

Discussion Regarding Antenna Registration #1

Ground-Based Transmissions
Originating From Litchfield Antenna Range

The frequencies specified at Antenna Registration #1 relate to BAE Systems' proposed ground-based transmissions to be initiated from BAE Systems' Litchfield Antenna Test Range. With respect to these ground-based transmissions, the following is noted:

I. Requested Area of Operation for Ground-Based Transmissions

The Litchfield Antenna Test Range is comprised of multiple separate testing locations on the BAE SYSTEMS campus at which the subject experiment may be conducted. In addition, depending on the particular requirements of the experiment (i.e., when generating signals at zero degree elevation), it may be necessary to move a given antenna along the bore site line on the range up to a distance of 100 feet.

Accordingly, in order to accommodate these requirements, by this application, BAE SYSTEMS is requesting authority to operate all of the specified ground-based transmissions within a 1,500 foot radius from the centerpoint geographic coordinates identified in the Application (i.e., 42-48-22 N.Lat.; 071-25-33 W.Long. [NAD 83]).

Commission approval of such area of operation will provide BAE SYSTEMS with the flexibility it requires to move the specified test equipment to any appropriate testing location on the Litchfield Antenna Test Range during the authorized term of operation, in response to the requirements of the experiment.

II. Categories of Ground-Based Transmissions

As discussed below, these ground-based transmissions are comprised of:

- "Ground-Based CW Transmissions"
- "Ground-Based FM Data Transmissions"
- "Ground-Based Data-Link (Uplink) Transmissions"

A. Ground-Based CW Transmissions

1. Ground-Based CW Transmissions Directed At Target Aircraft

a. The first type of Ground-Based CW Transmissions are ground-based CW transmissions that will be initiated at BAE Systems' Litchfield Antenna Range and directed at target aircraft. The flight paths of the target aircraft are specified at Exhibit 4.

b. The Output Power and ERP for these transmissions are proposed to be 5W, reported as a "Mean" value. In this regard, the transmitter will cycle through the frequency list in groups of 10 frequencies and be turned on for 100 msec per frequency (with a peak power of 50 W per frequency when turned on) with a duty cycle per frequency of 10%. Because the transmit power will be reduced to zero when not turned on, mean power is therefore a more accurate representation of the applicant's proposed activity.

c. Emissions designator is "NON" for these transmissions.

2. Ground-Based CW Transmissions Directed at Full-Scale Models

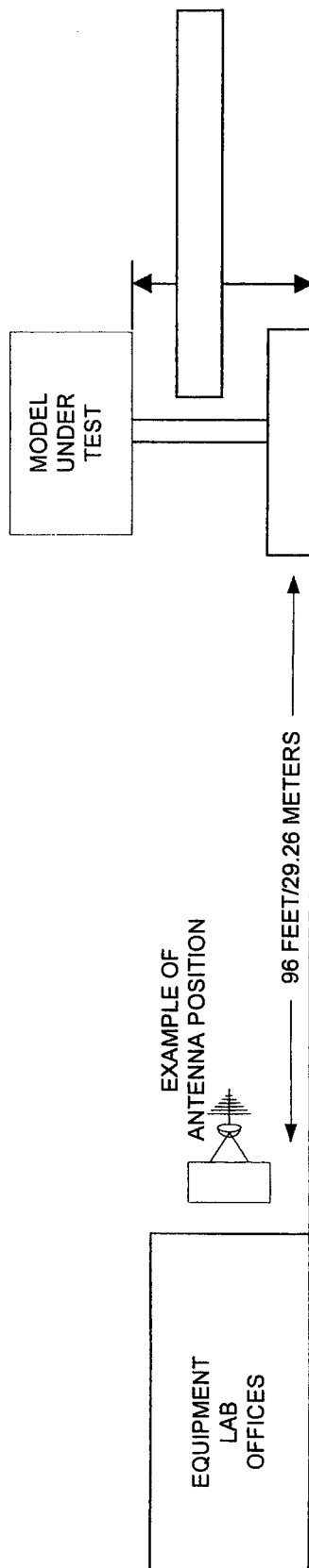
a. The second type of Ground-Based CW Transmissions are ground-based CW transmissions that will be initiated at BAE Systems' Litchfield Antenna Range and be directed at full-scale model aircraft also located at the Litchfield Antenna Range.

