

From: Sydney.Bradfield@faa.gov
Sent: Thursday, December 10, 2009 7:01 AM
To: Center, Ronald E
Cc: james.motley@faa.gov; thuy.t.nguyen@faa.gov; Thomas.CTR.Christein@faa.gov;
victor.hinton@faa.gov; timothy.j.pawlowitz@faa.gov; Thomas.Ahn@faa.gov;
Phuong.Duong@faa.gov; John.Hepsen@faa.gov
Subject: Re: LOW LEVEL CONTINUOUS WAVE (LLCW) TEST PALMDALE, CA

Attachments: Test Configuration.pdf

Ron,

Consistent with past authorizations for the same Lightning testing at Seattle, WA (NG 076954, NG T090338) and Everett, WA (NG 076955), we concur under coordination assignment NG T10045 to the below proposed testing at Palmdale, CA from May 1, 2010 to November 1, 2010 subject to the below denoted parameters of a swept continuous wave closed loop unintentional radiator from DC to 100 MHz with dwell time of no more than 50 msec on any frequency at 50 watt max ERP into aircraft fuselage inside closed door metal hangar with actual unintentional radiation expected of below 1 watt.

Please provide a cease buzzer point of contact and phone number for the Palmdale location.

Sydney Bradfield
WSA Engineering Services
LA Operations Engineering Support Center, AJW-W15M
Comm/Spectrum Support Center
310-725-3671, DSN 958-3671

"Center, Ronald E" <Ronald.E.Center@boeing.com>
12/08/2009 09:43 AM
To Sydney Bradfield/AWP/FAA@FAA
cc
Subject LOW LEVEL CONTINUOUS WAVE (LLCW) TEST PALMDALE, CA

Sydney,

We have a test requirement for FAA certification of the 747-8. The test is an LLCW, which is conducted as a closed loop, unintentional radiator. The test basically test the lightening protection of the aircraft, and a narrative description is provided below. I have also attached the diagram of the test set-up (referenced in the narrative). We have been conducting these test at both Paine Field in Everett and Boeing Field/King County International in Seattle for a number of years. In fact we are licensed for those locations, but currently do not have the hangar space to support this test requirement. Palm Dale is the only location where we have access to a Hangar large enough, which is available to support the test.

The test will be inside of a Hangar, with all doors shut, and since this is a closed loop test configuration we do not anticipate any emissions outside of the Hangar area.

However the FCC has asked that we obtain FAA coordination, so we request an NGT number.

Your assistance is appreciated.

Thanks,
Ron Center
The Boeing Company
Frequency Management Services
Seattle, WA
(206) 544-6044

Test Description

The purpose of this experimental operation is to allow for testing in support of the FAA required aircraft Lightning Testing and Certification.

The tests to be conducted are low level, swept continuous wave tests on production aircraft/components. This type testing is conducted as a closed loop, non-intentional radiator. The aircraft and ground plane form a closed loop transmission line, however parasitic emissions may occur. The emission type is CW. At best, the test set up is a very inefficient antenna, particularly at the higher frequencies, above 10 MHz. Although we do not have any measured data on the actual emission level, Boeing is currently licensed to conduct this same test in the Seattle area, and has ran it on numerous past occasions with no interference issues noted.

Also, in order to further minimize the possibility of interference, the test will be conducted inside of an aircraft hangar, with all doors closed. In addition, this is a swept frequency test, using a single sweep and a limited dwell time, which should allow the test to be conducted without any interference.

Test Description

This test requires the aircraft to be located on a ground plane constructed of chicken wire. A vector network analyzer, an HP 3577B or equivalent, will be used to inject low level swept CW currents, from DC to 100 MHz into the aircraft at a point that represent a typical lightning attachment location. Another connection from the aircraft will be made to the ground plane, which will represent a typical lightning exit location. The ground plane returns the current back to the network analyzer. It will sometimes be necessary to amplify the injected current using a laboratory grade 25 or 50 Watt linear amplifier. (See Figure 1 for a typical test setup). Again, the test configuration is set-up as a non-intentional radiator, and Boeing has conducted this type testing on numerous past occasions with no issues noted. The test is repeated with a variety of injection and exit configurations to represent various lightning attachment configurations. Testing, using widely spaced discrete frequencies would miss critical resonant frequencies.

The desired frequency range for this test is DC to 100 MHz. The sweep time will be approximately 10 seconds, with a dwell time at any single frequency that will not exceed 50 mS. A typical data acquisition will require 1 to 8 sweeps. The RF drive current will be turned off between data acquisitions. The down time between data acquisitions can be anywhere from minutes to hours depending on the complexity of the test configuration changes. The 747-8 as well as other aircraft types which have similar shapes, sizes, weights and composition may also be tested using this procedure. However the test procedure, RF parameters and test locations will not change. As summary of the frequency, power and emission data are follows:

Frequency Band:	DC - 100 MHz
Sweep Time Through Band:	10 Seconds
Max Dwell Time per Frequency:	50 milliseconds
Max ERP to Closed Loop Configuration:	50 Watts (see note 1)

(Note 1: 50 watts is the maximum input power into the closed loop test configuration. It is anticipated that the actual parasitic (unintentional emission) will be well below 1 watt. In addition, the test will be conducted inside of a metal construction aircraft hangar.)

Location of Operation:

Palm Dale, CA
34-36-44N; 118-04-37W, NAD83

Required Dates of Operation:

May 1, 2010 through November 1, 2010.

