

**Range 1 (Radome Range) RF Test System  
STA Information for Boeing Auburn**

**Exhibit 1 Summary  
See Descriptions and Drawings for Details**

| Test System               | Location       |  | Frequency Band      | Radiated Power |
|---------------------------|----------------|--|---------------------|----------------|
| Range 1<br>(Radome Range) | 17-80 Building |  | 9.345 and 9.375 GHz | -5 dBm         |
|                           |                |  |                     |                |
|                           |                |  |                     |                |

## **Exhibit 1**

### **Range 1 (Radome Range)**

**Purpose:** Range 1 is an open air test range used to test the operational characteristics of commercial aircraft weather radar radomes. These tests are used to qualify new radome models, verify manufacturing processes or evaluate repairs to damaged radomes. Transmissivity, reflectivity and side lobe characterization are a few of the parameters that can be measured.

**Equipment:** Radomes are mounted on a radome positioner in the 17-80 building. One of the referenced weather radar antennas is also mounted on the positioner and is mechanically linked to always point at the same elevation angle and bearing regardless of the radome positioner orientation. Low level CW signals from calibrated laboratory grade synthesized RF sources are transmitted through the aircraft radome to measure its operational properties. The beam of the weather radar antenna is centered on the bore sight axis of a 2.5 foot parabolic dish receive antenna mounted on a tower 325 feet from the weather radar transmit antenna. A partially wooded wetland owned by Boeing extends an additional 1300 feet beyond the receive antenna tower. The transmit beam boresight ultimately terminates on a hillside approximately 1.0 mile from the transmit antenna.

An equipment list, block diagram and site layout are attached.

**Frequency:** Radomes are tested at two frequencies, 9.345 GHz and 9.375 GHz.

**Power:** Operation of this range with a maximum of -5 dBm radiated power or 0 dBm at the RF source is requested. The RF path loss between the RF source and the transmit antenna is 5 dB minimum.

**Emissions:** The emissions will be CW.

**Mitigation Features:** A partially wooded wetland owned by Boeing extends an additional 1300 feet beyond the receive antenna tower. The transmit beam bore sight ultimately terminates on a hillside approximately 1.0 mile from the transmit antenna.

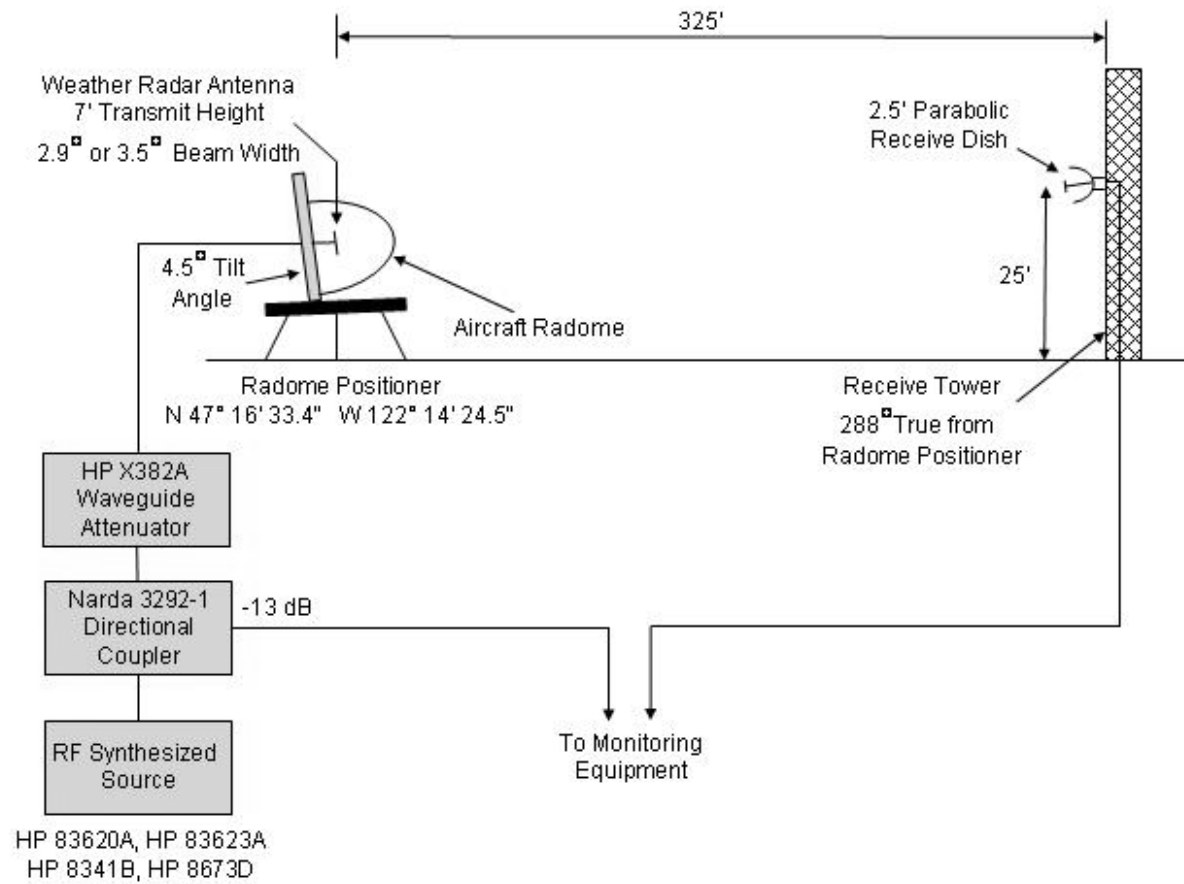
Pictures are attached.

