



Taking the
"SEARCH" Out of
Search and
Rescue

Federal Communications Commission
Experimental Radio Service
P.O. Box 358320
Pittsburgh, PA 15251-5320

Exhibit No. 1

The "Exhibit Information" section of the electronic FCC Form 442 asks for a narrative statement describing in detail the following:

- a. The complete program of research and experimentation proposed including description of equipment and theory of operation.
- b. The specific objectives sought to be accomplished.
- c. How the program of experimentation has a reasonable promise of contribution to the development, extension, expansion, or utilization of the Radio art, or is along lines not already investigated.

The FCC request for the above information (a, b, and c) is oriented toward the normal usage of an Experimental License and is not applicable toward the type of usage Artex desires. As per 47CFR5.202(g) stations operating in the Experimental Radio Service will be permitted to conduct operation in the testing of equipment in connection with production or type approval of such equipment.

Artex Aircraft Supplies requests an Experimental License to conduct qualification testing of Emergency Locator Transmitters and Antennas as required by the FAA (RTCA DO-183, Paragraph 2.4.2.2) and FCC 47CFR87.199(b). These tests require an open field site to qualify the transmitter and Antenna. The specific RTCA test procedure can be found at the end of this Exhibit as Appendix A.

The qualification procedure requires the ELT system including the Transmitter, Antenna, and Coax Cable to be measured against a reference system. This reference consists of a quarter-wave Mono-Pole Antenna, a 50mW signal source and Coax Cable representative of that used with the ELT system. The reference is set-up on the open field site and power output is measured. The reference system is then removed and the ELT system is substituted. ELT output power is then measured and compared to that of the reference system. If the ELT power is greater than or equal to that of the reference, then the ELT system passes this portion of the qualification test. The RTCA procedure as written has no equivalent bench test that can be used, and the open field test is, therefore, the only way to qualify the ELT system for power output. This test is not conducted during normal production of the ELT, but only when changes are made to the

ELT system requiring confirmation testing of output power. Testing is also conducted if a new component (Transmitter, Antenna, Coax) of the ELT system needs to be qualified.

Sincerely,

Wendell Neumeyer
Engineering Manager

APPENDIX A – RTCA POWER OUTPUT TEST PROCEDURE

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Part 87 of the Federal Communications Commission (FCC) rules. Prior to each operational test period, the test transmission on the selected frequency should be coordinated with the appropriate FAA Regional Frequency Management Office.

2.4.2.1 Operating Life (Paragraph 2.2.1)

Measurement Procedure

Operate the equipment at the specified low temperature using its own power supply continuously for a period as stated in paragraph 2.2.2.5, "Peak Effective Radiated Power," under the condition of maximum power consumption with the transmitter terminated with its nominal load impedance.

Immediately following the test period and without a break in equipment operation, determine the PERP measurements in accordance with Step 5, paragraph 2.4.2.2. PERP measurements shall be determined within 15 minutes after removal of the equipment from the cold chamber.

2.4.2.2 Transmitter (Paragraph 2.2.2)

Equipment Required

Power Meter (Hewlett Packard Model 435B, or equivalent).

Signal Generator (Hewlett Packard Model 8640B, or equivalent).

Receiver (Communications-Electronics Model 970A, or equivalent).

Diplexer (Triangle Microwave FY1116, or equivalent).

Frequency Counter (Hewlett Packard 5345A, or equivalent).

Detector (Hewlett Packard 8741A, or equivalent).

Amplifier (Hewlett Packard 465A, or equivalent).

Pulse Generator (Hewlett Packard 8011A, or equivalent).

Oscilloscope, variable persistence (Hewlett Packard 1741A, or equivalent).

Envelope Detector (Hewlett Packard Model 10515A, or equivalent).

Field Intensity Meter (Stoddard Model NM30A, or equivalent).

Measurement Procedure

Step 1 - Operating Frequencies (Paragraph 2.2.2.1)

Connect the equipment as shown in Figure 2-6. Operate the equipment, using its own power supply terminated with the nominal load impedance. Measure the carrier frequencies of the 121.5 and 243.0 MHz emissions, with an accuracy of at least five parts per million.

