

Raytheon Missile Systems  
Experimental License Modification Application  
Call Sign: WA2XFR  
File Number: 0003-EX-CM-2016

### **Explanation of Need for License Modification**

Raytheon Missile Systems (Raytheon) is a US defense contractor that develops innovative technologies, in particular for the US military. This division of Raytheon is primarily responsible for the development of advanced missile technologies, including the integrated command and control systems and radar technologies. Raytheon is seeking this license modification for authorization to increase the output power and ERP of its testing of some of the integrated radio frequency systems on its missile platforms.

### **Background:**

The missile systems under development include advancements in missile guidance, precision, and target acquisition. These systems need to be used in the lab, and then they need to be tested in test flights to ensure that all elements are working properly. As a result, Raytheon is seeking authorization to use the radio systems covered by this license, WA2XFR, as it continues to refine the command and control systems and radar technologies.

This application seeks authorization to increase the power used for airborne, mobile operations in a 120 km radius around the Raytheon facility. A parallel application was filed to increase the power at several fixed locations on the Raytheon plant in Tucson, Arizona. The requests have been separated into two for better tracking and compliance within Raytheon.

### **Technical Synopsis:**

|                        |                                                                 |
|------------------------|-----------------------------------------------------------------|
| Power level requested: | 5 kW output power, 35 MW ERP, but only for X band frequencies   |
| Area of Operation:     | airborne operations within 120 km of Raytheon's plant in Tucson |
| Antenna Gain:          | gain ranges from 20-45 dBi, application requests maximum        |

### **Purpose of Experimentation:**

Raytheon is undertaking these tests to experiment with new ways to use radar to achieve goals set by the Department of Defense. It is experimenting with various emission types to determine how to optimize the operation of the radio or radar. Further, it is enhancing the use of various spectrum bands at medium and long distances to deliver higher performance radar systems. The experimentation will result in greater understanding of how different signal types are able to perform

radar functions with variables for distance, altitude, and frequency to provide information on the optimal configuration.

#### Description of the Operations – Mobile, Airborne in a 120 km radius around the Tucson facility:

Raytheon has its main missile development plant site in Tucson, AZ. Here, it does most of its development and experimentation with the systems integrated into its missiles. To determine whether the research and development of new technologies is effective, the new technologies need to be tested in real-life situations, in this case, allowing radio systems on the missiles to function as if they were operating in a real-world, deployed environment. The missiles are loaded onto aircraft for test flights. The aircraft take off, and then the radio systems are engaged, in conjunction with a number of simulated factors that fool the missiles into believing that they are in real operation. The radio systems actually need to be tested in the real-world environment to determine how those radio systems perform in their position tracking, target acquisition, and responsiveness to command signals, among other factors. Operations on the ground track the radio signals and performance to see if the radio systems are operating as predicted in the laboratory. Information from the airborne tests allows Raytheon to make further advancements in the radio technologies to improve performance.

The center point of the radius of the operations is the aircraft hangar from which the test flights originate. Flight tests can be as frequent as two or three times a day. However, after a series of flight tests, the data collected is then analyzed by the program and the next round of technological development moves back to the lab, which results in gaps between the days of flight tests.

#### Time of Spectrum Use:

The radio frequency and radar systems are in use during all test flights. There can be as many as two to three test flights per day, although, as explained above, there are not test flights every day. All transmissions on and off times are logged, and the spectrum management office monitors the spectrum use.

#### Conclusion:

The experimentation and testing proposed is essential to the advancement of radar technologies incorporated into Raytheon's products. The Stop Buzzer point of contact for these operations is:

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If any additional explanation or information is needed, or if there are questions regarding this application, please contact either Mr. Fagan or Anne Linton Cortez, 520-344-8525 or [alc@conspecinternational.com](mailto:alc@conspecinternational.com).