TEXTRON Systems

**August 02, 2021**

**Federal Communications Commission**
**445 12th Street SW**
**Washington, DC 20554**
**(316) 821-9516**

**Title: STA License Request for UAS Testing at Yuma, AZ**

**Application File Number:** **1691-EX-ST-2021**
**Confirmation Number:** **EL718831**

Dear FCC,

This request for Special Temporary Authority (STA) is submitted pursuant to 47 CFR 5.61 to request authorization to perform a series of flight tests for evaluation of an Unmanned Air System (UAS) produced by Textron Systems. The proposed operations are planned from around November 29 2021 through May 27 2022, at Yuma Proving Ground (YPG) in Yuma, Arizona.

Frequency coordination with YPG Spectrum Management Office has been initiated. Local frequency assignments will be controlled by YPG personnel based on FCC issued band licenses herein requested.

Derek Landry, CIV, US ARMY
Spectrum Management Office
Yuma Proving Ground
928-328-7146

This document provides additional information relevant to the application and is provided as an attachment to the online application.

Stop Buzzer Contact
Jane Euting
(410) 628-5722

Kind Regards,

Mark Stoufflet
Bell Frequency Coordinator
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PURPOSE:

Textron Systems, in coordination with YPG, plans a series of performance test flights of the model A5000, an Unmanned Air System (UAS) that makes use of a hybrid architecture of proven technology. This hybrid architecture is from three Textron Systems UAS platforms; Shadow M2, Shadow 200 and Aerosonde. Key technologies/systems include the M2 airframe, Shadow 200 flight controller and the Aerosonde datalinks and ground control system. Planned testing at YPG focuses on completing the integration efforts necessary to qualify the hybrid system utilizing an iterative approach to ensure flight safety and system performance.

There are other Radio Frequency (RF) transmissions associated with this program; however, those are requested in separate STA FCC requests. This request pertains to the primary datalink which is a Tactical Common Data Link (TCDL).

The STA is to allow for the normal operations of the UAS, which includes but is not limited to:

- Evaluate engine performance
- Evaluate taxi and brake performance
- Evaluate the Air Data System (ADS)
- Evaluate automated takeoff and landing performance
- Verify the Air Vehicle's flight ceiling
- Verify the endurance of the AV

**Expected Dates of Operation:**
Based on receipt of FCC license approval but targeting 08/09/2021 to 12/02/2021.

**Location:**
Yuma Proving Ground
Yuma, AZ 85365
301 C Street
Test Area Center Point: 33° 21' 11.4" N, 114° 16' 37.6" W (33.353159N -114.277104E)
Requested Operation Radius: 50 km
Maximum Height Above Ground of Air Vehicle: 18,000 ft MSL

The closest airport is Yuma Proving Grounds - Laguna Army Airfield at 34.25 miles (55 km).

Testing will be confined within a radius of 50 km centered at WGS 84 coordinates of Latitude 33° 21' 11.4" N and Longitude 114° 16' 37.6" W at a flight elevation not to exceed 18,000 ft MSL (5500 m MSL). Figure 1 below shows a map view of the test location with 25 km and 50 km operations bands shown as red circles. The ground control station transceiver is located at the center point (Latitude 33° 21' 11.4" N and Longitude 114° 16' 37.6" W) at an elevation of 422 ft (129 m) MSL.

