



Mobile Engine Test System (METS)

For Lockheed Martin C130H/J and P3 Orion Aircraft



Overview:

- As part of the total integrated logistics support for the Lockheed Martin C130 and P3 Orion aircraft, Aerotest Limited have designed, developed and supplied advanced open air Mobile Engine Test Systems (METS) which are capable of performance testing the following:
- Hercules C-130H Allison T56-A15 power plant installed into a Quick Engine Change Unit with a Hamilton Standard 54H60-91 propeller installed.
- Allison T56/ 501 bare power plant with a Hamilton Standard 54H60-91 propeller installed.
- Hercules C-130J AE2100D3 power plant installed into a Quick Engine Change Unit with a Dowty Aerospace R391 six bladed composite propeller installed.
- Adaptability to support the Lockheed Martin P3 Orion Allison T56-A14 power plant installed into a Quick Engine Change Unit with a Hamilton Standard 54H60-77 propeller installed.

A METS Facility provides the following advantages:

- A flexible testing solution within a safe and efficient environment.
- Proves the quality of the overhauled power plant, propeller and nacelle as individually or a complete assembly - fully tested and ready for a ONE TIME aircraft installation.
- A Dynamometer Test Cell for bare engine testing is no longer required.
- "State of the Art" Data Acquisition hardware platform which communicates back to the control cabin via a single Ethernet connection/cable.
- The DAQ hardware is incorporated into a temperature controlled 'Field Instrumentation Enclosure' which typically houses other ancillary sensors & equipment e.g. pressure sensors, pump contactors, starters etc.
- Prevents the aircraft being used as an expensive test facility, thus increases aircraft availability.
- One facility catering for multiple aircraft platform.

A METS Facility comprises of:

Test Trailer & Mounting Frame including the following:

- Test trailer with turntable steering, adjustable tow-arm equipped with NATO standard towing eye, brake system and foam filled tyres.
- QECU's and power plants are installed onto an aircraft standard Duplex stainless steel mounting frame at the same propeller centreline height as that of the aircraft wing. This reduces the amount of propeller ground-tip vortices and FOD hazards, which can damage the propeller and power plant.
- Test trailer retention & safety system thrust tie-down chains which include integral spindle tensioners connecting to ground anchor plates complete with chemical anchors rated for C130J maximum thrust loads, QECU mounting frame seizure reaction tie-down wire assemblies with integral spindle tensioners connecting to ground anchor plates complete with chemical anchors and an integral fifteen ton stabilizing jacks and integral run-away trip wire.
- The Aerotest METS test trailer is the only unique facility in the world to be equipped with optional front and rear hydraulic access scissor lift platforms reducing aerodynamic backwash blockage and resultant induced strain on the installed propeller.



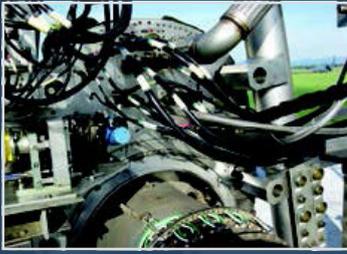
AERO ENGINE & COMPONENT TEST FACILITIES



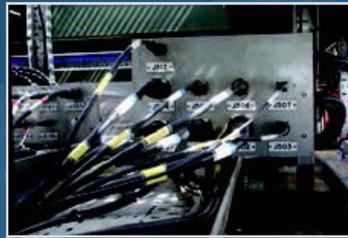
A METS Facility comprises of:

Test trailer & Mounting Frame including the following:

- As well as 'optional' front and rear hydraulic scissor platforms, the Aerotest METS can also include fixed personal work platforms – front and rear.
- The Aerotest METS can also facilitate the installation of nominated 'bare' engines (T56-A14/A15 & 501-D22A), using a series of demountable support frames. These frames are designed to support the engine at the propeller gearbox end.
- Personal access step located either side of the trailer to gain access to either front and rear hydraulic scissor or fixed platforms as required.



