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| Applicant: | National Test Pilot School |
| File Number: | 0224-EX-PL-2013 |

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The National Test Pilot School (NTPS) required an Unmanned Aerial Vehicle (UAV) to serve as a flight test instructional device. With few exceptions, UAVs cannot currently be operated in the National Airspace System (NAS) and are platforms that require extensive training for safe operation. Consequently, a Cessna 150 (Figure 1) was converted into a surrogate unmanned aerial vehicle (SUAV). The SUAV will always have a certified airplane pilot on-board who can deactivate the ground-controlled autopilot system at any moment. The aircraft was modified to be remotely operated using the Cloud Cap Piccolo II autopilot. The Piccolo autopilot allows the system to be controlled via Command Directed (CD) mode or in a Remotely Piloted Vehicle (RPV) mode. The SUAV system is currently configured to control the elevator, ailerons, and throttle from the Ground Control Station (GCS), shown in Figure 2. An Electro Optic/Infrared gimbal is currently being integrated onto the SUAV in the future to enhance the flight test training for systems evaluations. The SUAV was certified by the Federal Aviation Administration (FAA) as an optionally piloted aircraft (OPA) in August of 2010.



Figure 1 – Cessna 150



Figure 2 – GCS

The aircraft will be based at the National Test Pilot School, 1030 Flight Line Hangar 72, Mojave, CA, 93502. All flights are authorized by the FAA within a 40 nm radius area (containment area) as identified in Figure 3. This SUAV must be operated to avoid areas having heavy air traffic, and when operated in the vicinity of villages, towns, cities or other populated areas. The pilot must plan routing that will avoid densely

populated areas and congested airways. The majority of operations will take place in the Isabella military operating area (MOA).

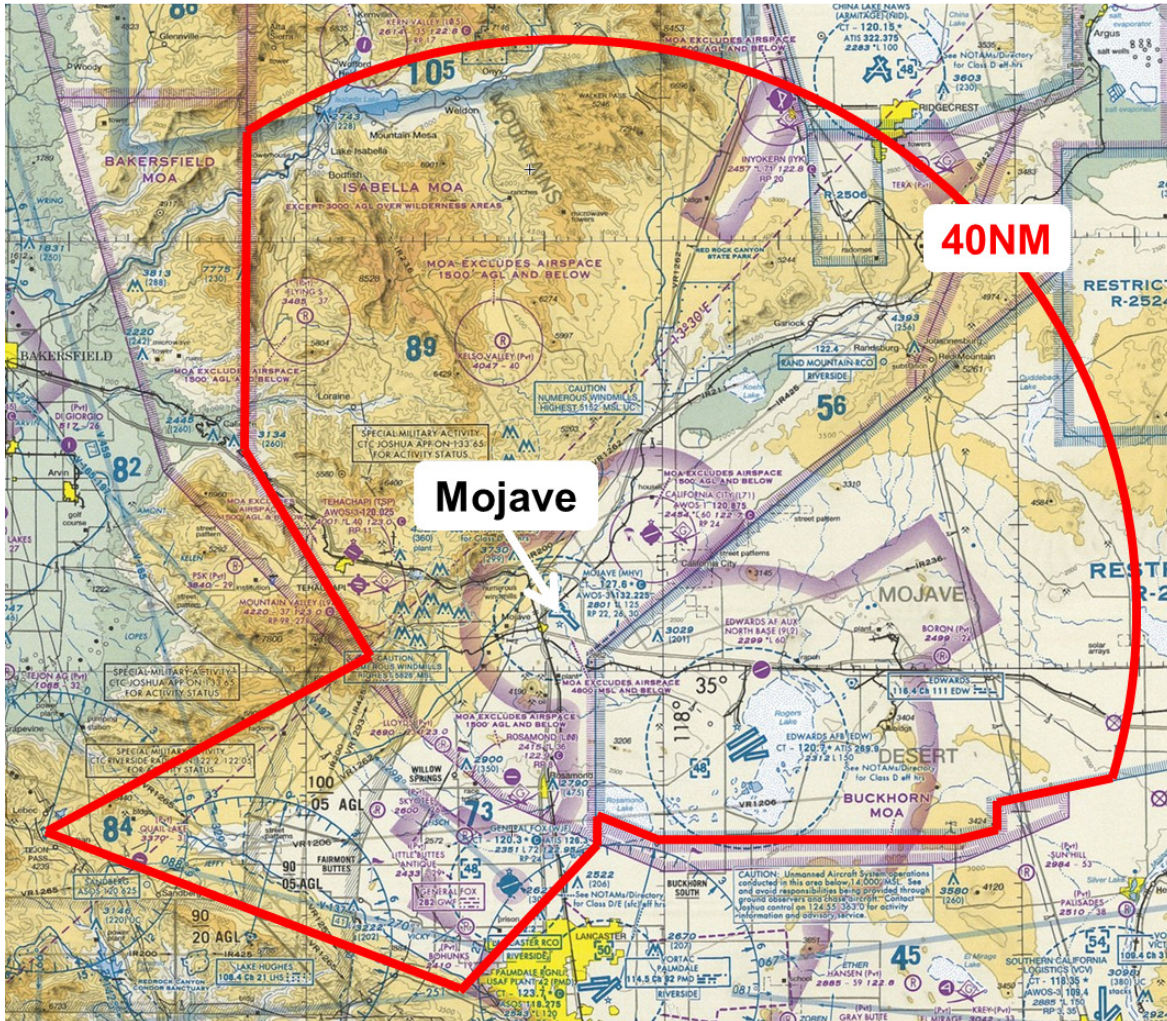


Figure 3 – SUAV Operating Area

The FCC previously granted a license to the National Test Pilot School (Call Sign:WF2XLJ File Number:0276-EX-PL-2010) for the SUAV. This license allowed use of a 10W 2.4GHz analog video transmitter onboard the aircraft. This system was found to provide an unacceptably short range for video transmission and removed from the aircraft and replaced with a Microhard VIP5800 5.8GHz digital data link. The 5.8 GHz radio provided increased range but is still too short for our needs. To increase this range we will install a L-Com HA5805 5W amplifier on the data link transceivers which will give the system a calculated 10 watt EIRP on the aircraft, and up to a 251 watt EIRP on the ground transceiver with a directional antenna. A block diagram of the updated system is shown in Figure 4 with a placeholder for the amplifier highlighted in red.

