antenna	N	Y
5 Watt transmission power	N	N
Global coverage	N	N
Identification of the aircraft	N	N





Improvements

Improved mechanical resistance

TSO-C91	TSO-C91a	TSO-C126
N	Y	Y





Improvements

Improved mechanical resistance

Improved G-Switch

TSO-C91	TSO-C91a	TSO-C126
N	Y	Y
N	Y	Y





Improvements

	TSO-C91	TSO-C91a	TSO-C126
Improved mechanical resistance	N	Y	Y
Improved G-Switch	N	Y	Y
Remote control panel in the cockpit	N	Y	Y





Improvements

	TSO-C91	TSO-C91a	TSO-C126
Improved mechanical resistance	N	Y	Y
Improved G-Switch	N	Y	Y
Remote control panel in the cockpit	N	Y	Y
Outside antenna	N	Y	Y





Improvements

	TSO-C91	TSO-C91a	TSO-C126
Improved mechanical resistance	N	Y	Y
Improved G-Switch	N	Y	Y
Remote control panel in the cockpit	N	Y	Y
Outside antenna	N	Y	Y
5 Watt transmission power	N	N	Y





Improvements

	TSO-C91	TSO-C91a	TSO-C126
Improved mechanical resistance	N	Y	Y
Improved G-Switch	N	Y	Y
Remote control panel in the cockpit	N	Y	Y
Outside antenna	N	Y	Y
5 Watt transmission power	N	N	Y
Global coverage	N	N	Y





Improvements

	TSO-C91	TSO-C91a	TSO-C126
Improved mechanical resistance	N	Y	Y
Improved G-Switch	N	Y	Y
Remote control panel in the cockpit	N	Y	Y
Outside antenna	N	Y	Y
5 Watt transmission power	N	N	Y
Global coverage	N	N	Y
Identification of the aircraft	N	N	Y





Regulation - General

- ICAO Annex 10
 - 2000 : improved 121.5 MHz transmission
 - 2002 : 406 MHz (TSO-C126 or ED62) for all new installations
 - 2005 : 406 MHz (TSO-C126 or ED62) for all aircraft
 - 2005 now being moved to 2007?





Regulation - USA

- FAR 91.207
All civil aircraft are required to carry a TSO C91a or TSO C126 certified ELT.
- Part 121 operators and operations governed by Part 135 are required to carry a TSO C91a or TSO C126 certified ELT.
- Aircraft that are not required to carry an ELT include military aircraft, experimental aircraft, balloons and gliders.





Regulation - Europe

1/3

- JAR-OPS 1.820
 - 2002 : 406 MHz ELT (any type)
- JAR-OPS 1.830
 - 2 Survival ELTs for flights over water
 - 1 Survival ELT for flights over desert





NEW . . .

- New issue of JAR-OPS 1.820 (March 2000)
 - An operator shall not operate an aeroplane first issued with an individual Certificate of Airworthiness on or after 1 January 2002 unless it is equipped with an Automatic Emergency Locator Transmitter (ELT) capable of transmitting on 121.5 MHz and 406 MHz.
 - An operator shall not operate on or after 1 January 2002 an aeroplane first issued with an individual Certificate of Airworthiness before 1 January 2002 unless it is equipped with any type of ELT capable of transmitting on 121.5 MHz and 406 MHz except that aeroplanes equipped on or before 1 April 2000 with an automatic ELT transmitting on 121.5 MHz but not on 406 MHz may continue in service until 31 December 2004.
 - An operator shall ensure that all ELTs that are capable of transmitting on 406 MHz shall be coded in accordance with ICAO Annex 10 and registered with the national agency responsible for initiating Search and Rescue or another nominated agency.





Regulations in New Zealand

- Currently under rules development





Manufacturers offer

- Commercial aviation
 - Airliners
 - Commuters

- General Aviation
 - Business aircraft
 - Helicopters
 - Light aircraft





Common features

- Small size, light weight
- 3 frequency transmitter (121.5/243/406 MHz)
- Full qualification (J-TSO & TSO) on the same P/N
- Complying with latest regulation
- *Short circuit protection*
- Easy programming (no hardware operation)
- *Pin-programming option*
- 6 year battery (*non hazardous technology*)
- Wide range of accessories





Size, Weight

UNIQUE

- The **KANNAD** 406 AF is the smallest and lightest three-frequency ELT available on the market
 - Transmitter dimensions
172 mm x 82 mm x 82 mm (6.8" x 3.2" x 3.2")
 - Overall dimensions (max)
181 mm x 100 mm x 95 mm (7.1" x 3.9" x 3.8")
 - Weight (incl. bracket, batteries)
Typical : 1110 g (2.45 lbs.)
Max : 1180 g (2.60 lbs.)





