FCC EXPERIMENTAL STA APPLICATION EXHIBIT

Question 5: Airborne Test Profile & Interference Mitigation Exhibit
Captive X-Band Radar Seeker Characterization Flights

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1. System Overview & Airframe Integration

The purpose of this experimental test is to characterize and evaluate a TSC Aquila radar system against maritime surface targets for a startup defense contractor project. The TSC has been previously tested under an STA submitted by TSC against airborne targets. The information derived from this testing will feed product engineering and development and influence future guidance and system capabilities. This radar has been previously tested under STA 0047-EX-CN-2025.

The transmitting hardware under test is a captive X-band radar seeker undergoing characterization and performance evaluation. This radar is strictly integrated into a designated experimental aircraft— a Mobius (Berkut Derivative) bearing FAA tail number N379NA. The seeker assembly is housed inside an external, aerodynamically sealed radome pod rigidly mounted to the nose of the aircraft on centerline. No structural ground modifications, tower construction, or environmental impacts are associated with this temporary test profile.

Radar specifications include:

- Lower Freq: 9.25 GHz
- Upper Freq: 9.9 GHz
- Power: 396 W
- ERP: 2500 W
- Peak: 1E-8%
- Emission Designator: 500MQ3X
- Modulating Signal: LFM

The radar system external specifications are designed as such for integration into the aircraft testbed. This system will include power conditioning, data processing and collection, and external GPS units for data capture.