- Throttle actuation system controlled via the Driver control screen inside the acoustic control cabin, the throttle system assembly is installed onto the QECU mounting support frame.
- The actuation system provides the drive pulley system that interface to the QEC pulley through the sprag unit. A similar actuator is mounted alongside to interface to the QEC Propeller pitch control pulley.



- The electrical control signals, power and instrumentation lines are routed via Aerotest designed moulded "Rachem" cable harnesses connected at the firewall of the QEC.
- Each harness is clipped or tied neatly in cable trays to relevant Junction Boxes/ GFE and then to a stainless steel field terminations cabinet which houses the DAQ system/ transducers etc.
- From here all digital control and parameter sensor data is then transmitted via Ethernet back to a host computer for further processing within the acoustic control cabin.



- The METS facility includes an optional fire extinguishing system using C130J aircraft Halon storage system. The METS facility includes a hydraulic loading system which is used to test the QEC on-test hydraulic pump accessory.
- Air start pipe work and bleed air control & measurement system includes a stainless steel air start pipe routed up the QECU.



- The rear section of the METS test trailer is stainless steel anti-slip decking which provides a mounting surface for the stainless steel weatherproof IP65 termination cabinets. Interruptible test point terminations are installed for easy diagnostics.
- The entire METS Test trailer IP65 termination cabinets are interconnected with moulded QEC interfacing engine control harnesses.

Optional METS Facility Jib Crane

The Aerotest METS facility includes an optional 3000Kg lift capacity, 5.700m reach Jib Crane to install and remove C130/ P3 QEC's and propellers on and off the Duplex QEC support frame.





Acoustic control cabin

A METS Facility comprises of:

Acoustic control cabin including the following:

The “State of the Art” Acoustic Control Cabin offered is a very high-quality product; the operators will benefit from the enhanced acoustics, room space, console ergonomics and advanced software Instrumentation & Control System Features.

Based on external dimensions of an ISO 20ft shipping container, to make transportation and handling easier which can be de-mounted for transportation purposes only and can be transported by air, road and sea.

Acoustic Control Cabin Features:

- Large triple-pane acoustic and hermetically sealed viewing window
- A single acoustically treated door equipped with a “panic-release” luminous button lock.
- The door is also equipped with a double-glazed acoustic viewing panel for operational safety.
- Suspended anti-static computer flooring.
- Category 3 VDU fluorescent lighting.
- Dimmable VDU/Console low voltage slider rack cabin roof internal spot lighting positioned to give minimum VDU glare and reflections.
- Spacious environment
- 2 Swivel chairs.
- Wall-mounted whiteboard with pens.
- Air conditioning, rated for 20°C internal with an external ambient of +45° fitted with acoustic ducts for cable feeds and a fresh air make up system.
- The system includes an AC heat pump for winter/night time running conditions.
- The dedicated METS Mains power distribution/ terminations cabinet is provided and installed at one end of the cabin and is specifically designed to fit the METS cabin.
- Hand-held CO2 fire extinguisher.
- The cabin has a light switch for external floodlight control, internal dimmable spot light control and fluorescent lights.
- UK standard power socket outlets are included for any auxiliary 230V AC Equipment.

Control Cabin External Features:

- 4 anti-vibration acoustic-shock mounts.
- Wind-speed and direction indication interfaced to Test Facility Software.
- Two cabin mounted halogen floodlights for night-time QEC running.
- Two off Lightning protection earthing bosses, which will require connection to a suitable local earth of less than 1 ohm.
- Air-conditioning condenser unit with integral heat pump.
- Stainless steel access steps with stainless steel handrails.
- Public address speaker horn.
- NATO Green RAL 381C-285 Matt Finish.