Three frequency transmitter

- Integrated design (not a 121.5/243.0 ELT with an additional 406 MHz module)
 - Improved reliability
 - One single RF output
 - Reduced consumption
-
- The **KANNAD** 121 AF can be upgraded to become a **KANNAD** 406 AF by replacing the PCB (Service Bulletin available)





Full qualification

- Qualification granted worldwide (TSO-C91a & TSO-C126, JTSO2C91a & JTSO2C126, CAA VC, DGAC QAC, LBA...)
- One P/N for both standards (The **KANNAD** ELTs complies with the most severe of both RTCA and EUROCAE specifications and a deviation has been accepted by FAA with regards to G-Switch activation curve).
- No need to replace the ELT when changing country of registration

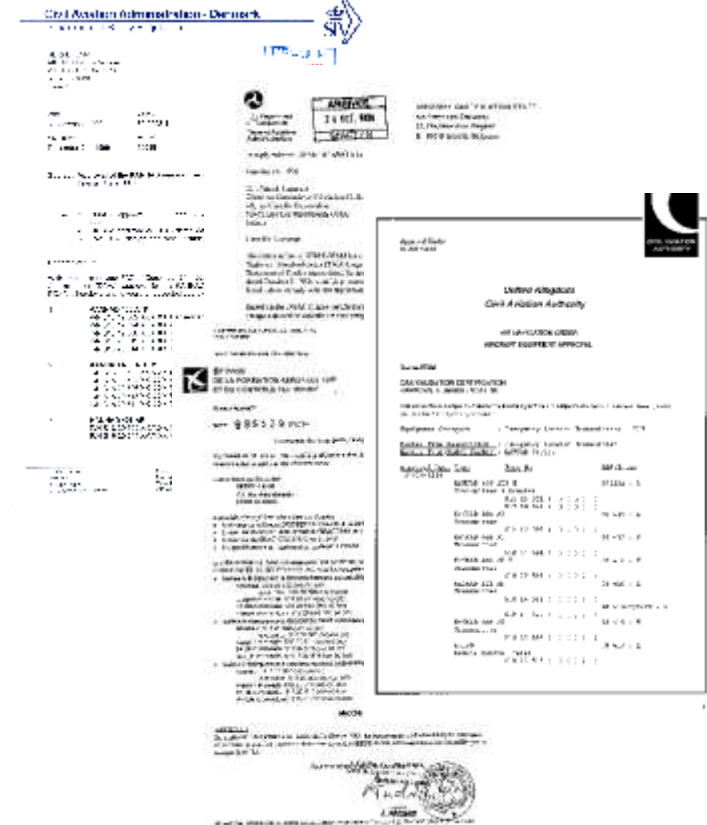
UNIQUE





Compliant with regulation

- ICAO ANNEX 10
- FAR91.207
- Part 121
- Part 135
- JAR-OPS 1.820
- JAR-OPS 1.830
- JAR-OPS 3.820





“Short circuit protection”

UNIQUE

- No combination of short circuits between the Remote Control Panel wiring and airframe will inhibit the ELT from being automatically activated or from reset once activated.
- This function is of utmost importance as the bundle might be damaged in the event of a crash





Easy programming

- No hardware operation
- PR550 programming equipment (interface to be connected to a standard PC)
- Compatible with the 4 protocols defined by ICAO:
 - Tail Number
 - Aircraft Operator Designator
 - Serial Number
 - 24 bit Address





Pin programming (option)

- The identification is automatically downloaded into the ELT when installed on board (when connected to the remote control panel)
- A “Programming dongle” is part of the wiring linking the ELT to the Remote Control Panel. The programming dongle contains the data



UNIQUE

- A “Maintenance dongle” enables to reset the ELT programming





6 year battery

- The battery is only changed every 6 years thanks to Lithium batteries
 - Limited maintenance costs
 - Improved reliability
- COST EFFECTIVE**
- Currently hazardous for air transportation (IATA A45) but were non hazardous up to 2001
 - Currently can't be shipped FedEx, DHL, UPS



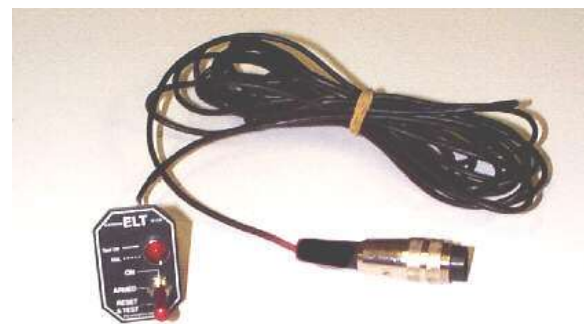


Accessories

Remote Control Panels



RC500-320



RC100



RC400

Can be adapted to comply with aircraft manufacturer's specs





Accessories

□ Antennas



ANT500 & ANT600
High speed antennas



ANT300
Low speed
antenna

The **KANNAD** ELTs are compatible with any TSO'd or JTSO'd antenna





Accessories


- NAV interface
 - The **KANNAD** ELTs are capable of transmitting the 144 bit “long message” including the aircraft position
 - Interface under development
 - CS144-NMEA (interface to on board GPS receiver via RS232/422)
 - CS144-GPS (with GPS receiver integrated)
 - CS144-ARINC (interface to any NAV equipment via ARINC429)
 - Availability Q4/2001





