



Alison T56-A14/A15 Fuel Nozzle Spray Pattern Test Facility

For the Lockheed Martin C130A-H Hercules & P3 Orion Aircraft



Fuel Nozzle Spray Pattern Test Facility Front View (Left)
Fuel Nozzle Spray Pattern Test Facility Chiller Unit (Right)

The compact, mobile, user friendly and cost effective fuel nozzle spray pattern test facility has been designed to verify Alison T56-A14/A15 fuel nozzles by flushing, segmentation and proof pressure testing to OEM recommended test schedules.

The test facility consists of a fully mobile brushed stainless steel cabinet integral sink, spray/ viewing chamber and flow check fixture with an ergonomically angled control panel containing all necessary instrumentation and controls to operate the facility. It has double doors both front and rear to allow easy access for routine maintenance and calibration.

A fluid temperature control unit is connected to the test facility cabinet to maintain the temperature of the fluid within the tank to required limits. It consists of a brushed stainless steel mobile cabinet containing accumulator tank, pump unit, evaporator, compressor, condenser, immersion heater, fans and electrical controls. An electronic temperature controller/display is mounted on top of the unit and water level indicator mounted at the LHS of the unit.

The temperature of the water in the chiller tank is regulated by the unit such that the fluid supplied to the nozzles is maintained at the required temperature of between 78 & 82°F. Flexible hoses (approximately 3m long) are connected between the chiller unit and the main facility unit using self-sealing quick release couplings.

All equipment used in the facility is fully compatible with MIL-PRF-7024E type II operating fluid (commonly known as calibrating fluid) and is CE certified to meet current legislation and EU directives.

To operate, the facility must be connected to a suitable local mains electrical supply, an air supply and the tank filled with calibrating fluid.

Part Marking

The fuel nozzle spray pattern facility is individually identified with the following information:

- Part Number
- NATO Stock Number (NSN)
- Description
- Individual Serial number

The benefits of the Aerotest fuel nozzle spray pattern test facility include:

- A unique circular graduated target plate combined with a visual protractor angle plate which allows combined accurate three dimensional assessments of a 360 degree spray pattern.
- The unique nozzle mounting design allows for quick installation and removal, saving valuable operator time.
- The Aerotest design offers T56-A14 & A15 power plant dual Fuel Nozzle testing capability.
- The serviceability of the fuel nozzles can be established quickly without the need for installing replacements and sending nozzles off to a third parties for verification.
- Reduction in combustor repairs directly due to poor fuel nozzle maintenance.
- Pumps, motors, filters and controls are all supplied and installed to European standards.
- The Aerotest design provides simplicity and depending on the Fuel Nozzle type and testing characteristics, the design of this facility could be adapted to test other fuel nozzle types.

Fuel Nozzle Testing

The fuel nozzle spray facility is designed to test the following fuel nozzles:

- Alison T56-A14, (AP-3C Orion) engine. Nozzle P/N 6809611/ 23074273
- Alison T56-A15, (C130A-H) engine. Nozzle P/N 6809618/ 6794320/ 23074274

Special Features Cabinet

- The facility cabinet consists of a stainless steel support frame, encased with brushed stainless steel panels, which houses the fluid storage tank, the pump/ motor unit, an integral sink, all filtration, flow monitoring equipment and pipe work. The top panel of the cabinet also serves as a direct mounting point for the flow check fixture.
- An ergonomically angled control panel contains three digital panel indicators to measure flow, fluid line temperature and pressure. 'ON', 'OFF', 'RESET' and emergency stop buttons are also installed to control the facility.
- The fuel nozzle spray pattern cabinet includes an integral stainless steel sink located next to the spray chamber. The fluid drains by gravity from the sink back into the main fluid storage tank.

