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Applicant:	National Test Pilot School
File Number:	0508-EX-CN-2020

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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 an Optionally Piloted Aircraft (OPA). The C-150 OPA is required to have a certified airplane safety 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 OPA system is currently configured to control the elevator, ailerons, and throttle from the Ground Control Station (GCS), shown in Figure 2. A CloudCap/Collins TASE 200 Electro Optic/Infrared gimbal is currently integrated onto the SUAV to enhance the flight test training for systems evaluations. The C150 was certified by the Federal Aviation Administration (FAA) as an optionally piloted aircraft in August of 2010.

Figure 1 – Cessna 150

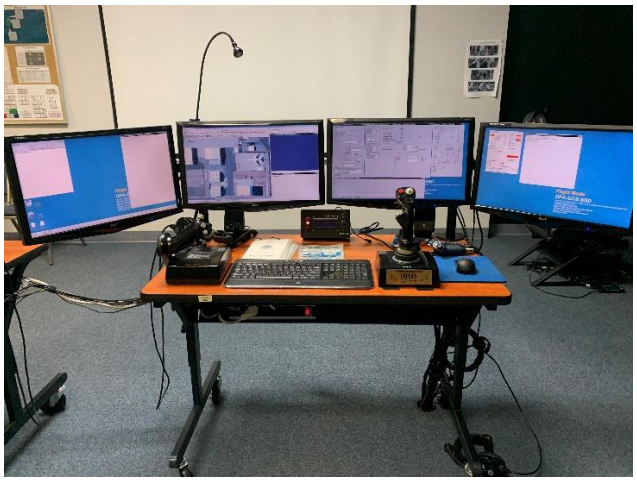

Figure 2 – GCS Station

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 OPA 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 GCS 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).

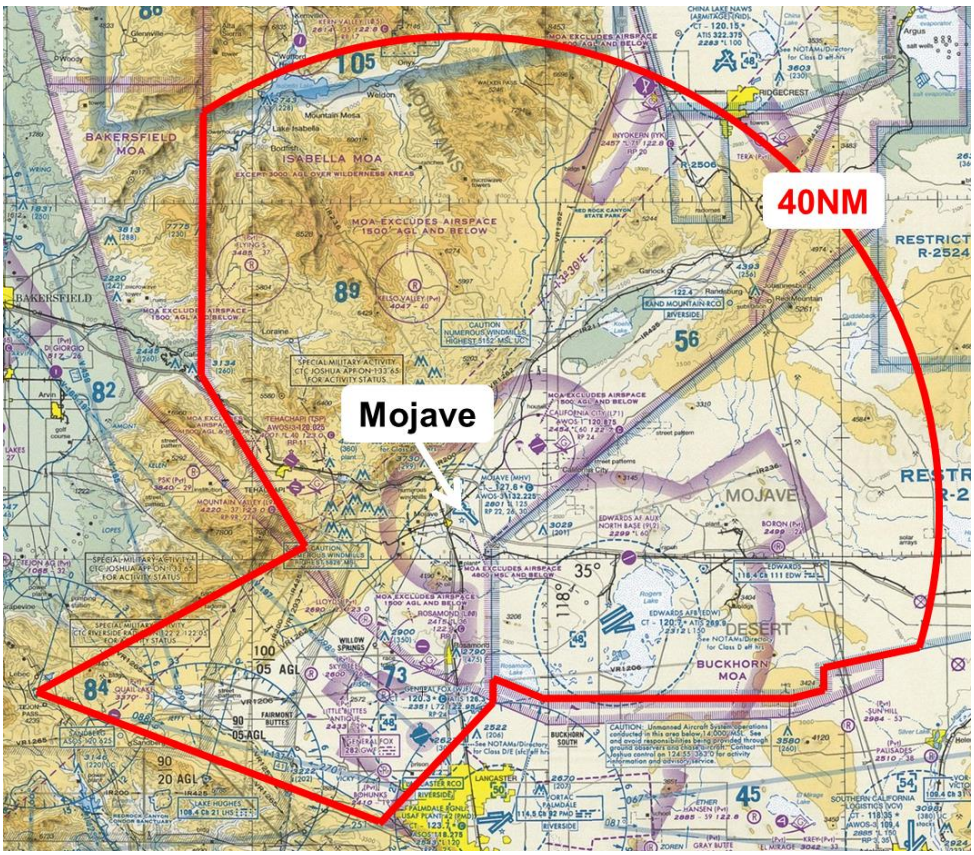

Figure 3 – SUAV Operating Area

The FCC previously granted a license to the National Test Pilot School (Call Sign: WG2XPV File Number: 0224-EX-PL-2013) for the OPA that expired 1 August 2018. This license allowed use of a 5W 5.8GHz digital data link transmitter onboard the aircraft. This is accomplished through installing a L-Com HA5805 5W amplifier on the data link transceivers which will give the system a calculated 6.1 watt ERP on the aircraft, and up to a 153 watt ERP on the ground transceiver with a directional antenna. A block diagram of the system is shown in Figure 4 with the amplifier highlighted in red.

