

NPRM 2020-05 ASC M-3

Installation, Maintenance and Registration of ELT and Aviation-use PLB

Meeting air operators after receiving comments to NPRM 2020-05

4th January 2021, Monday

Airworthiness Section of CAA

Agenda

1. Purpose of meeting
2. Types of distress beacons
3. Phases of aircraft emergency
4. ELT registration requirement
5. International Beacon Registration Database
6. ELT – Maldives CAA current practices and work in progress
7. Models of ELT used in Maldives
8. ELT decoded information
9. Difference between ASC AW 12 (Aug 2000) & ASC M-3
10. ELT inspection and testing requirements of some States



Agenda (Cont.)

- 11. ELT tasks in MRBR/MPD
- 12. Testing and inspection requirements and methods described by ELT OEMs
- 13. Information on coding
- 14. COSPAS SARSAT overview
- 15. Typical methods used for ELT annual inspection and testing – some videos
- 16. Comments to NPRM
- 17. Any input from participants
- 18. Conclusion



Purpose of meeting

- To highlight key differences between current regulation on ELT (i.e. ASC AW 12, dated 03 August 2000) and proposed regulation ASC M-3 (NPRM 2020-05)
- A look at ELT related continuing airworthiness requirements (i.e. MRBR or MPD tasks) in aircraft currently registered in Maldives
- A look at how ELT checks are performed according to:
 - Aircraft type certificate holder
 - ELT OEM
- Responding to comments to NPRM
- Discussion on changes, if any, to the final text of the regulation

Types of Distress beacons

- Distress beacons can be used for maritime, aviation and personal use.
- ELT is used in aircraft.
- EPIRB on marine vessels.
- PLBs are designed for use by persons in distress who may be on land, in the air or at sea
- Aviation regulation does allow to carry PLB instead of ELT in some cases. PLB may be carried on board an aircraft in addition to ELT. Further details in MCAR Air OPS

Phases of aircraft emergency

- The three emergency phases defined in ICAO Annex 12 are:
 - **Uncertainty phase.** A situation wherein uncertainty exists as to the safety of an aircraft and its occupants.
 - **Alert phase.** A situation wherein apprehension exists as to the safety of an aircraft and its occupants.
 - **Distress phase.** A situation wherein there is a reasonable certainty that an aircraft and its occupants are threatened by grave and imminent danger and require immediate assistance.

ELT registration - International requirement

- ICAO Annex 10 Ch 5 states “States shall make arrangements for a 406 MHz ELT register. Register information regarding the ELT shall be **immediately available to search and rescue authorities**. States shall ensure that the register is updated whenever necessary.

International Beacon Registration Database (IBRD)

- IBRD is designed to be freely available to users with no access to national registration facilities and to Administrations who wish to avail themselves of the facility to make their national beacon registration data more available to SAR services.
- [IBRD user information link on website](#)

ELT – Maldives CAA current practices

- CAA does not feed any data to IBRD (<https://www.406registration.com>) as CAA does not have access credentials.
- CAA publishes ELT register on CAA website home page. The ELT register has air operator name, aircraft registration and nationality mark, ELT serial number and ELT hex code.
- ELT hex code can be coded in various protocols and the ELTs used in Maldivian registered aircraft use various protocols.

ELT – work in progress

- The CAA has drafted NPRM 2020-05, ASC M-3 and ELT/PLB registration form.
- ASC M-3 guide aircraft owners and operators on ELT and PLB coding, registering with CAA & updating registration information, testing and continuing airworthiness.
- Once ASC M-3 is issued, the current regulation ASC AW 12 will be repealed.

ELT decoded information - current cospas-sarsat website

- When we decode ELT hex code of an aircraft using the cospas-sarsat online decode program, we see that national point of contact for ELT is given as Maldives Transport Authority with Primary email: hussainnazeer@transport.gov.mv.
- National contact for PLB is given as Communications Authority of Maldives with Primary email: secretariat@cam.gov.mv. SAR point of contact (SPOC) is given as Maldives Airports Company Ltd with AFTN VRMMYCYX.
- As an example, please enter 8Q-MAO, DHC-6-300 hex code B8E6433D627E231 <https://www.cospas-sarsat.int/en/beacon-decode-program>

Models of ELT used on aircraft in civil aircraft register

- As of 20-Dec-2020, there are 107 civil aircraft registered in Maldives
- Total 106 ELT installed or carried onboard as per data provided by operators on July-Sep 2019
- The tables on next slide shows the models of ELT used from data gathered in July – Sep 2019

Models of ELT used on aircraft in civil aircraft register (cont)

- The tables shows the models of ELT used from data gathered in July – Sep 2019

#	ELT type	ELT manufacturer	ELT model	Total in Maldives fleet
1	Automatic Fixed	ACR Electronics/ Artex	ARTEX C406, C406-1, C406-2, G406-4, C406-N	66
2	Automatic Fixed	ACR Electronics/ Artex	ARTEX ELT 1000	8
3	Automatic Fixed	ACR Electronics/ Artex	ARTEX 110-406	8
5	Automatic Fixed	AMERI-KING CORP	AK-451	6
6	Automatic Fixed	ACR Electronics/ Artex	ME406	4
7	Automatic Fixed	SOCATA	ELT 96, ELT 96A	4
8	Automatic Fixed	ELTA	ADT406 AF/AP	3
9	Automatic Fixed	ACR Electronics/ Artex	ARTEX ELT 4000	1
10	Automatic Fixed	ELT SA	A06V2r	2
11	Portable	ELTA	ADT406 S	3
12	Portable	Orolia SAS	KANNAD 406	2

Difference between ASC AW 12 (Aug 2000) & ASC M-3

1. Which aircraft has to be equipped with ELT is stated in AS AW12 (i.e. aircraft engaged in public transport) but M-3 refers to Air OPS (details the requirement for commercial and non-commercial operations)
2. AW 12 applies to foreign aircraft but M-3 does not mention foreign registered aircraft. CAA expects foreign operators to meet ICAO Annexes but this is not the subject of M-3
3. AW 12 requires ELT to meet or exceed FAA TSOC91a and complies with European Directive 62. M-3 requires the later standard (i.e. FAA TSO-C126() or ETSO equivalent).