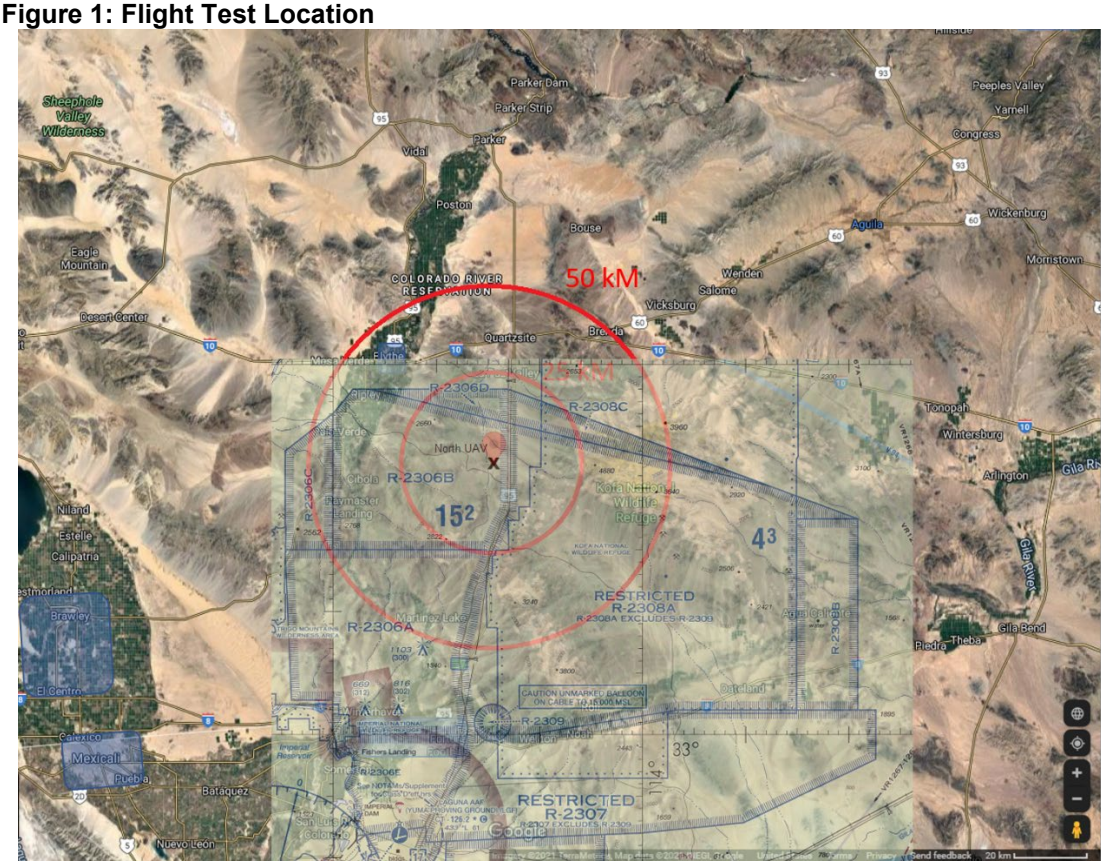
All flight operations and test day frequency assignments are coordinated with YPG. All frequencies being used are under the control of YPG who will be managing all deconflictions

of frequencies and airspace for the period of this test event. For this Engineering Test, the A5000 AV will utilize Shadow 200 GCE and (Tactical Common Datalink) TCDL datalinks and perform the following flight cards:

- High Speed Taxi
- Shakedown
- All Modes
- ADS Evaluation with Air Data BoomAirspeed Calibration Data Collection
- Airspeed Calibration Verification
- Automated Takeoff/Landing
- Flight Ceiling Test
- Endurance Flight – High Weight
- Endurance Flight – Low Weight

