



Federal Aviation Administration

Memorandum

Date: July 16, 2018

From: James Allison
Aviation Safety Engineer, Systems & Equipment Branch, Los Angeles Aircraft
Certification Office (LAACO), AIR-793

To: Mr. Timothy Monville
Senior Air Safety Investigator, National Transportation Safety Board (NTSB)

Prepared by: James Allison

Subject: Teardown investigation of an Ameri-King AK-450-[] series Emergency Locator
Transmitter (ELT) sent from the National Transportation Safety Board (NTSB).
(Refer to NTSB ERA17FA231)

Summary

The National Transportation Safety Board (NTSB) requested the Los Angeles Aircraft Certification Office (LAACO) to support a teardown inspection and testing of an Ameri-King AK-450 series Emergency Locator Transmitter (ELT). On June 6, 2018 a team from the FAA Los Angeles Aircraft Certification Office (LA ACO) comprised of Louise Wu (MIDO Senior Inspector), Eric Igama (ASE) and James Allison (ASE) traveled to Ameri-King in Huntington Beach to observe and report on the teardown investigation.

The LAACO brought the sealed ELT container received from the NTSB to the Ameri-King facility; it was opened onsite by Ameri-King personnel. Ameri-King AK-450 series ELT with serial number 486244 was recorded. General appearance of the unit was observed as good, intact.

The following tests were conducted on the Ameri-King AK-450 series ELT per Ameri-King TDI-450 Rev NC , Tear Down Instruction , dated 5/31/18 (see Appendix A).

All tests were completed and the results were observed as follows:

- The Transmitter Functional Test swept tone signal was not audible.
- The Periodic Maintenance Test swept tone signal was not audible (Functional and G-Switch) included in the Periodic Maintenance Test.
- The Acceptance Test Procedure (ATP) was also performed by Ameri-King consisting of a Beacon Test; an automated test run via a Dell Axim X-50 Personal Digital Assistant (PDA). The tester was a WS Technologies Inc., model BT100AV Series ELT Tester. The signal was at a very low power and was performed 3 time with the measurements for the signal power level varying between 0.4dmb and 0.8dbm/
- The last test performed was measurement of the voltage of the "D" cell batteries that power the ELT main unit. The six Duracell "D" cell "copper top" batteries were removed intact from the ELT main unit. Note: "D" cell battery voltage is 1.5 V. The voltage of each battery was measured using a BK Precision Model 2703C Digital Multi-meter. The voltage for each battery was as follows:

Battery	Voltage (V)
1	1.36
2	1.36
3	1.36
4	1.36
5	1.36
6	1.36
AVG	1.36

The following day, new batteries were inserted to check the transmitted power level. When the ELT was activated using the on position on the on/off/arm switch on the ELT, the automated test run via a Dell Axim X-50 Personal Digital Assistant (PDA) failed to detect any signal until the BNC antenna connector on the ELT was wiggled / tightened until a signal was detected. There are no known recorded issues of a design or manufacturing defect that would be related to the loose antenna connection. This may have been because of the re-soldering of the connection during the reassembly after the teardown the day before as this was not an issue during the testing the day before. The output was almost non-existent this time at -15.6dbm. We tried it again and again the antenna connect had to be wiggled to get a signal again which resulted in a power level similar to what we had seen the day before at 0.7 dbm. We noticed on the Bearcat receiver that we could hear a very slight tone that faded a lot after initial activation using the on position on the on/off/arm switch on the ELT. We turned the volume up to a high level and were able to hear the tone. This may have been missed the first day as the volume was not turned up to as high a volume level.