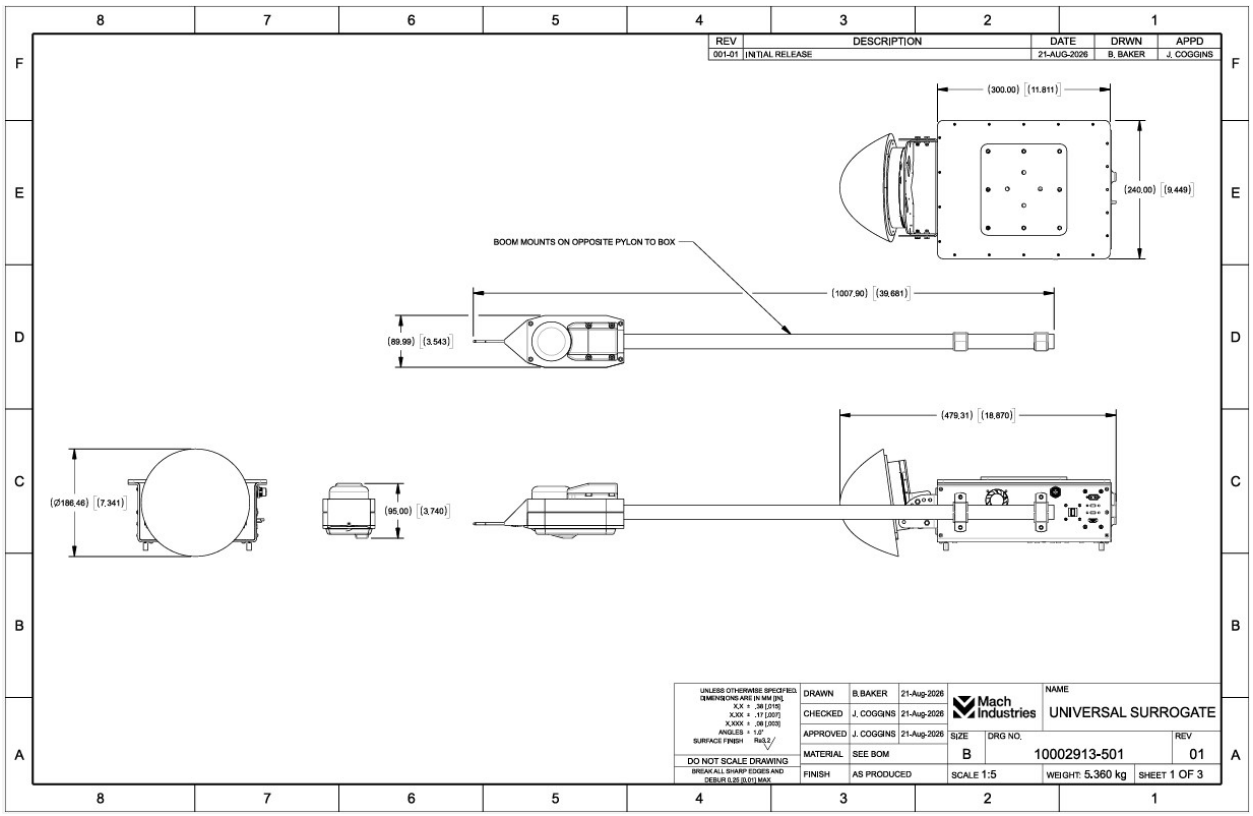

Fig 1. Aquila Radar Surrogate Integration Diagram

The system will be integrated into the test platform utilizing a composite “see through” material on the nose of the aircraft. This mounting position will provide unobstructed view within the radar FOV, eliminate pilot risk factors, and allow the pilot complete situational awareness of the radar pointing vector.

Fig 2. Radar Aircraft Integration

2. Spatial & Visual Geometry Requirements

Purpose: Replaces the 'Antenna Sketch' with precise, coordinate-bounded spatial footprints over the Santa Barbara Channel (work area option 1), between Catalina and Channel Islands (Option 2), between San Clemente Island and San Diego (Option 3) off the Pacific Coast of Southern California, or off the coast of San Luis Obispo County (Option 4).

Flight operations and RF testing will occur exclusively over the open waters, in one of three locations, depending on weather, airspace restrictions, or other environmental aspects. Option 1 (primary) is the Santa Barbara Channel, safely bound within the designated maritime polygon defined by the following NAD83 coordinates:

- Vertex A: N34 23.09 W120 32.78
- Vertex B: N34 13.27 W120 32.78
- Vertex C: N34 13.27 W 120 8.53
- Vertex D: N34 23.09 W 120 8.53

