

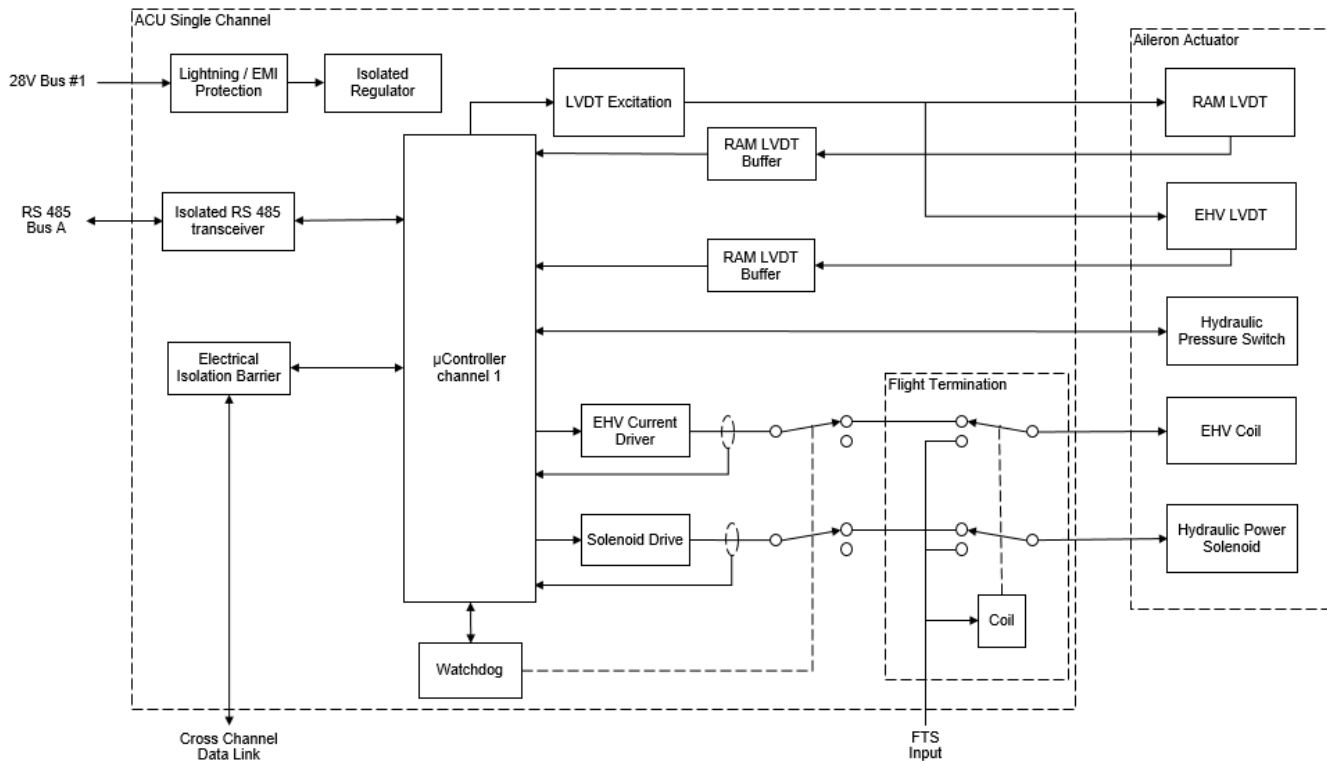
F O Engineering has a strong track record of designing Fast and Optimal control systems for the defense, aerospace and industrial markets. Our products encompass a broad range of technologies including high performance and reliable digital designs. Our engineers can satisfy hard to meet requirements ranging from compact design and unique environmental conditions to complex applications and challenging price points.

## Actuator Control Unit (ACU)



**Figure 1 Actuator Control Unit**

The Actuator Control Unit (ACU) is a dual channel controller designed for positioning flight control surfaces which use electro-hydraulic servo-actuators. This unit was designed for the fighter drone program and specifically was optimized to operate the F/A-18 C/D Aileron actuator. Figure 1 is a picture of the unit and shows the connections of one of the two channels. The opposite side of the unit has identical connections for the electrically isolated second channel. Each channel contains all of the functionality required to control the actuator and to fully monitor and isolate detected faults during operation. The two channels operate in an active-active mode with gain doubling in the remaining channel should one channel be taken off-line; either by self-monitoring or by command of the Flight Control Computer. Figure 2 shows the block diagram of one of the two channels. The other channel is identical. The block in the lower left corner of the diagram provides an electrically isolated independent means to force an actuator hard over, providing a means for aerodynamic flight termination.



**Figure 2** Single Channel Block Diagram

### Features:

- Dual Channel – Full electrical isolation between channels
- RS-485 / RS-422 Digital Communication supports a command / response protocol and Configuration file tailoring
- Configurable Control Laws allow tailoring of:
  - Outer Position PID loop
  - Velocity PID loop
  - Electro-hydraulic Servo Valve Current PID loop
  - Optional Notch Filter
- Optional Kinematic scheduling to support either linear or angular command and response
- Self-Monitoring Fault Detection Logic:
  - FCC Communication
  - Main Ram LVDT integrity
  - EHV Position - command vs. position
  - EHV Current – command vs. measured
  - Solenoid Current – command vs. measured

- Channel Command mismatch
- Cross Channel Data Link Fault
- Power Supplies and Board Over Temperature
- Failure Reversion Mode
  - Customer settable by faults
  - Failed channel disconnects EHV Command and Solenoid Command
  - Remaining channel doubles position loop gain to maintain dynamic performance
- Qualification:
  - MIL-STD 704 28 VDC Power Requirements
  - MIL-STD 461
    - Radiated and Susceptibility Requirements
    - Pin and Cable Bundle Injection
  - Operating Temperature range -65°F to 170°F
  - Vibration and Shock levels for engine areas
- Software Certification is DO-178B, DAL B (Internally Conducted)
- Physical
  - Weight – 2.32 pounds
  - Dimensions
    - Length – 7.0”
    - Width – 5.15
    - Height – 2.50”

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We maintain an ISO9001 and AS9100 certified design and production facility in Santa Clarita, California. We welcome the opportunity to introduce you to our engineering capabilities. Please contact us with any questions you may have about our company and products.

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