Detailed Log of Events

The following FAA personnel observed the testing at the Ameri-King facility starting at 10:30 am on 6/6/2018:

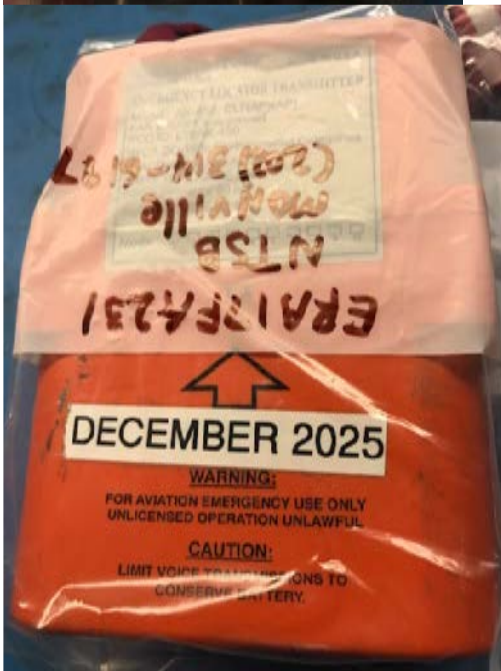
Eric Igama, Aviation Safety Engineer, LA ACO, AIR-793

Louise Wu, Senior Aviation Safety Inspector, Los Angeles/Van Nuys MIDO Section, AIR-873

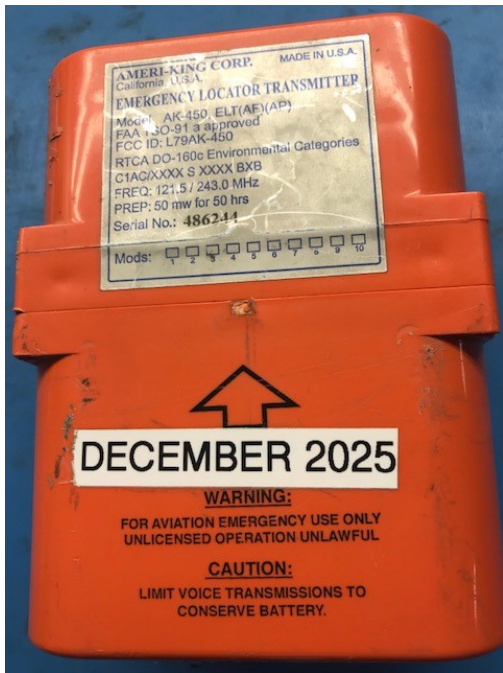
James Allison, Aviation Safety Engineer, LA ACO, AIR-793

Keith Van (Ameri-King owner) who conducted the tests greeted us. We started by unpackaged the ELT unit shown in the pictures below.





An external inspection of the unit was performed and the serial number “486244” was confirmed. Other than scuffmarks and some scratches on the side shown below, no dents, holes, cracks, or penetrating damage was seen.



During the functional testing handheld Bearcat receiver was used to monitor the 121.5 MHz frequency.



No remote switch was included in the packaging with the unit so a new switch and wire were used for the functional test and connected to the unit. The unit was switched to the ARM position (switch down) and the remote was used to turn on the unit for self-test. The LED light on the remote lit up as expected as did the LED on the unit to indicate it was active. Although the unit indicated it was active, no tone was heard on the Bearcat receiver. The reset button on the remote was selected and the unit turned off (LED turned off) as expected. A separate unit at the manufacturers facility was activated by shaking to verify that the tone could be heard using the receiver and it was heard. The test on the unit in question was repeated multiple times with the same result. It was noted that when the unit indicated that it was active (LED light on the ELT was lighted), the static on the Bearcat receiver went away.



The battery pack on the unit was then opened up for an inspection of the batteries. The battery compartment appeared clean and dry. Some of the batteries had dents but not such that it affected their operation. The batteries were all Duracell “D” batteries with a stamped date of December 2025.