Difference between ASC AW 12 (Aug 2000) & ASC M-3 (Cont.)

4. AW 12 describes the specifications given in TSO-C91, but M-3 refers to the required TSO number but does not describe its contents in the rule
5. AW 12 describes how ELTs should be marked in detail, but M-3 refers to MCAR-21.A.807 and states “ battery expiry date and 15-Hex ID shall be legibly marked on the outside of the beacon”
6. AW 12 requires the location of ELT to be marked “EMERGENCY LOCATOR TRANSMITTER HERE”. M-3 states “location of beacon(s) shall be identified in the aircraft emergency equipment layout”

Difference between ASC AW 12 (Aug 2000) & ASC M-3 (Cont.)

7. AW 12 states that each ELT is required to be coded with National registration (eg: 8Q) and Serial Number of the individual ELT. M-3 does not restrict the ELT coding protocols used currently in Maldives. Of course the country code is a must irrespective of the protocol used.
8. AW 12 requires a functional check of ELT every 90 days. M-3 requires self-test every six months and in addition, requires an annual testing and inspection.
9. A form developed for ELT registration and update of registration details

Difference between ASC AW 12 (Aug 2000) & ASC M-3 (Cont.)

- When ASC M-3 states TSO C126(), it covers, as of this date, the following FAA and European specifications for ELT
 - 1. FAA [TSO C126a](#)
 - 2. FAA TSO C126b
 - 3. FAA TSO C126c
 - 4. JAA JTSC 2C126
 - 5. [EASA ETSO 2C126 \(Date: 24.10.03\)](#)
 - 6. [EASA ETSO C126a](#) (05.07.2012)
 - 7. [EASA ETSO C126b](#) (Date: 5.8.2016)
 - 8. EASA [ETSC C126c](#) (applicable from 25.7.2020)

ELT inspection and testing requirements of some States (USA)

Title 47: Telecommunication

PART 87—AVIATION SERVICES

§87.197 ELT test procedures.

- *ELT testing must avoid outside radiation. Bench and ground tests conducted outside of an RF-shielded enclosure must be conducted with the ELT terminated into a dummy load.*

Title 14: Aeronautics and Space

PART 91—GENERAL OPERATING AND FLIGHT RULES

FAR 91.207 paragraph (d):

- *«Each emergency locator transmitter [...] 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. »*

ELT inspection and testing requirements of some States (Canada)

CAR Part VI - Standard 625 Appendix C: Out of phase tasks and equipment maintenance requirements – CAR

12. Emergency Locator Transmitters (ELTs)

(b) ELTs capable of transmitting on 406 and 121.5 MHz frequencies:

- (i) ELTs powered by **non-water-activated** batteries shall be maintained at intervals not exceeding:
 - (A) 12 months, in accordance with the applicable **operational test** requirement in Appendix G of Standard 571; **and**
 - (B) 24 months, in accordance with the applicable **performance test** requirement in Appendix G of Standard 571.
- (ii) ELTs powered by **water-activated batteries** shall be maintained at intervals **not exceeding five years** in accordance with the applicable **performance test** required by Appendix G of Standard 571.
- (iii) ELT batteries shall be maintained at the interval recommended by the ELT manufacturer and in accordance with the applicable standards of airworthiness in Appendix G of Standard 571.

ELT inspection and testing requirements of some States (Canada)- cont.

CAR Part V - Standard 571 Appendix G: Maintenance of Emergency Locator Transmitters (ELTs)

(3) *Operational test* of ELT capable of transmitting on both 406 and 121.5 MHz

- (a) Operational test shall include (i) self-test (ii) verify lights...(iii) verify proper 24-bit address (iv)....

(4) *Performance Test* of ELT capable of transmitting on both 406 and 121.5 MHz

(b) As a minimum, the performance test for ELTs powered by non-water-activated batteries shall include:

- (i) *Inspection of the ELT [...]*
- (ii) *measured peak power of the 406 MHz and 121.5 MHz transmissions [...]*
- (iii) *measured frequencies of the 406 MHz and 121.5 MHz transmissions [...]*
- (iv) *verification of 406 MHz digital message [...]*
- (v) *121.5 MHz audio modulation [...]*
- (vi) *measured current draw [...]*
- (vii) *test of the automatic activation system [...]*

ELT inspection and testing requirements of some States (EU)

EASA issued following recommendations in SIB No. 2019-09, 17 June 2019

- EASA recommends that all affected operators accomplish a self-test of ELT and PLB as required by the manual of the beacon manufacturer.
- EASA recommends that all affected operators perform an [annual verification of the beacon registration](#).
- EASA recommends all affected TC and STC holders to correct the ICA of the affected products and modifications

Appendix 1: ELT [Annual Test](#) and [Inspection](#)

Test and verification objectives:

The ELT test and inspection should address the following aspects:

- [ELT installation](#) has not degraded (attachment to the aircraft structure, connectors, cables, antennas);
- absence of [battery defect](#) (absence of leak, vent, deformation, trace of heating);
- if the ELT is fitted in or attached to an article intended for floatability: absence of wear, puncture of the article fabrics that may affect the floating capability;
- [g-switch operation](#);
- transmitted [power](#) and [frequencies](#).

ELT tasks (i.e. MRBR or MPD tasks) in aircraft currently registered in Maldives

- ELT tasks in ATR 72-212A MPD Rev 32

#	Task ref.	Description	Threshold Interval	Job reference	Effect.
1	256521-OPT-10000-1	Auto test of ELT in order to avoid excessive battery passivation	6 MO	JIC: 256521-TST-10000	Post 4080
2	256521-OPT-10010-1	Operational test of ELT	5 YE or NR	JIC: 256521-OPT-10000	ALL
3	256521-RAI-10000-1	Removal of ELT for battery discard	NR / VR	CFR JIC: 256521-RAI-10000	ALL

ELT tasks (i.e. MRBR or MPD tasks) in aircraft currently registered in Maldives (cont.)