b. The purpose of these transmissions is to measure individually the performance of full-scale antennas of various types (i.e., loop, monopole, dipole), and measure the performance of the antennas on a full-scale aircraft replica. The target model aircraft may be utilized while resting at ground level or resting on a platform raised no higher than 12.5 feet above ground level, with a transmit distance of no more than 100 feet (see figure attached hereto).

c. The Output Power and ERP for these transmissions are proposed to be .007W, reported as a "Mean" value. The transmitter will not be left on continuously due to the nature of the experiment and the need to physically reposition the model under test between measurements, cycle through frequencies, change elevation angles of the transmit antenna, etc. where the transmit power is reduced to zero. The actual duty cycle of the transmit system is approximately 7%. Mean power is therefore a more accurate representation of the applicant's proposed activity.

d. Emissions designator is "NON" for these transmissions.

**FIGURE ILLUSTRATING GROUND-BASED TRANSMISSIONS
DIRECTED AT FULL-SCALE MODELS**



B. Ground-Based FM Data Transmissions

Each of the FM Data Transmissions to be utilized in this experiment will involve ground-based FM Data transmissions initiated at BAE Systems' Litchfield Antenna Range and directed at target aircraft. The flight paths of the target aircraft are specified at Exhibit 4. The difference between the types of FM Data Transmissions to be utilized is the length of time that the frequencies will be turned on, as described below.

1. "Short-Burst" Ground-Based FM Data Transmissions

a. The first type of Ground-Based FM Data Transmissions are ground-based FM Data transmissions that will involve the transmitter cycling through the frequency list in groups of 10 frequencies and being turned on for *100 msec* per frequency (with a peak power of 50 W per frequency when turned on) with a duty cycle per frequency of 10%. Because the transmit power will be reduced to zero when not turned on, mean power is therefore a more accurate representation of the applicant's proposed activity. The Output Power and ERP for these transmissions are proposed to be 5W, reported as a "Mean" value.

b. Emissions designator is "25K0F3D" for these transmissions, with a 6 kHz modulating frequency.

2. "Sustained Burst" Ground-Based FM Data Transmissions

a. The second type of Ground-Based FM Data Transmissions are ground-based FM Data transmissions that will involve the transmitter cycling through the frequency list in groups of 10 frequencies and being turned on for *1 minute* per frequency (with a peak power of 50 W per frequency when turned on) with a duty cycle per frequency of 10%. Because the transmit power will be reduced to zero when not turned on, mean power is therefore a more accurate representation of the applicant's proposed activity. The Output Power and ERP for these transmissions are proposed to be 5W, reported as a "Mean" value.

b. Emissions designator is "25K0F3D" for these transmissions, with a 6 kHz modulating frequency.

C. Ground-Based Data Link Transmissions Directed at Target Aircraft

1. These ground-based transmissions will be initiated at BAE Systems' Litchfield Antenna Range and be directed at target aircraft within the flight area of operation specified at Exhibit 4. These "uplink" transmissions are for the purpose of determining and monitoring the aircrafts' position, velocity, altitude and other flight information. The TDLC dish can be steered 360° in azimuth and -5° to +85° in elevation.

2. Amplifier output will be 5W and antenna gain will be 26dBic - therefore the output power is reported as 50W "Peak". Emissions designators are "21M4G7D" and "64M0G7D" for these transmissions.

III. Frequency Requirements for Ground-Based Transmissions

The particular frequency requirements of BAE Systems with respect to the proposed Ground-Based Transmissions are set forth below. BAE Systems confirms that it is willing to accept “carve-outs” which reflect these actual frequency requirements:

