DPS1000 Pitot-Static Test Set

USER INSTRUCTION MANUAL
M/N DPS1000, P/N: 101-01175

Doc. P/N: 56-101-01175
Revision B
October 15, 2014

BARFIELD, INC.

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CONTACT INFORMATION

Users are requested to notify the manufacturer of any discrepancy, omission, or error found in this manual. Inquiries should include specific questions and reference the publication title, number, chapter, page, figure, paragraph, and effective date.

Please send comments to:

TECHNICAL CUSTOMER SUPPORT - GSTE
BARFIELD, INC.
P.O. BOX 025367
MIAMI, FL 33102-5367
USA

Telephone **(305) 894-5400**
(800) 321-1039

Fax **(305) 894-5401**

Email gsesales@barfieldinc.com

ATTENTION

Although every effort has been made to provide the end user of this equipment with the most current and accurate information, it may be necessary to revise this manual in the future. Please be sure to complete and return the enclosed **OWNER WARRANTY REGISTRATION CARD** to Barfield in order to validate the warranty and to ensure that you will receive updated information when published. You MUST have your name and address on file at Barfield as a registered user of this equipment, to be able to obtain the service covered by the warranty.

Visit the company website, http://barfieldinc.com, for publication updates.

Please send the Registration Card to:

Barfield, Inc.
P.O. Box 025367
Miami, FL 33102-5367
USA

REVISION RECORD

REV.	ECO #	REV. DATE	DESCRIPTION OF CHANGE
		May 28, 2014	Initial Release
B	260-01041	October 15, 2014	Update Barfield logo and warranty

LIST OF APPROVED REPAIR FACILITIES

The manufacturer of this equipment does not recommend the user to attempt any maintenance or repair. In case of malfunction, contact the manufacturer, to obtain the list of approved repair facilities worldwide, ensuring that this equipment will be serviced using proper procedures and certified instruments. A Return Maintenance Authorization (RMA) number will be assigned during this call, to keep track of the shipment and the service.

BARFIELD PRODUCT SUPPORT
DIVISION

Telephone (305) 894-5400
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INTRODUCTION

1. PUBLICATION BREAKDOWN

This user instruction manual establishes the standards of operation for the DPS1000 Pitot-Static Test Set.

Its purpose is to provide sufficient information for the personnel unfamiliar with this unit to understand it, identify its parts, and operate it in accordance with proper procedures, operating techniques, precautions and limitations.

Note: The manufacturer has designed this equipment to be safe when operated using the procedures and instructions detailed in this manual. Do not use this equipment for any other purpose than that stated, as the protection provided by the equipment may be impaired.

Use good engineering practice for all procedures in this publication.

2. INFORMATION PROVIDED WITH THE UNIT

Besides this User Instruction Manual, the Tester is delivered with the four information items described below.

A. The identification label example, (Figure 1), located on the front bulkhead of the Test Set, provides the following information:

Manufacturer Name

Designation of Equipment

Equipment Part Number

Equipment Model Number — Equipment Serial Number

Equipment Modification (if applicable) — Equipment Options (if applicable)

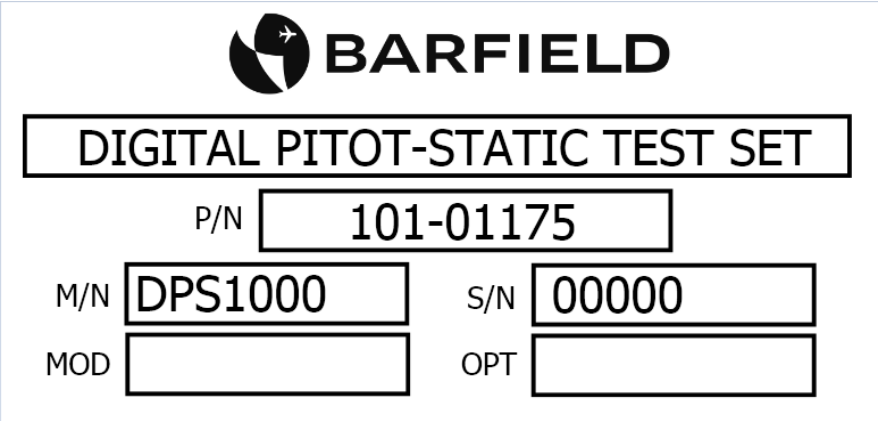
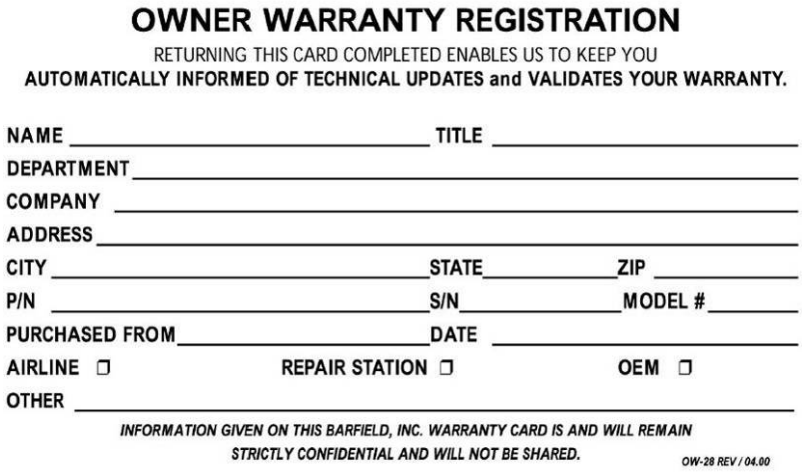


Figure 1 Identification Label

B. The Owner's Warranty Registration card (Figure 2), is to be completed by the owner and returned to Barfield, Inc. within **ten (10) days** of purchase to ensure automatic update of printed matter and validation of warranty.



OWNER WARRANTY REGISTRATION

RETURNING THIS CARD COMPLETED ENABLES US TO KEEP YOU
AUTOMATICALLY INFORMED OF TECHNICAL UPDATES and VALIDATES YOUR WARRANTY.

NAME _____ TITLE _____
DEPARTMENT _____
COMPANY _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____
P/N _____ S/N _____ MODEL # _____
PURCHASED FROM _____ DATE _____
AIRLINE ❒ REPAIR STATION ❒ OEM ❒
OTHER _____

INFORMATION GIVEN ON THIS BARFIELD, INC. WARRANTY CARD IS AND WILL REMAIN STRICTLY CONFIDENTIAL AND WILL NOT BE SHARED.

OW-28 REV / 04.00

Figure 2 Owner Warranty Registration Card

C. Each new or re-certified unit is delivered with a Certificate that shows the date when the unit was tested by the manufacturer, its serial number, and when the next certification is due. This certificate confirms that the unit performed according to its design specifications.

D. The DPS1000 Limited Two Year Warranty can be seen in Figure 3.

3. RECERTIFICATION

The Test Set has a one-year recertification requirement. Maintenance required by this unit must be performed by qualified technicians in a shop equipped with the necessary tooling and facilities.

Note: Recertification by a calibration/repair shop ***not*** possessing the necessary technical knowledge, documentation, special test equipment, tooling and standards will adversely affect the accuracy/capability of the DPS1000 for testing the aircraft, including the demanding Reduced Vertical Separation Minimum (RVSM) accuracy requirement.

LIMITED ONE YEAR WARRANTY

BARFIELD INC. ("BARFIELD") warrants only to the original Purchaser of this product from BARFIELD or an authorized distributor that this product will be free from defects in material and workmanship under normal use and service for one year after date of purchase. BARFIELD reserves the right, before having any obligation under this limited warranty, to inspect the damaged BARFIELD product, and all costs of shipping the BARFIELD product to BARFIELD for inspection shall be borne solely by the Purchaser. In order to recover under this limited warranty, Purchaser must make claim to BARFIELD within 60 days of occurrence, and must present acceptable proof of original ownership (such as a purchase order, invoice, warranty card registration, or other documentation BARFIELD deems acceptable) for the product. BARFIELD, at its option, shall repair or replace the defective unit covered by this warranty. Please retain the dated sales receipt as evidence of the original purchaser's date of purchase. You will need it for any warranty service. In order to keep this limited warranty in effect, the product must have been handled and used as prescribed in the instructions accompanying this product. This limited warranty does not cover any damage due to accident, misuse, abuse or negligence. This limited warranty is non-transferable and does not apply to any purchaser who bought the product from a reseller or distributor not authorized by BARFIELD, including but not limited to purchases from internet sites. This warranty does not affect any other legal rights you may have by operation of law. Contact BARFIELD at www.Barfieldinc.com or customer service at (305) 894-5506 for warranty service procedures.

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BARFIELD INC.
4101 NW 29th Street
Miami, Florida 33142, USA

Form 7.5.3-13
Dated 09/01/2014, Rev. 1

Figure 3 Limited 2 Year Warranty

CHAPTER 1: DESCRIPTION

1. INTRODUCTION

The BARFIELD INC. **DPS1000 Imperium Series** (P/N: 101-01175) is a self-contained flight line Pitot-Static Test Set. The DPS1000 provides complete measurement and pneumatic control for leak testing, functional tests of air data instruments, components and systems.

Figure 4 DPS1000 Imperium Series - Digital Pitot Static Test Set

The DPS1000 is a two channel measurement and pneumatic control unit. This two channel "**STATIC (Ps) and PITOT (Pt)**" Test Set has two modes of operation:
(1) **Leak Measure** mode with leak testing facilities.
(2) **Control** mode providing controlled pressure and vacuum to simulate Aeronautical, EPR and various Pressure units as requested by the user setting the applicable Target values.

The DPS1000 has **three** display configurations. Each of these modes offers various units of operation: (1) **Aeronautical** (2) **EPR** (Engine Pressure Ratio) and (3) **Pressure Units**.
For **Aeronautical**: ft, m, kts, km/hr. While operating in **EPR** mode, the following units are available: inHg, mbar, psia, mmHg, kPa, inH_2O. When operating in **Pressure Units** mode, it can operate as (1) two absolute channels: Ps & Pt or (2) as an absolute and differential channel: Ps & Qc in units of inHg, mbar, psia, mmHg, kPa, inH_2O.

While operating in the **Aeronautical** mode, the DPS1000 has two types of Leak Testing features: (1) the traditional **Leak Rate Timer** and (2) and **ATP Leak Test Profiles**. While operating in Pressure units or EPR mode, only the traditional Leak Rate Timer function is available.

When operating in the **Aeronautical** mode, the STATIC (Ps) port is used to measure/simulate the static ports pressure altitude. At all times, the displayed value for pressure altitude "**ALT**" (ft or m) is computed based on a Baro setting of **29.9213** inHg (**1013.25** mb).

Note: The Baro setting value on the DPS1000 cannot be changed.

When operating in the **Aeronautical** mode, the PITOT (Pt) port is used to measure/simulate the CAS and MACH value(s) based on the pressure differential between the PITOT (Pt) and STATIC (Ps) ports.

The STATIC (Ps) channel measurement is accomplished using an absolute transducer while the PITOT (Pt) channel uses a differential transducer. The PITOT (Pt) channel differential measurement is referred to as Qc, where Qc = Pt – Ps and thus Pt = Ps + Qc.

The display on the DPS1000 is a GUI "graphic user interface" with touch screen control. The GUI is organized as a split screen with the left side containing the measurement /control parameters and the right half contains the menu system and test set configuration status window located on the top right of the GUI screen. The measurement/control parameters screen can be configured as a 4-parameter or 2-paramerter display.

There is two predefined performance limits (default and max) that cannot be changed or redefined by the user. Using the GUI, a supervisory – lead person (pin code required) will have the ability to define custom performance limits. Any user (no pin code required) will be able to select the performance limits required. When the test set is powered on, the unit will by default use the limits selected during the previous use.

The DPS1000 has integrated pumps to produce vacuum and pressure required for the integrated 2-channel pneumatic controller. By default, the unit is configured with quick connect ports for Ps & Pt hoses to be connected. These ports are self-sealing meaning when the external hoses are not connected the ports on the test set are sealed. Likewise, the mating female hose connectors are also self-sealing when disconnected from the test set. The DPS1000 may also be order with optional AN4 ports (option: B) for both Ps & Pt.

The DPS1000 supports wireless remote control using Wi-Fi direct hardware which allows the DPS1000 to be controlled using an android or iOS compatible tablet. The embedded Wi-Fi direct hardware requires a custom pin-code to enable this feature. Each DPS1000 requires a unique custom pin-code (considered option: A) available at an additional cost to enable this feature. Once the Wi-Fi hardware is enabled, any supported tablet will connect to that test set for no additional fee, the tablet application will be available at no cost.

Note: All DPS1000 units are configured with Wi-Fi hardware installed however the hardware is disabled unless option: A is purchased. The tablet app will provide wireless remote control capability with the same GUI screen formats and functionality as the built-in touch screen on the Test Set.

The DPS1000 Pitot Static Test Set provides a very accurate and convenient method of performing leak testing of aircraft pitot-static systems; including air data computers and airspeed, altimeter, MACH, vertical speed, engine pressure ratio, and manifold pressure indicators.

The DPS1000 Digital Pitot Static Test Set meets the demanding RVSM accuracy requirement of ±0.003 in. Hg and compliance requirements of 91.171.

Note: It is important that the customer be sure the use of the Test Set is in compliance with other aspects of the regulations. The DPS1000 Test Set also fully meets the requirements of the DOT Advisory Circular 43-203B for performing Altimeter and Static System Tests and Inspections.

Note: It is important that the customer be sure the Test Set is in compliance with the Recertification requirement.

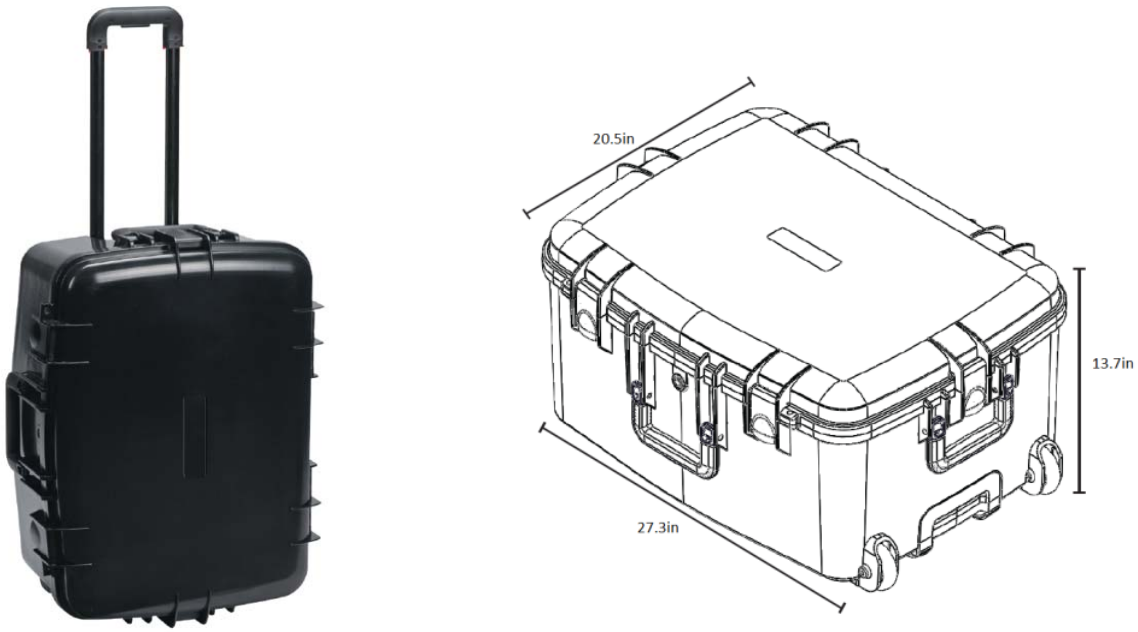


Figure 5 Optional Travel / Shipping Case
(sized to qualify as a checked bag with most commercial airlines)

2. PHYSICAL DESCRIPTION

A. Carrying Case

The carrying case is a Copolimer injection molded case comprised of upper and lower sections:

- The lower section supports the panel assembly.
- The upper section is a removable lid.