- ELT tasks in ATR 72-212A MPD Rev 32

#	Task ref.	Description	Threshold Interval	Job reference	Effect.
3	256521-RAI-10005-1	Removal of ELT for functional test (including G-switch) (CFR) NOTE 1: At ELT battery discard during 256521-RAI-10000-1	NR or NOTE 1	CFR JIC: 256521-RAI-10000	Post 4080
4	256521-RAI-10005-2	Removal of ELT for functional test of G-switch (CFR) NOTE : At ELT battery discard during 256521-RAI-10000-1	NR or NOTE	CFR JIC: 256521-RAI-10000	Pre 4080

ELT tasks (i.e. MRBR or MPD tasks) in aircraft currently registered in Maldives

Key points from ATR 72-212A ELT procedures

1. 25-65-21-OPT-10000-002 & 25-65-21-OPT-10000-003 is Operational test of fixed ELT. Caution states the following:
 - *Perform the test during the **first 5 minutes of each hour**; out of this range, the nearest control tower may need to be contacted to clear false alert because **a short burst (1 or 5 second) of real signal transmission on 121.5 mhz is achieved***
 - *During self-test. Never keep switch 2mx in manual position during **more than 50 seconds for a test** as this will **sent a real distress alert** by the aircraft*
- 25-65-21-TST-10000-002 & 25-65-21-TST-10000-003 is auto-test of fixed ELT

ELT tasks (i.e. MRBR or MPD tasks) in aircraft currently registered in Maldives (cont.)

- ELT tasks in [DHC-8-300 MRBR](#)

#	Task no.	Description	Interval	Job reference	Effect.
1	2560/02	Discard of the two frequency ELT battery (Task requires ops test after install)	Expiry date on battery	Q300.MTCM[30].MTCM 2560_02 AMM25-61-05-02	ALL
2	2560/03	Operational check of two frequency ELT with inertia switch (G-switch) (Task requires ops test of ELT)	24 months NOTE 8	Q300.MTCM[30].MTCM 2560_03 AMM25-61-06-02	ALL
3	2560/15	Operational check of two frequency ELT with inertia switch (G-switch) (Task requires ops test of ELT)	24 months	Q300.MTCM[30].MTCM 2560_15	ALL

[Note 8](#): In accordance with vendor recommendations

ELT tasks (i.e. MRBR or MPD tasks) in aircraft currently registered in Maldives (cont.)

Key points from DHC-8-300 ELT AMM procedures

1. [AMM25-61-05-02](#) describes the RAI of ELT unit, ELT antenna & ELT buzzer. It also describes ops test and functional test of ELT
2. Ops test can be done from remote switch in flight compt
3. A warning states “if you operate ELT for more than 47 secs, the ELT will transmit the 3rd signal to satellite”. “Do the test during the given time approved by NAA”
4. Refers to commercially available test sets and attenuator with regard to ELT functional test

ELT tasks (i.e. MRBR or MPD tasks) in aircraft currently registered in Maldives (cont.)

Key points from DHC-8-300 ELT AMM procedures (cont.)

5. There is a functional test of 121.5 MHz signal & 406 MHz signal. 406 MHz test is with SARTSAT Beacon test set Artex P/N 453-0131. The test set is used to confirm registration code.
6. A note states:
 - Do the test in less than the period of the first 5 mins after hour
 - Do the test in not more than 3 audio sweeps of the transmitter
 - If the test exceed the limitations given above, notify the local ATC authorities

ELT tasks (i.e. MRBR or MPD tasks) in aircraft currently registered in Maldives (cont.)

Key points from DHC-8-300 ELT AMM procedures (cont.)

7. A note under Ops test procedure states “The **microprocessor in the ELT unit checks the G-switch**, the 406.025 MHz transmitter for correct RF output, and the battery pack. If the ELT operates correctly, the LED will stay on for approximately one second and then go off. The LED then flashes 5 times and goes off. This shows that the ELT does not receive navigation data, and navigation data is not supplied to the ELT in this Dash 8 aircraft.”

ELT tasks (i.e. MRBR or MPD tasks) in aircraft currently registered in Maldives (cont.)

■ ELT tasks in DHC-8-200 [MRBR](#)

#	Task no.	Description	Interval	Job reference	Effect.
1	2560/02	Discard of the 2 frequency ELT battery (Task requires ops test after install)	Expiry date on battery	Q200.MTCM[28].MTCM 2560_02	ALL
2	2560/03	Operational check of 2 frequency ELT with inertia switch (G-switch) (Task requires ops test of ELT)	24 months NOTE 8	Q200.MTCM[28].MTCM 2560_03	ALL
3	2560/15	Operational check of 3 frequency ELT with inertia switch (G-switch) (Task requires ops test of ELT)	24 months	Q200.MTCM[28].MTCM 2560_15	ALL
4	2560/16	Discard of the 3 frequency ELT battery	Expiry date on battery	Q200.MTCM[28].MTCM 2560_16	ALL

[Note 8](#): In accordance with vendor recommendations

ELT tasks (i.e. MRBR or MPD tasks) in aircraft currently registered in Maldives (cont.)

Key points from DHC-8-200 Artex ELT AMM procedures (appl. to MSN 429)

1. [AMM25-63-03-05](#) describes the procedure for operational & functional tests. It states the following:
 1. *When the ELT transmits emergency signals, the light (LED) flashes continuously and the buzzer gives a distinct sound*
 2. *Make sure that an approved time is given by the NAA*
 3. *The [microprocessor in the ELT unit checks the G-switch](#), the 406.025 MHz transmitter for correct RF output, and the battery pack.*
 4. *Do the [functional test](#) of the ELT unit for the 406 MHz signal (encoded digital message) with [test set Artex P/N 453-0131](#)*
2. Do a [functional test](#) of the ELT for the [121.5 MHz signal](#) as follows
 - *While you monitor the transmission on the VHF audio system, set the ELT remote switch on the FDR/ELT control panel in the flight compartment to the ON and then back to the ARM position [when 3 sweeps of the distress signal \(warble tone\) are heard](#), which takes about 1 second*

ELT tasks (i.e. MRBR or MPD tasks) in aircraft currently registered in Maldives (cont.)

Key points from DHC-8-200 Artex ELT AMM procedures (appl. to MSN 429)

3. A note states:

- *Do the test in less than the period of the first 5 mins after hour*
- *Do the test in **not more than 3 audio sweeps** of the transmitter*
- *If the test exceed the limitations given above, notify the local ATC authorities*

4. AMM25-63-03-00 “**After 47 seconds** of normal ELT operation, the **406.025 MHz** **will be transmitted** to the satellite and is considered to be a **valid distress signal**.”