US CALIBRATION
Calibration Management Audit Report

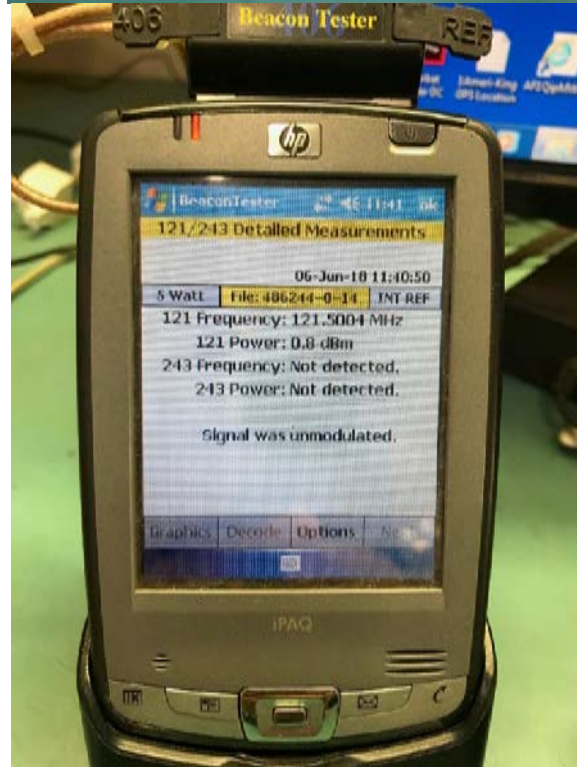
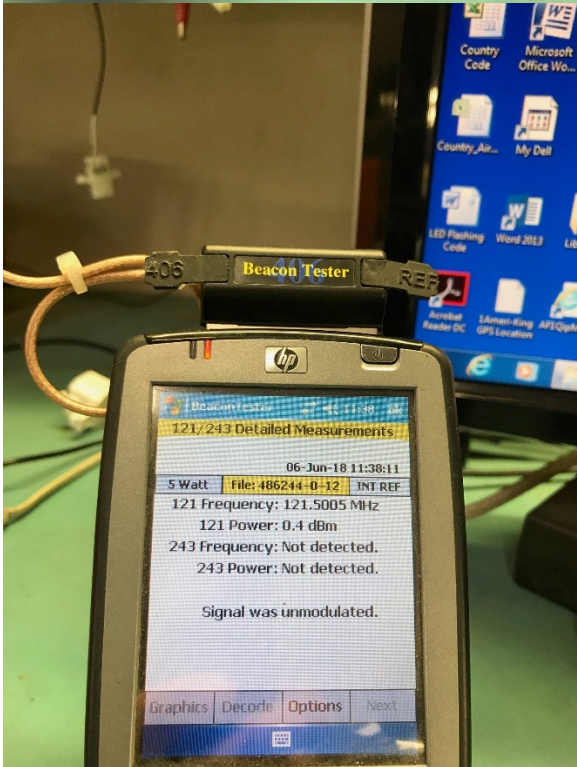
17922 Sky Park Circle Suite 400
Irvine, Ca 92614
Phone: (949) 724-9474 Fax: (949) 724-9473

Certificate of Calibration

Customer: Amari-Sing 17801 Surfer's Loop Huntington Beach, CA 92647 Contact: Keith Van Phone: 714-343-3555		Service Request #: SR-C-001097 Status: Firmed Job No: JAA35045 Customer PO #: 431609 Calibration Dates: 06/05/2018 Next Cal Due: 06/05/2019	
Device Under Test	Manufacturer: BK Precision	Model: 2703C	Serial #: 131A17202
	Description: MULTIMETER	ID #: NONE VISIBLE	
Device Conditions	As Received: In Tolerance	As Returned: In Tolerance	Adjusted: No Limited Use?: No
Environmental Conditions	Field Calibration?: No	Temperature: 20°C	Relative Humidity: 40%
Comments: None			
Facility:		Area:	Position:
Tolerance: Manufacturer Specifications			
Sample Data Points			
Description	Normal	As Found	As Left
DC Voltage	10.00 VDC	10.00 VDC	10.00 VDC
AC Voltage @ 60 Hz	100.0 VAC	100.0 VAC	100.0 VAC
Resistance	10.00 kΩ	10.00 kΩ	10.00 kΩ
DC Current	100.0 mA DC	99.4 mA DC	99.4 mA DC
	2.00 ADC	2.00 ADC	2.00 ADC
* Denotes out of tolerance measurement data.			
Standard Used			
Manufacturer	Model	Description	Next Cal Due
Fluke	750DA-6	Calibrator	06/15/2019
Procedure Used:	G-0010	Multimeters	Revision: 1-01-04

The voltage of each of the battery cells was measured at 1.36 volts, indicating some amount of discharge from the expected 1.5 volts.