Step 2 - Modulation Characteristics (Paragraph 2.2.2.2)

Operate the equipment as in Step 1. Observe the modulation envelope on the storage oscilloscope and determine the upper and lower audio frequency sweep limits, sweep rate and modulation factor.

Step 3 - Modulation Duty Cycle (Paragraph 2.2.2.3)

Operate the equipment as in Step 1. Observe the detected modulation envelope indicated on the storage oscilloscope and determine the modulation duty cycle.

Step 4 - Transmitter Duty Cycle (Paragraph 2.2.2.4)

Operate the equipment as in Step 1. Observe the modulated signal and determine that the carrier is not interrupted between sweeps.

Step 5 - Peak Effective Radiated Power (Paragraph 2.2.2.5)

Test Conditions

The test site should be on level ground which has uniform electrical characteristics. The site should be clear of metal objects, overhead wires, etc., and free as possible from undesired signals such as ignition noise or other RF carriers. The distance from the transmitter under test, or the field strength meter, to reflecting objects such as rain gutters or house plumbing should be at least 100 meters (330 feet). At the transmitter end, the aircraft/transmitter may be rotated by moving, or a turntable may be provided. The equipment under test

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shall be placed on a nonmetallic structure 1.3 meters (4.26 feet) off the ground. The equipment under test shall be located as follows:

- a. ELT (AF) and (AP) - Place the ELT on or inside the test structure in a configuration representing a typical aircraft installation.
- b. ELT (AD) and (S) - Place the ELT on the ground with a supplementary ground plane.

Measurement of radiated or received signals should be made at a point 30 meters (100 feet) from the antenna. At this point, a wooden pole or insulated tripod with a movable horizontal boom should be arranged so that the search antenna can be raised and lowered through an elevation of $\lambda/2$. The field intensity meter (FIM) and search antenna should be mounted on the end of the boom with its cable lying horizontally on the boom back to the supporting mast. The FIM is placed on a suitable tripod at the foot of the mast.

For each frequency measurement, the FIM antenna should be adjusted to the correct length for the frequency involved.

Method of Measurement

The basic method of measuring of PERP is that of direct substitution as detailed below:

- a. Place the standard $\lambda/4$ monopole antenna on a ground plane with a minimum dimension of $\lambda/2$ radius. Connect a calibrated signal generator set for the power required in paragraph 2.2.2.5. Account for all losses in transmission lines and impedance mismatch at the antenna to ensure that the transmitted signal is not less than that specified in paragraph 2.2.2.5, "Peak Effective Radiated Power."
- b. Place the FIM antenna in a vertical position with the lower element tip at least $\lambda/4$ above the ground.

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- c. Measure the field strength with the FIM in "peak position." The FIM antenna may be rotated about its center axis for a maximum reading (vertical to horizontally polarized reception).
- d. For ELTs with externally mounted antennas, replace the standard $\lambda/4$ antenna and its calibrated source with the ELT.
- e. For ELTs with an integrally mounted antenna, replace the standard $\lambda/4$ antenna, $\lambda/2$ ground plane and calibrated source with the ELT system mounted inside a representative mockup of a standard installation i.e., a mockup of the aircraft fuselage with seats and windows; or, for antennas mounted within a fincap, a representative mockup of the aircraft vertical stabilizer.
- f. Measure the field strength with the FIM in "peak" position. The FIM antenna again may be rotated for maximum signal. The height of the FIM antenna may also be adjusted for maximum signal. The ELT under test and test mockup should be rotated to obtain field strength measurements at least every 10 degrees of azimuth. The pattern should be essentially omnidirectional in the horizontal plane. The pattern deviation shall not be greater than 6 dB from the reference signal at any selected point. The average of four evenly spaced field strength readings shall be equal to, or greater than, the standard.
- g. Repeat a. through f. above for each of the two radiated frequencies involved.
- h. For internal antennas, perform sufficient tests to establish the minimum allowable window dimensions and proximity distances as required in paragraph 3.1.10.4.
- i. For external antennas, perform sufficient tests to establish the minimum proximity distances as required in paragraph 3.1.10.2.