
Frequency Authorization Request

Rev E
25 January 2008
Prepared by

NORTHROP GRUMMAN

The logo consists of the words "NORTHROP GRUMMAN" in a bold, italicized, blue sans-serif font. A blue curved line starts below the "N" and sweeps upwards and to the right, ending under the "N" of "GRUMMAN".

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Material contained in this document is UNCLASSIFIED.

Introduction.

This document is an authorization request to radiate low duty cycle, pulsed Continuous Wave (CW) test signals into the Radio Frequency (RF) spectrum.

Objectives.

To utilize a fixed position, ground-based emitter to operate in the 20 MHz – 3000 MHz spectrum and to conduct low level swept CW tests on aircraft-based antenna receiver systems.

The intent is to use low powered CW test signals to calibrate and to measure the effectiveness of aircraft-based antenna systems; not to purposely interfere with authorized RF spectrum use. Northrop Grumman ESL is not performing Electronic Warfare (EW) tests or exercises. The ground-based emitters do not transmit high powered jamming signals.

Area of Operation.

The ground-based emitter will be located at the McClellan Airfield, Sacramento, California. Flight tests will be flown out of the McClellan Airfield and in the Sacramento Central Valley locale.

- Airport Code = MCC
- Coordinates: 38-40-03.5000N/121-24-02.2000W (38.66764/-121.40061)
- Located 6 miles NE of Sacramento, CA.
- Surveyed elevation is 75 feet mean sea level (MSL).
- Fixed position, ground-based emitters are less than 100 feet above ground level (AGL).

Requested Frequencies.

See attachments 1 and 2.

- Attachment 1 contains three hundred (300) target frequencies between 20 – 800 MHz.
 - This spectrum encompasses EW Band designations Alpha 1 + 20 through Charlie 7.
- Attachment 2 contains one hundred (100) target frequencies between 800 – 3000 MHz.
 - This spectrum encompasses EW Band designations Charlie 7 through Echo 10.

Period of Request.

1 July 2008 – 30 June 2009.

Topographical Layout.

Sacramento Central Valley locale; typically less than 200 feet MSL.

Altitudes.

Test signal emitters will be from stationary ground-based antennas. Receiver aircraft altitudes will be 30,000 feet or less.

Times.

Operation 24/7/365 is desired with the understanding that some frequencies and/or operations will be denied or restricted to certain times of day.

Expected Duration per Activity.

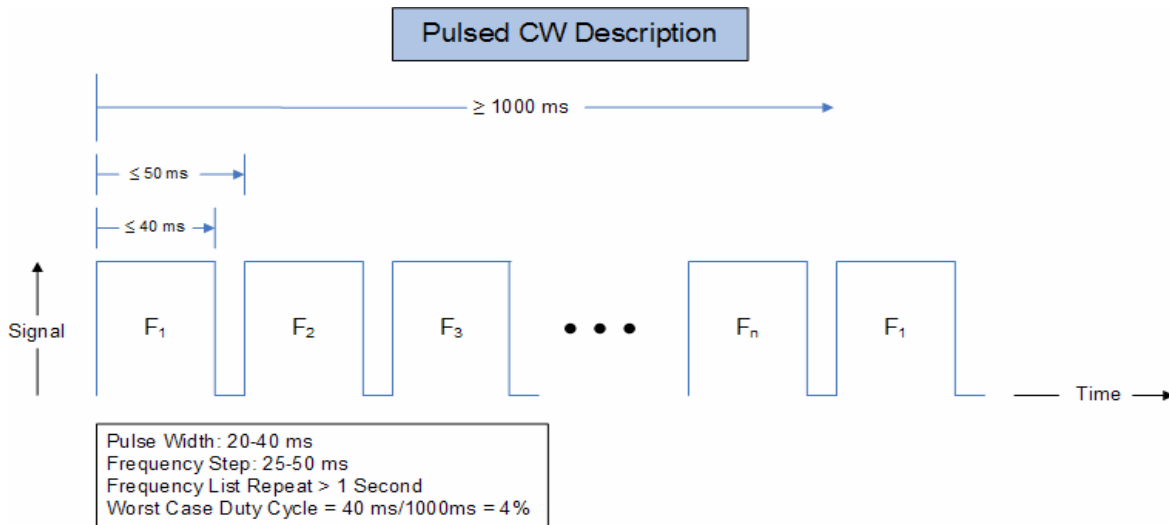
Routine operations are desired. Test flights and test signal transmissions are to be conducted on a frequent and recurring basis. Flight tests are typically four (4) hours or less per sortie.