## Attachment 1

### Radome Range Equipment List

| Frequency (GHz) | Efficiency | Gain (dB) | Beam Width (Deg) | Weather Radar Antennas Used on Range 1<br>For our test purposes both antennas are operationally equivalent. |
|-----------------|------------|-----------|------------------|-------------------------------------------------------------------------------------------------------------|
| 9.345           | 0.95       | 34.4      | 3.50             | Rockwell/Collins WFA-701X Flat Plate Antenna                                                                |
| 9.375           | 0.95       | 34.4      | 3.50             |                                                                                                             |
|                 |            |           |                  |                                                                                                             |
| 9.345           | 0.95       | 35.0      | 2.90             | Honeywell/Bendix REA-4B Flat Plate Antenna                                                                  |
| 9.375           | 0.95       | 35.0      | 2.90             |                                                                                                             |
|                 |            |           |                  |                                                                                                             |
|                 |            |           |                  | <b>Other RF Equipment Used</b>                                                                              |
|                 |            |           |                  |                                                                                                             |
|                 |            |           |                  | <b>RF Sources which are used interchangeably:</b>                                                           |
|                 |            |           |                  | Hewlett Packard 83620A (10 MHz - 20 GHz)                                                                    |
|                 |            |           |                  | Hewlett Packard 83623A (10 MHz - 20 GHz)                                                                    |
|                 |            |           |                  | Hewlett Packard 8341B (10 MHz - 20 GHz)                                                                     |
|                 |            |           |                  | Hewlett Packard 8673D (10 MHz - 26.5 GHz)                                                                   |
|                 |            |           |                  |                                                                                                             |
|                 |            |           |                  | <b>Other Components:</b>                                                                                    |
|                 |            |           |                  | Hewlett Packard X281A N-WG Adapters (4 ea.)                                                                 |
|                 |            |           |                  | Hewlett Packard X382A Precision Waveguide Attenuator                                                        |
|                 |            |           |                  | RG-214 Coaxial Cable - 6 feet                                                                               |
|                 |            |           |                  | RG-402 Coaxial Cable - 5 feet                                                                               |
|                 |            |           |                  | X-Band Waveguide - 5 feet                                                                                   |
|                 |            |           |                  | Narda 3292-1 1-18 GHz Directional Coupler                                                                   |
|                 |            |           |                  |                                                                                                             |
|                 |            |           |                  | <b>Transmitter Information:</b>                                                                             |
|                 |            |           |                  | 17-80 Building, Auburn, WA                                                                                  |
|                 |            |           |                  | Lat/Lon: N 47° 16' 33.4" W 122° 14' 24.5"                                                                   |
|                 |            |           |                  | Antenna Height: 7 feet                                                                                      |
|                 |            |           |                  | Beam Direction: 288° True                                                                                   |
|                 |            |           |                  | Beam Elevation Angle: 4.5°                                                                                  |
|                 |            |           |                  | Signal Modulation: CW                                                                                       |
|                 |            |           |                  | Bandwidth: CW                                                                                               |
|                 |            |           |                  | Maximum RF Source Power: 0 dBm                                                                              |
|                 |            |           |                  | Transmission Line Loss: 5 dB                                                                                |
|                 |            |           |                  | Maximum Power at Antenna Input: -5 dBm                                                                      |