A. Frequency Requirements for Ground-Based CW Transmissions

<u>Requested Band Or Frequency</u>	<u>Specific Frequency(ies) Required for Experiment</u>
15-29.9 MHz	20.000, 20.100, 20.225, 20.325, 20.425, 20.525, 20.625, 20.655, 20.725, 20.825, 20.925, 21.025, 21.150, 21.250, 21.350, 21.450, 21.575, 21.675, 21.775, 21.900, 22.000, 22.100, 22.225, 22.325, 22.450, 22.550, 22.675, 22.775, 22.900, 23.000, 23.125, 23.250, 23.350, 23.475, 23.600, 23.700, 23.825, 23.950, 24.075, 24.173, 24.175, 24.300, 24.425, 24.550, 24.675, 24.800, 24.925, 25.050, 25.175, 25.300, 25.425, 25.550, 25.675, 25.800, 25.925, 26.075, 26.200, 26.325, 26.450, 26.600, 26.725, 26.850, 27.000, 27.125, 27.250, 27.400, 27.525, 27.658, 27.675, 27.800, 27.950, 28.100, 28.225, 28.375, 28.500, 28.650, 28.800, 28.950, 29.075, 29.225, 29.375, 29.525, 29.675, 29.825 MHz
29.975 MHz	29.975 MHz
30-74.8 MHz	30.000, 30.150, 30.325, 30.475, 30.625, 30.775, 30.850, 30.911, 31.066, 31.221, 31.377, 31.534, 31.692, 31.850, 32.010, 32.175, 32.350, 32.500, 32.675, 32.825, 33.000, 33.150, 33.250, 33.325, 33.500, 33.650, 33.675, 33.750, 33.825, 33.975, 34.000, 34.175, 34.325, 34.500, 34.675, 34.850, 35.025, 35.200, 35.375, 35.550, 35.725, 35.925, 36.100, 36.275, 36.450, 36.625, 36.850, 36.825, 37.000, 37.200, 37.375, 37.550, 37.750, 37.950, 38.125, 38.325, 38.500, 38.700, 38.900, 39.100, 39.275, 39.475, 39.675, 39.875, 40.075, 40.275, 40.475, 40.675, 40.875, 41.100, 41.300, 41.500, 41.700, 41.925, 42.125, 42.325, 42.550, 42.750, 42.975, 43.200, 43.400, 43.625, 43.850, 44.050, 44.275, 44.500, 44.725, 44.950, 45.175, 45.400, 45.625, 45.850, 46.075, 46.300, 46.550, 46.600, 46.775, 47.000, 47.250, 47.475, 47.725, 47.950, 48.200, 48.425, 48.675, 48.925, 49.175, 49.425, 49.600, 49.650, 49.900, 50.150, 50.400, 50.650, 50.925, 51.175, 51.425, 51.675, 51.950, 52.200, 52.450, 52.725, 52.975, 53.250, 53.525, 53.775, 54.050, 54.325, 54.600, 54.875, 55.150, 55.425, 55.700, 55.975, 56.250, 56.525, 56.825, 57.100, 57.375, 57.675, 57.950, 58.250, 58.550, 58.825, 59.125, 59.425, 59.725, 60.025, 60.325, 60.625, 60.925, 61.225, 61.525, 61.850, 62.150, 62.450, 62.775, 63.100, 63.400, 63.725, 64.050, 64.350, 64.675, 65.000, 65.325, 65.650, 65.975, 66.325, 66.650, 66.975, 67.325, 67.650, 68.000, 68.325, 68.675, 69.025, 69.350, 69.700, 70.050, 70.400, 70.750, 71.100, 71.475, 71.825, 72.175, 72.550, 72.900, 73.275, 73.625, 74.000, 74.375, 74.750 MHz

III. Frequency Requirements for Ground-Based Transmissions

A. Frequency Requirements for Ground-Based CW Transmissions, cont.

<u>Requested Band Or Frequency</u>	<u>Specific Frequency(ies) Required for Experiment</u>
75.125 MHz	75.125 MHz
75.2-108 MHz	75.500, 75.875, 76.250, 76.625, 77.025, 77.400, 77.775, 78.175, 78.575, 78.950, 79.350, 79.750, 80.150, 80.550, 80.950, 81.350, 81.775, 82.175, 82.575, 83.000, 83.400, 83.825, 84.250, 84.675, 85.100, 85.525, 85.950, 86.375, 86.800, 87.250, 87.675, 88.125, 88.550, 89.000, 89.450, 89.900, 90.350, 90.800, 91.250, 91.700, 92.150, 92.625, 93.075, 93.550, 94.025, 94.475, 94.950, 95.425, 95.900, 96.400, 96.875, 97.350, 97.850, 98.325, 98.825, 99.325, 99.825, 100.000, 101.000, 102.025, 103.050, 104.075, 105.125, 106.175, 107.225 MHz
108.300 MHz	108.300 MHz
108.5-118.4 MHz	109.375, 111.575, 113.825, 114.950, 116.100, 117.275
118.450 MHz	118.450 MHz
119.625 MHz	119.625 MHz
120.1-129.2 MHz	120.825, 122.025, 123.250, 124.475, 125.725, 126.975 MHz
129.5-135.2 MHz	129.550, 130.825, 133.475, 134.800 MHz
136.150 MHz	136.150 MHz
137-152.885 MHz	137.500, 138.875, 140.275, 141.675, 143.100, 144.525, 145.975, 147.425, 148.900, 150.400, 151.900 MHz
153.400 MHz	153.400 MHz MHz
154-156.515 MHz	154.950, 156.500 MHz
156.81-161.625 MHz	158.050, 159.650, 161.225 MHz