Some of the case standard features include:

- One-touch extension handle and wheels for carry-on ease.
- Largest legal airline carry-on size.
- Guaranteed for Life

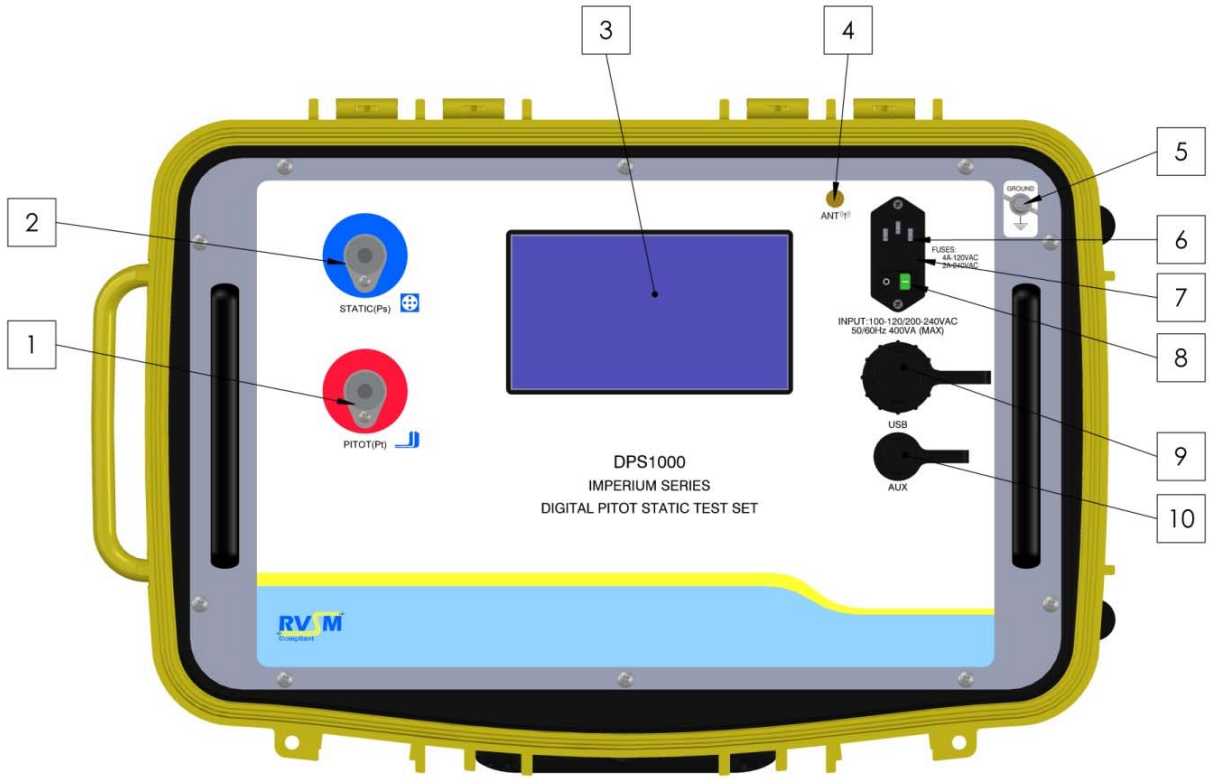


Figure 6 DPS1000 Front Panel

B. Front Panel Switches and Controls (Components shown in Figure 6).

(1) PITOT (Pt) PORT	Connect to Aircraft Pitot system. This is also referred to as the Pt port and Total Pressure port.
(2) STATIC (Ps) PORT	Connect to Aircraft Static system. This is also referred to as the Ps port.
(3) Display - Touch Screen	Touch screen GUI "Graphic User Interface" is used to display and control all aspects of the Test Sets operation. The only physical switch is the Power ON/OFF.
(4) Wi-Fi Antenna	Used for Wi-Fi communication. This feature (if enabled) can be used to communicate with an android or iOS tablet. Barfield provides a custom App that allows a tablet to be used as a wireless remote control.
(5) Ground (Earth) Stud	Used to ensure test set chassis is at same ground potential as Aircraft or Instrument being tested.
(6) Fused Power Entry Module	Connects external power to the tester. Unit uses either a cable with a standard 115VAC plug or the optional cable for operator installation of 230VAC plug.
(7) Power Entry Fuse holder	Power Entry module fuses. For 120 VAC operation use 1(ea) fuse: 4A For 220 VAC operation use 2(ea) fuse: 2A
(8) Power ON/OFF switch	Used to power On/Off Test Set operation
(9) USB port	Standard USB Port used for multiple purposes • To Upgrade Test Set HUIM or PCM Firmware from flash drive • To download Test Set history log contents onto USB flash drive.
(10) Micro USB port	OEM use only

C. Hose Assembly and Adapters

The hose kit is included with each Test Set and includes the following items:

(1) A pitot hose assembly is a 25-ft red hose with a self-sealing quick disconnect for attachment to the pitot port on the test set. The aircraft hose end has an AN4 type fitting for connection to a pitot port adapter with a tethered AN4 cap used for leak testing hose assembly prior to attaching Nav-aid / port s adapters to aircraft.

(2) A static hose assembly is a 25-ft blue hose with a self-sealing quick disconnect for attachment to the STATIC (Ps) port on the test set. The aircraft hose end has an AN4 type fitting for connection to a pitot port adapter with a tethered AN4 cap

used for leak testing hose assembly prior to attaching Nav-aid / port s adapters to aircraft.

(3) The pitot tube adapter is a flexible expandable rubber tube used to connect to the pitot hose to an aircraft's pitot port.

The static port adapter kit is a universal adapter kit designed for connecting the static hose to the aircraft's static port.

Note: The pitot and static adapters universally fit many aircraft, but in some cases these adapters are not recommended or are inadequate. Barfield, Inc. distributes high quality custom made pitot and static adapters for use on all general aviation, airline, helicopter, and military aircraft. For additional information, contact the Barfield GSTE Sales Department or visit the web page at http://www.barfieldinc.com.

D. Electrical Connections

1) Power Entry - the power entry to the unit is a connector Style IEC 320-C14 module with an Illuminated ON/OFF Switch and equipped with a fuse holder.

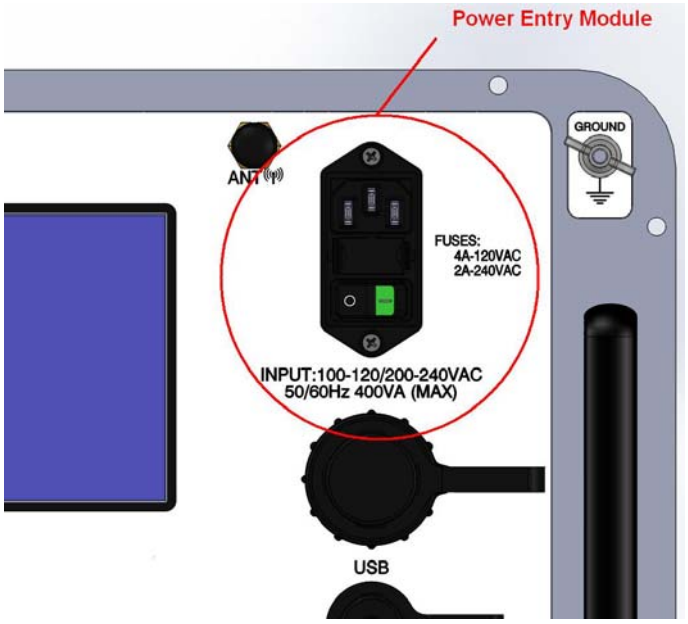


Figure 7 Power Entry Module

Note: The power switch is not a power isolator as defined by EN61010.

The unit must be connected to the correct electrical power supply as stated, adjacent to the power connector.

CAUTION: The supply must provide connection to a protective ground terminal. The unit must be always connected to the supply earth (ground).

2) Power Supply Cable - the unit uses a common 3 prong IEC320-C13 AC power cable. The cable length is 6.56' (2.00m) and the wire gauge is 18 AWG.

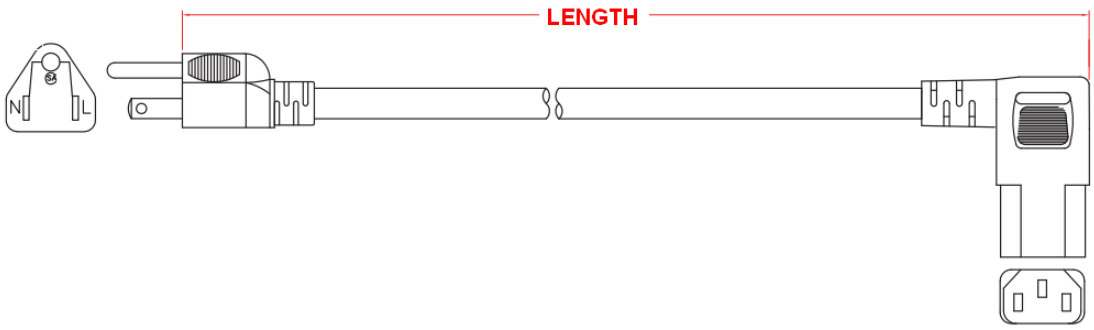


Figure 8 Power Supply Cable

CAUTION: When using a different power cord, make sure that is correctly rated for the power supply.

3) Fuses – there is a Miniature Fuse, 5 x 20 mm, Time-Lag T, L, 250 VAC, 5A is installed on the fuse compartment of the power entry module.

Note: Only replace with properly rated fuses

4) External earth/ground connection (Stud) - an external earth (ground) cable may be connected to the stud on the front panel of the unit providing integrity of the earth (ground) connection. This will ensure that test set chassis is at same ground potential as Aircraft or Instrument being tested.

CHAPTER 2: SPECIFICATIONS AND CAPABILITIES

1. PHYSICAL DATA

- Height: 9.0 in. (22.86 cm)
- Width: 14.8 in. (37.6 cm)
- Length: 22.2 in. (56.38 cm)
- Weight: 35 lbs. (15.9 kg)

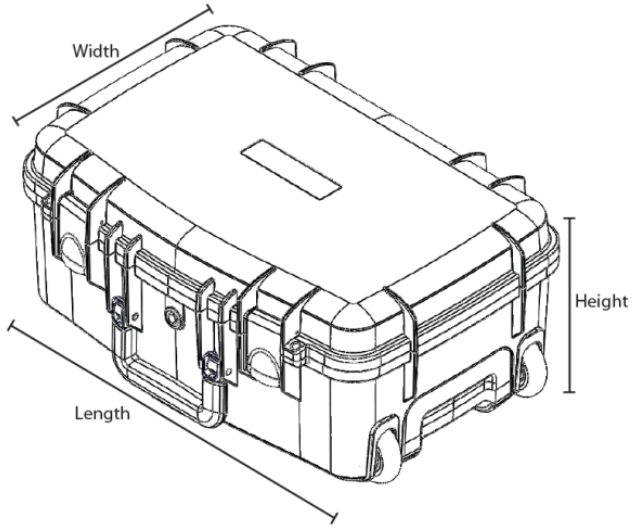


Figure 9 Case Dimensions

2. SPECIFICATIONS

- Altitude: -1,800 to 55,000 ft.
- Airspeed: 5 to 650 knots
- ROC: 0 to ± 6,000 ft/min (with 125 cu.in volume)
  Note: ROC up to ± 20,000 ft/min, depending on system volume)
- Mach: 0.01 to 3.5
- Ps channel: 0.8 in. Hg -to- 32 in. Hg *absolute* (STATIC (Ps) port)
- Pt channel: 0.0 inHg -to- 40 inHg differential (PITOT (Pt) port)
- *Ps System Volume: 125 cu. In*
- *Pt System Volume: 75 cu. in*
- EPR: Pt2 Range: 2.693 inHg to 32 inHg
  Pt7 Range: 2.693 inHg to 72 inHg (not to exceed 40 inHg differential from Pt2)

No	P/N	Description	Qty per assembly
1	115-00632	Hose Kit with Quick Connects. Two each 25 ft hoses, blue hose for **STATIC (Ps)** channel and red hose for **PITOT (Pt)** channel.	(1ea) 25ft red hose and quick connect. (1ea) 25ft blue hose and quick connect.
2	194-00073	Shipping container for DPS1000. The container is sized to qualify as a check bag for most commercial airlines.	(1ea)

Table 1 DPS1000 Accessories

3. ACCURACY: (typical)

- Altitude: ± 0.0030 in. Hg (± 0.102 mbar)
  ± 3 ft @ 0 ft
  ± 6 ft @ 20,000 ft.
  ± 8 ft @ 30,000 ft.
  ±14 ft @ 45,000 ft.
  ± 22 ft @ 55,000 ft.

- Airspeed: ± 0.002 inHg rising to ± 0.020 @ FS (± 0.06 mbar rising to ±0.68)
  ± 1.0 kts @ 20 kts.
  ± 0.5 kts @ 50 kts.
  ± 0.2 kts @ 650 kts.

- Rate of Climb: ± 2% of Target value

- MACH: ± 0.001 **MACH** above 0.10 **MACH**
- EPR: ± 0.001 ratio Pt7/Pt2 (ratio of 5.0 or less)
- Stability: 0.01% of range/year (max)

4. PERFORMANCE

The DPS1000 in Control mode into a leak tight system can achieve the following:

Rate of Climb “ROC”: 0 – 6,000 ft/min into 125 cu.in up to 55,000 ft

ROC up to 20,000 ft/min is achievable (Ps volume dependent)

Rate of CAS “RtCAS”: 0 – 300 kts/min into 75 cu.in up to 650 kts

Note: These Rates decrease for larger system volumes.