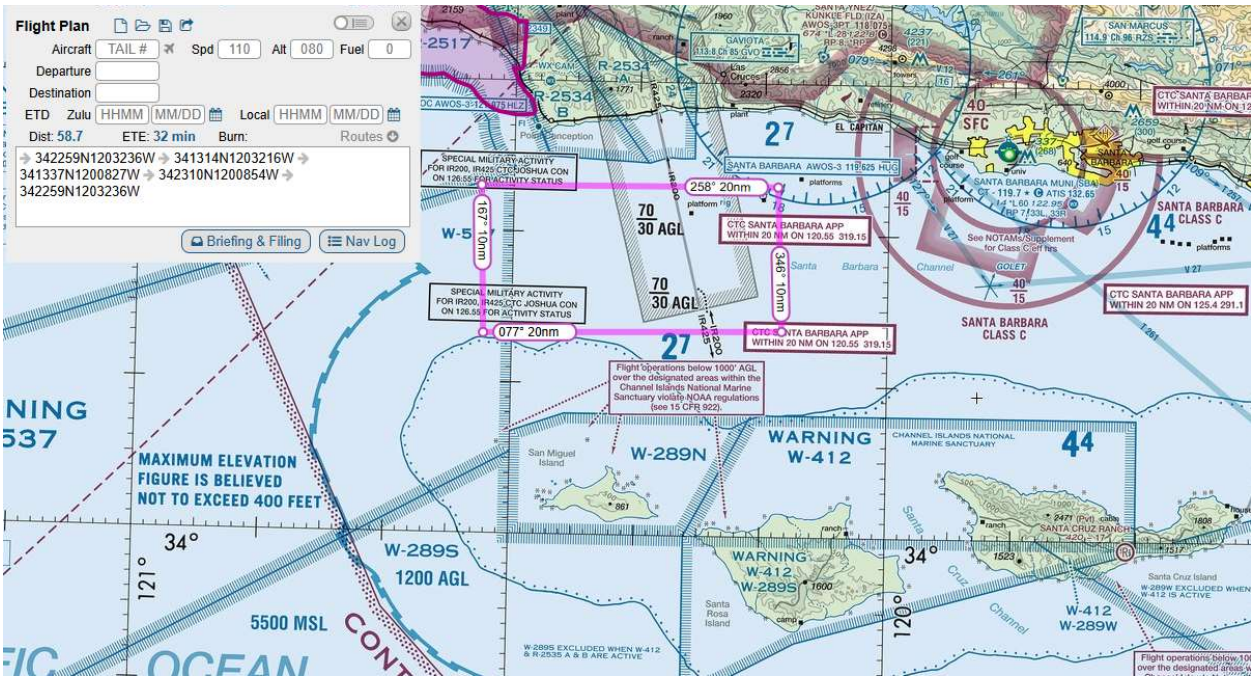

Fig 3. Option 1 Work Area

All transmissions will strictly maintain a lateral buffer distance greater than 28 kilometers (15 nautical miles) from Santa Barbara Airport (SBA) to fully isolate operations from primary civilian terminal radar service areas (TRSA).

Option 2 (secondary) is between the Channel Islands and Catalina Island, safely bound within the designated maritime polygon defined by the following NAD83 coordinates:

- Vertex A: N33 52.67 W119 46.31
- Vertex B: N33 36.43 W119 46.31
- Vertex C: N33 36.43 W119 00.00
- Vertex D: N33 52.67 W119 00.00

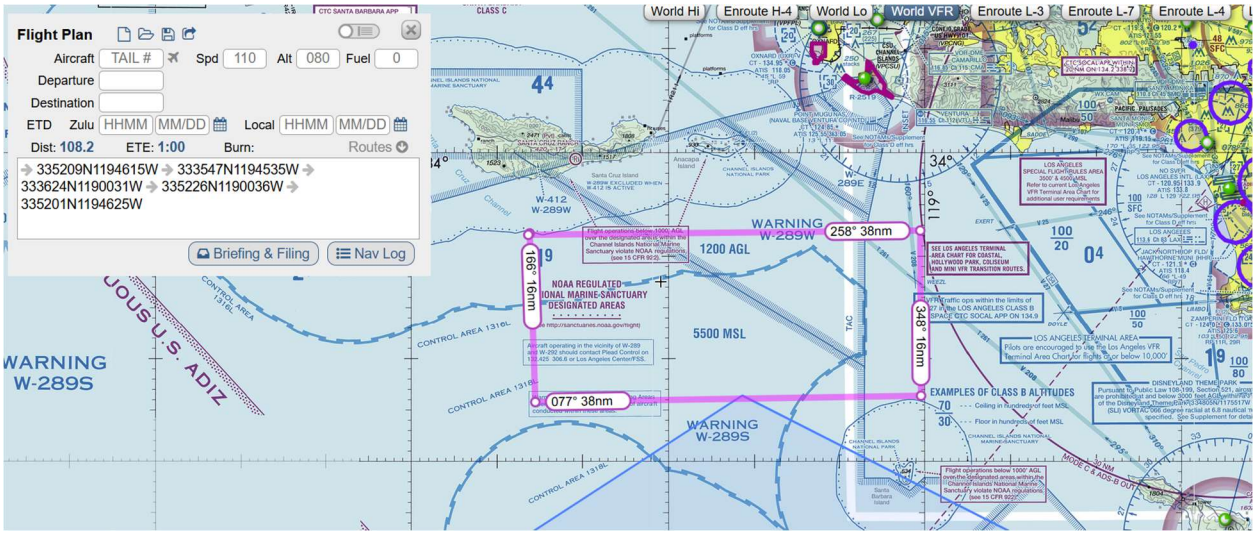

Fig 4. Option 2 Work Area

All transmissions will strictly maintain a lateral buffer distance greater than 56 kilometers (30 nautical miles) from Los Angeles International Airport (KLAX) and 30 kilometers (16 nautical miles) from Pt Mugu NAS (KNTD) to fully isolate operations from primary civilian terminal radar service areas (TRSA) and congested civilian traffic.