The antenna mounted on the Cessna 150 aircraft is an omnidirectional antenna with a 3 dB gain. The ground station uses a L-Com HG4958-22EG dish antenna with a 22 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 10 degrees horizontal and 12 degrees vertical. This will provide a 153 watt ERP.

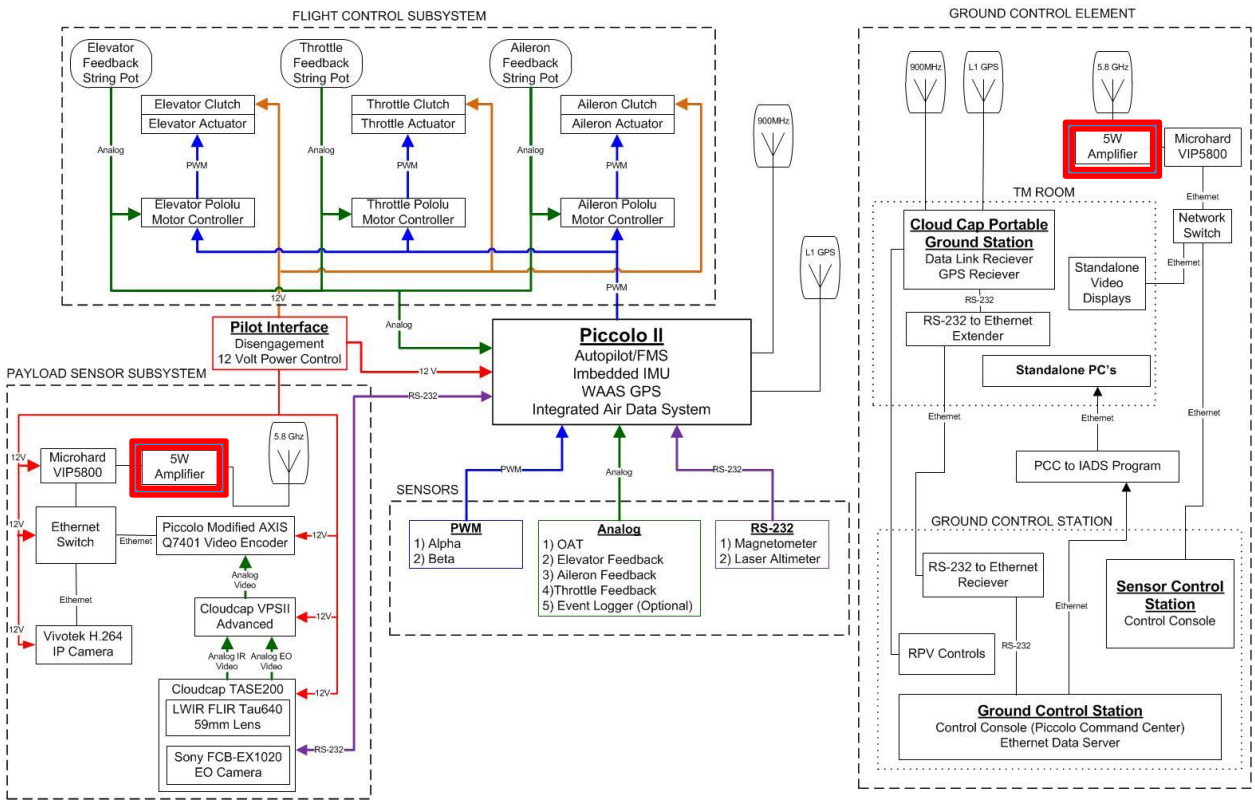

Figure 4- SUAV Block Diagram with proposed amplifier highlighted in red

The video link of interest transmits the video signal from the gimbal sensor 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 via radio 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 NTPS has been granted 5 year licenses for this 5.8 GHz frequency as well as for 900 MHz frequencies. NTPS has requested a 5 year license, to be able to continue to utilize and develop the 5.8 GHz system over time.

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