Ergonomically designed control console equipped with:

- Flat screen high resolution Drivers Screen - QECU and Plant Displays.
- Flat screen high resolution Supervisors Screen - Test Scheduling.
- Ethernet linked latest standard PC's all pre-configured with the latest MS Windows operating environment.
- A separate flat screen monitor for the video feeds.
- Reversionary hard wired emergency Control Panel.
- Test Cell Communications Control Panel.
- Computerised 90 kW load bank control panel using RS 485.
- CCTV system – tilt/pan/zoom cameras, CCTV controller and video storage.
- MIL-STD 1553 data bus analysis Vibration monitoring suite with programmable filters.
- FFT vibration analysis interface control panel.
- A4 Printer.

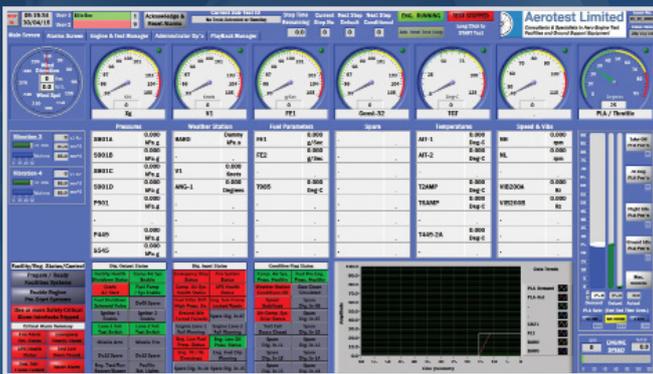




- The Aerotest METS Supervisory Control and Data Acquisition (SCADA) system has been developed using National Instruments globally supported 'LabView' software to run within the well proven and reliable latest MS Windows operating environment.
- The software code is the brains and intelligence at the heart of the system and is designed to be intuitive and 'User Friendly' in everyday use.
- Any customer specified engine test procedures can be created on behalf of the customers (Standardised Tests).
- The facility also allows the customer to easily write their own automated test procedures using 'Excel' familiar to most PC users.

The Key Features of the SCADA system are:

- Separate 'Drivers' & 'Supervisors' screens.
- User definable displays.
- Primary Parameter Dial Displays.
- Text Parameter Displays
- Trending Graphs



Externally the acoustic cabin is equipped with:

- Wind-speed and direction transducer interfaced to test program software (propeller wind speed and directions limits file)
- Two cabin mounted halogen floodlights for night-time running.
- A Flashing beacon interlinked to engine running.
- Lightning protection conductor aerial and earthing connections
- Air-conditioning condenser unit with integral heat pump.
- Public address safety speaker horn.

The Aerotest METS Facility also offers additional features:

Optional QECU Air Start System

- The Aerotest METS air start system replaces the high maintenance cost of aircraft / GSE Auxiliary Power System (APU) to provide compressed air to the test trailer and engine interface connection flange.
- The system comprises of a vertical air receiver/pressure vessel, a purpose built compressed air skid package to accommodate a rotary screw compressor, desiccant/ refrigerant dryer and necessary filtration.



Optional QECU Fuel System

- The modern, proven Aerotest METS facility fuel system comprises of suitable capacity horizontal double cylindrical construction fuel tank with integral pump and filtration unit housed within a secure cabinet at the front of the tank including a roller shutter door mounted on integral saddles. The tank is located at a safe distance away from both the METS Acoustic control cabin and Test trailer.
- The tank can be offered as an optional trailer mounted design which is double lined.
- From the fuel pump assembly which includes an inlet strainer, fuel filter the fuel is pumped via inter-connecting pipe-work to a Fuel Control Module which is mounted on the Test Trailer, the module includes, pressure regulation, flow measurement turbine flow meter with fuel temperature sensing.



Slave Oil System

- When testing an Allison T56/ 501 'bare' engine, the METS facility also includes a 'slave oil system' which is required to provide a pressure and temperature controlled oil supply to the Engine Power Section (PS) and Propeller Reduction Gearbox (RG) in place of the T56-QEC integral system normally used as part of an indoor Dynamometer Test Cell set-up.

Ordering Information:

NCAGE Number: KE 160



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