ELT tasks (i.e. MRBR or MPD tasks) in aircraft currently registered in Maldives

- ELT tasks in A320/1 MRBR Rev 24, Sep 2019

#	MSI ref.	Description	Threshold Interval	MPD Job reference	Effect.
1	25.65.32	BEACON TRANSMITTER - EMERGENCY PORTABLE			
		02 remove survival ELT for in shop operational check	60 MO Note 29	256500-720-802	A/C with portable ELT
		03 remove survival ELT for in shop battery replacement	Note 3 Note 29	256500-920-804	A/C with portable ELT

Note 3: For interval selected for the various Part Numbers, refer to the Appendix 10 of this MRB Report.

For P/N: S1823502-03 it is 72 MO per appx 10

Note 29: Interval to be managed at component level.

ELT tasks (i.e. MRBR or MPD tasks) in aircraft currently registered in Maldives

- ELT tasks in A320/1 MRBR Rev 24, Sep 2019

#	MSI ref.	Description	Threshold Interval	MPD Job reference	Effect.
2	25.65.33	ELT (COCKPIT) 01 Discard transmitter battery and perform operational check of transmitter after battery replacement	Note 3 Note 29	256533-710-001	A/C with ELT in cockpit

Note 3: For interval selected for the various Part Numbers, refer to the Appendix 10 of this MRB Report.
Note 29: Interval to be managed at component level.

ELT tasks (i.e. MRBR or MPD tasks) in aircraft currently registered in Maldives

- ELT tasks in A320/1 MRBR Rev 24, Sep 2019

#	MSI ref.	Description	Threshold Interval	MPD Job reference	Effect.
3	25.65.35	ELT (REAR FUSELAGE)			
		01 operational check of ELT system by manual activation	36 MO	256500-710-001	A/C with fixed ELT
		02 remove ELT for in shop operational check of acceleration sensor NOTE: Credit can be taken for previous accomplishment Of task 25.65.35/03	72 MO	256500-720-004	A/C with fixed ELT

ELT tasks (i.e. MRBR or MPD tasks) in aircraft currently registered in Maldives

- ELT tasks in A320/1 MRBR Rev 24, Sep 2019

#	MSI ref.	Description	Threshold Interval	MPD Job reference	Effect.
3	25.65.35 (Cont.)	ELT (REAR FUSELAGE)			
		03 remove ELT for in shop discard of battery pack of ELT	Note 3 Note 29	256500-920-802	A/C with fixed ELT
		04 General visual inspection of external ELT antenna	36 MO	256500-210-802	A/C with fixed ELT

Note 3: For interval selected for the various Part Numbers, refer to the Appendix 10 of this MRB Report.
For P/N: 95N6088 it is 36 MO per appx 10

Note 29: Interval to be managed at component level.

ELT tasks (i.e. MRBR or MPD tasks) in aircraft currently registered in Maldives

Key points from A320 ELT AMM procedures

1. [25-65-00-710-001-A](#) is Operational Check of ELT System by Manual Activation
2. Caution states “Do not do the ELT test for longer than 150 seconds. If you do, the ELT will send distress signals and rescue operations will start”
3. Note states “You can see and hear the indications and sounds continuously for 100 seconds, then intermittently (on for 1 second - off for 1.5 seconds). After 150 seconds, the ELT transmits real distress signals on 121.5 MHz, 243 MHz and 406 MHz. The 406 MHz transmitter operates at intervals of 50 seconds, but the first 3 transmissions are in unmodulated carrier mode (ignored by the satellite system).”

ELT tasks (i.e. MRBR or MPD tasks) in aircraft currently registered in Maldives

Key points from A320 ELT AMM procedures

4. [25-65-00-720-004-A](#) is to Remove ELT for In Shop Operational Check of Acceleration Sensor
5. Task states “Send the ELT to the workshop for an operational check of the acceleration sensor (G-switch). Refer to the manufacturers CMM for the correct procedure.”

ELT tasks (i.e. MRBR or MPD tasks) in aircraft currently registered in Maldives

- ELT tasks in DHC-6-300 PSM 1-6-7 Insp. Req. Manual Rev 20, Nov 2018

#	MSI ref.	Description	Threshold Interval	Job reference	Effect.
1	7	ELT Condition. Replace or recharge batteries when 50% of battery useful life has expired. Note Refer to date marking on equipment and specific manufacturer's instructions and Local Regulatory Authority approval.			

ELT tasks (i.e. MRBR or MPD tasks) in aircraft currently registered in Maldives

- ELT tasks in DHC-6-300 PSM 1-6-7 Insp. Req. Manual Rev 20, Nov 2018

#	MSI ref.	Description	Threshold Interval	Job reference	Effect.
2	7.a.(1)	ELT (Mod 6/2049) Inspect bonding of the mating surfaces between the ELT backshell and airframe (< 2.5 milliohms). Note HIRF/IEL/DEL inspection. Refer to Inspection Requirements, Page 7, Para 12 for details.			

ELT tasks (i.e. MRBR or MPD tasks) in aircraft currently registered in Maldives

- ELT tasks in DHC-6-300 PSM 1-6-7 Insp. Req. Manual Rev 20, Nov 2018

#	MSI ref.	Description	Threshold Interval	Job reference	Effect.
2	7.a.(2)	ELT (Mod 6/2049) Inspect bonding of the mating surfaces between the ELT antenna and airframe (< 3.0 milliohms). Note HIRF/IEL/DEL inspection. Refer to Inspection Requirements, Page 7, Para 12 for details.			

ELT self-test and annual inspection as given in OEM manual (ACR Electronics, Artex C406-1 series)

About Artex C406-1 ELT

1. The C406-1 is a type AF (Automatic Fixed) ELT, which transmits on 121.5, 243.0, and 406 MHz.
2. The ELT automatically activates during a crash and transmits the standard sweep tone on 121.5 and 243.0 MHz. Approximately every 50 seconds, for up to 520 milliseconds (long message protocol), the 406 MHz transmitter turns on. During that time, an encoded digital message is sent to the COSPAS-SARSAT Search and Rescue (SAR) satellite system
3. The CMM procedure for annual test is [similar](#) for Artex ELT model numbers C406-1, C406-2, C406-N, G406-4, ME406 & 110-406.

