Raytheon Missile Systems
Experimental License Renewal Application
Call Sign: WH2XXU
File No.: 0452-EX-CR-2019

Explanation of Experiment

Overview:

Raytheon Missile Systems builds and develops technology for missiles sold to the US government. In the course of that work, many different tests are conducted on the missiles and the technology incorporated into those missiles to be sure that they function properly when needed and to make sure that they do not explode except when the proper signals are given. The current application seeks to renew authorization to allow for environmental testing of various Raytheon missiles at an environmental test laboratory National Technical Systems (NTS) adjacent to Raytheon's facilities in Huntsville, Alabama.

Background:

In developing missile technologies, Raytheon works to ensure that it meets its specification provided by the customer. This laboratory provides the equipment for vibration, shock, temperature, and pressure testing. This environmental testing requires Raytheon to monitor the performance of three radio systems incorporated into several missile systems. Those radio systems control flight termination, flight telemetry, and the radar transponder. Each one has to perform during the environmental testing. The telemetry will allow the remote collection of missile performance information.

Synopsis:

- Frequencies needed: 420-430 MHz – only one frequency; 5665 & 5800 MHz, 2250.5 MHz
- Location of use: Indoors at environmental test laboratory in Huntsville, Alabama
- Limited time of use: Spectrum will be in use less than 2-4 hrs./day; details below

Explanaton of Spectrum Use:

420-430 MHz Spectrum use: This frequency is used for flight termination. If and when a missile is being tested, the frequency is used to send a signal to the missile to control/terminate the flight test. In this laboratory environmental testing, it is expected that one frequency in this band will be used intermittently for approximately 4 hours of testing (per day, but not every day) to test how the flight terminate system works under the strains of various environmental situations. Because this function is so important, the range of tests needed to verify its performance level is very broad. The signal level is reduced as low as possible for the testing, and the testing is conducted indoors.

5665 MHz and 5800 MHz: These are radar transponder frequencies, used with very low duty cycle. The 5665 MHz frequency is a Radar simulator. It sends a one (1) microsecond pulse to the missile about once every 5 minutes. The 5800 MHz frequency is the response frequency, sending a one (1) microsecond pulse back to the radar simulator when it hears a pulse. The duty cycle is 0.00004 %.

The signal level for the 5665 MHz interrogator is low, only 3 Watts maximum with no antenna gain. This signal will be reduced to the lowest level possible which will still allow the signal to reach the missile. The signal level for the 5800 MHz response is only 50 Watts with no antenna gain. The missile transponder which is necessary due to the speed, distance and altitude of the missile in an actual launch. For this testing, both radios will be indoors in the laboratory. This is necessary to make sure the transponder works under all environmental conditions.

2250.5 MHz: This signal is used to send telemetry data back from the missile during environmental testing. The environmental testing simulates the environment the missile sees during an actual flight. The telemetry includes voltages, vibration levels, stress levels, temperatures, and missile health. It will be monitored and recorded at all times during the test. The signal is expected to be in use for approximately 2 hours per day. This amount of time is needed to test the performance of the telemetry communications systems in a range of environmental conditions and to ensure that all telemetry communications are transmitted completely.

The signal level is kept as low as possible. The 5 Watt transmitter has no antenna gain. The testing will be conducted inside in the laboratory, along with the other tests.

Time of Use:

The environmental testing being conducted will examine performance of the Raytheon products in a number of different environmental conditions and across combinations of those conditions. The testing requires examining the performance of all three radio systems and validating the quality of radio system and missile performance over time. This testing is expected to provide significant information on any changes that might be needed to accommodate unanticipated circumstances encountered by a missile in flight. The tests have been designed to maximize the data derived from testing while keeping spectrum use to the least necessary to understand system performance across the range of environmental factors being examined.

Test Location:

The testing will be conducted indoors in a laboratory operated by National Technical Systems (NTS). The environmental factors being tested would not be available to test in an anechoic chamber. All testing will be indoors in NTS labs with some being performed in metal enclosures. Raytheon is seeking this license because it will control operation of the radio systems during testing.

Stop Buzzer Point of Contact:

Jim Ortega, Spectrum Manager
Raytheon Missile Systems
(520) 794-0227 (office)
James.e.ortega@raytheon.com

Conclusion:

Raytheon is working with a test laboratory to undertake ongoing environmental testing of some of its missile systems. That testing requires use of the radio systems incorporated into the missile to

ensure the proper performance of those radio systems across a range of environmental conditions. The time of use has been limited as much as possible, but it is important to test to be sure that the missile will function properly when in use should it encounter any of the environmental factors being examined. All testing will be indoors.

If there are any questions about the proposed testing or any of the information in this application, please contact Anne Linton Cortez, WFS, alc@conspecinternational.com or 520-360-0925.