III. Frequency Requirements for Ground-Based Transmissions

A. Frequency Requirements for Ground-Based CW Transmissions, cont.

<u>Requested Band Or Frequency</u>	<u>Specific Frequency(ies) Required for Experiment</u>
162.850 MHz	162.850 MHz
164-173.6 MHz	164.475, 166.125, 167.775, 169.450, 171.150, 172.875 MHz
174-228.6 MHz	174.600, 176.350, 178.100, 179.875, 181.675, 183.500, 185.325, 187.175, 189.050, 190.950, 192.850, 194.775, 196.725, 198.700, 200.700, 202.700, 204.725, 206.775, 208.825, 210.925, 213.025, 215.175, 217.325, 219.500, 221.675, 223.900, 226.150, 228.400 MHz
228.8-328.6 MHz	230.675, 233.000, 235.325, 237.675, 240.050, 242.450, 247.325, 249.800, 252.300, 253.900, 254.825, 257.175, 257.375, 259.950, 262.550, 265.175, 267.825, 270.500, 271.175, 273.200, 275.925, 278.700, 284.300, 287.125, 290.000, 292.900, 295.825, 298.800, 301.775, 304.800, 307.850, 310.618, 310.925, 314.025, 317.175, 320.350, 323.550, 326.775 MHz
330.050 MHz	330.050 MHz
333.350 MHz	333.350 MHz
335.4-454 MHz	336.675, 340.050, 343.450, 346.618, 346.875, 357.400, 360.975, 364.575, 368.225, 371.900, 375.625, 379.375, 383.175, 387.175, 390.875, 391.175, 394.775, 398.725, 402.725, 406.750, 410.825, 414.925, 419.075, 423.275, 427.500, 431.775, 436.100, 440.450, 444.850, 449.300, 453.800 MHz
456-470 MHz	458.325, 462.925, 467.550 MHz
472.225 MHz	472.225 MHz
476.950 MHz	476.950 MHz
481.725 MHz	481.725 MHz
486.525 MHz	486.525 MHz
491.400 MHz	491.400 MHz
496.300 MHz	496.300 MHz
500.000 MHz	500.000 MHz
508-614 MHz	510.000, 520.200, 530-542, 548-554, 563.100, 574.350, 578-584, 585.850, 597.550, 609.500 MHz

III. Frequency Requirements for Ground-Based Transmissions

A. Frequency Requirements for Ground-Based CW Transmissions, cont.

<u>Requested Band Or Frequency</u>	<u>Specific Frequency(ies) Required for Experiment</u>
621.700 MHz	621.700 MHz
626.0-632.0 MHz	626.0-632.0 MHz
634.125 MHz	634.125 MHz
646.825 MHz	646.825 MHz
659.750 MHz	659.750 MHz
662.0-668.0 MHz	662.0-668.0 MHz
672.950 MHz	672.950 MHz
686.400 MHz	686.400 MHz
700.125 MHz	700.125 MHz
714.125 MHz	714.125 MHz
728.425 MHz	728.425 MHz
734.0-740.0 MHz	734.0-740.0 MHz
742.975 MHz	742.975 MHz
757.850 MHz	757.850 MHz
758.0-764.0 MHz	758.0-764.0 MHz
773.000 MHz	773.000 MHz
788.450 MHz	788.450 MHz
794.0-800.0 MHz	794.0-800.0 MHz
800.000 MHz	800.000 MHz
804.225 MHz	804.225 MHz
809-928 MHz	809.975, 820.325, 830.745, 844.395, 858.287, 866.755, 872.385, 893.985, 902.025, 923.800 MHz
940.4-1200 MHz	942.275, 961.125, 980.350, 999.950, 1019.950, 1040.350, 1061.150, 1104.025, 1126.125, 1148.625, 1171.600, 1195.050 MHz
1218.950 MHz	1218.950 MHz
1243.325 MHz	1243.325 MHz
1251-1850 MHz	1268.175, 1293.550, 1319.425, 1345.800, 1372.725, 1400.175, 1428.175, 1456.750, 1485.875, 1515.600, 1525.000, 1545.900, 1559.000, 1576.825, 1608.350, 1626.500, 1640.525, 1673.350, 1706.800, 1740.950, 1775.750, 1811.275, 1849.975 MHz
1863.555 MHz	1863.555 MHz
1890.945 MHz	1890.945 MHz
1909.965 MHz	1909.965 MHz
1910.025 MHz	1910.025 MHz