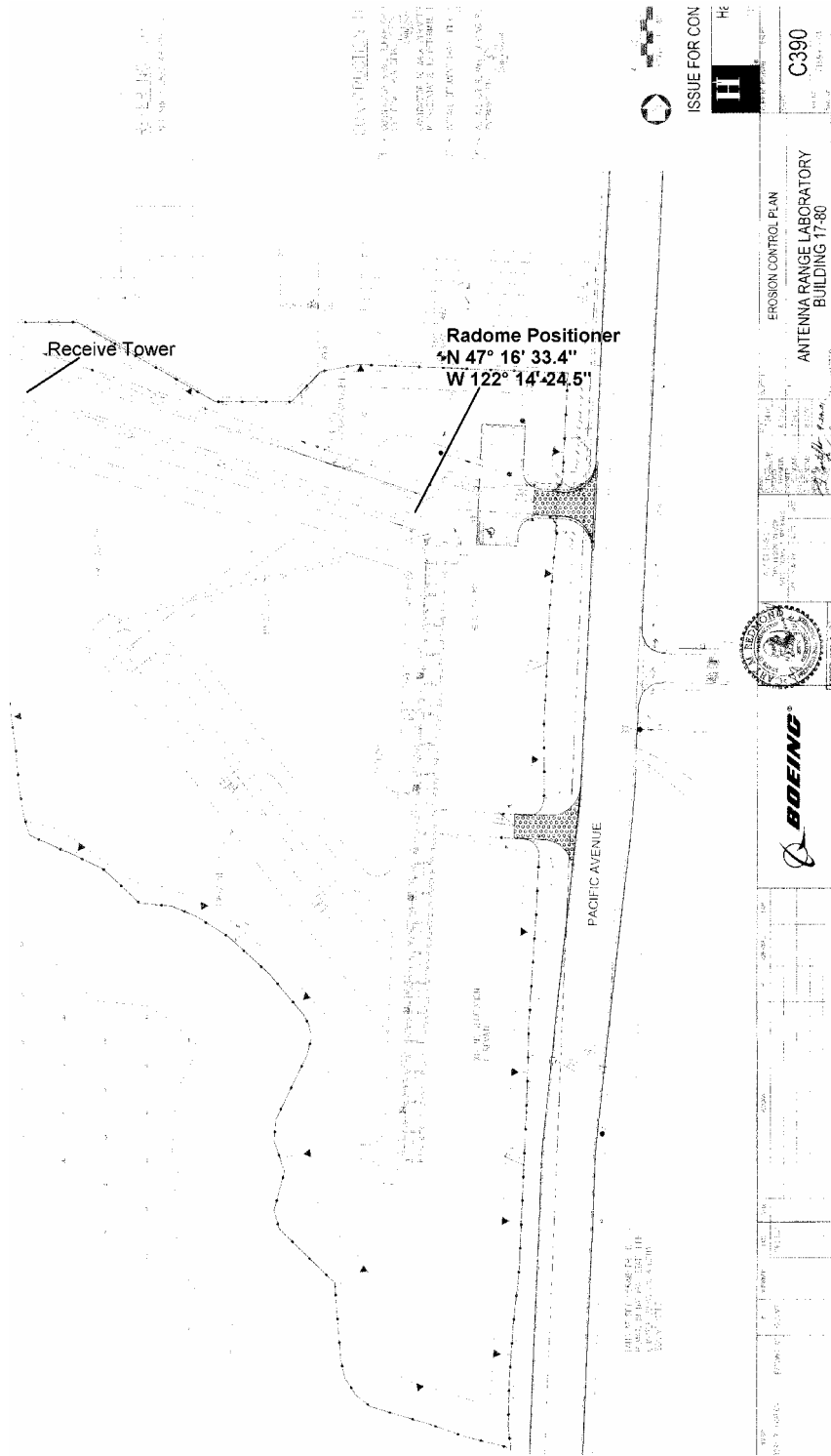
## Attachment 2



**Auburn Radome Range Block Diagram**

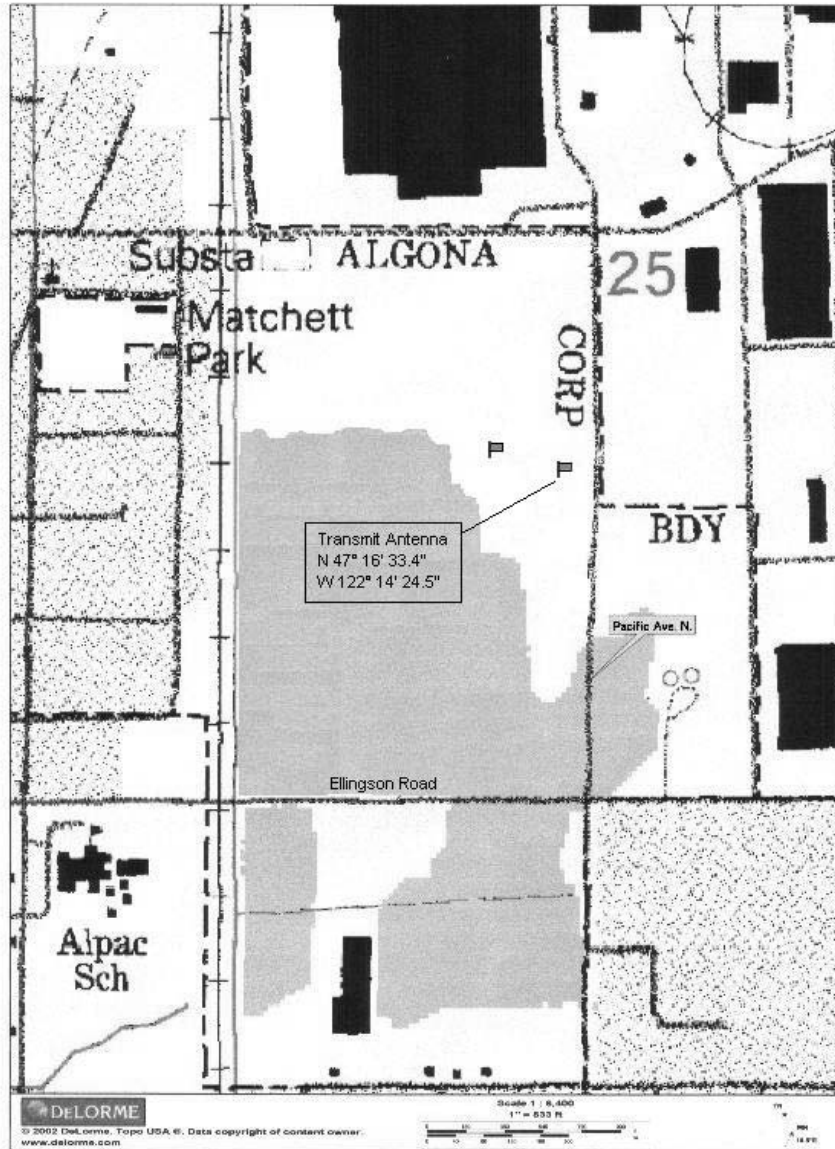
# Attachment 3

## Site Layout



## Attachment 4

### Site Map



## **Attachment 5**

### **Radome Positioner**



## Attachment 6

### Receive Tower and Topography