The battery pack was reinstalled and the G-Switch activation was tested. An abrupt and forceful shake was performed multiple times but the unit never activated. The manufacturer did not know why the G-Switch did not activate and did not have the capability to determine the cause. The same action was performed with a different unit on hand and it activated as expected. The unit was then tested using a spectrum analyzer attached to the antenna. The test software was executed on a HP PDA. Multiple runs were conducted. The power output varied from 0.4 dBm to 0.8 dBm with the expected to be 17.4 dBm.

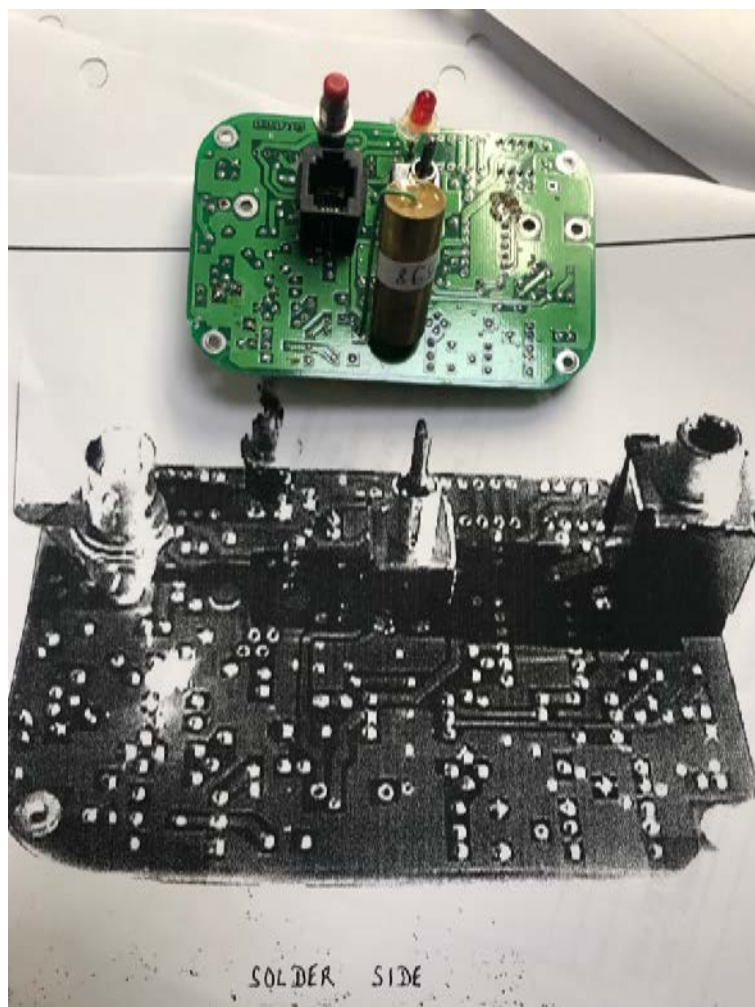


Next, the unit was disassembled and the circuit card was removed. No visible obvious damage was observed on the circuit card and all electronic components appeared to be adequately secured on its board. The wires on the connection to the battery pack did not look like the solder was well bonded to the pins for the battery connectors but a continuity test was performed from the circuit board connection to the battery pack side and it was a very good low resistance connection (0.001 ohm).

The plastic casing securing the circuit board appeared to be clean and dry with no obvious signs of damage.



It was noted that the circuit board did not match the photo with the approved drawings indicating it was not the approved design.