Transmitter/Antenna Properties (projected).

Frequency Tuning Range (MHz)	Transmit Amplifier Power (P1db)	Cable Losses	Polarization	Nominal Antenna Gain (dBi)	3 db Beamwidth E Plane (degrees)	3 db Beamwidth H Plane (degrees)	Effective Radiated Power
20 - 800	≤ 75 watts (48.7 dBm)	-2 db	Vertical & Horizontal	7.5	65	100	≤ 263 watts (54.2 dBm)
800 - 3000	≤ 80 watts (49.0 dBm)	-3 db	Vertical & Horizontal	7.5	65	100	≤ 224 watts (53.5 dBm)

Calibration Transmit Pulse Description.

Test signal sweep lists will be comprised of a subset of frequencies from the requested frequency ranges noted in attachments 1 and 2. The sweep list transmission will be repeated as the test aircraft executes flight turns. When the aircraft completes the test turn, the sweep list transmission is terminated. Another sweep list is then created with a new subset of frequencies. The transmission and turn processes are then repeated with the new sweep list. The test signal pulse is described below.



Remarks.

Additionally, 360 degree azimuth coverage around the transmit site is requested to maximize the options in choosing flight tracks with the understanding that some azimuths will be denied or restricted to certain times of day.

Daytime Test Frequencies.

See attachment 3.

Daytime Voice Frequencies.

See attachment 4.

References.

1. Chairman of the Joint Chiefs of Staff Manual: Performing Electronic Attack in the United States and Canada for Test, Training, and Exercises. [CJCSM 3212.02B, 15 October 2003]
2. FCC Online Table of Frequency Allocations, Revised on November 16, 2007
3. Experimental Class Radio Authorizations for Plant 42, Site 2 Calibration Facilities (EDW 2004-020a) [Western Area Frequency Coordinator clearance for a related program located in Palmdale, CA.]

ATTACHMENT 1
CALIBRATION FREQUENCIES 20 MHz to 800 MHz

List of frequencies 20 MHz to 800 MHz. The list contains three hundred (300) frequencies spaced roughly evenly throughout the requested spectrum. Modulation will be Continuous Wave (CW) only. Frequencies are in MHz. If a listed frequency is denied or excluded, a replacement adjacent frequency is requested.

20.00	33.15	54.95	91.15	151.05	190.50	309.50	513.20
20.25	33.60	55.70	92.35	153.05	191.00	313.65	520.10
20.50	34.05	56.45	93.60	155.10	191.50	317.85	527.05
20.75	34.50	57.20	94.85	157.20	194.05	322.10	534.10
21.05	34.95	57.95	96.10	159.30	196.65	326.40	541.25
21.35	35.40	58.75	97.40	161.45	199.30	330.75	548.50
21.65	35.85	59.55	98.70	163.60	201.95	335.20	555.85
21.95	36.35	60.35	100.00	165.80	204.65	339.70	563.30
22.25	36.85	61.15	101.35	168.00	207.40	344.25	570.85
22.55	37.35	61.95	102.70	170.25	210.20	348.85	578.50
22.85	37.85	62.80	104.10	172.55	213.00	353.50	586.25
23.15	38.35	63.65	105.50	174.85	215.85	358.25	594.10
23.45	38.85	64.50	106.90	177.20	218.75	363.05	602.05
23.75	39.35	65.35	108.35	179.55	221.70	367.90	610.10
24.05	39.90	66.25	109.80	180.50	224.65	372.85	618.30
24.35	40.45	67.15	111.25	181.00	227.65	377.85	626.60
24.70	41.00	68.05	112.75	181.50	230.70	382.90	635.00
25.05	41.55	68.95	114.25	182.00	233.80	388.05	643.50
25.40	42.10	69.85	115.80	182.50	236.95	393.25	652.10
25.75	42.65	70.80	117.35	183.00	240.15	398.50	660.85
26.10	43.20	71.75	118.90	183.50	243.35	403.85	669.70
26.45	43.80	72.70	120.50	184.00	246.60	409.25	678.65
26.80	44.40	73.65	122.10	184.50	249.90	414.75	687.75
27.15	45.00	74.65	123.75	185.00	253.25	420.30	696.95
27.50	45.60	75.65	125.40	185.25	256.65	425.95	706.30
27.85	46.20	76.65	127.10	185.50	260.10	431.65	715.75
28.20	46.80	77.70	128.80	185.75	263.60	437.45	725.35
28.60	47.45	78.75	130.55	186.00	267.15	443.30	735.05
29.00	48.10	79.80	132.30	186.25	270.75	449.25	744.90
29.40	48.75	80.85	134.05	186.50	274.40	455.25	754.90
29.80	49.40	81.95	135.85	186.75	278.10	461.35	765.00
30.20	50.05	83.05	137.65	187.00	281.85	467.55	775.25
30.60	50.70	84.15	139.50	187.50	285.65	473.80	785.65
31.00	51.40	85.30	141.35	188.00	289.50	480.15	800.00
31.40	52.10	86.45	143.25	188.50	293.40	486.60	
31.80	52.80	87.60	145.15	189.00	297.35	493.10	
32.25	53.50	88.75	147.10	189.50	301.35	499.70	
32.70	54.20	89.95	149.05	190.00	305.40	506.40	

