

Raytheon Missile Systems
Experimental License Application
File Number: 0107-EX-CN-2020

Explanation of Experiment

Raytheon Missile Systems (Raytheon) builds systems used for national security and defense. Creating products and systems that are difficult to detect is an important part of developing new technologies that keep our nation safe. The nature of the research is to determine the radar cross section of various objects under test. Radar pulses are narrowly focused to bounce off those objects, and the radar returns are evaluated to determine the profile of the object. There is no way to measure the radar cross section of an object without using a radar. This application seeks authorization for the use of a near field radar cross section range to comply with the terms of a federal contract. The contract number is: N00019-15-C-0092.

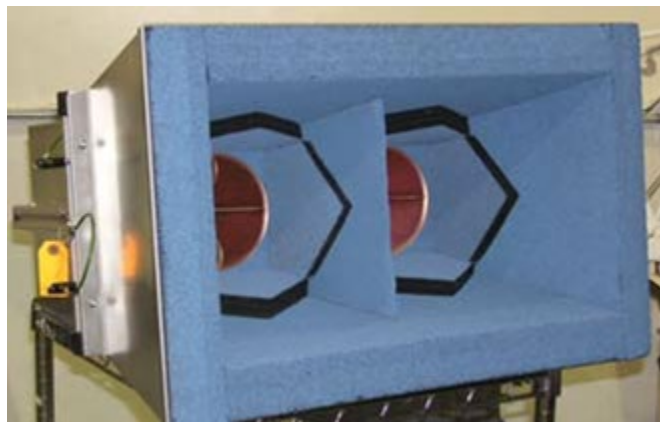
Raytheon conducted some experimentation under an STA, WP9XFB. This application requests the entire spectrum bands that were requested in that application.

Technical Synopsis:

- Spectrum requested: 2-18 GHz, per contract
- Federal contract number: N00019-15-C-0092
- Pulsewidth: 40 nanoseconds
- Power levels are low: 100 mW output power requested, with max ERP of 6.3 W at 18 GHz
- Time of use is brief on any frequency

Description of Operations:

Raytheon will be using this range to send radar pulses toward a unit under test to evaluate the near field radar cross section returns from the unit. The system has been designed using a Sensor Concepts SCI – 2K antenna, see below:



This antenna will be mounted about 8 feet above the ground. This means that it will be slightly higher than the unit being tested, which allows for some downtilt and ground absorption of radio

Area of Operations:

The proposed operations are limited to a small part of the Raytheon plant site at its headquarters in Tucson, Arizona. The plant site is a secure facility which is not open to the general public. The radar testing will be conducted on an empty portion of the plant site, utilizing some of the same facilities that are in use by a different radar cross section range licensed under KA2XAG. This area was selected for its remote, open characteristics and because any backlobe energy from a transmitter would be absorbed by buildings on the plant site, further protecting any other users from the potential of any interference.

Need for Entire Requested Band:

To achieve the object of this testing, Raytheon needs to be able to send radar pulses across the whole band to map the cross section of the object under test. The radar pulsewidth has been limited to the minimum necessary to achieve the results required by the contract. The time of use was limited in this way to avoid any harmful interference to any other radio users in the area.

This application requests use of the entire band for national security purposes. The objects being tested need to be tested using radar that covers the entire requested band, because that will assist Raytheon in protecting its products from radar detection from the enemies of the US. Raytheon has worked diligently to mitigate the effects of the requested spectrum use, but it's contractual requirements require testing across the entire band.

No Likelihood of Harmful Interference to Other Operations:

In order to acquire the directional RF transmission radiated by the radar, a receiver would actually have to be looking for it: the receiver would have to be located in the forward plane of the transmitting antenna, with a major antenna lobe facing toward the range. The receiver would also need to be looking to acquire the radar pulse at precisely the frequency and instant that the radar is transmitting, and it would need to be sufficiently sensitive to detect the short duration and extremely attenuated signal. Standard radio receivers are not designed to process signals at the pulse width used by the test facility, thus any detected RF signal will be filtered out by receivers that are sensitive enough to detect signals at such low levels.

Stop Buzzer Point of Contact:

Should there be any instances of interference, the stop buzzer point of contact is:

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

Conclusion:

Raytheon has a contract from one of its US government customers to conduct near field radar cross section testing. The contract requires Raytheon to deliver results across the 2-18 GHz band. Use of the entire band is required, although most of the spectrum will not be in use. When the spectrum is

used, it will be stepped through using only a 40 nanosecond pulsewidth at each step. The power level is low, and the area of operations is limited to a remote area of the secure Raytheon facility.

If there are any questions about this application, please contact Anne Cortez, WFS, at 520-360-0925 or alc@conspecinternational.com.