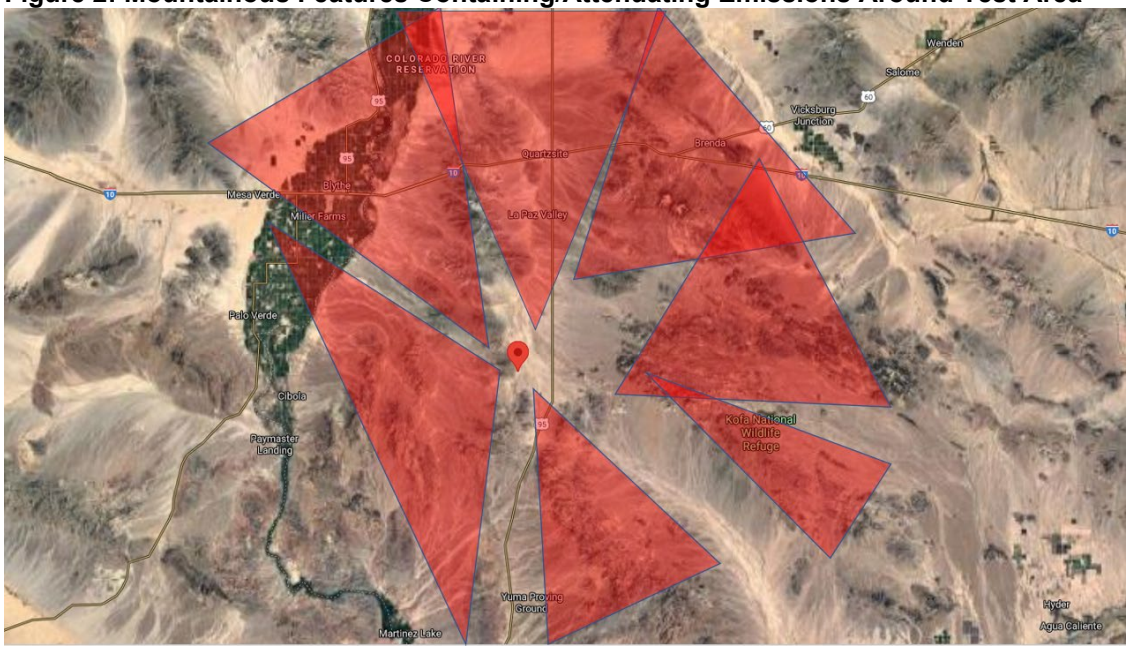
The frequencies and range (50 km) requested by this STA are required for the normal operation and execution of these flights. All antennas marked as “Mobile” in the STA application will be part of the air vehicle under test.

**Figure 1: Flight Test Location**



Mountainous features, indicated by the red shades areas in figure 2, surround the test area and serve to contain the uplink transmissions and attenuate the downlink transmissions. These natural features, along with YPG controlling frequency assignments, aid in frequency deconfliction.

**Figure 2: Mountainous Features Containing/Attenuating Emissions Around Test Area**




**Equipment:**

Table 1 lists all relevant test equipment.

**Table 1: Test Equipment**

| Location | Manufacturer | Model Number | Function | No. of Units |
|---|---|---|---|---|
| UAS | L3 Technologies | 1000442810 | Video Transmitter (2.2-2.3 GHz) | 1 |
| UAS | Shine Micro | SA161-MH | Identification Data Receiver | 1 |
| UAS | Nuwaves | 6030-06-01 | Blade Antenna | 1 |
| UAS | Shakespeare | 5912 | VHF Antenna | 1 |
| Ground | L3 Technologies | 1000442810 | Video Receiver (2.2-2.3 GHz) | 1 |
| Ground | Pharad, LLC | MP-800-1900 | Omni Directional Antenna | 1 |

**Transmitted Frequencies:**

The downlink direction is from the air vehicle to the Ground Control Station (GCS) and uses a YPG assigned frequency in the range of 2.2 – 2.3 GHz with the list of emission designators indicated below. Although only one frequency for the downlink transmissions is needed, Textron Systems is requesting band licenses within these stated ranges such that the YPG is in control of frequency deconfliction and frequency transmission assignments.

The following emission designators are used for test:

- 4M79G1D, at 2.2 – 2.3 GHz



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**Test Configuration:**

Figure 3 illustrates the concept of the four-antenna data link architecture. The primary data link (TCDL) is a full duplex link consisting of an independent uplink and downlink. The uplink configuration uses a ground based directional antenna and the airborne omni antenna located at the nose of the air vehicle. The downlink configuration uses an omni antenna located at the tail of the air vehicle which is received by an omni antenna located at the GCS. Each link consists of separate hardware and there is no antenna switching involved.

