

To: Purdue Fort Wayne

From: Andrew Koselke, Bowmar LLC, Electrical Engineer

Date: 28-June-2023

Subject: Proposed Senior Capstone Project Proposal

Title: F-15 Missile Status Indicator Test Fixture Re-Engineering/Rebuild

Sponsor(s): Primary: Andrew Koselke, Secondary: Wayne Buchan

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Description:

Design and build a replacement electrical system to replace one currently employed in a test fixture constructed in the early/mid 1970's utilizing primarily discrete electronic components. Function of test fixture is to sequentially power multiple wire coils in a user-chosen pattern to confirm the electro-mechanical device powered by the coils operates as intended. User inputs into the test system are selected via mechanical switches which Bowmar prefers to retain and consist of selection of time duration each coil is 'on', selection of order sequence in which the coils are 'on', selection of time between when each coil is active, and selection of which coils are active for the test. Other features beyond the original design are intended to be added such as additional LED lighting to the tester and additional indicators to make the output of the tester easier to interpret for the user. Bowmar has an extra tester cabinet which is intended to be re-used for construction of the proposed updated tester.

Disciplines:

This is primarily an electrical project although it does have mechanical aspects and may find some appeal to a mechanical student with an interest in manufacturing automation.

Estimated Budget:

Bowmar has earmarked \$5,000.00 towards the re-build of this test fixture.

Technology involved:

The nature of the application lends itself to a PLC-based solution. However, microcontroller based solutions may also be considered (i.e. Arduino, raspberry pi, etc.)

Technology disclosed:

Current/voltage/timing requirements required to power coil-operated electro mechanical devices.

The F-15J fighter aircraft is currently operated by the Japan Defense Agency, also referred to as the Japanese Air Force. The F-15J fighter jet has a Missile Status Indicator (Logicator) that provides the pilot with the status of all weapons stores installed on the aircraft. The Logicator provides the pilot the following situational awareness status for all loaded weapons:

1. HNG- This notifies a pilot that a weapon selected to fired did not properly launch or jettison from the aircraft.
2. RDY- This notifies the pilot that the weapon selected is in a ready status and aligned to be launched from the aircraft.
3. ARM- Confirms to the pilot weapon selected is in an armed status.
4. STBY- Notifies the pilot that the weapon selected in in a stand-by status.
5. Identifies the number of rounds remaining for the 20 mm M61 Vulcan gun.

Some of the weapon's stores installed on the aircraft include:

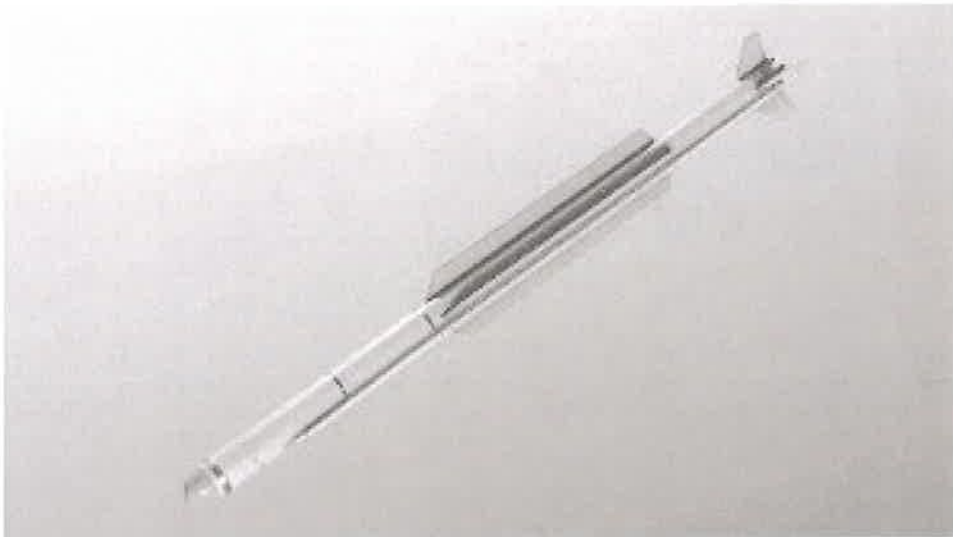
1. The **AAM-3** air-to-air short-range missile



2. The **AAM-4** air-to-air medium-range radar homing missile



3. The **AAM-5** air-to-air short-range missile



4. The **AIM-9** "Air Intercept Missile" is an air-to-air short-range missile.



5. The **AIM-7** air-to-air medium-range missile



6. M61 Vulcan 20 mm rotary gatling gun



Faculty Advisor: Dr. Elizabeth Thompson

Students: 2-3 Students