ELT self-test and annual inspection as given in OEM manual (ACR Electronics, Artex C406-1 series)

Key points from Artex C406-1 inst, ops n maintenance manual

1. A **monthly functional check** is recommended to verify operational status of the ELT. (refers to SUBTASK 25-62-10-750-01 on page 33.)
2. Describes the USA and Canada requirements. US and Canada requires annual tests
3. Under the heading “**other countries**” it states “In the absence of any inspection requirements from national regulatory authorities, operators should **follow the annual inspection procedures** outlined in Inspection and Test Regulatory Requirements, subsection United States”

ELT self-test and annual inspection as given in OEM manual (ACR Electronics, Artex C406-1 series)

Key points from Artex C406-1 inst, ops n maintenance manual

4. Inspection and Test Procedures. The annual ELT inspection and test checklist given in page 26.
5. **G-Switch Functional Check** – Item 4a. CAUTION: A **jumper** and **50-ohm load is required** to perform this check. Due to potential of physical or electronic damage if the jumper or 50-ohm load is improperly installed, this step should be only performed by an experienced technician/mechanic
6. Activate the ELT by using a **rapid forward (i.e., throwing) motion** in the direction of the arrow on the ELT label, followed by a rapid reversing action

ELT self-test and annual inspection as given in OEM manual (ACR Electronics, Artex ELT 1000 & 4000)

Key points from manuals of Artex ELT 1000 & ELT 4000

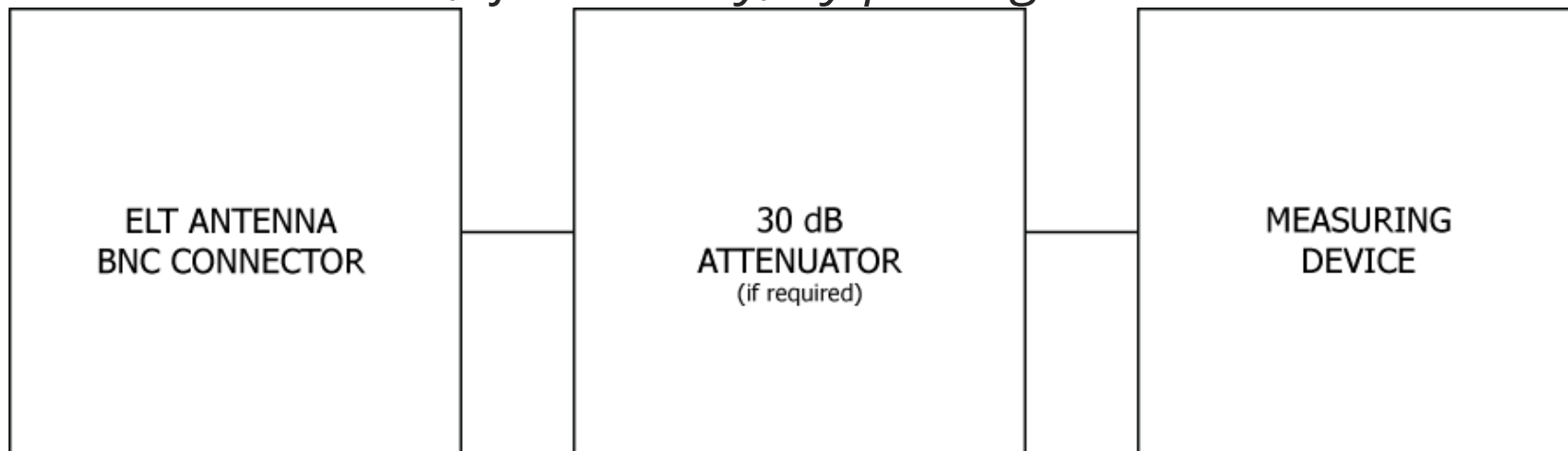
1. ELT 4000 Battery system requires no TSO certification, while lithium battery packs used on the ARTEX ELT 1000 are certified under TSO C142a
2. G-Switch Functional Check:
 1. *Install the 500-0079 G-switch Loop Test Connector Fixture on the ELT receptacle or jumper ELT receptacle pins 5 and 12*
 2. *Activate the ELT by using a rapid forward (i.e., throwing) motion in the direction of the arrow on the ELT label, followed by a rapid reversing action*

ELT self-test and annual inspection as given in OEM manual (ACR Electronics, Artex ELT 1000 & 4000)-Cont.

Key points from manuals of Artex ELT 1000 & 4000

1. 406 MHz frequency measurement:

- 1. Connect the measuring device, as specified in Figure 6 Performance Test Setup on page 27.*
- 2. Activate the ELT, if necessary, by placing the control switch in the ON position.*