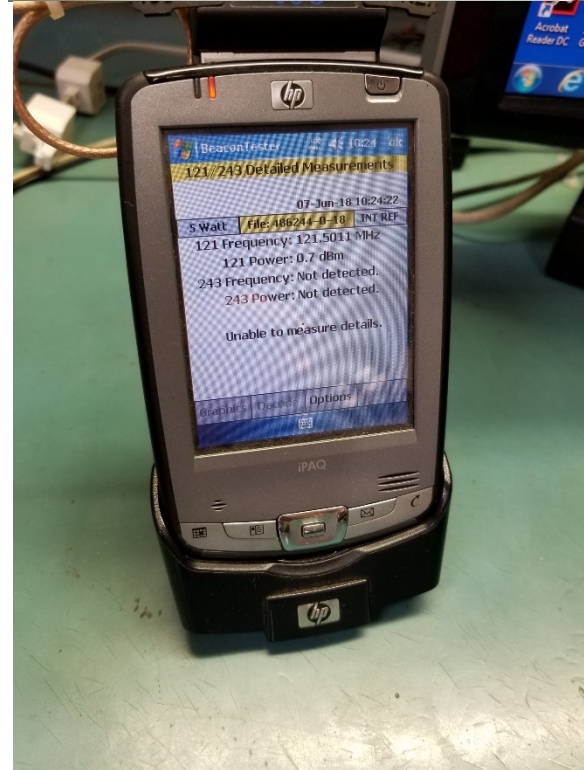
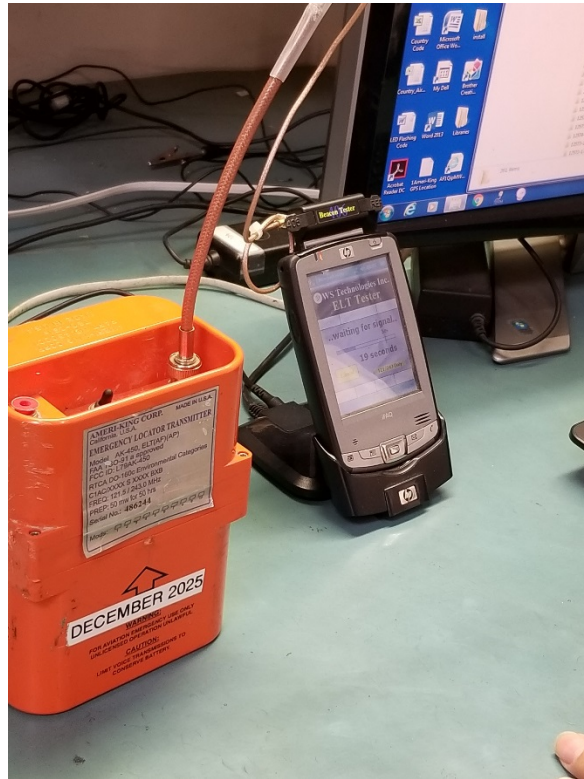


We concluded the testing for the day about 1pm.

After we left, we were contacted by the supplier who requested that we return for some additional testing on the batteries and to try new batteries to see if that had any effect on the operation of the unit.

We returned the following day at 10am. The voltage of the battery pack as a unit was measured at 8.20 volts. The batteries were replaced with new batteries and the battery pack was reinstalled. The unit was activated using the on position on the on/off/arm switch on the ELT again with the test unit connected to the BNC antenna connection on the ELT. When the ELT was activated using the on position on the on/off/arm switch on the ELT, the automated test run via a Dell Axim X-50 Personal Digital Assistant (PDA) failed to detect any signal until Mr. Van wiggled / tightened the antenna connector to the BNC connector on the ELT until a signal was detected. There are no known recorded issues of a design or manufacturing defect that would be related to the loose antenna connection. This may have been because of the reassembly and re-soldering of the connector after the teardown the day before as this was not an issue during the prior testing. The measured power level was almost non-existent this time at -15.6dbm. We repeated the test and the antenna connector again had to be wiggled to get a signal, resulted in a power level similar to what we had seen the day before at 0.7 dbm. We noticed on the Bearcat receiver that we could hear a very slight tone that faded a lot after initial activation. We turned the volume up to a high level and were able

to hear the tone. The silence on the receiver we heard the day before may have been that the unit was transmitting the tone but the receiver was not turned up to a sufficient level to hear. The original batteries were reinstalled in the unit and the testing was concluded and the unit was re-packaged.