ATTACHMENT 2
CALIBRATION FREQUENCIES 800 MHz to 3000 MHz

List of frequencies 800 MHz to 3000 MHz. The list contains one hundred (100) frequencies spaced roughly evenly throughout the requested spectrum. Modulation will be Continuous Wave (CW) only. Frequencies are in MHz. If a listed frequency is denied or excluded, a replacement adjacent frequency is requested.

810.70	1130.70	1577.15	2199.85
821.55	1145.85	1598.30	2229.35
832.55	1161.20	1619.70	2259.20
843.70	1176.75	1641.40	2289.45
855.00	1192.50	1663.40	2320.15
866.45	1208.50	1685.70	2351.25
878.05	1224.70	1708.30	2382.75
889.80	1241.10	1731.20	2414.70
901.70	1257.75	1754.40	2447.05
913.80	1274.60	1777.90	2479.85
926.05	1291.70	1801.70	2513.10
938.45	1309.00	1825.85	2546.80
951.05	1326.55	1850.30	2580.95
963.80	1344.35	1875.10	2615.55
976.70	1362.35	1900.25	2650.60
989.80	1380.60	1925.70	2686.10
1003.05	1399.10	1951.50	2722.10
1016.50	1417.85	1977.65	2758.60
1030.10	1436.85	2004.15	2795.55
1043.90	1456.10	2031.00	2833.00
1057.90	1475.60	2058.20	2870.95
1072.10	1495.35	2085.80	2909.40
1086.45	1515.40	2113.75	2948.40
1101.00	1535.70	2142.05	2987.90
1115.75	1556.30	2170.75	3000.00

ATTACHMENT 3
DAYTIME TEST FREQUENCIES.

Daytime use frequencies 20 MHz to 500 MHz. Modulation will be Continuous Wave (CW), Amplitude Modulated (AM) or Frequency Modulated (FM). AM and FM modulations may not exceed 42 kHz bandwidth. The facilities will transmit for less than one (1) second and remain off for at least thirty two hundred msec (3.2 seconds) before transmitting on the same authorized frequency for normal operation. See the requested frequencies listed below. An additional thirty (30) frequencies are requested spaced between 500 and 800 MHz. Frequencies are in MHz. If a listed frequency is denied or excluded, a replacement adjacent frequency is requested.

20.050	150.000
20.540	152.020
22.310	161.779
25.410	175.410
26.660	185.290
27.480	195.650
30.750	205.080
35.810	214.000
37.110	226.210
40.040	239.700
45.060	253.258
49.510	271.689
52.920	297.450
62.490	312.530
77.810	335.250
79.970	350.250
83.970	370.000
91.830	390.000
105.800	409.919
108.670	440.059
110.430	459.889
113.650	470.000
116.040	480.000
120.020	495.000
122.940	499.970

ATTACHMENT 4 DAYTIME VOICE FREQUENCIES

Northrop Grumman may request frequencies to be used with normal voice modulation during the day if approved with 30 minutes advance notice. An additional six (6) frequencies are requested between 500 and 800 MHz. Frequencies are in MHz. If a listed frequency is denied or excluded, a replacement adjacent frequency is requested.

23.703
32.175
72.400
123.200
143.425
173.000
228.600
289.175
399.000
429.500

Test frequencies requested for use for up to 30 minutes continuous with no modulation. If a frequency is denied or excluded, an adjacent frequency is requested.

123.200
228.600
289.175
309.750
399.000