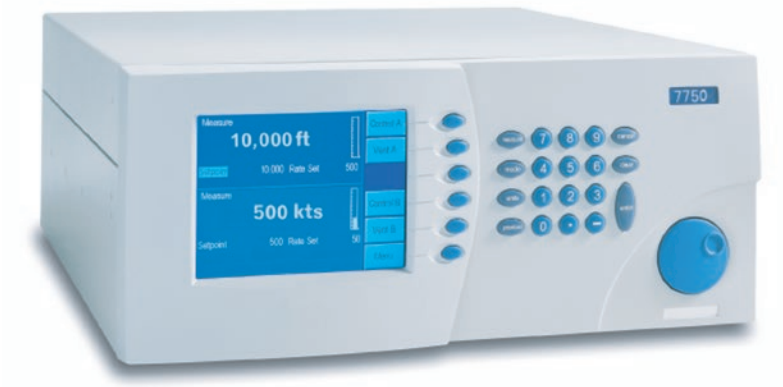
FLUKE®
Calibration

Technical data

# Series 7750i Ruska Laboratory Air Data Test Set




For more than thirty years, we have provided high precision Air Data Test Sets (ADTS) to the aerospace industry, airframe and component manufacturers for testing avionics instrumentation used on a variety of aircraft from fixed-wing to rotary to the space shuttle. The Model 7750i Air Data Test Set represents the latest generation ADTS incorporating a unique quartz sensor having unequalled precision and long term stability with the latest pressure control technology. The Model 7750i ADTS provides high performance measurement and control of all air data parameters.

The Model 7750i is a laboratory ADTS for calibrating a wide variety of avionics instrumentation such as altimeters, airspeed indicators, rate of climb meters, Mach meters, air data computers and engine-based control systems that rely on accurate control and measurement of pressure. The 7750i can be used to calibrate devices that are required to meet the Reduced Vertical Separation Minimal (RVSM) requirements, controlling altitude to within three feet (better than 0.0011 inHg) at sea level. Additionally, the 7750i provides precision rate control for both altitude and airspeed.

The Model 7750i is ideal for use in Automatic Test Equipment (ATE) systems. The seven-inch height (4U) allows easy integration into comprehensive test systems. Additionally, an IEEE-488 interface is provided for PC-based control. The 7750i can be set to emulate previous generation ADTS (Model 6610), eliminating the need to alter existing software.

## Features

- High accuracy, RVSM compliant
- Accuracy to ±3 feet 0.04 knots
- True differential sensor for airspeed (Qc)
- One year calibration interval
- Automatic zeroing
- Variety of Ps and Qc ranges available

## Automatic go to ground

Upon selecting the go to ground command, the 7750i safely controls the pressure to the current, local barometric pressure. The user can then disconnect the device under test (DUT) without exposing sensitive instruments to a potential pressure transient or shock.

## Leak test mode

A separate mode is provided for performing leak checks prior to beginning an actual calibration.

## Protecting the device under test

In order to protect the DUT, the operator can program high and low limit settings for:

- Altitude
- Airspeed
- Rate of climb
- Mach
- Negative Qc
- ARINC 565 envelope

## Automatic volume characterization

The 7750i automatically tunes the controller into external volumes ranging from 80 to 1000 cubic centimeters (5 to 60 cubic inches). This allows a large degree of flexibility for the configuration of the test system and the type of aircraft and components to be tested. For component manufacturers, a large number of devices can be tested simultaneously on a single manifold.

## Automatic zeroing

As with any instrument, regular zeroing is suggested to achieve maximum performance. This task is now automated and can be performed at the push of a button, or over the PC interfaces. The 7750i incorporates the vacuum sensor onboard; no separate or external vacuum gauges or sensors are required. In addition, only one vacuum pump is required to operate and zero the 7750i ADTS. Zeroing is performed in 30 to 45 minutes using the specificed vacuum pump.

## Avionics and pressure units

The Model 7750i displays the common avionics units including feet and meters for altitude, calibrated airspeed in knots, km/hr, and Mach with corresponding rate displays for each unit per minute. It can also display pressure units.

High performance for fixed-wing or rotary aircraft

Although the standard configuration offered is a Ps range of 32 in Hg and a Qc range of 68 in Hg, we also offer custom ranges. For example, for exclusive testing of rotary aircraft, a Qc range of 32 in Hg can be provided, increasing performance in the lower airspeed ranges. For other custom ranges please consult factory.