APPENDIX A

Ameri-King Tear Down Instruction



AMERI-KING CORP.

Phone [REDACTED]

Huntington Beach, [REDACTED]

Fax [REDACTED]

Keith Van [REDACTED]

May 25 (13 days ago) Reply

to james.allison

Dear Mr Allison

Thank you for your confirmation ELT Serial number # 486244. This ELT was manufactured more than 7 years ago, therefore its Manufacturer Traveler sheet and its manufactured test data is not available.

1. Please advise if the ELT Unit # 486244 is broadcasting now ?? assuming all 6 Battery cells are still good.

2. Attached please find Document IM-450, Rev A, Installation and Operation Manual Emergency Locator Transmitter, Model AK-450.

3. Tear Down Procedures:

3.1 Conduct Transmitter Functional Test per Manual call out in Document IM-450, Rev A, Para 3.3

3.2 Conduct IM-450, Rev A, Paragraph 3.4 Periodic Maintenance (Ref FAR Part 91.52, Part 91.169, Part 43 Appendix D(i), call out in Document IM-450, Rev A, Para 3.3 .

3.3 Tear down Instructions, per TDI-450, Rev NC.

Dis-assembling the ELT per Manufacturer Drawings 450000 NC, 450 001 NC, 450002 NC, 450003 NC, 4500012 NC.

Visual Inspect all electrical discrete components, i.e. Resistors, Capacitors, Inductors, Transistors, Diodes, Switches, Connectors.

Verify No broken leads..

Verify No damage components

Verify they all soldered are intact on the PCB.

Verify all 6 Battery Cell Voltage, 1.5 Vdc.

Please confirm if the above Tear down Instructions are adequate ??

Thank you.

Keith Van for Ameri-King Corp.

Ameri-King Corp.

[REDACTED] Huntington Beach, CA [REDACTED]

Tel [REDACTED]

Fax [REDACTED]

Attachments area



AMERI-KING CORP.

Huntington Beach, CA

Phone

Fax

Document No.: TDI-450 Rev NC , Tear Down Instruction , dated 5/31/18

Model: AK-450

Serial No.: 486 244

Test Location: Ameri-King Corp., 17881 Sampson Lane Huntington Beach, CA 92648

Test date: 6/6/18

Tear down by: [REDACTED] Cam Xuan (Ameri-King Corp) date: 6/6/18

Inspected by: [REDACTED] Keith Van (Ameri-King Corp) date: 6/6/18

Witness by: [REDACTED] Louise Wu (LAMIDO) date: 6/6/18

Witness by: [REDACTED] James Allison (LAACO) date: 6/6/18

Witness by: [REDACTED] Eric Igama (NPSB) date: 6/6/18

(LAACO) kv.

DOCUMENT PARA.	DESCRIPTION	TESTING / INSPECTION REQUIREMENT	PASS	FAIL	COMMENT
	General Appearance	Attach Picture 1, ELT S/N 486 244 (See Attachment 1)	✓		
IM-450, Rev A, Para 3.3	Transmitter Functional Test	Conduct Test per IM-450, Rev A, Para 3.3 Verify No Anomalies.		✓	No audible 12.5 MHz tone
IM-450, Rev A, Para 3.4	Periodic Maintenance	Conduct Test per IM-450, Rev A, Para 3.4 Verify No Anomalies.		✓	STEP 7 FAILS
DWG 450 000 NC	Final Assembly	Visual Verify all Sub Assys installed per Drawing 450 000 NC Verify No Anomalies.	✓		
DWG 450 001 NC	Sub Assembly, Front Panel	Visual Verify all Components installed per Drawing 450 001 NC Verify No Anomalies.	✓		
DWG 450 002 NC	Sub Assembly, Battery Separator	Visual Verify all Components installed per Drawing 450 002 NC Verify No Anomalies.	✓		0.001 SL FOR EACH BATTERY LEAD (RED & GREEN LEADS)



AMERI-KING CORP.