5. OPERATING TEMPERATURE RANGE

0 °C to 50° C (32° F to 122° F)

6. DISPLAY UNITS

- **CAS**: kts, km/hr
- **ALT**: ft , meters
- **MACH**: dimensionless ratio
- **ROC**: ft/min, m/min
- **Pt, Ps, Qc**: inHg, mbar, psia, psid, kPa, mmHg, inH_2O@4C, inH_2O@20C, inH_2O@60C
- **EPR**: ratio (Pt/Ps), inHg, mbar, psia, psid, kPa, mmHg, inH_2O@4C, inH_2O@20C, inH_2O@60C

7. PRESSURE MEDIA

Two internal high reliability electric pumps generate the required pressure and vacuum. The 4-head vacuum pump is configured to provide each channel (Ps & Pt) with its own dedicated 2-headed vacuum source. The pressure pump is a single head unit and supplies both channels (Ps & Pt) with a common pressure supply.

8. TRANSDUCERS

Latest Technology Transducers with the highest accuracy and stability commercially available. The Ps channel uses an absolute pressure transducer while the Pt channel uses a differential pressure transducer.

9. INPUT A/C POWER

Electronic switcher power supply module with auto input voltage detection circuitry for an A/C input voltage of 100-120/200-240VAC @ 50-60Hz.

10. FUSE PROTECTION

Fuse overload protection is provided by a Miniature Fuse, 5 x 20 mm, Time-Lag T, L, 250 VAC, 5A is installed on the fuse compartment of the power entry module.

CHAPTER 3: OPERATION

1. PREPARATION

The DPS1000 has been designed with a user friendly GUI "Graphical User Interface" which provides a very intuitive understanding of the man/machine interaction therefore greatly simplifying the learning experience. However, we still **STRONGLY RECOMMEND** the user becomes familiar with the DPS1000 operations and menu structure before connecting it to an aircraft system or instruments and/or performing any tests.

The test procedures are described in place of any specifications by either the airframe or instrument manufacturer. Particular attention should be addressed to preliminary procedures to avoid erroneous test results, and to avoid the danger of damaging any of the aircraft or Test Set instruments. The quick connect ports on the test set and mating hoses are color-coded and keyed to help prevent accidental crossing of Pitot and Static hoses.

Each test set is completely calibrated and tested before shipment. To ensure the integrity of the tests, the DPS1000 should be leak checked before each use. To help automate this process, use the predefined ATP Test Set–only.

WARNING: Observe aircraft and equipment servicing procedures as well as safety precautions detailed in the AMM "Aircraft Maintenance Manual", CMM "Component Maintenance Manuals" and procedures and practices stated in local orders.

2. POWER ON INITIALIZATION

A. Set power switch to ON. After approximately 7 seconds, the display will indicate "DPS1000" during the initial boot-up process. The following, or *similar* screens appear during the Test Set initialization:

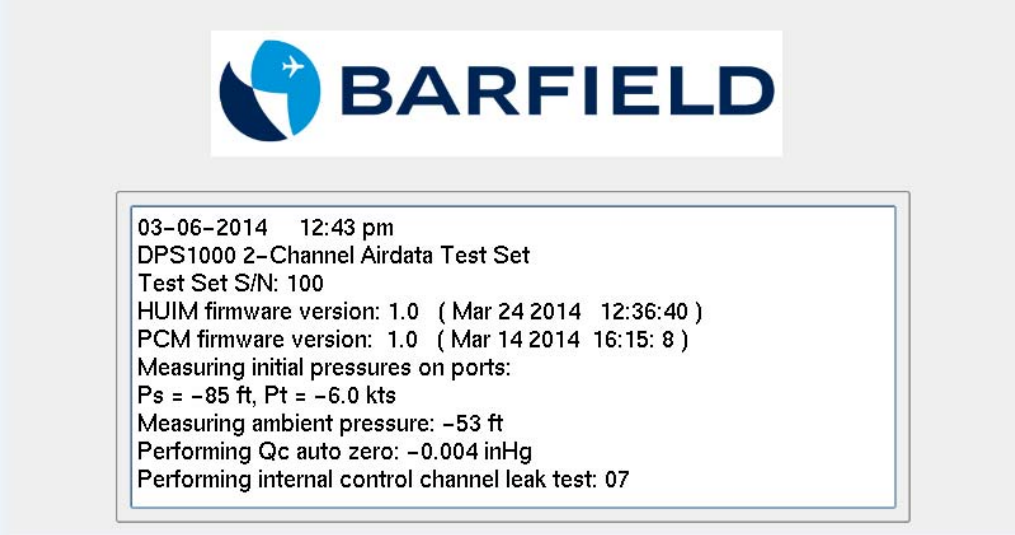


Figure 10 Power On Initialization Display

B. During the DPS1000 power ON initialization process the information is both displayed and written to a log file. The log file provides the ability to go back and view the initialization process and results if needed. The log file can be viewed at a later time by going to the Menu sequence Menu →, Menu →, Log File, Current History. Note, the "Current History" log file contains logged information for the current powered ON session.

C. The final process during the Power ON initialization process the test set will equalize the internal pneumatic pressure contained in the DPS1000 manifold and control vessels to ambient. When this process has completed, the test set will be vent to ambient pressure and the display will indicate this.

D. At this time the test set is ready for the hoses to be attached to the PITOT (Pt) and STATIC (Ps) ports.

E. It is standard practice and highly recommended to perform a Test Set Leak Test. The most effective procedure is to perform the leak test with the hoses attached to the test set and with the other end of the hoses capped. This will provide the most accurate leak test results and allows the user to establish a baseline regarding what is the leak rate of the Test Set and hose combination prior to interfacing with the aircraft or instrument under test.

3. OPERATING MODES

The DPS1000 has two pneumatic control modes of operation, (1) the default mode: 2-channel (Ps & Pt) mode and (2) 1-channel: Pt-Only mode which the user can select under the Setup 1 menu.

The DPS1000 when power ON after the initialization process has completed will always be configured into the default 2-channel (Ps & Pt) mode. This 2-channel mode is by far the most common method used while working with Aeronautical instruments and aircraft Pitot-Static systems. While configured in the 2-channel mode, the STATIC (Ps) port is used to both measure and simulate the STATIC (Ps) port pressure altitude and the PITOT (Pt) port CAS "calibrated airspeed" equivalent pressure. At all times, the displayed value for pressure altitude "ALT" (ft or m) is computed based on a Baro setting of 29.9213 inHg (1013.25 mb). Note: The Baro setting value cannot be changed.

The Pt-only mode can be used to drive an Airspeed or MACH indicator that has it's STATIC (Ps) port left vented to ambient (local barometric pressure). When the single channel Pt-only mode is selected the DPS1000 will perform a Go To Ground function before transitioning into this mode to ensure the Test Set Ps port is at ambient barometric pressure, at the conclusion of the Go To Ground the test set will leave the STATIC (Ps) port vent to ambient while driving the PITOT (Pt) port to the Target pressure specified by the user.

Below is an example of the 2-modes:

1) Default: Aeronautical 2-Channel (Ps&Pt) (Figure 11)
2) Aeronautical 1-Channel (Pt Only) (Figure 12)

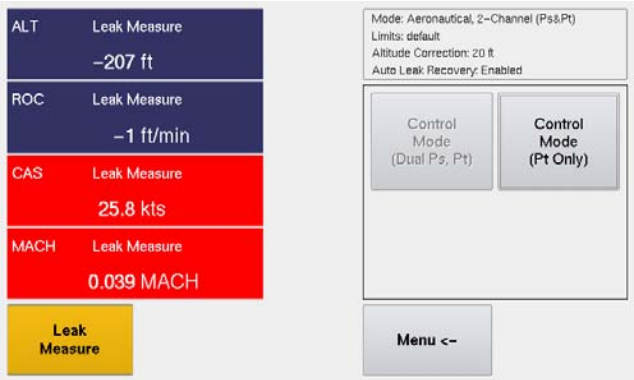


Figure 11 Default 2-Channel (Ps & Pt) mode

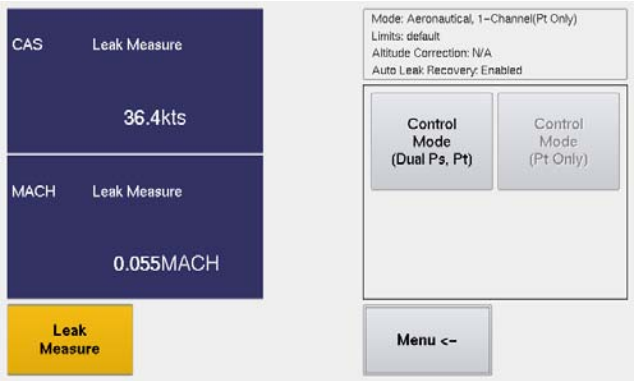


Figure 12 Single Channel "1-Channel (Pt Only)" Mode

4. TEST SET CONFIGURATION STATUS – "DISPLAY"

The Test Set provides **Configuration Status** information displayed on the top right of **UI** display. The following information is included:

- **Mode**: 2-channel(Ps & Pt) or 1-channel Pt-Only
- **Limits**: Indicates the limits presently being used
- **Altitude Correction**: Indicates the correction factor entered by the user. Default = 0 unless user specifies
- **Auto Leak Recovery**: Enabled/Disabled

Note: The Configuration Status area is an active touch zone that will position the menu page to the 2nd page (equivalent) to selecting Menu > from the main menu.

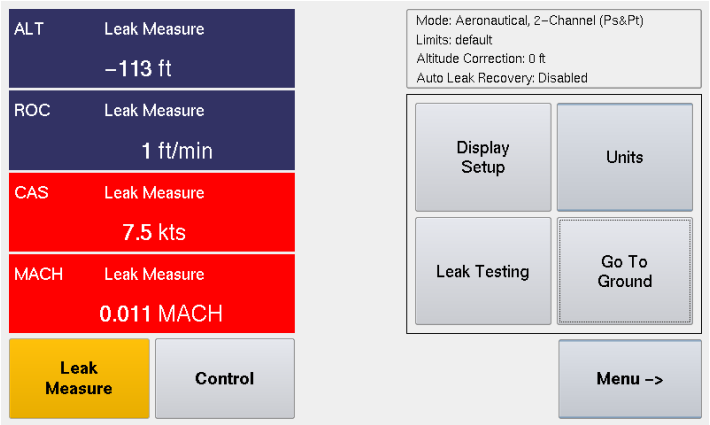


Figure 13 Test Set Configuration Information Displayed

5. USER INTERFACE MENU AND DISPLAY

The UI "User Interface" was designed and structured to provide the user/operator with the most efficient and intuitive man-machine interface as possible.

- The left-half of the screen is dedicated to provide all the measurement and control display screens.
- The right-half of the screen is dedicated to provide all the menu displays and selections
- The top right-quadrant is used to display Test Set operational status (Mode, Limits, Altitude Correction, Auto Leak Recovery) information.
- The Leak Measure and Control mode softkey will have an amber background indicating which mode the test set is presently operating in. See figure below:
- While in Leak Measure mode, "Target = " is not displayed for any of the 4-parameters or 2-parameters displayed and therefore the touch zones for those parameters is not active.
- While in Control mode, the 4-parameters or 2-parameters displayed will have a "Target =" value displayed, when the Test Set transitions from Leak Measure to Control mode the Target value(s) are automatically set to the present value measured on the Ps & Pt ports. During the transition to Control mode, "Wait Resuming Control" is displayed and ALL touch screen zones are disabled except for the "Cancel" soft-key. When the message "Wait Resuming Control" disappears the pneumatic controller has achieved pressure equalization with the current pressure on the Ps & Pt ports. At this time the 4-parameter or 2-paramter touch zones are active and the user can enter Target values for each of the displayed parameters.
- While in Control mode, the Leak Testing softkey is ghosted. Leak testing can only be accomplished while in Leak Measure mode.

Figure 14 Display Setup Aeronautical Menu

Note: Regarding the UI Menu structure, the menu screen above is considered the top level “Root Menu”.

Note: Throughout this section while explaining all the UI related functions the soft-key “touch screen” sequence will be listed based on starting at the top level “Main Menu” position.

- While in **Control** mode, the Target value(s) can be specified by the user simply touching the touch zone area for the Target parameter of interest. For example see below for the Display Setup with ALT, ROC, CAS, MACH being displayed the Target value for any of the 4-parameters can be entered by initially touching the parameter touch zone area which will cause the Target keypad to be displayed for user entry. For this example the ALT touch zone was selected.
- While in **Leak Measure** mode, the touch screen is not active for any of the 4 parameters, only the menu side (right-half) of the screen or the Leak Measure and Control mode softkey are active.

Figure 15 Target Value Keypad Screen

A. Display Setup – Configuring display format

The Display Setup allows the user to configure the display as a 2 or 4-parameter format. While operating in Aeronautical mode for example, the 4-parameter format will allow ALT, ROC, CAS and MACH or ALT, ROC, CAS, and RtCAS to be displayed. While in Control mode, Target values can be assigned to ALL 4 parameters by simply touching the screen on each of the 2 or 4-parameter displayed areas.

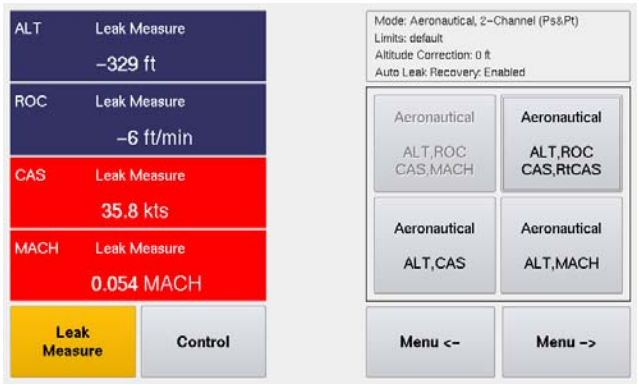


Figure 16 Display Setup: 4-Parameter

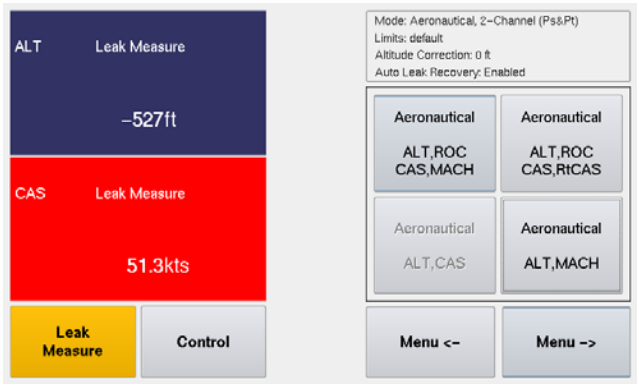


Figure 17 Display Setup**:** 2-Parameter formats

B. Units - displayed units

Once the Display Setup has been selected, (Aeronautical, Pressure units or EPR, 4-parameter or 2-parameter display format) the Units menu choices allows the user to select the units of measure for the given display parameters selected. For example, for Aeronautical mode the available units for ALT is (1) ft or (2) m, depending on which is selected the corresponding units for ROC (1) ft/min or (2) m/min and for CAS (1) kts or (2) km/hr and for RtCAS (1) kts/min or (2) km/hr/min. Regarding MACH, it is dimensionless quantity and is always displayed as MACH.