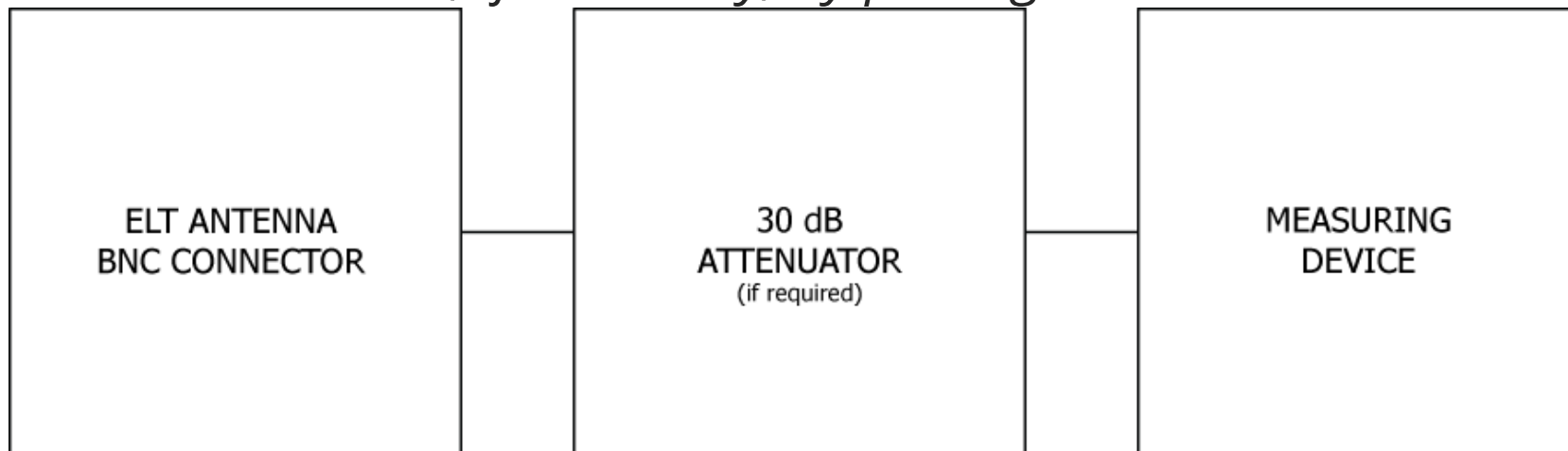


ELT self-test and annual inspection as given in OEM manual (ACR Electronics, Artex ELT 1000 & 4000)-Cont.

Key points from manuals of Artex ELT 1000 & 4000

1. 406 MHz power output measurement:

- 1. Connect the measuring device, as specified in Figure 6 Performance Test Setup on page 27.*
- 2. Activate the ELT, if necessary, by placing the control switch in the ON position.*



ELT self-test and annual inspection as given in OEM manual (Orolia Kannad ELT)

Key points from SL S18XX50X-25-02 of Orolia Kannad ELT

- PERIODIC INSPECTION
- The only check required by the manufacturer is the periodic self-test as described in the Installation/Operation manual.
- However, a periodic inspection may be required by your national authorities: in this case refer to Service Letter "SL [S18XX502-25-12](#) Periodic Inspection" (for standard ELTs) or Service Letter "SL S1840501-25-05 Periodic Inspection" (for COMPACT ELTs and INTEGRA ELTs).

ELT self-test and annual inspection as given in OEM manual (Orolia Kannad ELT)-Cont.

Key points from SL S18XX502-25-12 of Orolia Kannad ELT

- PERIODIC INSPECTION
- Testing the various elements of KANNAD ELTs is mandatory at each battery replacement (approximately **6 years interval**). The **only periodic check** required by Orolia S.A.S. is the **monthly self-test** as described in the Installation/Operation manual. However, some Civil Aviation Authorities may require the ELT be tested periodically.
- TOOLS
 - 50 Ohm BNC Load, 1 Watt
 - COSPAS-SARSAT Decoder
 - Frequency meter
 - Wattmeter

ELT self-test and annual inspection as given in OEM manual (Orolia Kannad ELT)-Cont.

Key points from SL S18XX502-25-12 of Orolia Kannad ELT

- **Operation of controls and crash sensor for automatic ELTs**
- NOTE: Not applicable to ELT of S type which are not fitted with automatic shocks sensor (G-Switch).
- **IMPORTANT: Do not operate for more than 50 seconds.**
- (a) Connect a 50 Ohm load to the «ANT» receptacle.
- (b) Switch to ARM and wait for the end of the self-test.

ELT self-test and annual inspection as given in OEM manual (Orolia Kannad ELT)-Cont.

Key points from SL S18XX502-25-12 of Orolia Kannad ELT (Cont.)

- **Operation of controls and crash sensor for automatic ELTs**
- (c) Check operation of the crash sensor:
 - - For KANNAD 406 AP and AF and KANNAD 406 ATP, cause abrupt move of the ELT towards the front (refer to flight direction arrows on upper label of ELT).
 - - For KANNAD 406 AP-H and AF-H, cause abrupt move of the ELT towards the front with the ELT having a 45-degree upward tilt.
 - - For KANNAD 406 AF (6D), cause abrupt move of the ELT for each of the six directions (towards the front, downwards, upwards, towards the rear, the left and the right).
- (d) Make sure that the ELT operates (aural and visual indicator activated).
- (e) Switch the ELT to OFF.
- (f) Disconnect the 50 Ohm Load.

ELT self-test and annual inspection as given in OEM manual (Orolia Kannad ELT)-Cont.

Key points from SL S18XX502-25-12 of Orolia Kannad ELT

Presence of a Sufficient Signal Radiated from its Antenna

406 MHz transmission test (optional on FAR91.207)

- Although this test is optional according to FAR 91.207, Orolia S.A.S. recommends performing this test if possible.
 - This test must be carried out with a COSPAS-SARSAT decoder.
 - When performed a few meters away from the ELT antenna, this test also validates the antenna radiation.
- (a) Perform a self-test.
- (b) Check the 15HEXID displayed by the COSPAS SARSAT tester. It must be identical to the programmed 15HEXID.

Information on beacon coding

- Your beacon's 15 character Hex ID uniquely identifies your 406 MHz beacon and is encoded in the message your beacon transmits to search and rescue services if your beacon is activated.
- The complete beacon identification code includes the: **protocol flag, protocol code, country code, and other identification data**
- Identification data is encoded together with the **country code** and other information in the beacon message in binary format. The beacon 15 Hex ID is derived from a 406 MHz message by presenting every 4 bits of a beacon message, starting from bit 26 to bit 85, as a hexadecimal character
- The country code is part of every beacon identification data. This code is the [3-digit decimal number](#) allocated to each country/territory by the International Telecommunication Union (ITU)
- The **country code is encoded in binary notation in bits 27 to 36** of the message. The country code indicates the administration maintaining the beacon registration data base.
- **the country code should always match the flag of the vessel or aircraft.**

Information on beacon coding (Cont.)

- Every shop/AMO that codes ELT or PLB will provide the 15 Hex code. This Hex code can be decoded at COSPAS-SARSAT website <https://www.cospas-sarsat.int/en/beacon-decode-program>
- How do I check my beacon is correctly coded? ([A video by COSPAS SARSAT](#))

Information on beacon coding (Cont.)

- The specification of the distress signal characteristics (Cospas-Sarsat document C/S T.001), which ensures that all 406 MHz beacons are compatible with the Cospas-Sarsat Space Segment, is applicable to all types of beacons. However, different user groups have different needs; hence the need for various coding protocols. To satisfy these requirements, the Cospas-Sarsat specification provides for various coding options which are divided in two groups of coding protocols:
 - User Protocols; and
 - Location Protocols.
- The user protocols can be used for encoding the beacon identification and other data in the digital message transmitted by a 406 MHz distress beacon, but do not allow for encoding beacon position data.
- User protocol options are shown on next slide

Information on beacon coding (Cont.)