III. Frequency Requirements for Ground-Based Transmissions

A. Frequency Requirements for Ground-Based CW Transmissions, cont.

<u>Requested Band Or Frequency</u>	<u>Specific Frequency(ies) Required for Experiment</u>
1918.724 MHz	1918.724 MHz
1929.975 MHz	1929.975 MHz
1946.925 MHz	1946.925 MHz
1960.575 MHz	1960.575 MHz
1975.545 MHz	1975.545 MHz
1990.025 MHz	1990.025 MHz
1999.800 MHz	1999.800 MHz
2000.000 MHz	2000.000 MHz
2100.000 MHz	2100.000 MHz
2200-2450 MHz	2200.000, 2300.000, 2430.000 MHz
2500.000 MHz	2500.000 MHz
2533.600 MHz	2533.600 MHz
2536.225 MHz	2536.225 MHz
2586.950 MHz	2586.950 MHz
2609.600 MHz	2609.600 MHz
2638.675 MHz	2638.675 MHz
2655-2700 MHz	2691.450 MHz
2745.275 MHz	2745.275 MHz
2768.600 MHz	2768.600 MHz
2800.175 MHz	2800.175 MHz
2851.600 MHz	2851.600 MHz
2856.200 MHz	2856.200 MHz
2900-4200 MHz	2913.325, 2971.575, 3000.000 MHz

III. Frequency Requirements for Ground-Based Transmissions

B. Frequency Requirements for Ground-Based FM Data Transmissions

The following are the frequency requirements for the Ground-Based FM Data Transmissions, matched with the requested bands on the instant Application.

20.000, 20.655, 24.173, 27.658 MHz

(contained in the Application within the requested 15-29.9 MHz band)

31.250, 31.275, 33.650, 33.675, 33.750, 33.975, 36.850, 41.100, 46.600,
49.600, 53.525, 60.325, 72.900 MHz

(contained in the Application within the requested 30-74.8 MHz band)

83.000, 87.250 MHz

(contained in the Application within the requested 75.2-108 MHz band)

110.475 MHz

(contained in the Application within the requested 108.5-118.4 MHz band)

129.550 MHz

(contained in the Application within the requested 129.5-135.2 MHz band)

164.475

(contained in the Application within the requested 164-173.6 MHz band)

204.725, 226.150 MHz

(contained in the Application within the requested 174-228.6 MHz band)

253.900, 257.175, 265.175, 271.175, 310.618 MHz

(contained in the Application within the requested 228.8-328.6 MHz band)

346.618, 380.250, 387.175, 391.175, 436.100 MHz

(contained in the Application within the requested 335.4-454 MHz band)

530.625, 541.225, 578.000, 584.000 MHz

(contained in the Application within the requested 508-614 MHz band)

626.000 MHz, 632.000 MHz, 662.000 MHz, 668.000 MHz

734.000 MHz, 740.000 MHz, 800.000 MHz

893.985 MHz

(contained in the Application within the requested 809-928 MHz band)

1243.325 MHz

1345.800, 1525.000, 1559.000, 1626.500 MHz

(contained in the Application within the requested 809-928 MHz band)

1909.965 MHz, 2533.600 MHz, 2609.600 MHz

2768.600 MHz, 2851.600 MHz

III. Frequency Requirements for Ground-Based Transmissions

C. Frequency Requirements for Data Link (Uplink) Transmissions

15150-15350 MHz