Option 3 (tertiary) is between the San Clemente Island and San Diego, safely bound within the designated maritime polygon defined by the following NAD83 coordinates:
- Vertex A: N33 17.81 W118 20.00
- Vertex B: N32 36.46 W118 20.00
- Vertex C: N32 36.46 W117 47.48
- Vertex D: N33 17.81 w117 47.48

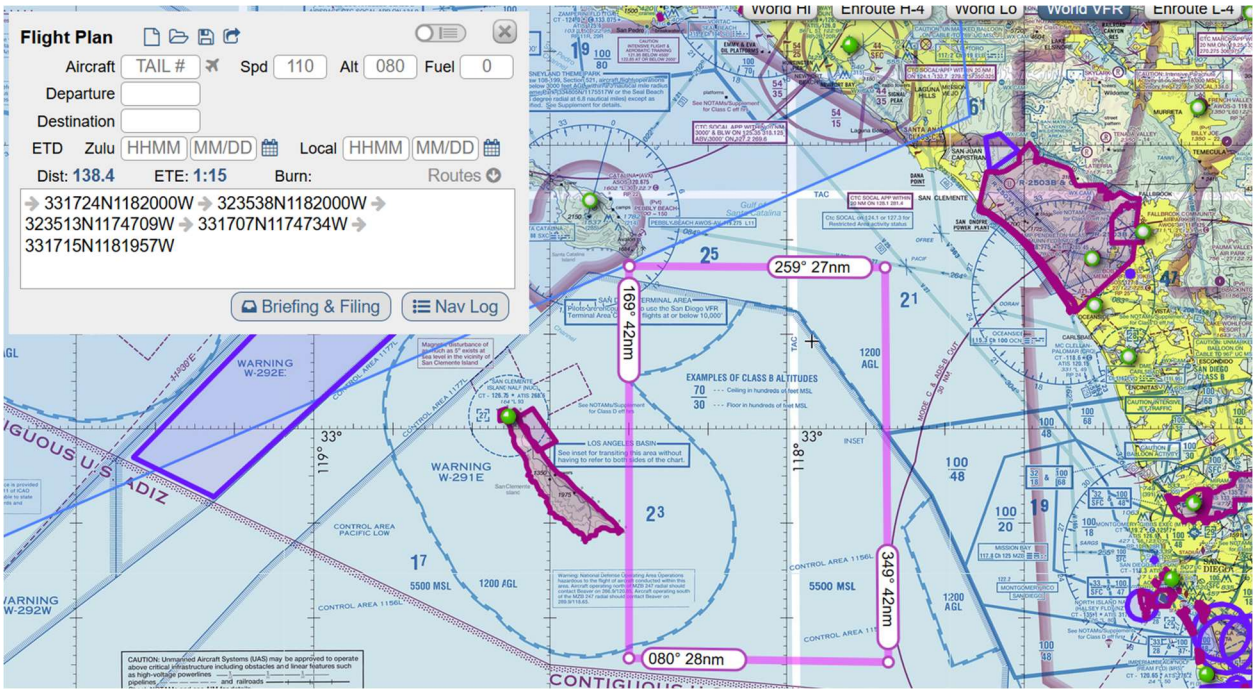

Fig 5. Option 3 Work Area

All transmissions will strictly maintain a lateral buffer distance greater than 56 kilometers (30 nautical miles) from San Diego International Airport (KSAN) and 41 kilometers (22 nautical miles) from Camp Pendelton (KNFG) to fully isolate operations from primary civilian terminal radar service areas (TRSA) and congested commercial airspace.

Option 4 is between the off the coast of San Luis Obispo County, safely bound within the designated maritime polygon defined by the following NAD83 coordinates:
- Vertex A: N35 29.72 W121 40.00
- Vertex B: N34 49.52 W121 40.00
- Vertex C: N34 49.52 W121 08.00
- Vertex D: N35 29.72 W121 08.0

