

# **Raytheon Request for FCC Special Temporary Authorization (STA)**

Radar Design, Development, and Test

STA File Number: 0483-EX-ST-2013

STA Confirmation Number: EL520421

Date: 24 May 2013

## **Purpose of Operation:**

Frequency authorization over the range of 8.5 – 9.0 GHz and 9.2 – 10.5 GHz is being requested for the period of June 18 to December 10 2013. The authorization will be used to perform measurements on various radar systems at different stages of design, development, and manufacture at a Raytheon facility. These measurements may include calibration, evaluation, verification, and integration type tests.

## **STA Explanation:**

The purpose of this request for a Special Temporary Authorization is to perform low power measurements on radar systems or parts of radar systems, outside of a shielded anechoic chamber, in order to meet internal and external customer commitments.

## **Test Summary:**

An experimental license is required to perform low power measurements of various radar systems when a shielded anechoic chamber is not available or practical. The requested frequency ranges are those frequencies allocated for Radiolocation as a primary service in X-Band per the NTIA Manual Table of Frequency Allocations, and excludes 9.0 – 9.2 GHz, which is an FAA coordinated band.

Whenever possible, the radar system will transmit into an anechoic box, i.e. a five-sided anechoic chamber, inside the Raytheon facility, thereby reducing RF leakage and potential interference to other equipment to negligible levels. In limited cases, testing may also be performed outside the Raytheon facility but on Raytheon property, in a secure test area with appropriate site safety measures.

Waveform modulation types will include the following: pulsed Linear FM, pulsed Non-Linear FM, pulsed CW, and pulsed Linear FM with frequency hopping, and CW. Modulated waveforms will have a duty cycle of at least 50%. It is expected that radar system testing may occur 24 hours a day, seven days per week for 4 weeks up to 6 times per year.

## **Radiation Hazard Calculations and Site Safety Measures:**

Initial calculations show that general public exposure limits will be reached at a 4.1 meter distance and occupational exposure limits at 1.8 meters, using formula (6) from FCC OET Bulletin 65 “Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields”, dated August 1997. These are worst-case calculations and do not consider duty cycle or average power.

Raytheon’s RF safety group is involved in all testing that requires free space radiation to ensure that no personnel are subjected to RF power density levels exceeding the Maximum Permissible Exposure (MPE) limits of the Part 1.1310 of the FCC Rules and the guidelines in FCC’s OET

Bulletin Number 65. Raytheon has a Company Policy and an Environmental, Health and Safety Standard which address electromagnetic energy exposure control. It is Raytheon's policy to ensure that our personnel, the general public and our customers are not exposed to RF levels which exceed applicable standards. To that end, we will have an RF Safety Control Plan in place for the testing. The Plan will define the procedures and controls required to prevent personnel exposure to levels which exceed the MPE. To verify the safety of personnel, an RF survey will be performed at the initial turn-on of the system. All measured levels, where personnel have access, must be below the MPE limits before testing can proceed.

**Raytheon Technical Point of Contact:**

Name: Karen Dyberg  
 Title: Principal Engineer, Spectrum Management and RF Safety  
 Phone: Office 978-440-4022, Cell 508-450-9236  
 Email: karen\_i\_dyberg@raytheon.com

**Period of Use:**

Start date: 18 June 2013  
 End date: 10 December 2013

**Equipment Information:**

**Radar Transmitter:**

Manufacturer: Raytheon Company  
 Model: Various X-Band equipment  
 Number of units: Up to two, most likely different equipment, operating at different locations at the same facility.  
 Experimental (Y/N): Yes - Typically the equipment under test will be experimental. At other times the equipment under test may be an existing system.

**For each frequency:**

RF output at the transmitter terminals:  
 35 Watts, peak

**Effective radiated power from the antenna (if pulsed emission, specify peak power):**

500 Watts, peak

**Necessary Bandwidth and Emission Designators**

The emission designator consists of the necessary bandwidth and emission classification symbols. The emission designators cover all potential uses.

Type of signal	Emission Designator
Pulsed Linear FM	130MQ3N, 72M4Q3N, 24MQ3N, 5M5Q3N
Pulsed Non-Linear FM	130MQ3N, 72M4Q1N, 24MQ1N
Pulsed CW	200KP0N, 8M4P0N
Pulsed Linear FM with frequency hopping	130MQ3N, 72M4Q3N, 24MQ3N
CW	N0N

Emission Designator Classification Symbols used:

First Symbol - Type of modulation of the main carrier	N	Emission of an unmodulated carrier.
	Q	Carrier is angle-modulated during the period of the pulse (i.e. chirp, FM).
	P	Sequence of unmodulated pulses.
Second Symbol - Nature of signals modulating the main carrier	0	No modulating signal.
	1	Single channel containing quantized or digital information without the use of a modulating sub-carrier, excluding time-division multiplex.
	3	A single channel containing an analog signal.
Third Symbol - Type of info transmitted	N	No information transmitted.