Figure 18 Display Units – for Aeronautical Mode

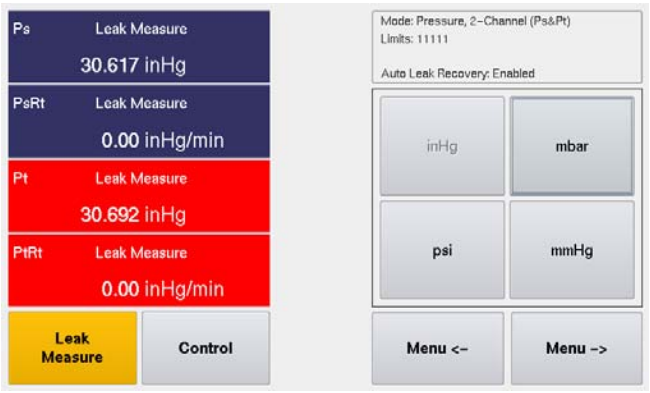


Figure 19 Display Units – for Pressure Units Mode

C. **Leak Testing** – There are two types of leak tests supported on the DPS1000, the traditional leak testing using the Leak Rate Timer or use the automatic test process called ATP Leak Test Profiles.

Figure 20 Leak Testing Menu

1. **Leak Rate Timer** – traditional leak testing which the user sets the target values of the desired ALT and CAS values. Once the test set achieves those target values the user selects Leak Measure mode followed by Leak Testing followed by Leak Rate Timer being selected.

   Main Menu: Leak Testing → Leak Rate Timer

   Wait Time is the duration of time that will allow the Ps & Pt pressure(s) to stabilize before beginning the Leak Test measurement cycle.

Note: anytime there is compression or expansion of a gas in a closed system there will be a resulting pressure change as a result of adiabatic.

- The Wait Time is to allow thermal equilibrium “adiabatic” to occur so that the leak measurement made during the “Leak Time” phase is truly a result of the system leak rate and not a result of adiabatic instability.
- For Low Level Leak testing < 5,000 ft a Wait time of 1:00 min is recommended.
- For High Level leak testing (> 10,000 ft or high ROC) a Wait Time of 5:00 minutes or more is recommended to allow for adiabatic stability to occur.

Leak Time is the duration of time that will be used to measure the leak rate. The value can be changed. Touch “Leak Time” zone area and touch screen keypad will appear allowing User to re-define the Leak Time.

Figure 21 Leak Rate Timer Results

2. **ATP Leak Test Profiles** – automated leak testing.

   The user can select the ATP “Automatic Test Process” Leak Test Profile which defines the necessary test parameters. Once the ATP profile has been selected, the user can select RUN and walk away returning once completed to observer the leak test results.

   Main Menu: Leak Testing, ATP Leak Test Profiles, Select Leak Test Profile(s)

Figure 22 Select ATP Leak Test Profile

The ATP Leak Test provides the following profile options:

- **ALR** “Auto Leak Recover” can be “(X)” selected/deselected
- **Ambient Comp** can be “(X)” select/deselected

  Ambient Comp, compensates for local ambient barometric pressure to ensure for example that a 5,000 ft leak test is really checked at a pressure altitude equivalent to 5,000 ft above the local barometric pressure.
- **Pass Limits** can be “(X)” selected /deselected which determines whether or not pass/fail limits are used. If Pass Limits is selected “(X)”, the user can specify the pass limit value for each of the 3 possible leak tests.

Regarding the actual Leak Test(s), there are 3 possible leak tests that can be selected. (1) Pt channel, (2) Ps Low ALT and (3) Ps High ALT.

Note: for the Pt channel leak, the ATP will automatically take the Ps channel to ground prior to starting the Pt channel leak test.

- **Wait**: The wait time is the time allowed for the system under test to settle and stabilize after the target CAS or ALT has been reached. The generally rule is the higher the target CAS or ALT a longer wait time should be used to allow for adiabatic to settle so that the leak measurement will truly represent the systems leak rate and not be influenced by the expansion/contraction of gases in a closed system. The Pt and Ps Low ALT share the same Wait time value while the Ps High ALT has its own wait time value specified.
- **Measure**: The measure time is simple the amount of time to allow for the leak measurement cycle. Typically 1:00 minute is used for Pt & Ps Low ALT and a longer time may be used for Ps High ALT.
- **Run**: begins executing the ATP leak test that is presently loaded as defined.
- **Save**: simply saves the present ATP leak test parameters as presently defined.
- **Cancel**: exits the ATP leak test. Any changes made to the ATP leak test parameters will not be saved.

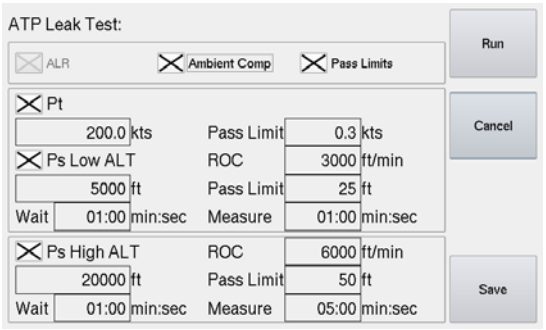


Figure 23 ATP Leak Test - Parameter Profile Screen

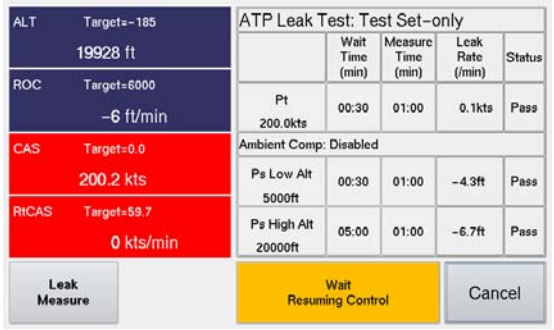


Figure 24 ATP Leak Test Results Screen

D. **Go To Ground**: This function will take the Test Set back to Ground (ambient barometric pressure altitude) and CAS = 0 Kts. Go To Ground can be selected while operating in Leak Measure or Control mode.

Note: During Power ON initializations, the Test Set measures ambient barometric pressure “GROUND” and stores it in a temporary memory. When the user selects Go To Ground, the Ps Target = ambient pressure altitude. After completion of Go To Ground (Unit Safe at Ground) the Test Set measures ambient barometric pressure again and that becomes the latest ambient barometric pressure altitude at ground.

Main Menu: Go To Ground

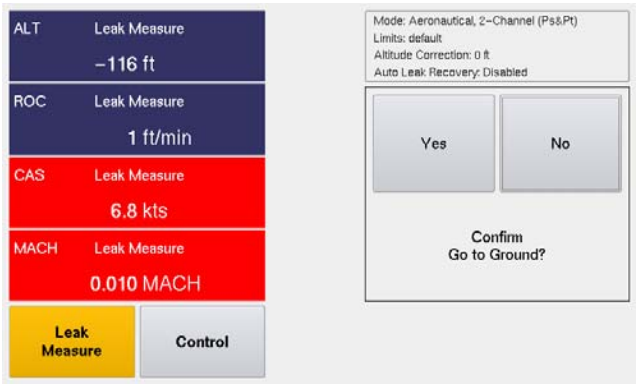


Figure 25 Go to Ground Confirm Screen

User can select “Go To Ground” from the Main menu, while in either Leak Measure or Control mode. At the conclusion of Go To Ground, the Test Set will perform an AutoZero function to trim off any small Qc pressure offset that may have crept into the Qc transducer typically due to thermal component (Test Set Warming or cooling). The AutoZero function greatly improves the low airspeed (< 50 kts) measurement accuracy. Also, the Test Set will remain Vented to ambient until the Control mode is selected.

Note: There is two circumstances where an AutoZero function is performed (1) at the conclusion of Go To Ground function and (2) every 5 minutes if CAS < 50 kts and the Test Set is in the Leak Measure mode.

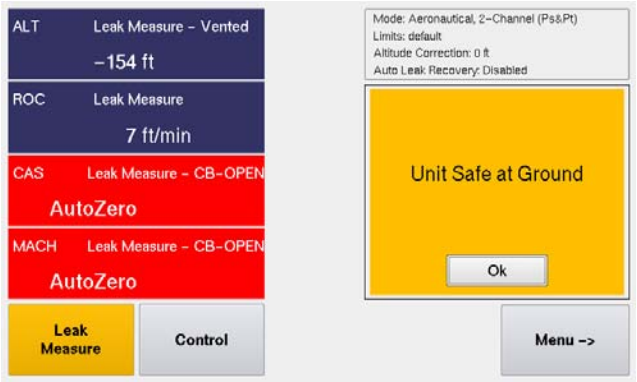


Figure 26 Conclusion of Go To Ground

When the AutoZero function is performed, the CB valve (Sv_CB) is OPEN.

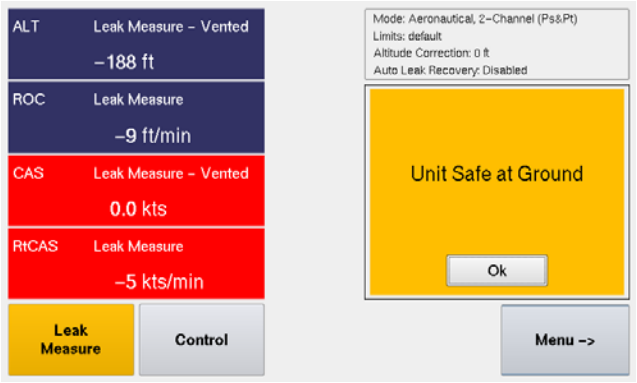


Figure 27 Conclusion of Go To Ground

After a Go To Ground function is performed, Test Set will remain Vented to ambient.

E. **Setup 1** – The following is available under this set of menu(s):

Figure 28 Setup 1

Main Menu: MENU →, Setup 1

1) Auto Leak Recovery – when Test Set is operating in Leak Measure mode and Auto Leak Recovery is Enabled. If a high leak rate occurs (High ROC or RtCAS) than ALR will automatically activate CONTROL mode which will than set ALT target and CAS target to present level and the controller will come online and try to maintain the current Altitude & CAS. To disable this feature, select Disable Auto Leak Recovery.
2) Limits View / Select – Allows user to select and view any of the saved limit file values.
3) Altitude Correction – Allows user to enter a correction factor regarding the altitude difference between the physical test set and the Aircraft ports and or Unit under test. Below is an example of the Aircraft static port being located 20 ft physical higher (“+”) than where the DPS1000 test set is located.

   Note: If the DPS1000 test set was physical higher than Instrument or aircraft than the altitude correction would be entered as a (“-“) negative value.

Figure 29 Altitude Correction Screen

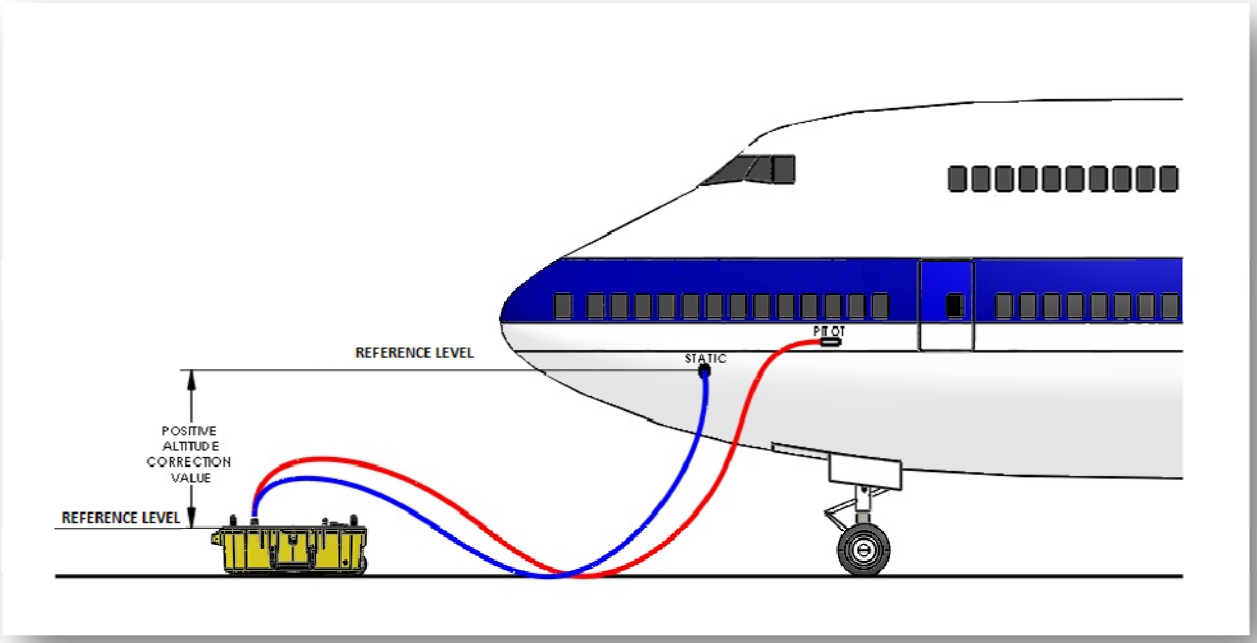


Figure 30 Altitude Correction On-Aircraft

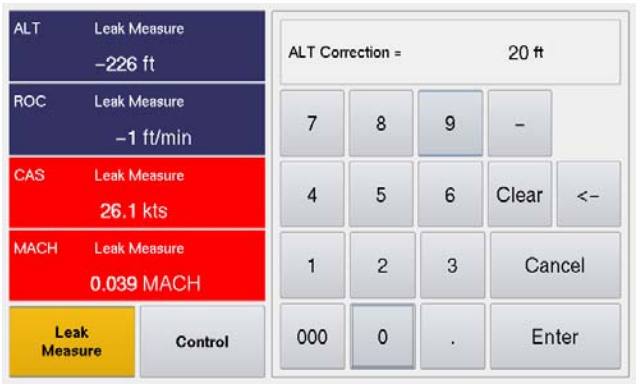


Figure 31 Altitude Correction Keypad

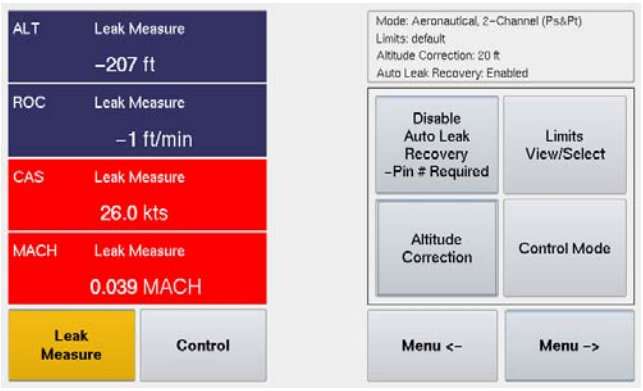


Figure 32 Test Set Configuration, Updated Altitude Correction

4) Control Mode – Allows user to select the default: 2-Channel (Ps & Pt) mode or 1-Channel (Pt-Only) mode. You will see the operating "Mode:" is always indicated in the status window located on the top right-side of the UI display.