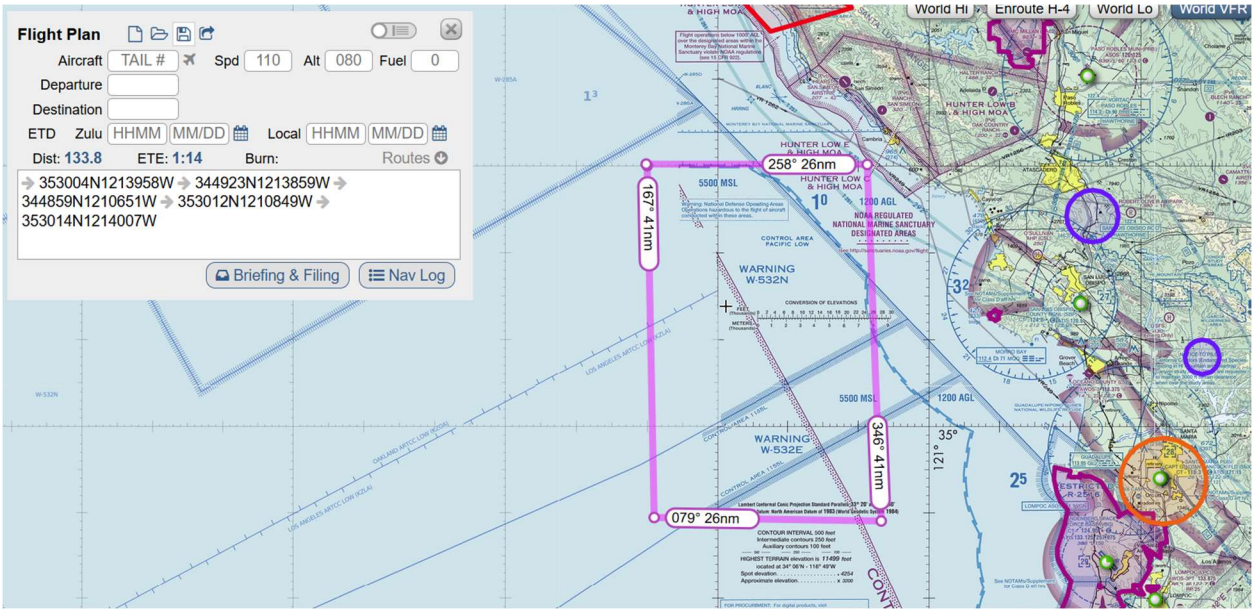

Fig 6. Option 4 Work Area

All transmissions will strictly maintain a lateral buffer distance greater than 54 kilometers (29 nautical miles) from San Luis Obispo Airport (KSBP) and 52 kilometers (28 nautical miles) from Vandenberg AFG (KVBG) to fully isolate operations from primary civilian terminal radar service areas (TRSA) and congested commercial airspace.

3. Vertical Flight Profile & Beam Orientation Constraints

Purpose: Conclusively proves to FAA Spectrum Engineering that the radar energy will not leak into commercial air corridors.

The aircraft will operate at low-altitude profiles strictly bound between a floor of sea level and a maximum ceiling of 3,000 feet Above Ground Level (AGL) / Above Mean Sea Level (AMSL). Throughout all test intervals, the X-band radar seeker's gimbal limits will be mechanically and electronically constrained to downward-looking geometries. The boresight vector will target sea clutter or surface-towed arrays at a minimum depression angle of [e.g., -15 degrees] relative to the flight horizon. Transmissions out toward the horizon or upward into civilian aviation corridors are strictly prohibited, ensuring all RF energy terminates directly into the ocean's surface layer. The pilot will be trained to only arm the radar within the designated corridors, and will take care to avoid pointing at land or aircraft to the maximum extent possible.

Based on these parameters, the radar should have an effective maximum range of less than 7nm against large targets, with a one way maximum range of 14Nm. As all of these working areas are greater than 15NM from towered airfields, this should pose no risk to non-participating aircraft or traffic.