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# Specifications

| Mode | Absolute | | Differential | |
|---|---|---|---|---|
| Precision[A] | ±(0.005 % of reading) from 40 % to 100 % FS. ±(0.005 % of 40 %) from 0 % to 40 % FS. | | | |
| Stability: Over 3 months | 0.0019 % RDG/3 months | | 0.0019 % RDG/3 months | |
| Over 1 year | 0.0075 % RDG/year | | 0.0075 % RDG/year | |
| Zeroing vacuum sensor | ±10 mtorr at 100 mtorr, ±10% RDG at 100 mtorr | | N/A | |
| Control stability | 0.001 % FS | | 0.001 % FS | |
| Control low limit[B] | 0.3 in Hg abs. (10 mbar a) | | 0 in Hg in - Qc mode/0.3 inHg abs. in Pt mode | |
| Zero drift | <0.004 % FS/24 hr. | | <0.004 % FS/24 hr. | |
| Rate of climb | 0 to 1829m/min (0 to 6000 ft/min) | | N/A | |
| Rate of climb tolerance | 1 % of commanded rate for altitudes up to 15,240 m (50,000 ft)<br>5 % of commanded rate for altitudes from 15,240 m (50,000 ft) to 21,336 m (70,000 ft) | | N/A | |
| Standard load volume | 80 $cm^3$ to 1000 $cm^3$ (5 $in^3$ to 60 $in^3$) | | 80 $cm^3$ to 1000 $cm^3$ (5 $in^3$ to 60 $in^3$) | |
| Mach | N/A | | 0 to 10.000[D] | |
| Total uncertainty[C] (aeronautical units) | **32 in Hg a**<br>Sea level ±0.9 m (3 ft)<br><br>9144 m (30,000 ft)<br>±0.9 m (3 ft)<br><br>18,288 m (60,000 ft)<br>±3.4 m (11 ft) | **40 in Hg a**<br>Sea level ±0.9 m (3 ft)<br><br>9144 m (30,000 ft)<br>±1.2 m (4 ft)<br><br>18,288 m (60,000 ft)<br>±3.7 m (12 ft) | **32 in Hg D**<br>50 ±0.18 knots<br>100 ±0.09 knots<br>250 ±0.04 knots | **68 in Hg D**<br>50 ±0.39 knots<br>250 ±0.07 knots<br>500 ±0.03 knots<br>1000 ±0.04 knots |
| Total uncertainty[D] (engineering units) | **32 in Hg a**<br>32 ±0.0030 inHg<br>30 ±0.0028 inHg<br>15 ±0.0016 inHg<br>5 ±0.0011 inHg | **40 in Hg a**<br>40 ±0.0038 inHg<br>30 ±0.0029 inHg<br>15 ±0.0017 inHg<br>5 ±0.0013 inHg | **32 in Hg D**<br>0.5 ±0.0009 inHg<br>16 ±0.0016 inHg<br>32 ±0.0030 inHg | **68 in Hg D**<br>0.5 ±0.0019 inHg<br>16 ±0.0023 inHg<br>32 ±0.0032 inHg<br>68 ±0.0063 inHg |

A Precision is defined as the combined effect of linearity, repeatability and hysteresis throughout the operating temperature range. Some manufacturers use the word "Accuracy" in place of Precision," however the meaning is identical.

B Requires vacuum pump to control 0 psig, or the vent mode can be used to obtain 0 psig.

C Total uncertainty is defined as the two sigma combined uncertainty of linearity, hysteresis, repeatability, thermal effects one year drift stability and the uncertainty in the Ruska primary standard, which includes the uncertainty from NIST.

D Limits can be set to prevent excessive mach.

| General | |
|---|---|
| Electrical power | 90/260 V ac, 50/400 Hz, 150 W max. |
| Temperature | Operating: 18 °C to 36 °C (64 °F to 97 °F)<br>Storage: -20 °C to 70 °C (-4 °F to 158 °F) |
| Humidity | Operating: 20 % to 75 % RH, non-condensing<br>Storage: 5 % to 95 % RH, non-condensing |
| Weight | 20 kg (45 lb) |
| Dimensions (H x W x D) | 17.8 cm x 41.9 cm x 48.3 cm (7 in x 16.5 in x 19 in) |
| Pressure medium | High purity nitrogen or dry, clean air |
| Warm up time | 24 hours |
| Digital interface | IEEE-488.2<br>RS-232<br>Model 6610 emulation mode<br>SCPI syntax |

| | |
|---|---|
| Pneumatic connections | 1/4 in FNPT on all ports. Adapters provided for AN6 and AN4 |
| Supply pressure | 60 psi ± 5 psi (4 bar ± 0.5 bar) |
| Supply vacuum | Minimum 50 liters per minute with auto-vent valve.<br>Ultimate vacuum less than 1 mtorr |

## Display

| | |
|---|---|
| | TFT active matrix color, 6.4 inch<br>Display resolution: 1 ft, 0.1 m, 0.1 kn/hr, 0.00001 Mach |

## Units

| | |
|---|---|
| Altitude | ft, meters |
| Airspeed | knots, km/hr, Mach |
| Pressure | Engineering units: inHg at 0 °C and 60 °F, kPa, bar, psi, in$H_2O$ at 4 °C, and 25 °C, kg/cm$^2$, mmHg at 0 °C, cmHg at 0 °C, and cm$H_2O$ at 4 °C and four user defined linear units of measure.<br>Aeronautical units: feet, meters, knots, km/h, Mach |

| Ranges | Ps | Qc |
|---|---|---|
| 7750i-802 | 32 | 68 |
| 7750i-803 | 40 | 68 |
| 7750i-804 | 32 | 32 |
| 7750i-805 | 40 | 32 |

## Control

Rate control indication
RoC: Rate of climb in all above units
RtAS: Rate of airspeed in Knots or km/hr
Total uncertinaty expression: 2 Sigma
Ps/32 inHg FS: RSS of 0.0091 % of Reading and 0.0008 inHg
Ps/40 inHg FS: RSS of 0.0091 % of Reading and 0.0009 inHg
Qc/32 inHg FS: RSS of 0.0091 % of Reading and 0.0007 inHg
Qc/68 inHg FS: RSS of 0.0091 % of Reading and 0.0012 inHg

## Calibration

One year interval is recommended. Use of primary standard such as the Model 2468 Pitot Static Gas Piston Gauge is recommended.

## Options

Lines and fittings kit (supply and test lines) part number 7750-104
Vacuum pump_85 liter/minute capacity with auto-vent valve
Filter and muffler
National Instruments LabVIEW™ driver
ISO 17025 accredited calibration certificate