   The Pt-Only mode can be used to drive an Airspeed or MACH indicator that has it's Ps (static) port vented to ambient (*local barometric pressure*). When the single channel Pt-only mode is selected the DPS1000 will perform a Go To Ground function before transitioning into this mode to ensure the Test Set Ps port is at ambient barometric pressure, at the conclusion of the Go To Ground the test set will leave the Ps port vent to ambient while driving the Pt port to the Target pressure specified by the user.

Note: The DPS1000 <u>always</u> powers up into the default: 2-Channel (Ps & Pt) mode.

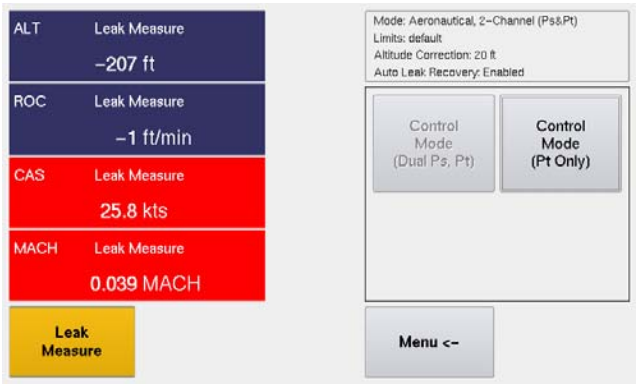


Figure 33 Setup 1 Control Mode(s)

5) Copy History file to USB

   This allows a copy of the history log to be transferred to an external USB flash drive. With the file on a flash drive it can be opened and reviewed using any tools that allow view of ascii text files. At times this file could be emailed to Barfield to aide in trouble shooting some issues/problems.

F. **Setup 2** – *(Pin # Required)*

The Setup 2 menu is pin protected to provide some level of security to the activities that can be accomplished under this menu structure. *After entering the user pin# code, the following screen (Fig x) will allow*

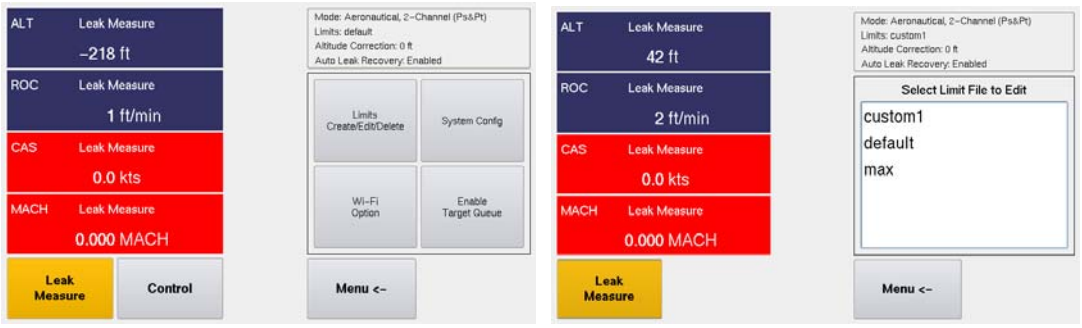


Figure 34 Setup 2 - Selecting Limit File to Edit

a) Limits – Create, Edit, Delete

i. Create Custom Limits

Allows user to create custom limit profile(s).

Note: this is in addition to the two pre-defined (1) default and (2) max limit profiles.

ii. Edit Custom Limits

Allows user to edit custom limit profile(s).

Note: user cannot edit the two pre-defined (1) default and (2) max limit profiles.

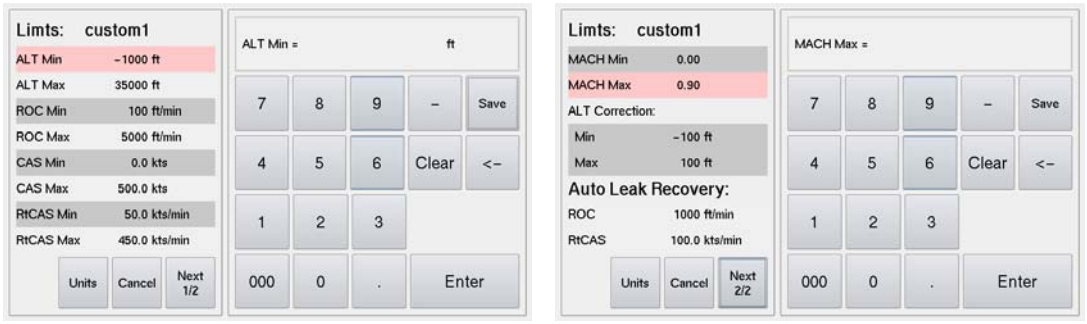


Figure 35 Setup 2 – Edit Custom Limits

iii. Delete Custom Limits

Allows user to delete custom limit profile(s).

Note: user cannot delete the two pre-defined (1) default and (2) max limit profiles.

Figure 36 Delete Custom Limits

b) System Config *(future feature – not supported on initial product release)*

i. ALR

a.) Power ON default to: Enabled or Disabled (*Presently **ALR** Power ON: Disabled*)

b.) Pin # not required (Yes/No) (Presently Pin # not Required)

c.) Boot-up with previous setting or system defaults (Presently: default)

ii. Power ON – Auto Go To Ground (Enable/Disable) (*Presently: Enabled*)

c) Wi-Fi option *(future feature)*

The Wi-Fi option requires a custom key-code (unique for each test set) to enable the Wi-Fi hardware contained in the DPS1000. Once the hardware is enabled, both android and iOS tablets can function as a remote terminal to control the DPS1000. The android and iOS Applications software is free, the only cost is enabling the hardware contained in the DPS1000.

i. Enter key-code to Enable

Note: ALL DPS1000 have the necessary Wi-Fi hardware installed.

Enable Target queue - *(future feature considered)*

This will allow user to enter up to 10 Target values into queue

G. **Setup 3** – This is for OEM only, OEM or Service Pin # required.
(*Custom pin# required for each Test Set*)

1) Change User Pin#

Allows user to change the current **user** pin#.

Note: User must know current pin # in order to change it.

2) Help – brief top level help screens

3) Touchscreen Calibration

If touch screen sensitivity or zone accuracy has shifted, allow user to calibrate touch screen.

Note: when this is selected the test set requires a reboot for the screen calibration process to begin.

4) Log File There is two log file selections available.
   1. Current History – Recorded event history since the unit was last powered on.
   2. Complete History – Recorded ALL event history dating back to ether when the product was 1st powered ON or until it was last cleared.

Note: Only OEM under Setup 3 can clear the Complete History file.

5) Backlight – Adjust display backlight intensity.

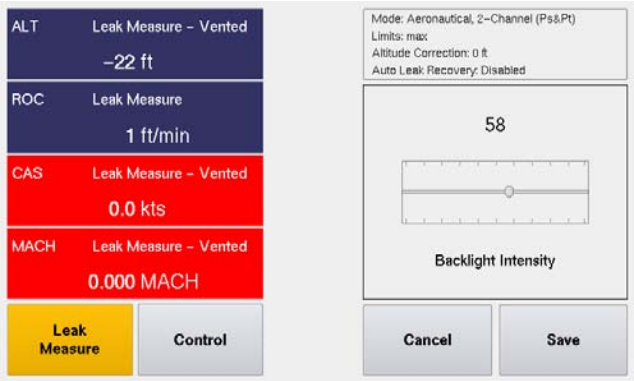


Figure 37 Backlight Adjustment

6. TEST SET OPERATION

Preliminary Setup

- Ensure that the DPS1000 Powered ON//OFF switch (8) is in the OFF position prior to connecting the AC power cable.

- As a standard practice and under normal circumstances it is recommended that the DPS1000 does not have hoses connected prior to initialization. This is not a requirement just an additional precaution.

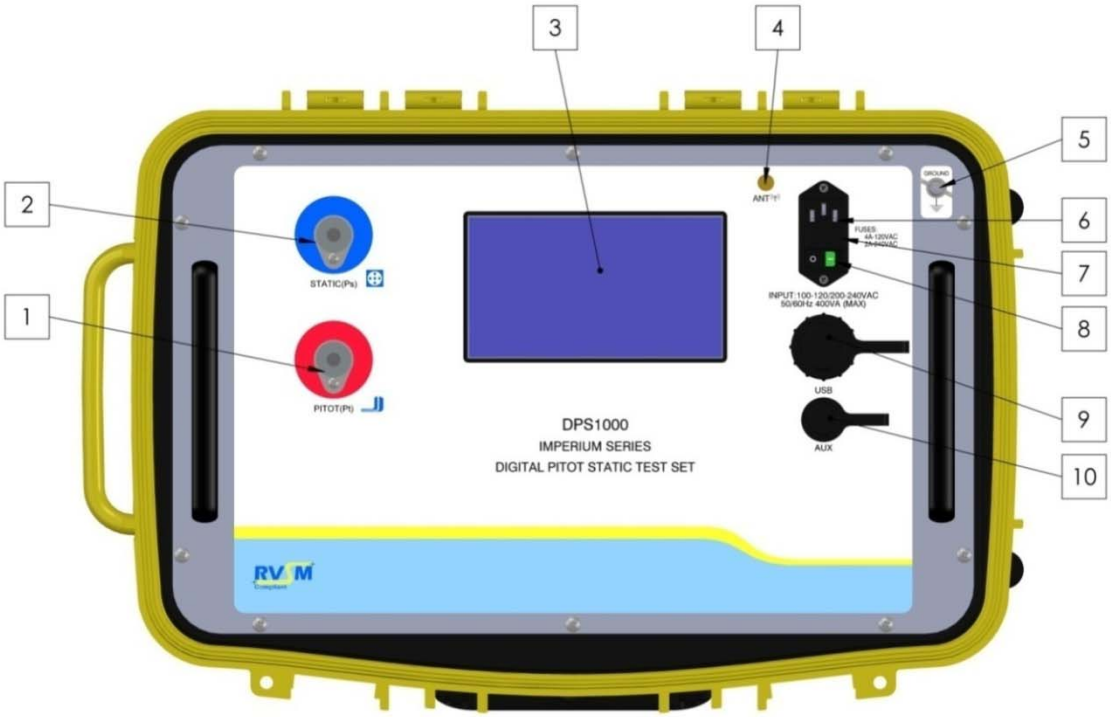


Figure 38 DPS1000 Front Panel

A. Power ON

During normal use, it is recommended that the Test Set is powered ON and allowed to complete its Power ON initialization process prior to connecting the hoses to the STATIC (Ps) and PITOT (Pt) ports.

During power ON initialization the following discovery occurs:

- The Test displays a power ON initialization window during this phase as shown above. There is a log file created that records all the initialization steps and results that occur during this phase.
- The test set measures the initial pressure found on STATIC (Ps) and PITOT (Pt) ports and records it as a temporary value.
- The ambient pressure is measured and recorded as a temporary value. This value will be used by the Go To Ground function.
- The Pt measurement channel performs a Qc auto-zero to trim any small offset that has occurred.

- An internal control channel leak test is performed. The control channel leak test should not be confused with the actual leak test of the Test Set itself. The control channels are very small pneumatic channels within the manifold between the proportional control valves and the transducers. During this test the test sets internal manifold mounted output valves SvPs_Out and SvPt_Out are closed and therefore the Ps and Pt Output reservoirs are not included in this test.
- The Vacuum Pump and pressure pumps are tested to verify they are able to achieve the performance expected.
- The initialization display window and log file includes the Test Set(s) power on cycle count, # of hours the test set has been powered ON, # of hours on the pressure pump, # of hours on the vacuum pump.
- At the end of the initialization cycle the test set performs a Go to Ground to ensure both the STATIC (Ps) and PITOT (Pt) ports are at ambient pressure.

Note: During this power ON initialization Go To Ground phase the Target ROC will default to a very low rate (2,000 ft/min), the user can change the ROC for that occurrence but touching the ROC touch zone and changing the Target value.

- After power ON initialization has completed, the test set will remain in Leak Measure mode with the STATIC (Ps) and PITOT (Pt) ports Vented to ambient and the displayed message will be:

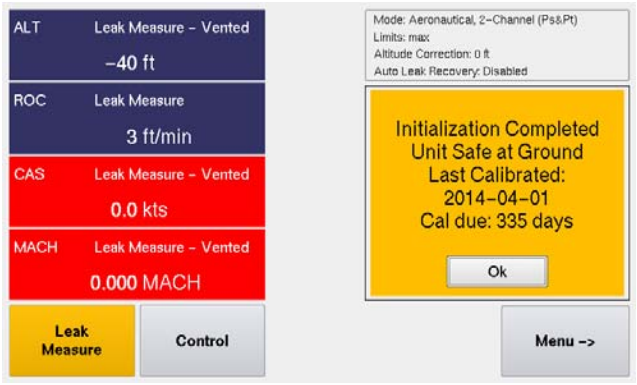


Figure 39 Initialization Display

B. Leak Measure Mode

The DPS1000 has two modes of operation, Leak Measure and Control. The default mode of operation for the DPS1000 is Leak Measure mode. At the conclusion of power ON initialization the Test Set will be placed in the Leak Measure mode.
While in Leak Measure mode the Test Set is continuously measuring / monitoring the pressure on both the STATIC (Ps) and PITOT (Pt) ports. The display will be continuously updated (~ 2 times/second) with the latest pressure measurement results. In Leak Measure mode, the pneumatic pressure pump, vacuum pump and four proportional control values (PvPs_V, PvPs_P, PvPt_V, PvPt_P, reference DPS1000 Pneumatic diagram) are off.

When the Display Setup is configured for Aeronautical mode, the DPS1000 has some additional features and safe guards such as ALR and Leak Test ATP.
While in Leak Measure mode, the ALR “Auto Leak Recover” (if enabled) monitors the leak rate of ROC and RtCAS. If the rates exceed the values defined under the Limits

menu (Example: with Limits=default, ALR for ROC = 1,000 ft/min and RtCAS=25 kts/min) the Test Set will automatically switch into Control mode with the Target values set to the current ALT and CAS values and the Test Set pneumatic controller will try to overcome the leak and stabilize the pressures on the STATIC (Ps) and PITOT (Pt) ports. When this occurs, there will be a message displayed “Excessive Leak Detected”.

The Leak Test ATP profiles are only available when the Display Setup is configured for Aeronautical display mode. When the user selects Pressure or EPR “Engine Pressure Ratio” display mode, the Leak Test ATP will not be available only the Leak Rate Timer feature is available under these two display modes.

C. Control Mode

The Control mode on the DPS1000 provides a two channel pneumatic controller. The DPS1000 controller is referred to as the PCM “Pneumatic Control Module, this module provides an absolute pressure controller for the STATIC (Ps) channel and a differential pressure controller for the PITOT (Pt) channel. This two channel precision controller is used to control and simulate the Target pressure and vacuum set point conditions and rates as requested by the user setting Target set points. The pneumatic controller is capable of controlling the STATIC (Ps) channel pressure with a resolution of ~ 0.0002 inHg while maintaining/controlling the PITOT (Pt) channel differential pressure with a pressure resolution of ~0.0004 inHg. The precession custom controller provides the ability of maintain a constant CAS “Airspeed” (maintaining a constant differential pressure with regards to the STATIC (Ps)) even during high rates of ROC enabling 0 kts CAS (the most demanding control situation) to be well maintained under considerably high slew rates of 6,000 ft/min and higher.