Huntington Beach, CA

Phone

Fax

DWG 450 003 NC	Sub Assembly, Battery Case	Visual Inspect all Components installed per Drawing 450 003 NC Verify all 6 Battery Cell Voltage, 1.5 Vdc + 0.0/-0.2 Vdc Verify No Anomalies.	✓ 1.36v 1.36v 1.36v 1.36v 1.36v 1.36v		
DWG 450 0012 NC	Main PCB Assembly.	Visual Inspect all electrical discrete components, i.e. Resistors, Capacitors, Inductors, Transistors, Diodes, Switches, Connectors, installed per Manufactured Drawing 450 0012 NC. Verify No broken leads.. Verify No damage components Verify they all soldered are intacted on the PCB. Verify No Anomalies.	✓ ✓ ✓ ✓		

ADDITIONAL COMMENTS:

- OUT OF BOX BATTERY (EXPIRE) MARKED) DECEMBER 2025
- NO REMOTE UNIT ENQUIRING RECEIVED
- NO MOUNTING TRAY RECEIVED
- NO REMOTE COAX CABLE, NO REMOTE UNIT RECEIVED
- CEN BATTERIES (6 PIECES) MARKED) DEC 2025 (FROM DURACELL)
- "REPLACE MAIN BATTERIES BY DATE LABEL" IS BLANK (NO MARKING)
- PARA 3.4. STEP 7 : TRANSMITS BUT NO AUDIO SIGNAL HEARD.
SHOWS (0.4-0.8)dbm ONLY.



AMERI-KING CORP.

Huntington Beach, CA

Phone

Fax

ADDITIONAL COMMENTS:

- 6 BATTERY cels NO LOAD : 8.20 Vdc
- 6 BATTERY cels WITH LOAD : 7.87 Vdc
- ELT TRANSMITTERS : (0.7 — 1.0) dbm

Hi Eric,

Here is the response to the questions and the updated memorandum.

1. On page 2 of the memorandum, it indicates that when new batteries were installed and the unit was activated no signal was detected until the antenna connector was wiggled/tightened. I need to confirm what antenna connector they are referring to and what was wiggled/tightened. Was it the test antenna connection or the antenna fitting of the ELT. I would like to have that clarified in the Memorandum
[It was the connection to the antenna fitting on the ELT](#)
2. Was the loose antenna related to a design or manufacturing defect? Is that a known issue?
[There is no known design or manufacturing defect that would be related to the loose antenna connection, not a known issue.](#)
3. Why didn't the unit activate when the G-switch was activated. The reason needs to be spelled out in the Memorandum
[The manufacturer had no idea about why the unit did not activate, whether it was a defective G-switch or bad connection or something else and had no capability to determine the cause.](#)
4. Page 11 references a resistance value for the circuit board power connection as 0.0001 Ohms. If they could add what the specification is here that would help
[The manufacturer had no specification that defined acceptable resistance for the circuit board power connection.](#)
5. On Page 12 it indicates that the circuit board did not match the photo with the approved drawings. Was it an unapproved part?
[The circuit board did not match the approved drawing so as it was observed it was not approved.](#)
6. On Page 13 I need to have the notes clarify where the antenna was connected. Was it to the BNC fitting of the ELT?
[The antenna was connected to the BNC antenna connection on the ELT](#)
7. Page 13 references a re-soldering of the antenna connector the day before. I did not see that in any of the previous pages of the Memorandum and need that added in the appropriate location of the Memorandum
[Updated page 2 to match page 13.](#)

The memorandum has been updated per the questions above, see attached.

[REDACTED]

Aviation Safety
Aerospace Engineer (Systems), Systems & Equipment Branch (AIR-793)
Los Angeles Aircraft Certification Office, Federal Aviation Administration

Email: [REDACTED]