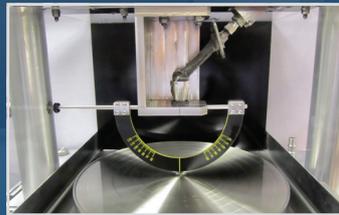
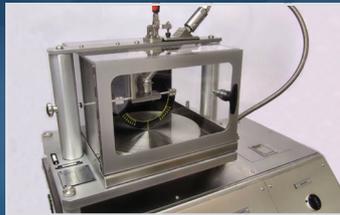
Special Features – Hydraulics

- The hydraulic equipment is situated inside the cabinet mounted on a sub-frame.
- Fluid is supplied to the fuel nozzle from the tank via a diaphragm type pump and filtration system and a calibrated turbine flow meter. Pressure is regulated via a manual control valve mounted on the control panel.

Special Features – Spray Chamber

The fuel nozzle under test can be viewed through a clear perspex spray chamber. The spray chamber consists of an access door and specific test tooling which is located on top of the main spray test chamber support plate.

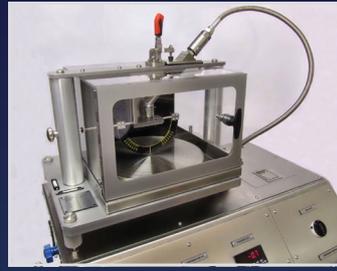
- The perspex spray chamber contains a target plate with a lip at its edge to maintain a thin meniscus of fluid at the surface. This instantly displays symmetry of the spray pattern avoiding complicated nozzle turning mechanisms. The spray angle is measured on a retractable protractor plate mounted below the nozzle capable of measuring spray angles between 60° to 120°.



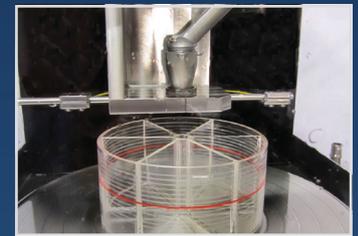
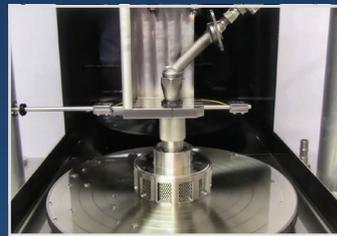
- The support plate sits on top of the test cabinet and has the ability to be levelled in two planes using three adjustable feet, thus ensuring the meniscus of fluid over the "spray-pattern" plate is maintained level at all times.

Special Features and Specification – Spray Chamber

- During operation, fluid flowing from the test piece fills the target plate. The meniscus enables the operator to immediately distinguish a full 360 degree spray pattern from the fuel nozzle. The target plate has concentric circular grooves showing whether the spray pattern is symmetrical avoiding time consuming fuel nozzle manipulation.



- The protractor plate is positioned centrally beneath the nozzle mount and the target plate below. The nozzle spray angle can be read directly from the protractor plate during operation.
- The protractor plate can be completely removed from the nozzle spray at any point during operation, reducing the risk of the spray pattern becoming distorted.
- Additional tooling is also included to carry out both the fuel nozzle proof pressure test and the segmentation patternator test; both of these fixtures are stored in the sink compartment, as part of the test schedule.



Special Features – Air Supply

- A standard 5.5 Bar g (80 psig) clean shop air supply used for purging nozzles after test is required to connect onto a standard female quick release coupling.

Special Features – Electrical Circuits.

- The Test Facility is fitted with a 5m cable with an IEC EN 60309-2 compliant, nominal 16A industrial socket outlet'.
- An adjustable safety cut-out thermal switch is provided, which is set and wired into the pump motor control circuit so that if the preset temperature is exceeded, the pump will automatically be stopped.
- The extra-low voltage (24 volt D.C) powered control switches and lamps are installed in a separate console panel to prevent any possibility of spray from the test fluid coming into contact with any operator controls. This panel complies with the relevant regulations for these conditions.
- Operating and Maintenance instructions are supplied with each facility.



Aerotest Limited

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