

## Technical Description

Submitted by Joel Thorsheim on behalf of Insitu  
The Boeing Company  
Frequency Management Services  
P.O. Box 3707 MC: 2T-22  
Seattle, WA 98124-2207  
206-544-6066 Office  
206-662-0701 Fax

### Dates of Operation:

Start Date: 23 October 2015  
Stop Date: 28 February 2016

### Equipment and Frequency Requirements

#### Command and Control Uplink from Ground Station to UAS

Frequency Band: 902-928 MHz  
Channels/Spacing: Frequency hopping; 50 to 112 center frequencies, user selectable, 112 channels in 230.4 KHz increments starting with 902.2464 MHz  
Emission: 230KF1D  
Transmit Output: 1 Watt  
Output Power: 61 Watts ERP  
Manufacturer: Freewave Technologies  
Model: FGRM-501X005  
Antenna Gain: 20 dB  
Antenna Type: 1.8 Meter Parabolic Reflector  
Ant. Vert. Beamwidth: 15 degrees  
Ant. Horz. Beamwidth: 15 degrees

#### Mobile Command and Control Downlink from UAS to Ground Station

Frequency Band: 902-928 MHz.  
Channel Spacing: Frequency hopping; 50 to 112 center frequencies, user selectable, 112 channels in 230.4 KHz increments starting with 902.2464 MHz  
Emissions: 230KF1D  
Transmit Output: 1 Watt  
Output Power: 1 Watt ERP  
Manufacturer: Freewave Technologies  
Model: FGRM-501X005  
Antenna Gain: 0 dB  
Antenna Type: Center-Fed Half-Wave Dipole (Vertical)

#### Mobile Video Downlink from UAS to Ground Station

Frequencies: 2411, 2434, 2453, 2463, 2473, and 2486 MHz  
Emissions: 18M0F9W and 16M0F3F  
Transmit Output: 2 Watts  
Output Power: 1.22 Watt ERP  
Manufacturer/Model: L-3 Southern California Microwave/VNTX Series  
Manufacturer/Model: Global Microwave Systems/NT series  
Antenna Gain: 0 dB  
Antenna Type: Dipole

#### Transponder

Manufacturer/Model: Sagetech Corporation  
Model Part Number: 400-819506R00  
Modes: 3/A/C  
Frequency: 1090 MHz  
Emissions: 11M0M1D

Transmit Output: 175 Watts Peak  
Output Power: 107 Watts ERP  
Antenna Gain: 0 dB  
Antenna Type: Monopole  
Pulse Rate: 1.0 Mpps  
Pulse Width: 0.45 usec +/- 0.1 usec  
Pulse Rise Time: 0.05 usec to 0.1 usec  
Pulse Fall Time: 0.05 usec to 0.2 usec

Stop buzzer for this operation is Insitu Operations Action Center at 866-637-4691.

**Ground Control Station Locations**

City and State: Taiban, New Mexico  
Latitude and Longitude: 34-29-36 N 104-0-23 W  
Radius of Operation: Fixed within 2 kilometers

City and State: Mountainair, New Mexico  
Latitude and Longitude: 34-30-24 N 106-11-51 W  
Radius of Operation: Fixed within 2 kilometers

**Mobile UAS Location**

City and State: Fort Sumner to Mountainair, New Mexico  
NW Corner N34°48'00.00", W106°35'60.00"  
SW Corner N34°18'00.00", W106°36'00.00"  
SE Corner N34°18'0.00", W103°54'0.00"  
NE Corner N34°48'0.00", W103°54'0.00"  
Radius of Operation: See above Lat/Long  
Flight Level: 1,200 ft AGL