

Raytheon Missile Systems
Experimental STA Application
File Number: 0681-EX-ST-2017

Explanation of Experiment and Need for STA

Raytheon Missile Systems (Raytheon) builds a number of missile systems for government and approved foreign customers. Raytheon is working to test operation of the radio systems and the functioning of its missiles when they are under stress from G forces. The proposed testing will be conducted in a centrifuge in California. Three radio systems will be tested, including one flight terminate and two telemetry links.

Need for an STA:

The currently proposed testing is designed to be short term testing to review the operation of the radios installed in several of Raytheon's missile systems. The goal is to test for five months to see if the radios are operating properly. The centrifuge is being used to simulate some of the challenging flight conditions that Raytheon's missile systems might experience in a real-world use situation. The radios need to be tested in those conditions to be sure that the links operate properly.

Description of Operations

The goal of this testing is to determine how the missile radio systems operate when the missile is under the stress of motion, particularly G forces.

When testing is underway, the S band frequency will be used to send data to the control station with information on the health of the missile, including voltages, currents, and possibly G force readings. This information will help Raytheon to determine whether any improvements are needed to increase the performance or reliability of its missile systems under test.

Location of Testing

The centrifuge is in Santa Clarita, California. An aerial photo of the location shows that the centrifuge is sheltered by surrounding buildings and it set into the ground. (It is much bigger than the centrifuge in a chemistry lab).



The Raytheon hardware will be positioned at one end of the beam in the center of the centrifuge. The other end will have a calibrated weight on it to counterbalance the Raytheon hardware when the centrifuge is in operations. All the testing is below the rim of the centrifuge.

The concrete walls of the centrifuge and the earth embankments around the outside of the centrifuge should substantially attenuate any signals in use. Further, when the testing is done, and centrifuge is on, the signals will move across a 360-degree arc. This means that the transmitter will be in motion, making the signals harder to detect outside of the centrifuge.

Power Levels and Time of Use

A test is expected to take approximately 8 hours. The spectrum will be in use during those tests as described in more detail below.

420-430 MHz flight terminate frequency. This frequency will operate at 0.5 W, with 0.5 W ERP. This frequency is in use, at low power, for the entirety of the centrifuge testing. If the tone is interrupted, then the missile goes boom. Because this test is intended to measure the effects of motion on the operation of the missile, the systems must all be operational. The tone is required to ensure that the flight does not terminate improperly, because that system is built into the operation.

2245.5 MHz frequency: This frequency will operate at 5 W, with 5 W ERP. It will only be in use periodically, as it sends telemetry data to the ground station. It is an FM signal.

5.4-5.9 GHz frequencies: this is a pulsed signal, in use only part of the time during the test. The ground station sends out a low powered interrogator signal, at 100 mW, and the hardware responds with a 50 W, 76 W ERP responsive signal. The radios are installed as they would operate in the

field, and the radios cannot be altered for the purposes of this testing. Thus, the power level of the responsive signals cannot be reduced. However, the energy from the signal transmitted by the hardware will be contained in the centrifuge. The transmitter will be in use a limited amount of time.

Stop Buzzer Point of Contact

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Conclusion

Raytheon is preparing to test some of its missile systems in a centrifuge to measure and improve system performance. Those tests require that Raytheon use the radio systems incorporated into the hardware when they are being testing in the centrifuge. This application seeks authorization for this testing, which will take place at a centrifuge in Santa Clarita, California. The operations will all take place below the rim of the centrifuge.

If there are any questions about the proposed operations or if any additional information is required, please contact Tom Fagan or Anne Cortez at alc@conspecinternational.com or 520-360-0925.
Thank you for your assistance.