- First table is taken from rationale document, 2nd table is what is included in the proposed rule. In affect, both shows that owners/operators can choose [any protocol](#) from the four options under user protocol group

Figure 1 List of Available Coding Options for User Protocols

Application	Identification data	Protocols
ELT	Unique ELT Serial Number*	Serial User
	Aircraft Operator Designator & Serial Number*	Serial User
	Aircraft 24-bit Address	Serial User
	Aircraft Registration Marking	Aviation user
PLB	Unique PLB Serial Number*	Serial User

Table 1A: ELT Coding Methods – User Protocols

These protocols provide identification data only

Serial User			Aviation User
ELT with Serial Number	Aircraft Operator Designator and Serial Number	Aircraft 24-bit Address	Aircraft Nationality and Registration Marking

Information on beacon coding (Cont.)

(Table given in the rationale document of NRM)

Figure 2 List of Available Coding Options for Location Protocols

Application	Identification data	Location data	Protocols
ELT	Unique ELT Serial Number*	<u>4 minute</u> resolution encoded in PDF-2	User-location
		position offset to 4 second resolution encoded in PDF-2 in addition to <u>15 minute</u> resolution encoded in PDF-1	Standard Location
	Aircraft Operator Designator & Serial Number*	<u>4 minute</u> resolution encoded in PDF-2	User-location
		position offset to 4 second resolution encoded in PDF-2 in addition to <u>15 minute</u> resolution encoded in PDF-1	Standard Location
	Aircraft 24-bit Address	<u>4 minute</u> resolution encoded in PDF-2	User-location
		position offset to 4 second resolution encoded in PDF-2 in addition to <u>15 minute</u> resolution encoded in PDF-1	Standard Location
PLB	Aircraft Registration Marking	<u>4 minute</u> resolution encoded in PDF-2	User-location
	Serial number assigned by Administration	position offset to 4 second resolution encoded in PDF-2 in addition to <u>2 minute</u> resolution encoded in PDF-1	National Location
	Unique PLB Serial Number*	<u>4 minute</u> resolution encoded in PDF-2	User-location
PLB	Serial Number* Assigned by Administration	position offset to 4 second resolution encoded in PDF-2 in addition to <u>15 minute</u> resolution encoded in PDF-1	Standard Location
		position offset to 4 second resolution encoded in PDF-2 in addition to <u>2 minute</u> resolution encoded in PDF-1	National Location

Information on beacon coding (Cont.)

- Location group protocols from the proposed rule

Table 1B: ELT Coding Methods – Location Protocols

These protocols provide location data in addition to identification data

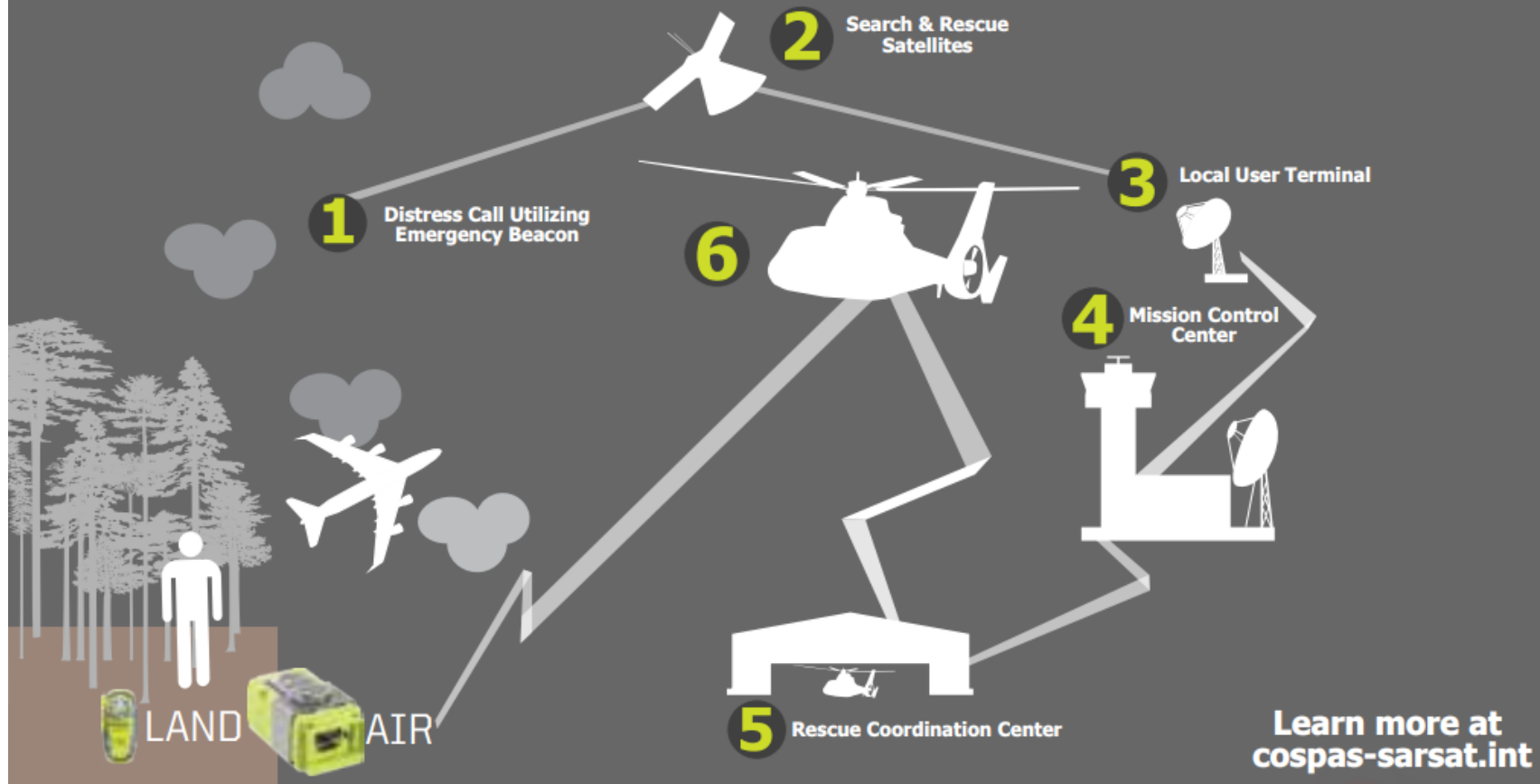
User Location				Standard Location		
ELT with Serial Number	Aircraft Operator Designator and Serial Number	Aircraft 24-bit Address	Aircraft Nationality and Registration Marking	ELT with Serial Number	Aircraft Operator Designator and Serial Number	Aircraft 24-bit Address

- Important:** Aviation-use PLBs must be coded as an ELT.

