

About

Altitude Switch Test Rig

The Altitude Switch Test Rig (Part No. 001749000) is a specialized testing system designed to evaluate the performance, accuracy, and durability of an altitude switch used in the IJT-LSP (Intermediate Jet Trainer – Limited Series Production) Project. The altitude switch is a critical aviation component that activates or deactivates an electrical circuit based on atmospheric pressure changes, ensuring proper aircraft functionality at varying altitudes.



Overview of the Unit Under Test (UUT) – Altitude Switch

The Altitude Switch consists of the following key components:

- **Pipe Union:** Connects the switch to the pneumatic system.
- **Bellow Assembly:** Expands or contracts in response to pressure variations.
- **Adjusting Cap Nut:** Regulates the movement of the bellow assembly.
- **Micro Switch:** A normally open switch that closes when pressure falls below a set threshold.
- **Electrical Connector:** Provides electrical interfacing for signaling and control.

Operating Principle:

1. Pressure is applied to the pipe union.
2. The bellow assembly expands due to pressure changes.
3. The micro switch activates, closing the electrical circuit when the pressure falls below 7600 meters (± 150 meters) altitude.
4. The system sends an electrical signal when the threshold is reached.

Functional Testing on the Altitude Switch Test Rig

Before starting the test, the rig is set up with:

- **Proper electrical and pneumatic connections** (as per circuit diagrams).
- **All switches in the OFF position** and solenoid valves open to the tank.
- **Air pressure of 10 Bar applied** to the air supply line.

1. Insulation Resistance Test

- Conducted using a 500V DC insulation tester.
- Test performed between shorted pins of the connector and the body for 1 minute.
- Acceptable resistance values:
 - ≥ 20 Mega Ohms under normal conditions.
 - ≥ 5 Mega Ohms under climatic conditions.

2. Accuracy Test

Steps:

1. Power ON the system and activate the pressure line to engage the solenoid valve.
2. Turn ON the vacuum pump and activate its solenoid valve.
3. Initially, close the needle valve to control pressure flow.

4. Adjust pressure using the vacuum regulator to 7600m altitude.
5. Gradually release pressure by opening the needle valve.
6. Observe the switch closing at 7600m ($\pm 150\text{m}$ under standard conditions, $\pm 300\text{m}$ under environmental conditions).
 - Red LED lights up when the switch closes.
7. Reapply pressure and check that the switch opens within 1500m of the closing value.
 - Green LED lights up when the switch opens.
8. Record the readings from the Digital Pressure Indicator (DPI) switch.

3. Proof Pressure Test

Steps:

1. Apply pressure to the unit and monitor readings on the DPI switch.
2. Increase the pressure until 12000m altitude is reached, then close the needle valve.
3. Maintain this pressure for 2 minutes to check for leakage or pressure drops.
 - The unit should hold steady pressure without any leaks.



Technical Details

SRNO	PART	SPECIFICATIONS
1.	DC Power Supply with Test Certificate & calibration Certificate	Input: 230 V +/- 10%, 1 Phase 50 Hz, AC, Output: 0-32 V DC, 2 Amp Rated, Indication for Voltage & Current (3-1/2 Digits)
2.	Insulation Tester with Test Certificate & calibration Certificate	Measurement Range: 0-20Gohm, Test Voltage: 500 V DC, 1000 V DC
3.	Ammeter with Test Certificate & calibration Certificate	Range 0-2A, accuracy: 0.1%, display 3 1/2 digit, with External Shunt
4.	Mating Plug	MIL D 38999/26 FA 35 SN
5.	Toggle Switches	DPST
6.	Toggle Switches	SPST
7.	Lamp	Green (28VDC)
8.	Lamp	Red (28VDC)
9.	Electric Items	wires(shielded ptfе), farul, thimbels
10.	POT	0-270 ohm & 10 watt

Application

Applications of the Altitude Switch Test Rig

- ✓ **Aviation & Aerospace Industry** – Ensures altitude switches in aircraft function reliably at different pressures.
- ✓ **Defense & Military Applications** – Used in military aircraft projects (e.g., IJT-LSP Project).
- ✓ **Flight Safety Systems** – Helps verify altitude-dependent switching mechanisms in avionics.
- ✓ **Quality Control & R&D** – Used by aircraft manufacturers and testing labs to validate altitude-based electrical switching.





Key Features

Ensures Accurate Altitude Sensing – Tests the altitude switch at precise pressure thresholds.

✓ **Enhances Aircraft Safety** – Prevents electrical failures in altitude-dependent systems.

✓ **Leak-Proof Verification** – Confirms no pressure loss at high altitudes.

✓ **Real-Time Monitoring** – Uses LED indicators and DPI switch to provide instant feedback.

✓ **Comprehensive Testing** – Performs insulation resistance, accuracy, and proof pressure tests.

The **Altitude Switch Test Rig (P/N 001749000)** is a **high-precision testing system** used for evaluating **altitude switches** in **aviation applications**. It simulates atmospheric pressure changes to verify **switch operation at 7600m altitude**, ensuring **accurate and reliable aircraft functionality**. The rig performs **insulation resistance, accuracy, and proof pressure tests**, ensuring **switch durability, precision, and leak-proof operation**. It is an essential tool for **aerospace manufacturers, defense applications, and quality control labs** working on **aircraft avionics and altitude-dependent systems**.