KANNAD 406 ATP



- Commercial aviation
- Top of the range
- Automatic-portable
- Solid-state G-Switch
(no subjected to wear and tear)
- Worldwide service by  **SEXTANT**
- Metallic housing

- Ref: AIRBUS,
British Airways, Virgin, Nouvelair, Daimler





KANNAD 406 AS

- ❑ Commercial aviation
Liferafts
- ❑ Survival ELT
- ❑ the smallest and lightest
TSO'd 3 frequency
survival ELT
- ❑ Available with mounting
bracket

- ❑ Ref : AIRBUS, Winslow, British Airways, RAAF





KANNAD 406 AF

- ❑ Commuters
Business aircraft
Light aviation
- ❑ Automatic fixed
- ❑ Mechanical G-Switch

- ❑ Ref: DASH8-400, Continental Jet (BD100),
Citation X, PILATUS, SOCATA





KANNAD 406 AP

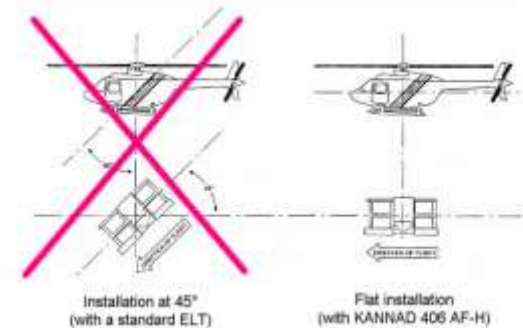
- Commuters
Business aircraft
 - Automatic-Portable
 - Mechanical G-Switch
 - Equivalent to KANNAD 406 AF with auxiliary antenna for use as a survival ELT
-
- Ref: Jetstream (BAe), Pacific Areospace





KANNAD 406 AF-H

- Helicopters
- Automatic fixed
- Flat installation
saving space and weight (no special mounting
bracket adaptation)
- Mechanical G-Switch 45°



- Ref: EUROCOPTER





KANNAD 121 AF



- Turboprops
Light aviation
 - Automatic fixed
 - 2 frequency ELT (121.5 & 243 MHz)
 - Easy to upgrade into a 3 frequency ELT
 - Morse code transmission (every min.)
 - Mechanical G-Switch
-
- Ref: PILATUS, SOCATA, ROBIN...

SB





Test & Maintenance

- Self-test every first flight of each month (GO/NO GO result on the ELT and on the RCP)
- Maintenance by JAR/FAR145 service station with valid agreement for KANNAD ELT maintenance
- Few specific tools required
Programming equipment,
COSPAS-SARSAT decoder
- ATA100 & ATA2100 (electronic version) CMMs
- Battery replacement every 6 years.



- AOG by  **SEXTANT**





Competitive edges

- Unique short circuit protection
- Pin-programming option
- 6 year battery
- State of the art solid-state G-Switch
- ...

□ References

- Selected by the Peruvian Army after six months of intensive testing
- Selected by Australian Air Force (RAAF)
- Selected by British Airways to equip its whole fleet
- Referenced by major OEMs

□ Distribution network - Service quality





Competition (2 freq ELTs)

	KANNAD 121 AF	NARCO ELT 910	ARTEX ELT110	ARTEX ELT200	AMERIKING AK450	ACK - E01	POINTER ELT3000
Worldwide qualification	YES	NO	NO	NO	NO	NO	NO
Upgradable	YES	NO	YES	NO	NO	NO	NO
Size	**	*****	*****	*	*****	****	*****
Weight	**	*****	*****	*	****	****	*****
Battery (years)	6	2	2	2	1	1	3
Short circuit protection	YES	NO	NO	NO	NO	NO	NO
Identification	Morse	NO	NO	NO	Voice	NO	NO
Price	*****	****	****	**	**	*	****





Competition (3 freq)

	KANNAD 406 AF	KANNAD 406 ATP	ARTEX ELT 406NAV	ELTA-CEIS A06
Worldwide qualification	YES	YES	NO	NO
Integrated design	YES	YES	YES	NO
G-Switch	MECHANICAL	ELECTRONIC	MECHANICAL	MECHANICAL
Size	**	*****	*****	*****
Weight	**	*****	*****	*****
Battery (years)	6	6	5	4
Short circuit protection	YES	NO	NO	NO
Coding protocols	4	4	4 (2)	4
Pin-programming	DONGLE	DONGLE	INTERFACE	BRACKET
NAV-ELT Interface	IN DEV	IN DEV	ARINC	NO
Price	**	****	****	****





How to contact us...

- Sales : Lloyd Klee Iklee@aviationsafety.co.nz

- Safety and Aviation Supplies Ltd
PO Box 91107
AUCKLAND
Phone : +64.9.3099111
Fax : +64.9.3099211

- Internet : www.aviationsafety.co.nz
Email : sales@aviationsafety.co.nz