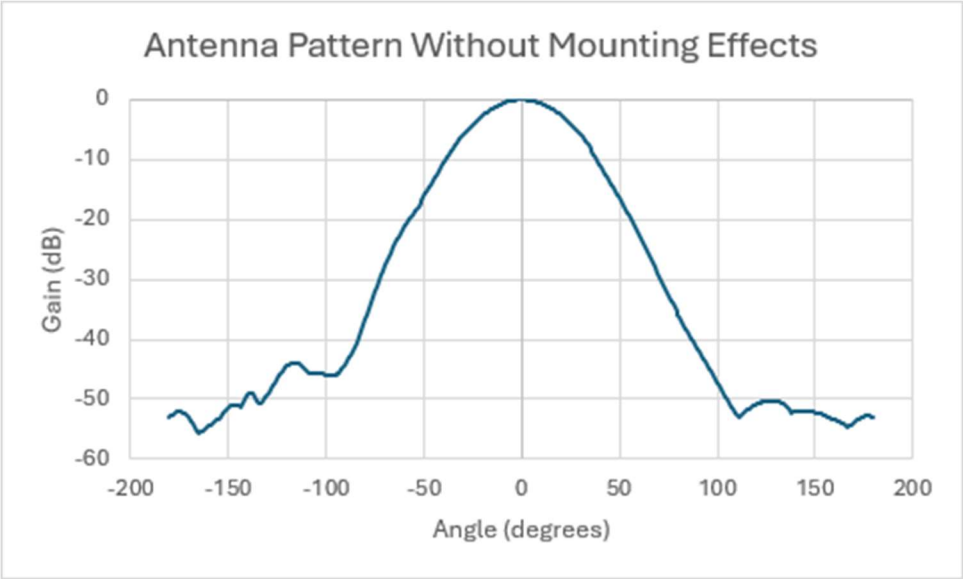

Fig 7. Radar beam Pattern

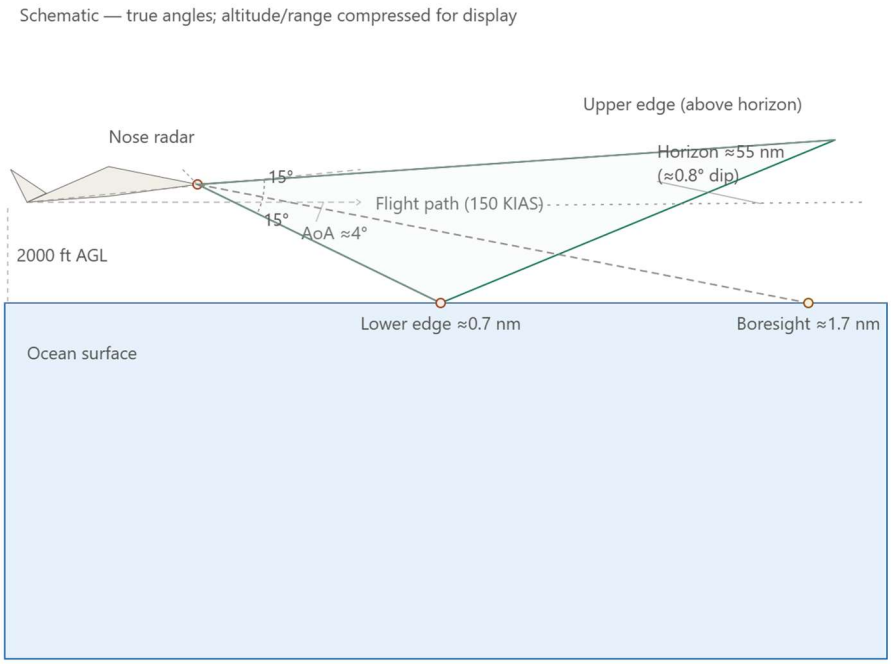

Fig 8. Aircraft Mounted Radar Pattern

2.4 Comprehensive Interference Mitigation & Co-Site Safeguards

Purpose: Addresses co-channel users (civilian marine radar and nearby military ranges like Point Mugu) to achieve NTIA/JSC concurrence.

To ensure zero harmful interference to co-primary maritime navigation systems and nearby government test ranges (NBVC Point Mugu / Vandenberg Space Force Base), the applicant enforces the following technical and operational constraints:

1. Frequency Range: Transmissions are tightly filtered to operate solely within the 9.25GHz to 9.9GHz band, entirely clearing civilian marine radionavigation blocks.
2. Duty Cycle & Pulse Profiling: The seeker uses short-pulse gating with a maximum duty cycle of [e.g., 2%] to minimize overall spectral density.
3. Absolute 'Stop-Buzzer' Protocol: A dedicated test pilot inside the aircraft will maintain continuous, real-time voice communications with local Air Traffic Control and Range Safety Officers utilizing VHF. Air Traffic Control and all stakeholders will be briefed of the operation in advance. In the event of a verified interference alert or an ATC directive, emissions will be terminated immediately via a single hardware-level cutoff switch. The designated 24/7 point of contact for this operation is: Greg Wellman, 978-552-3292.
4. Further safety measures will include a hard wired ARM/DISARM switch in the cockpit to disable all radar transmissions until safely within the designated corridor. Additionally, a Landing Gear lockout relay will be introduced (with override capability) to disable the radar when the aircraft landing gear is extended, preventing inadvertent transmissions in traffic pattern or on the ground.