COSPAS SARSAT overview

The Cospas-Sarsat Search & Rescue System

Cospas-Sarsat System Overview



COSPAS SARSAT overview

1. Distressed pilot activates beacon (ELT, PLB).
2. Beacon transmits a 406 MHz emergency message containing your Unique Identifier Number (UIN) to the LEOSAR (polar orbiting) and GEOSAR* (geostationary) satellite systems.
3. The satellites relay the 406 MHz emergency message to a ground station called the Local User Terminal (LUT). The LUT calculates the location of the signal by measuring the Doppler shift caused by the relative movement between the satellite and the beacon and forwards the location to the Mission Control Center (MCC).
4. The MCC continues to receive information from additional satellite passes and further refines the beacon position (2.6 m search radius). An alert message is generated that is combined with the registration information from the database and is forwarded to the appropriate Rescue Coordination Center (RCC).

COSPAS SARSAT overview

5. The RCC makes contact with the persons listed in the database to verify the existence of an emergency and gathers additional information about the beacon users. The RCC will dispatch the closest, capable Search and Rescue (SAR) forces.

6. Local SAR forces launch a rescue mission and if the beacon is not GPS enabled, use the 121.5 MHz homing signal to pinpoint the beacon.

* On average, worldwide, this notification (steps 2 through 5) takes **one hour**. For self-locating beacons that provide GPS position data in their first transmissions, the search radius is reduced to 100 m and the notification can take as little as **three minutes**. (Data provided by Cospas-Sarsat.)

Typical videos on ELT testing and inspection

1. [Annual testing of 406 MHz ELT](#)
2. [Annual testing of ELT by ELT Tester i406 Mini Wi-Fi](#)
3. [Musson Electronics Inc: ELT Test Equipment](#)

Always check with your aircraft TC holder or ELT manufacture on acceptable testing and inspection methods !

Comments to NPRM 2020-05

Comment#1 (IASL): The proposal is **not** acceptable but would be acceptable if the following changes were made:

1. 1. Para 11, Annual Testing and Inspection: Self-test is required to be carried out, at every 6 months (Para 11, Self-Test), as per manufacture instructions ensuring serviceability, thus a need for carrying out an annual test of transmitted power and frequency is not recognized.
2. Further there is no manufacturer requirement to check g-switch operation and carrying out these checks in-house will be very difficult. Hence instead of the annual test and inspection given in this Para, we propose to change it to a detailed visual inspection of the ELT.

Comments to NPRM 2020-05 (cont.)

Comment#2 (IASL): The proposal is **not** acceptable but would be acceptable if the following changes were made:

3. 2. Para 13, Beacon registration: As per Para 13(a) all ELTs and aviation-use PLBs, even if not fitted to an aircraft are required to be registered, The stored ELTs are not coded to specific aircraft and as per the [CAA Form ELT](#), aircraft specific data is required as well .
4. Hence we propose to change the Para as follows:
 - *Register with operator details excluding Aircraft Data for stored ELT/PLB; or*
 - *Keep the stored ELT/PLB in a shielded room or a shielded bag.*

Comments to NPRM 2020-05 (cont.)

Comment#3 (IASL): The proposal is **not** acceptable but would be acceptable if the following changes were made:

5. 3. Para 16, effectivity:

- IASL ELTs are coded to include the country code of Maldives and requires more time to check if the transmitted message meets any of the coding options given in the NPRM.
- IASL PLBs transmitted message needs to be checked to see if it meets any of the coding options given in the NPRM.
- IASL currently does not have in-house capability to do coding.
- IASL needs more time to properly check and if required re-code the beacons. This cannot be achieved before 10 January 2021, especially due to the impact of Covid-19. Hence we propose to change effective date for point (c) to 31 Dec 2021.

Comments to NPRM 2020-05 (cont.)

Comment#4 (Villa Air): The proposal is **not** acceptable but would be acceptable if the following changes were made:

1. Para 10 states “Live testing of the 406 MHz transmission is not permitted at any time.”
 - Villa Air propose to remove the above statement. Currently live testing allowed by manufacturer and live testing for less than 50 seconds will not be considered a distress signal. Hence, Villa Air proposes to allow live testing with strict time frame rather than utilizing option 2 (ii)

Comments to NPRM 2020-05 (cont.)

Comment#5 (Villa Air): The proposal is **not** acceptable but would be acceptable if the following changes were made:

2. Para 11 is about annual testing and inspection.
 - Villa Air propose to change the interval. All ELTs currently installed on Villa Air aircraft fleet has a manufacturer specified interval of 5 years for the above mentioned tasks (MRBR: 256500-10). We have had not a failed ELT during these checks, hence suggest to keep this in manufacturer specified interval rather than annual.

Comments to NPRM 2020-05 (cont.)

Comment#6 (Villa Air): The proposal is **not** acceptable but would be acceptable if the following changes were made:

3. Para 14 is about beacon coding.

- Unclear of the coding protocol specified. Villa Air proposes the following method in coding and being specified in rule:
- Coding method User protocol with ELT serial number and Aircraft Operator Designator ONLY (Will be in compliance with ICAO Annex 10, Volume III). Notification will be sent to CAA as to what SN ELT installed on which registration. This should also apply to those ELT in stock and informed to CAA that these are kept in stock.

CAA response to comments on NPRM 2020-05

CRD - ASC M-3 Issue 1 (NPRM 2020-05)

Any input from participants

- Any input from air operators?

Conclusion

- Conclusion
 - Thank you for your attendance