When the DPS1000 transitions into Control mode, the display indicates “Wait Resuming Control” during this transition period (~ 4 seconds) the PCM is responsible for establishing the same controlled pressures as last measured on the STATIC (Ps) and PITOT (Pt) ports while in Leak Measure mode. During the Leak Measure to Control transition, the Target set points are always preloaded with the same value as the existing pressure measured on the ports at the time the Control mode was selected.

- The following internal control sequences occur:
- The pressure presently on the STATIC (Ps) and PITOT (Pt) ports are measured and recorded.
- The output valves located internally on the DPS1000 pneumatic control manifold (SvPs_Out and SvPt_Out) are closed to isolate the pneumatic controller from the aircraft or instrument under test. This is done to insure that no transient pressure spikes are seen or impressed onto the UUT or aircraft while the internal control manifold is establishing the same control pressures that was last measured on the STATIC (Ps) and PITOT (Pt) ports, during this process the test set displays “Wait Resuming Control”. Once the PCM has established stable internal control vessel pressures the output valves (SvPs_Out and SvPt_Out) are opened.

7. TEST SET LEAK TEST

Each Test Set is completely calibrated and tested before shipment, but to ensure the integrity of the sensitive tests to be made, the pretests included in this section should be performed immediately before each use of the DPS1000.

A. PRELIMINARY SETUP

1. Ensure hoses are connected to the PITOT (Pt) port and STATIC (Ps) port of the test set. If the connectors on the aircraft end of the hoses are not quick disconnects or self-sealing, then a tight sealing plug should be used to seal the hose assembly. This is necessary to test the hose leakage as well as the tester. If a sealing plug is not available, then leak test the DPS1000 without connecting the hoses.

2. Connect the test set power cord, the STATIC (blue) hose and PITOT (red) hose to the test set if not already connected.

Note: The quick connect ports on the test set and mating hoses are color-coded and keyed to help prevent the accidental crossing of Pitot and Static hoses.

3. Set the POWER switch to ON. Allow the initialization to complete, than select “Leak Testing”.

Figure 40 Leak Testing Menu(s)

4. There are two method available for performing Leak Testing using the DPS1000:
   - Method-(1) Leak Rate Timer: the traditional method uses the Leak Rate Timer where the user first establishes a given CAS and ALT and uses the Leak Rate Timer to measure the Leak Rate.
   - Method-(2) ATP Leak Test: the DPS1000 has an automated feature called ATP Leak Test which allows the user to setup a profile ahead of time with the following parameters: (see Figure 41 and Figure 42) This is much more efficient since the user can select or create the profile and select RUN to execute the automated leak test and return when the ATP Leak Test has completed to review the leak test results.

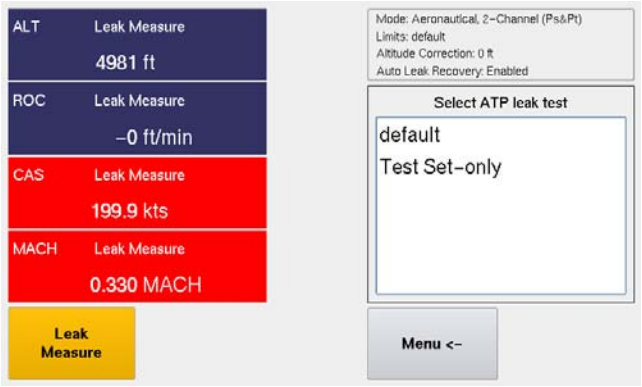


Figure 41 Selecting ATP Leak Test Profile

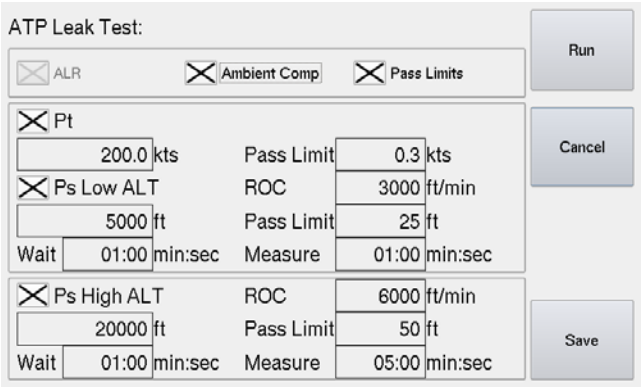


Figure 42 Leak Test Profile - Parameters Screen

5. Select from the UI Menu: (1) Leak Testing, (2) ATP Leak Test Profiles, (3) Test Set-only
6. The ATP Leak Test Profile for Test Set-only will perform a combined Pitot and Static Leak Test in the following order:
    - (1st) Pitot (Pt channel) Leak Test (default= 200 kts) while Ps channel remains at ground "ambient" pressure. If the (Ps channel) is not presently at ground, the ATP will automatically perform a Go To Ground function before starting the Pt channel leak test.
    - (2nd) Static (Ps channel) low level (default=5,000 ft)
    - (3rd) Static (Ps channel) high ALT (default=20,000 ft)

Note: The ATP Leak Test Profile "Test Set-only" can be altered by the user, once it has been altered it can be saved but a different profile name will be required.

Note: "Test Set-only" implies that no aircraft or instrument(s) are connected. Ideally the test set has the hoses attached and capped off so the test result represents the base line leak rate for all components except the aircraft or instruments about to be tested.

B. STATIC and PITOT Test Set Leak Test – (*Test Set and hoses only*)

1. Confirm hoses connected to both Ps and Pt ports on DPS1000.
   Confirm the other end of each hose is sealed with an AN4 plug.
   Determine the method of Leak Test, Method-(1) Leak Rate Timer, continue with the following steps (B-3.1) or Method-(2) ATP Leak Test, begin with step (B-4.1)

   a. Using Method-(1) Leak Rate Timer.

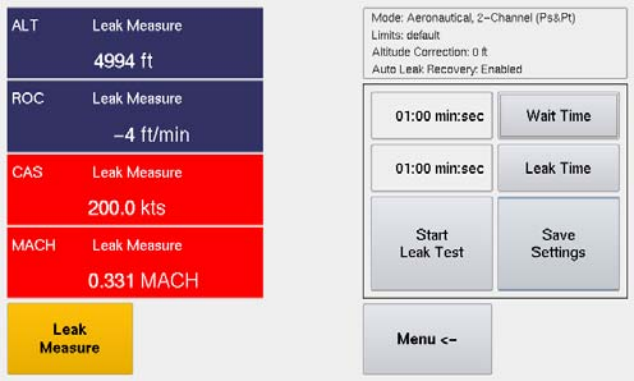


Figure 43 Leak Test Timer Screen

   b. Select Control mode, after for Wait Resuming Control to finish.
   c. Select ALT Target = enter the desired altitude to perform the leak test.
   d. After establishing the Target altitude, select Leak Measure mode.
   e. From the Main menu, select Leak Testing, Leak Rate Timer.
   f. Review the Wait Time and Measure Time.
   g. Select Start Leak Test.
   h. After the Wait cycle and Measure cycle have completed a message “Leak Test Completed Select Ok to view results” will be displayed.
   i. Record or note the ALT Leak rate.
   j. Select ← Menu, ←Menu, ←Menu.
   k. You are now positioned back at the root menu.
   l. Select Go To Ground, followed by “Yes” to confirm Go To Ground.
   m. Wait for Test Set to reach Ground (ambient pressure altitude). Test Set will display “Unit Safe at Ground”.
   n. The Test Set will automatically switch into Leak Measure mode with the PITOT (Pt) and STATIC (Ps) ports Vented to ambient and the pumps will be powered off.
   o. This completes leak testing the Ps channel using Method-(1) Leak Rate Timer.
   p. Select Control mode, after for Wait Resuming Control to finish.
   q. Select ALT Target = enter the desired altitude to perform the leak test.
   r. After establishing the Target altitude, select Leak Measure mode.
   s. From the Main menu, select Leak Testing, Leak Rate Timer.
   t. Review the Wait Time and Measure Time.
   u. Select Start Leak Test.
   v. After the Wait cycle and Measure cycle have completed a message “Leak Test Completed Select Ok to view results” will be displayed.
   w. Record or note the ALT Leak rate.

x. Select ← Menu, ←Menu, ←Menu.
y. You are now positioned back at the root menu.
z. Select Go To Ground, followed by “Yes” to confirm Go To Ground.
aa. Wait for Test Set to reach Ground (ambient pressure altitude). Test Set will display “Unit Safe at Ground”.
bb. The Test Set will automatically switch into Leak Measure mode with the PITOT (Pt) and STATIC (Ps) ports Vented to ambient and the pumps will be powered off.
cc. This completes leak testing the Ps channel using Method-(1) Leak Rate Timer.

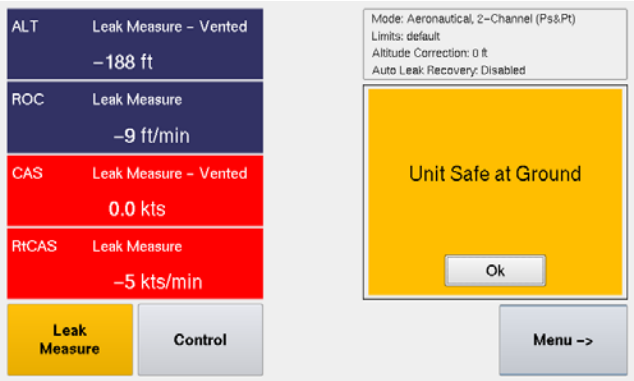


Figure 44 Leak Rate Timer, Unit Safe at Ground

dd. Using Method-(2) ATP Leak Test.

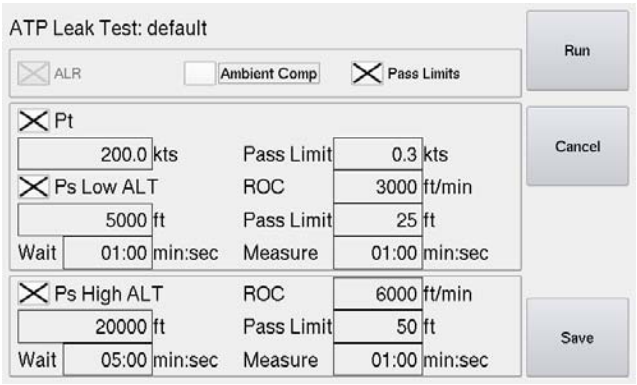


Figure 45 ATP Leak Test

Note: It is highly recommend performing the Test Set Only (with hoses attached to Test Set and capped) prior to performing the Aircraft Leak Test.

ee. From the main menu, select Leak Testing, Leak Test Profiles.
ff. Now you can either select an existing profile by selecting “Select Leak Test Profile(s)” or “Create Leak Test Profiles”(see ATP Leak Test Profiles).
gg. Follow the AMM “Aircraft Maintenance Manual” or appropriate documents regarding the specific leak test required. This information will be required to create/define the appropriate and safe ATP Leak Test profile.
hh. From the ATP Leak Test GUI screen, review/select the Leak Test parameters as required.
ii. After the parameters for the ATP Leak Test have been entered and configured as required, select Run.
jj. With Run selected, depending on the configuration of the Leak Test ATP, the automated leak test process will begin.
kk. If Pt Leak Test was selected it will be tested 1st. This test is always performed while Ps is at ground “ambient pressure”.

Note: If Ps ALT is not at ground pressure, a Go To Ground will be performed before starting the Pt Leak Test.

- If Ps Low ALT was selected it will be tested 2nd.
- If Ps High ALT was selected, it will be tested 3rd.
- At the conclusion of the ATP Leak Test the DPS1000 will automatically perform a Go To Ground function and the following screen will display the results:

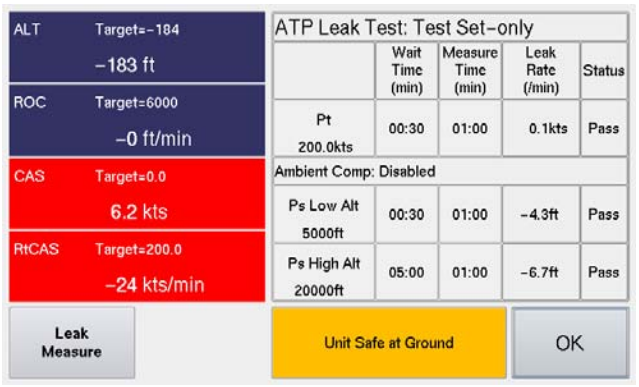


Figure 46 ATP Leak Test Results

ll. This concludes the ATP Leak Test.

C. APPLYING LEAK CORRECTION

If the leak rate does not exceed 2 kts/min or 50 ft/min, record the leak rate of the test set and hoses so that the values can be subtracted from the aircraft’s leak test. The calculated value removes the leaks caused by the Test Set and hoses, and isolates the aircraft systems’ leak rate.

8. AIRCRAFT TESTING

CAUTION: Observe all safety precautions detailed in the “AMM” Aircraft Maintenance Manual.

CAUTION: When using STATIC (Ps) static only, make sure that the differential pressure “Qc” stays within the limits of the ASI “Airspeed Indicator”.

A. PRELIMINARY SETUP

1. Ensure the “STATIC and PITOT Test Set Leak Test – (*Test Set and hoses only*) has been completed and that the DPS1000 is “Safe at Ground” and Vented before connecting the tester to the aircraft systems.

Note: The quick connect ports on the test set and mating hoses are color-coded and keyed to help prevent the accidental crossing of Pitot and Static hoses.

2. Using a Barfield Inc**.** universal adapter or another manufacturer’s custom aircraft pitot adapter, connect the PITOT PORT hose (*red band*) to the aircraft pitot system as referenced in the aircraft maintenance manual. Using the Barfield Inc**.** 2423F Static Port adapter or another manufacturer’s custom aircraft static adapter, connect the STATIC PORT hose (blue band) to the aircraft static system, as referenced in the aircraft maintenance manual.

Note: Some aircraft have more than one static port associated with a given static system. Make sure that other ports in the system being tested are sealed before continuing.

3. Set the aircraft altimeter baro setting to 29.92 inHg (*1013.25 mbar*).
4. View and select the appropriate Limits on the DPS1000 for the Aircraft / Instruments to be tested.
5. If necessary, (from the Main menu) select Display Setup to configure display for the Aeronautical display parameters required.
6. If necessary, (from the Main menu) select Units to configure the display for the Units required.