The antenna mounted on the Cessna 150 aircraft will be an omnidirectional antenna with a 3 dB gain. The ground station will initially use a L-Com HG5817Y-NF directional Yagi antenna with a 17 dB gain. The antenna is mounted on a rotator that is controlled by tracking software so that it is always pointing at the aircraft. The antenna beam width is 30 degrees horizontal and 25 degrees vertical. This will provide a 251 watt ERIP.

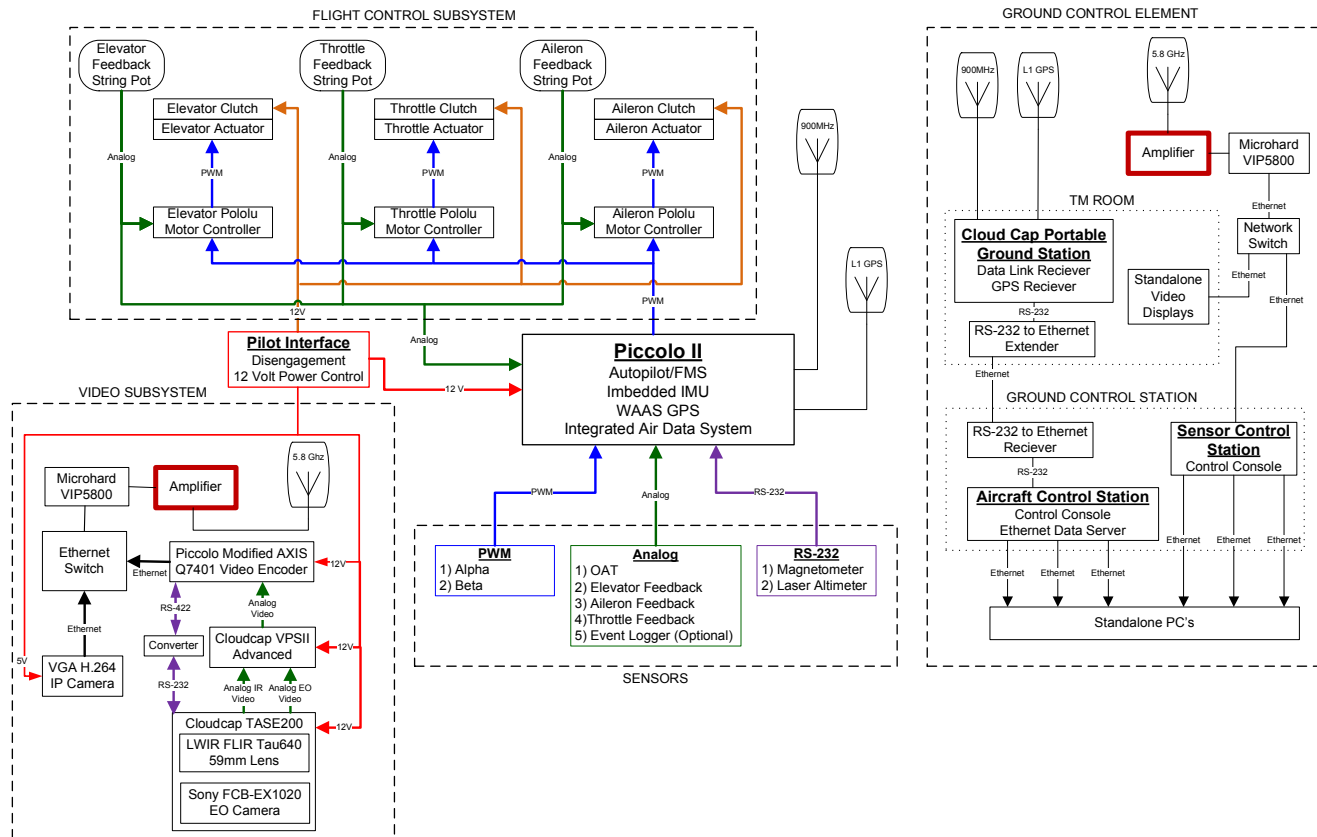


Figure 4- SUAV Block Diagram with proposed amplifier highlighted in red

The video link of interest is used transmits the signal from the forward looking IP camera mounted above the pilot's seat which provides situational awareness to the operator on the ground. It also transmits video from the video gimbal mounted on the left wing and receives commands to rotate the gimbal from the control station on the ground.

The ground station instructor in the GCS will maintain continuous verbal contact with the pilot aboard the SUAV via the aircraft's dual King Kx 125 NAVCOM Very High Frequency (VHF) radios. If any interference is observed, the ground station instructor will verbally command the pilot to shut down power to the system. The ground station instructor will be an instructor at the National Test Pilot School [1030 Flight Line, Bldg. 72 Mojave, CA 93502 (661)824-2977].

Previously we have been granted 5 year licenses for 900 MHz frequencies. The SUAV system was previously granted a 2 year license for the 2.4GHz 10W analog video datalink. The 5.8 GHz system will continue to be utilized and developed over time and therefore we have requested a 5 year license.

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