Raytheon Request for FCC Special Temporary Authorization (STA)

Prototype C-Band Noise Antenna Test

STA Confirmation Number: EL940230

11/12/2013

Purpose of Operation:

Frequency authorization is requested for the period of December 6th, 2013– June 6th, 2014 in the 5250 – 5850 MHz band in order to develop a C-Band noise antenna test kit. The kit will be a diagnostic tool, allowing us to troubleshoot the radar when issues arise in field. The target radar will be in receive-only mode during these tests. Integration will take place at the Raytheon Test Facility, Pelham, NH. The customer demonstration is planned to take place at another location (TBD).

STA Explanation:

The prototype noise antenna test kit is planned to be operated at the Raytheon Test Facility in Pelham, NH over the period of December 6th, 2013 – June 6th, 2014. The purpose of this request for Special Temporary Authorization is to integrate our proof of design before presenting it to the customer.

Test Summary:

An experimental license is required to integrate a prototype radar diagnostic tool before presenting to our customer. Starting in December 2013, we will be using a noise source generator with a digital band pass filter to limit the noise source within the 5250 – 5850 MHz band. The source will be a continuous wave source operating at a maximum 2W output. The calculations for the power output, cable losses, etc can be found below. The noise source will be emitted from a horn mounted atop a 9 m mast, connected to a 50 foot cable. It will be on just long enough for the radar to receive the signal and run the test to evaluate the radar health. The radar under test will be in receive mode only.

Raytheon's RF safety group and hazard assessment team have been involved with this prototype integration preparation to ensure personnel are NOT subjected to RF power density levels that exceed 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 Environmental, Health and Safety Standard which addresses 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.

Electromagnetic Energy Exposure Control Evaluation:

Power Density, Pd = (Max Power x Antenna Gain x duty cycle)/ (4 x Pi x R^2), where R is distance in meters

Max Power = 33 dBm = 2 Watts
Antenna Gain = 17 dB (50.11 numeric) (this was rounded up)
Assuming 6 meters from source placed atop 26' (approx. 9 meters) tower
At 6 meter, Pd = ((2 x 50.11)/ (12.56 x(6^2)))/10 = = 0.2 W/m^2 (.02 mW/cm^2)

Distance that meets general public limits of 5 W/m^2, i.e. 1 mW/cm^2:
Solving for R = sqrt (99.98 / (12.56 x 5)) = .89 meters is the safe distance from the antenna for personnel
NOTE: This evaluation did not take losses into account.

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Period of Use:
Start date: December 6, 2013
End date: June 6, 2014

Equipment Information:
Transmitter info:
Manufacturer: Noise Com, Inc.
Model: NC9282
Number of units: 1

Experimental (Y/N): Y

For each frequency band:

RF output at the transmitter terminals: 33 dBm, 5-6 GHz

RF Generator: 2 W peak/ 2W average because it is a CW source operating at 100% duty cycle

50-ft Cable: 7 dB loss

Power output after cable: 0.4 W

Effective radiated power from the antenna

Feedhorn: 15 dB, 7.59W effective radiated power (ERP),

34° beamwidth

366 meters to property line, resulting in 0.24 W rms

Power equation: $\frac{P_t * G}{4\pi R^2} = \frac{-6.2\ dBw * 15\ dBi}{11dB + 51.27\ dB}$ = -53.47 dBw, 600 MHz = 4.5µW

Frequency Tolerance:

N/A

List each type of emission separately for each frequency (basically list the emission designators)

5250 MHz – 5850 MHz: N0N

Emission Designator Classification Symbols used:

First Symbol -Type of modulation of the main carrier

N Emission of an unmodulated carrier.

Second Symbol -Nature of signals modulating the main carrier

0 No modulating signal.

Third Symbol -Type of info transmitted

N No information transmitted.

Locations:
The Raytheon facility in Pelham, NH, is located at North 42° 44'14.1", and West 071° 21'14.4" and ground elevation of 128.0 meters above sea level. The street address is 50 Bush Hill Road, Pelham, NH 03076.

Is a directional antenna (other than radar used)?
Yes.
If yes, give the following info:

Type of antenna, also (Manufacturer, model):
Narda Microwave-East, L3 Communications
Model: 643
Size: Length: 10.47" Width: 4.80" Height: 6.34"

Width of beam in degrees at the half-power point:
34° Azimuth, 34° Elevation

Orientation in horizontal plane:
+/- 1 degree relative to zero
Orientation in vertical plane:
90 degrees

Antenna will be pointed 94 – 100 degrees from True North depending on which radar is being tested
The antenna will be pointed directly at the radar being tested .

Will the antenna extend more than 6 meters above ground, or if mounted on an existing building, will it extend more than 6 meters above the building, or will the proposed antenna be mounted on an existing structure other than a building?
The antenna horn will be mounted 9m from the ground on a mast.

If Yes,
Overall height above ground to tip of antenna in meters:
9.2m

Elevation of ground at antenna site above mean sea level in meters:

128m (Pelham, NH facility)

Distance to nearest aircraft landing area in km:

Pelham, NH Test Facility:

Boire Field - Nashua, NH (ASH / KASH)	12.9km
Lawrence Municipal Airport - Lawrence, MA (LWM / KLWM)	19.3km
Manchester-Boston Regional Airport – Manchester, NH (MHT / KMHT)	22.5km
Laurence G. Hanscom Field - Bedford, MA (BED / KBED) (Also HAFB)	30.6km
Minute Man Airfield - Stow, MA (MMN)	33.8km
Waltham Airport - Waltham, MA (WLT)	38.6km
Fitchburg Municipal Airport - Fitchburg, MA (UXO)	38.6km
Beverly Municipal Airport - Beverly, MA (BVY / KBVY)	40.2km
Logan International Airport – Boston, MA (BOS / KBOS)	49.9km

List any natural formations of existing man-made structures (hills, trees, water tanks, etc) which in the opinion of the applicant would tend to shield the antenna from aircraft and thereby minimize the aeronautical hazard of the antenna: None

Attachment 2 is a graphical overview of the site.