B. LEAK TESTING - Combined ALT & CAS (using traditional Leak Rate Timer)

1. If the display indicates “Leak Measure”, select the CONTROL key to toggle the DPS1000 into the “Control” mode.
2. Select CAS touch zone, the key pad screen will be displayed with the “CAS = kts” parameter indicated in the user entry window.
3. Enter the desired CAS “Airspeed” value (for example, 300) and press ENTER.
4. The test set and aircraft will begin moving towards the airspeed entered.
5. If a different ROC rate is required, select ROC touch zone, the keypad screen will be displayed with the “ROC = ft” parameter indicated.
6. Enter the desired ROC “Vertical Speed”.
7. Select ALT touch zone, entry the desired altitude value required for the leak test altitude.
8. The test set and aircraft / instruments will begin moving towards this altitude at the VSI rate entered.
9. Allow test set to stabilize at Target values for a minimum of 10 seconds before selecting Leak Measure mode.
10. While in Leak Measure mode, select Leak Testing.

11. Select Leak Rate Timer.
12. If required, set the Wait time and Measure time to the values required.

Note: The default values are (Wait=1:00) minute and (Measure=1:00) minute for CAS airspeed and low altitude (typ < 10,000 ft). For High ALT (typ > 10,000 ft) additional wait time is recommended (Wait=5:00) or more may be required to allow the adiabatic to settle so the leak measurement will represent the actual leak rate.

Note: The DPS1000 is capable of conducting a combined Pitot and Static test (as described above) or individual system leak tests. To accomplish a single channel (Pitot only or Static only) modify the procedures by simply not entering Target value for the parameter / channel. For example, for Pt only Leak check, the ALT target would remain at ambient Ground pressure altitude while the CAS Target would be set at the desired CAS airspeed value. In this example, if the Test Set STATIC (Ps) channel is not already at ambient "Ground" pressure, 1st perform a "Go To Ground" function, than set CAS Target to desired airspeed.

13. If additional Leak Test at other altitudes or airspeeds is required, repeat steps (1) through (12) above for any additional test points.
14. Once Leak Test is completed, select the Go To Ground function to returning the DPS1000 to ground ambient pressure.
15. When Test Set and aircraft have reached ambient Ground pressure the pumps will be powered off and the Test Set will remain Vented to ambient until the Control mode is selected.

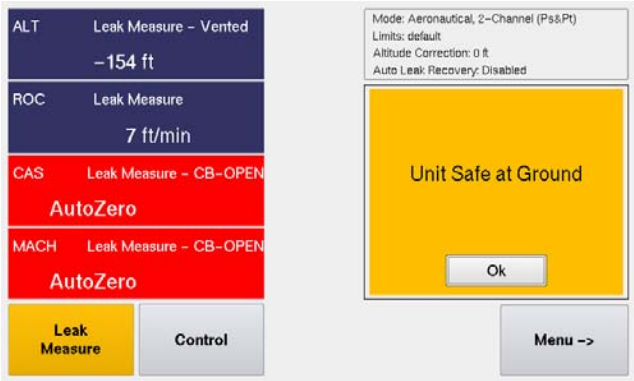


Figure 47 Unit Safe at Ground

C. LEAK TESTING - Combined ALT & CAS (using ATP Leak Test Profile)

The ATP Leak Test Profile feature provides an automated process for Leak Testing. Once a profile is created and saved it can be used to automate the Leak Test process allowing the user to perform other tasks while the ATP Leak Test is running.

1. For detail explanation of the ATP Leak Test capability and parameter field descriptions, reference section B-3.30 "Using Method-(2) ATP Leak Test".
2. Verify the DPS1000 including hoses and the Aircraft Pitot System Leak Test and Static System Leak Tests have been completed.

Note: It is always recommend that prior to performing any testing the DPS1000 test set and hoses should be known to be leak tight. The reality is every Test Set and

hose configuration has some level of leakage present, a confirmation of the existing leak rate is important to establish prior to trying to determine the leak rate of the aircraft or instruments in question.

3. Verify if the alternate pneumatic system(s) (co-pilot, standby auxiliary, etc.) share the same pneumatic lines, if so they must be sealed.
4. Ensure the aircraft altimeter has the baro set at 29.92 inHg (1013.25 mbar).
5. Select the appropriate Limit values for the aircraft / Instrument's to be tested.

Note: If the appropriate limits file does not exist go into Setup 2 and create the limit file:

- Menu →
- Setup 2
- enter user pin# (default pin: 123456)
- Limits Create/Edit/Delete
- Create Custom Limits - enter the parameter values for ALT, ROC, CAS, RtCAS, MACH, and ALR "Auto Leak Recovery"

CAUTION: Using incorrect limits can cause damage to sensitive components and aircraft systems.

Note: Before creating new limits refer to the appropriate AMM "Aircraft Maintenance Manual" or CMM "Component Maintenance Manual" for the actual minimum and maximum values to be applied.

6. Enter the Altitude Correction value if required.
   - Menu →
   - Setup 1
   - Altitude Correction
   - Read message, select "Ok"
   - Enter Altitude correction value. The height difference between the aircraft system or instrument under test and the DPS1000 test set.
7. Using the AMM or CMM, select the appropriate Leak Test ATP Leak Test Profile.
   - Leak Testing
   - ATP Leak Testing
   - ATP Select Leak Test Profile(s)
   - Select the appropriate profile to perform the Leak Test as specified by the AMM or CMM
   - If required, the default ATP profile can be selected and the parameters can be changed to the values specified by the AMM or CMM.
   - If the ATP profile value(s) or process(s) (Pt, Ps Low ALT, Ps High ALT) are changed, the user can select "Save" and name the ATP profile with an appropriate name for future use.
8. Once the ATP Leak Test profile has been configured and parameters are verified correct, select "Run".

Note: The Leak Test ATP is a fully automatic feature that proceeds as follows:

- 1st (if selected) the Pt leak test will be performed. If the STATIC (Ps) port is not at ambient Ground pressure the ATP will begin by performing a Go to Ground function prior to starting the Pt leak test
- 2nd (if selected) the Ps Low ALT leak test will be performed.
- 3rd (if selected) the Ps High ALT leak test will be performed.
- On completion of the 3rd (or last) selected leak test, the Test Set will perform a Go To Ground function.
- Once the test set and aircraft or instrument(s) under test are safe at ground "ambient" pressure, the Leak Test results will be displayed (Figure 48).

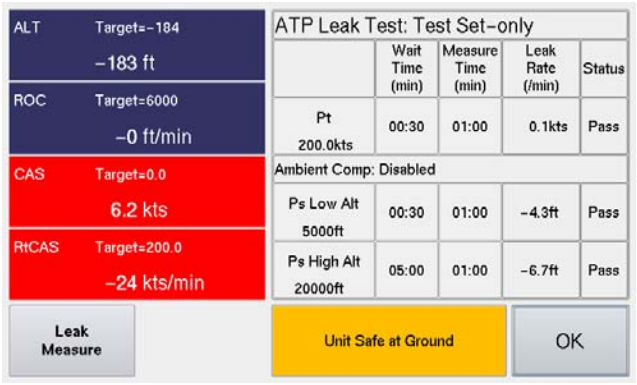


Figure 48 Leak Test Results

- Record the leak test results
- If additional leak test at other altitudes or airspeeds is required, select the appropriate ATP Leak Test profile or edit the values in the repeat steps 8 and 9 above for any additional test points.

9. This completes the Combine ATP Leak Test process.

D. Testing the Aircraft Static System

CAUTION: Observer all safety precautions detailed in the AMM and or CMM.

CAUTION: The AMM or CMM procedure should always be recognized as the primary authority and this manual should be recognized as a secondary aide. As such the primary objective of this manual is to provide instruction relevant to general test set operation while the AMM or CMM dictates the specific test process, sequences and values.

1. Verify the DPS1000 is powered ON and that Initialization has completed and that the system is safe at Ground and that the display indicates "Vented".
   a. If required, select Go To Ground and wait for the Test Set to indicate "Unit Safe at Ground".
2. Connect the hoses, both Static (Ps) and Pitot (Pt) to the DPS1000 ports.

Note: The Pitot (Pt) hose is not required to perform a Static system test however it is highly recommended as a safety precautions to protect the ASI from possible does.

3. If not already done, perform a Leak Test on the Test Set and hoses.

Note: CAP the aircraft end of each hose.

4. Connect the hoses to the aircraft Static and Pitot ports.

Note: Using the Pitot (Pt) hose for a Static system test will prevent the possibility of damaging the ASI “Airspeed Indicator” which can happen if the Static (Ps) channel is driven to a high altitude while testing and creates a large differential pressure which could exceed the ASI full scale rating.

Note: While testing the Static (Ps) system, the Target value for CAS should remain at 0 kts. While testing various altitude levels, the Test Set will maintain 0 kts (Qc = 0.000 inHg pressure differential) between the Ps and Pt ports which will ensure the ASI is not damaged.

5. Verify if the alternate pneumatic system(s) (co-pilot, standby auxiliary, etc.) share the same pneumatic lines, if so they must be sealed or isolated from the current pneumatic system about to be tested.
6. If necessary change the displayed parameters on the test set to those required. This can be accomplished by selecting Display Setup followed by selecting the aeronautical parameters desired.
7. If necessary different units can be selected by selecting Units.
8. Verify the limits selected are appropriate for the aircraft and or Instruments that are going to be tested.
9. If there is a height difference between the test set and the aircraft or instruments about to be tested, enter the Altitude Correction.
    a. Menu →, Setup 1, Altitude Correction, enter the altitude difference (with aircraft / instruments higher than test set the value would be entered as a (+) positive number).
10. At this time confirm the following has been accomplished:
    a. the test set and hose combination have been leak tested
    b. the test set hose(s) Static (Ps) and Pitot (Pt) has been connect to the aircraft or instrument to be tested
    c. the test set limits have been configured with the appropriate vales to protect the aircraft system or instrument(s) about to be tested
    d. If required, the altitude correction value has been entered
11. Select the Control soft-key.
    a. The test set will transition from Leak Measure to Control mode. You will notice the ALT and CAS target will be preloaded with the current pressure altitude and CAS values.
    b. Wait for Resuming Control phase to complete (typically 4 seconds)
12. Set the ROC Target value as specified by the AMM, CMM or AP “authorized procedure”.
13. Set the ALT Target value as specified by the AMM, CMM or AP.
14. Continue with the next ALT Target value required:

a. For test procedures requiring small step changes in ALT are required, there is a “Nudge” feature available that will simplify having to enter multiple small changes in Target values.
b. The “Nudge” key is located on the same pop-up keypad used for entering a new Target value.
c. The Nudge value can also be re-defined.

15. On completion of the Static system testing, select the Go to Ground function and wait for the “Unit is Safe at Ground” to be displayed.
16. This completes the “Testing the Aircraft Static System“.

E. Testing the Aircraft Pitot System

CAUTION: Observer all safety precautions detailed in the AMM and or CMM.

CAUTION: The AMM or CMM procedure should always be recognized as the primary authority and this manual should be recognized as a secondary aide. As such the primary objective of this manual is to provide instruction relevant to general test set operation while the AMM or CMM dictates the specific test process, sequences and values.

1. Verify the DPS1000 is powered ON and that Initialization has completed and that the system is safe at Ground and that the display indicates “Vented”.
   a. If required, select Go To Ground and wait for the Test Set to indicate “Unit Safe at Ground”
2. Connect the Pitot (Pt) port of the DPS1000 to the aircraft or ASI instrument being tested.

Note: The Static (Ps) hose is not required to perform a Pitot system test if the test set is configured for “1-Channel Pt Only” mode.

   a. When the test set is operated in the default 2-Channel Ps & Pt mode, both the Static and Pitot hose must be connected to the Aircraft to create a leak tight system. For operating in this configuration go to the next section “**Combine Testing of the Aircraft Pitot and Static System**”.

3. If performing a Pitot only test, configure the DPS1000 for 1-Channel Pt only mode as follows:

Note: Test Set should be Vented to ambient and in Leak Measure mode at this time.

   a. Menu →, Setup 1, Control Mode, Control Mode (Pt Only)
   b. Menu ←, Menu ←, Menu ←

Note: The UI display is now positioned back to the Main Menu.

4. If not already accomplish, perform a Leak Test on the Test Set and hoses.

Note: CAP the aircraft end of each hose.

5. Connect the hoses to the aircraft Pitot ports.

Note: While testing the Pitot (Pt) system with test set configured as 1-Channel (Pt only) mode, the Static (Ps) channel of the test set will remain vented to ambient, this is the same point of reference the aircraft’s Static port is referencing while drive the Pitot system with the test set.

   a. If the test set is configured in its (default: 2-Channel Ps & Pt) mode, the Target value for ALT should always remain at ambient Ground pressure altitude (value determined from the last Go To Ground). While testing various CAS values, the Test Set will maintain ambient pressure altitude equivalent on the Static (Ps) port. This is very important that the Test Set maintains ALT = ambient pressure altitude especially if Static (Ps) hose is not connected to aircrafts Static system.

6. Verify if the alternate pneumatic system(s) (co-pilot, standby auxiliary, etc.) share the same pneumatic lines, if so they must be sealed or isolated from the current pneumatic system about to be tested.
7. If necessary, change the displayed parameters on the test set to those required. This can be accomplished by selecting Display Setup followed by selecting the aeronautical parameters desired.
8. If necessary, different units can be selected by selecting Units.
9. Verify the limits selected are appropriate for the aircraft and or Instruments that are going to be tested.
10. At this time confirm the following has been accomplished:
    a. the test set and hose combination have been leak tested
    b. the test set Pitot (Pt) has been connect to the aircraft or instrument to be tested
    c. the test set limits have been configured with the appropriate vales to protect the aircraft system or instrument(s) about to be tested.
11. Select the Control soft-key.
    a. The test set will transition from Leak Measure to Control mode. You will notice the ALT and CAS target will be preloaded with the current pressure altitude and CAS values.
    b. Wait for Resuming Control phase to complete (typically 4 seconds)
12. Set the ROC Target value as specified by the AMM, CMM or AP “authorized procedure”.
13. Set the ALT Target value as specified by the AMM, CMM or AP.
14. Continue with the next ALT Target value required:
    a. For test procedures requiring small step changes in ALT are required, there is a “Nudge” feature available that will simplify having to enter multiple small changes in Target values.
    b. The “Nudge” key is located on the same pop-up keypad used for entering a new Target value.
    c. The Nudge value can also be re-defined
15. On completion of the Static system testing, select the Go to Ground function and wait for the “Unit is Safe at Ground” to be displayed.
16. This Completes the “Testing the Aircraft Static System“.

F. Combine Testing of the Aircraft Pitot and Static System

CAUTION: Observer all safety precautions detailed in the AMM and or CMM.

CAUTION: The AMM or CMM procedure should always be recognized as the primary authority and this manual should be recognized as a secondary aide. As such the primary objective of this manual is to provide instruction relevant to general test set operation while the AMM or CMM dictates the specific test process, sequences and values.

1. Verify the DPS1000 is powered ON and that Initialization has completed and that the system is safe at Ground and that the display indicates “Vented”.
    a. If required, select Go To Ground and wait for the Test Set to indicate “Unit Safe at Ground”
2. Connect the hoses, both Static (Ps) and Pitot (Pt) to the DPS1000 ports.

Note: The Pitot (Pt) hose is not required to perform a Static system test however it is highly recommended as a safety precautions to protect the ASI from possible does.

3. If not already accomplish, perform a Leak Test on the Test Set and hoses.

Note: CAP the aircraft end of each hose.