**Figure 3: Ground Station and Airborne Antenna Architecture Concept**

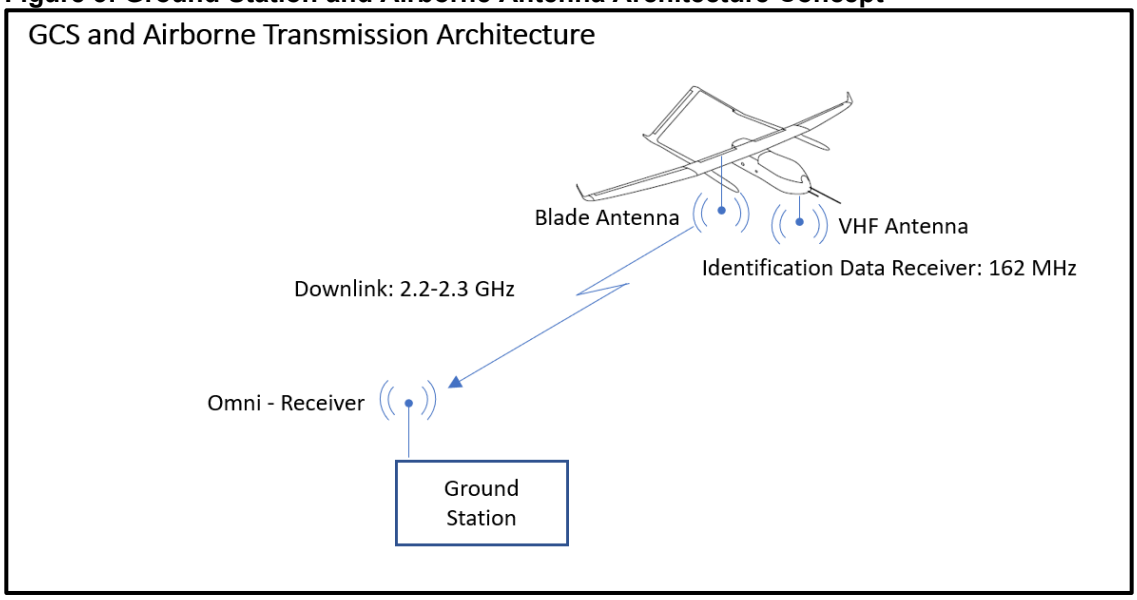
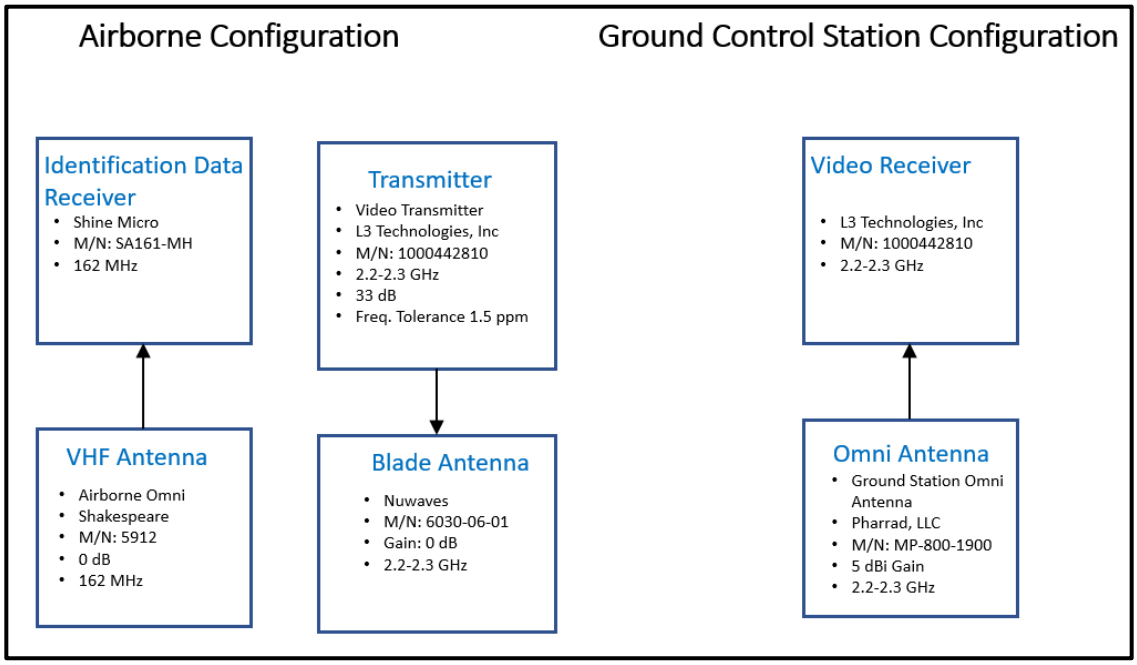


Figure 4 illustrates the airborne and ground station configuration.

**Figure 4: Airborne and Ground Station Configuration**



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Kind Regards,

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