4. Connect the hoses to the aircraft Static and Pitot ports.
5. Verify if the alternate pneumatic system(s) (co-pilot, standby auxiliary, etc.) share the same pneumatic lines, if so they must be sealed or isolated from the current pneumatic system about to be tested.
6. If necessary change the displayed parameters on the test set to those required. This can be accomplished by selecting Display Setup followed by selecting the aeronautical parameters desired.
7. If necessary different units can be selected by selecting Units.
8. Verify the limits selected are appropriate for the aircraft and or Instruments that are going to be tested.
9. If there is a height difference between the test set and the aircraft or instruments about to be tested, enter the Altitude Correction.
    a. Menu →, Setup 1, Altitude Correction, enter the altitude difference (with aircraft / instruments higher than test set the value would be entered as a (+) positive number).
10. At this time confirm the following has been accomplished:
    a. the test set and hose combination have been leak tested
    b. the test set hose(s) Static (Ps) and Pitot (Pt) has been connect to the aircraft or instrument to be tested
    c. the test set limits have been configured with the appropriate vales to protect the aircraft system or instrument(s) about to be tested.
    d. If required, the altitude correction value has been entered
11. Select the Control soft-key.
    a. The test set will transition from Leak Measure to Control mode. You will notice the ALT and CAS target will be preloaded with the current pressure altitude and CAS values.
    b. Wait for Resuming Control phase to complete (typically 4 seconds).

12. Set the ROC Target value as specified by the AMM, CMM or AP “authorized procedure”.
13. If required, verify/set the value for RtCAS as specified by the AMM or CMM. The default value is 300 kts/min
14. Set the ALT Target values and CAS Target values as specified by the AMM, CMM procedures.
15. Continue with the next ALT Target value or CAS Target value as required
    a. For test procedures requiring small step changes in ALT or CAS, there is a “Nudge” feature available that will simplify having to enter multiple small changes in Target values.
    b. By touching the appropriate touch zone area “ALT”, “CAS”, “MACH” the Target keypad will appear (only in Control mode). The value can be entered directly by keypad or the Nudge key can be selected which will than provide the Nudge function screen.
    c. The “Nudge” key is located on the same pop-up keypad used for entering a new Target value.
    d. The Nudge value can also be re-defined.
16. On completion, select the **Go to Ground** function and wait for the “Unit is Safe at Ground” to be displayed.
17. This Completes the “Combine Testing of the Aircraft Pitot and Static System“.

G. MACH Test and Constant MACH

The DPS1000 can provide either constant CAS “calibrated airspeed” or constant MACH. The parameter which is held constant is determined by which Target parameter the user enters as a set point. If the user selects CAS touch zone and enters the Target for CAS than CAS becomes the controlling parameter for the PITOT (Pt) channel. Similarly, if the user enters a MACH Target value than MACH is the controlling parameter.

With a Target value entered for MACH “i.e. Constant MACH”, once the DPS1000 reaches the Target MACH value, the PITOT (Pt) channel controller will continue to maintain the MACH value requested while the STATIC (Ps) Target value is changed by the user entering a different ALT Target.

Note: While operating in constant MACH mode (ie MACH Target set by user) each time the user changes the ALT Target value you will noticed the equivalent CAS Target will be automatically computed and updated as the equivalent CAS Target for the given MACH and ALT Targets requested. You will also notice that when operating in the constant MACH mode, the CAS Target parameter will be ghosted as a reminder that CAS is not the controlling parameter during constant MACH mode.

1. If required, from the Main Menu select Display Setup and select ALT, ROC, CAS, MACH display format.
2. Select Control mode.
3. Wait for Resuming Control to complete.
4. Enter the Target value for MACH.
5. Wait for MACH Target to be achieved.
6. The controller will maintain the MACH target value while the user selects various ALT target values.

7. On completion of the Constant MACH testing, select Go To Ground and wait for the Test Set to indicate “Unit is Safe at Ground” to be displayed.
8. At this time hose can be disconnected from the Test Set.

H. AIRSPEED SWITCH TEST

1. If required, from the Main Menu select Display Setup and select ALT, ROC, CAS, MACH display format.
2. Select **Control** mode.
3. Enter the Target CAS value below the operating limits of the switch.
   Note: For an airspeed switch with a 140 kts ± 2 kts trip point, start with a CAS Target of ~136 kts.
4. If necessary change the RtCAS Target low enough to observe the switch operation.
5. Wait for initial CAS Target to be achieved.
6. Select CAS touch zone, on Target keypad select “Nudge Mode”.
7. Use the Nudge **Up** key to slowly increase the CAS Target value until the Airspeed switch trip point is determined.

Note: if required the Nudge value “CAS Nudge = 0.x kts” can be changed by selecting the Define Nudge soft key.

8. Record the trip point where the switch contacts (closed).
9. Use the Nudge Down key to slowly decrease the CAS Target value until the Airspeed switch operates (opens).
10. Record the trip point where the switch contacts (open).
11. On completion of the Airspeed switch testing select the Go To Ground function and wait for the “Unit Safe at Ground” message to be displayed.

Note: The above method Nudge feature can be used with any of the Controlled Target parameters such as ALT, ROC, MACH, RtCAS, Ps, Pt, EPR.

9. ENGINE PRESSURE RATIO (EPR) TEST

Note: This test is limited by Test Set airspeed range.

A. Preliminary
1. Connect the PITOT PORT (red band) to the PT7 (Hi) port of the E.P.R. transmitter to be tested.
2. Connect the STATIC PORT (blue band) to the PT2 (Lo) port of the E.P.R. transmitter to be tested.

B. Test
1. The EPR function of the DPS1000 allows the display of the EPR Ratio PT7/PT2 and also pressures of PT2 and PT7 individually. The units of measure available for the PT2 and PT7 pressure display are: in. Hg, mb, or Altitude (ft. or m) and Airspeed (kts. or km/hour). To set up the EPR display to desired units of measure, refer to Table 2.

Note: If the EPR data is displayed in Altitude (ft.) and Airspeed (kts.), Table 2 can be referenced as a guide to establish the desired EPR Ratio.

2. Establish the respective static (Altitude or PT2) and pitot (Airspeed or PT7) pressure combination to achieve the desired EPR ratio.

AIRSPEED (knots) Pt7 (Hi) Port	ALTITUDE (feet) Pt2 (Lo) Port	EPR (Engine Pressure Ratio)
650	25,870	3.4
546	35,000	3.4
650	21,650	3.0
504	35,000	3.0
650	14,690	2.5
534	25,870	2.5
444	35,000	2.5
650	4,210	2.0
500	20,000	2.0
369	35,000	2.0
478	5,000	1.5
365	20,000	1.5
265	35,000	1.5

Table 2 Engine Pressure Ratio Test Table

3. After testing has been completed, use the Standard Test Set Shutdown Procedures to return the test set and aircraft to ambient pressures.

10. SHUTDOWN PROCEDURE

A. TEST SET SHUTDOWN PROCEDURE

From the Main Menu, select the Go To Ground function.
Confirm the Go To Ground, Yes.

Figure 49 Confirm Go To Ground

When the Go to Ground function has completed, the display will indicate “Unit Safe at Ground” and both the STATIC (Ps) and PITOT (Pt) ports are Vented to ambient.

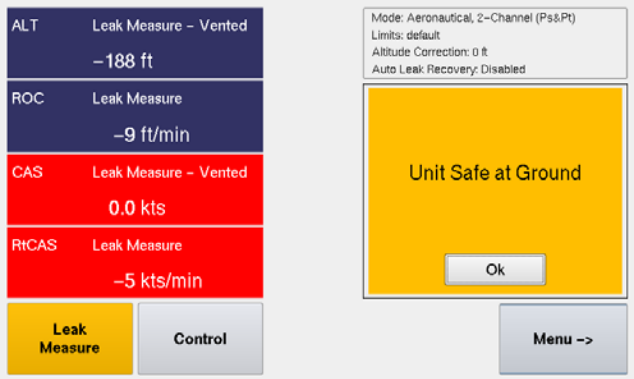


Figure 50 Unit Safe at Ground

CAUTION: Do not remove STATIC (Ps) or PITOT (Pt) hose or nav-aid adapters before Test Set displays “Unit Safe at Ground”.

Switch Power OFF and disconnect the STATIC and PITOT hoses from the STATIC and PITOT ports of the tester and aircraft.

CHAPTER 4: RECEIVING, SHIPPING, AND STORAGE

1. RECEIVING

No special unpacking procedures are necessary. It is recommended that the factory-shipping container and packing materials be retained should it become necessary, for any reason, to re-ship the Test Set, such as for the O.E.M. recertification.

It is also recommended that the Test Set undergo a leak check upon receipt and its carrying case should be carefully inspected for damage. If the test set has an excessive leak or is damaged immediately, notify the carrier and the manufacturer.

2. SHIPPING

Use standard delicate electronic equipment packaging procedures when packing the Test Set for reshipment.

3. STORAGE

A. Place a four-ounce bag of desiccant inside the case.
B. Close and latch the cover.
C. Store in a cool dry place.

Note: Should the test set become exposed to moisture or very high humidity, dry it as soon as possible and temporarily store it in a dehumidified area.

Appendix A: Abbreviations & Glossary

abs	Absolute
AAM	Aircraft Maintenance Manual
ALT	Altitude (ft or m).
ASI	Airspeed Indicator
CAS	Calibrated airspeed (kts or km/hr)
CMM	Component Maintenance Manual
EPR	Engine pressure ratio
^{o}F	Degrees Fahrenheit
^{o}C	Degrees Celsius
Fig.	Figure
ft	Foot
g	Gauge
hr	Hour
hm	Hecto meter
inHg	inches of Mercury
HUIM	Host User Interface module
Hz	Hertz
IAS	Indicated Airspeed
in	Inch
kg	Kilogram
km	Kilometer
kts	Knots
LCD	Liquid crystal display
m	Meter
max	Maximum
mbar	Millibar
min	Minute or minimum
mm	Millimeter
mph	Miles per hour
mV	Millivolt
PCM	Pneumatic Control module
Pin#	Personal identification number
Ps	Static Pressure

psi	Pounds per square inch
Pt	Pitot Pressure
PsRt	Ps Rate, rate of Ps pressure change
PtRt	Pt rate, rate of Pt pressure change
Qc	Differential pressure (Qc = Pt - Ps)
QFE	Local atmospheric pressure
QNH	Barometric pressure at sea level
ROC	Rate of climb in units of (ft/min or m/min)
Rt	Rate
RtCAS	Rate of change of **CAS** in units of (kts/min) or (km/hr/min)
RtQc	Qc rate, rate of Qc pressure change
TAS	True airspeed (Adjusted for ambient temperature) – Not Supported

Appendix B: Operating Limits

The DPS1000 is supplied with 2 pre-defined operating limits, these we refer to as **default** limit profiles and **max** limit profiles. The unit has limit files for each of the 3-modes of operation, **Aeronautical**, **Pressure units** and **EPR**. There will be a **max** limit profile for each of the 3-modes, these values are stored in a R/O "read only" file. There will also be a **default** limit profile for each of the 3-modes, these values are also stored in a R/O file. The Test Set will power up an initialize with the **default** limit when the product first ships. If the customer changes the limits to Max or a custom limit, the test set will power up using the last limits selected.
The following are the **default** limit profile values:

Mode: **Aeronautical**

Aeronautical Limit values – (default)		
Parameters	**Limits**	**Comments**
ALT Min	-1,500 ft { -460 m }	Minimum Target Altitude
ALT Max	50,000 ft { 15,240 m}	Maximum Target Altitude
ROC Min	100 ft/min { 30 m/min}	Minimum Target ROC
ROC Max	6,000 ft/min {1,830 m/min}	
ROC - (default)	3,000 ft/min {900 m/min}	
CAS Min	0.0 kts	Target = 0.0 or >= 5.0 kts
CAS Max	500 kts { 926 km/hr}	
RtCAS Min	50 kts/min { 100 km/hr/min}	
RtCAS Max	450 kts/min { 850 km/hr/min}	
RtCAS – (default)	300 kts/min {550 km/hr/min}	
MACH Min	0.03	Target = 0.0 MACH or >=0.03
MACH Max	0.90	
ALT Correction Min	-100 {-30 m}	
ALT Correction Max	+100 { 30 m}	
ALR: Auto Leak Recovery	Enabled (default)	
ALR: ROC	1,000 ft/min {300 m/min}	
ALR: RtCAS	100 kts/min {185 km/hr/min}	

Mode: **Aeronautical**

Aeronautical Limit Values – (max)		
Parameters	**Limits**	
ALT Min	-2,000 ft { -610 m }	Minimum Altitude
ALT Max	55,000 ft { 16,765 m }	
ROC Min	100 ft/min { 30 m/min}	
ROC Max	20,000 ft/min {6,000 m/min }	
ROC – (default)	3,000 ft/min {900 m/min}	
CAS Min	0.0	
CAS Max	650 kts {1,200 km/hr }	
RtCAS Min	50 kts/min {95 m/min }	
RtCAS Max	600 kts/min {1,000 km/hr/min }	
MACH Min	0.00	
MACH Max	3.0	
ALT Correction Min	-100	
ALT Correction Max	+100	
ALR: Auto Leak Recovery	Enabled (default)	
ALR: ROC	2,000 ft/min {600 m/min}	
ALR: RtCAS	200 kts/min {370 km/hr/min}	

Operating Limits (con't)

Mode: **Pressure**

Pressure Limit Values – (default)		
Parameters	**Limits**	
Ps Min	2.693 inHg	Ps Minimum Pressure
Ps Max	32.000 inHg	Ps Maximum Pressure
Qc Min	0.000 inHg	Qc Minimum Pressure
Qc Max	30.000 inHg	Qc Maximum Pressure
Pt Min	2.693 inHg	Pt Minimum Pressure
Pt Max	62.000 inHg	Pt Maximum Pressure
PsRt Min	0.10 inHg/min	Ps Minimum Rate
PsRt Max	16.0 inHg/min	Ps Maximum Rate
QcRt Min	0.50 inHg/min	Qc Minimum Rate
QcRt Max	10.0 inHg/min	Qc Maximum Rate

Mode: **Pressure**

Pressure Limit Values – (max)		
Parameters	**Limits**	
Ps Min	2.693 inHg	Ps Minimum Pressure
Ps Max	38.000 inHg	Ps Maximum Pressure
Qc Min	0.000 inHg	Qc Minimum Pressure
Qc Max	40.000 inHg	Qc Maximum Pressure
Pt Min	2.693 inHg	Pt Minimum Pressure
Pt Max	78.000 inHg	Pt Maximum Pressure
PsRt Min	0.50 inHg/min	Ps Minimum Rate
PsRt Max	10.0 inHg/min	Ps Maximum Rate
PsRt – (default)	3.0 inHg/min	Ps default Rate
QcRt Min	0.10 inHg/min	Qc Minimum Rate
QcRt Max	10.0 inHg/min	Qc Maximum Rate
QcRt – (default)	3.0 inHg/min	Qc default Rate

Operating Limits (con't)

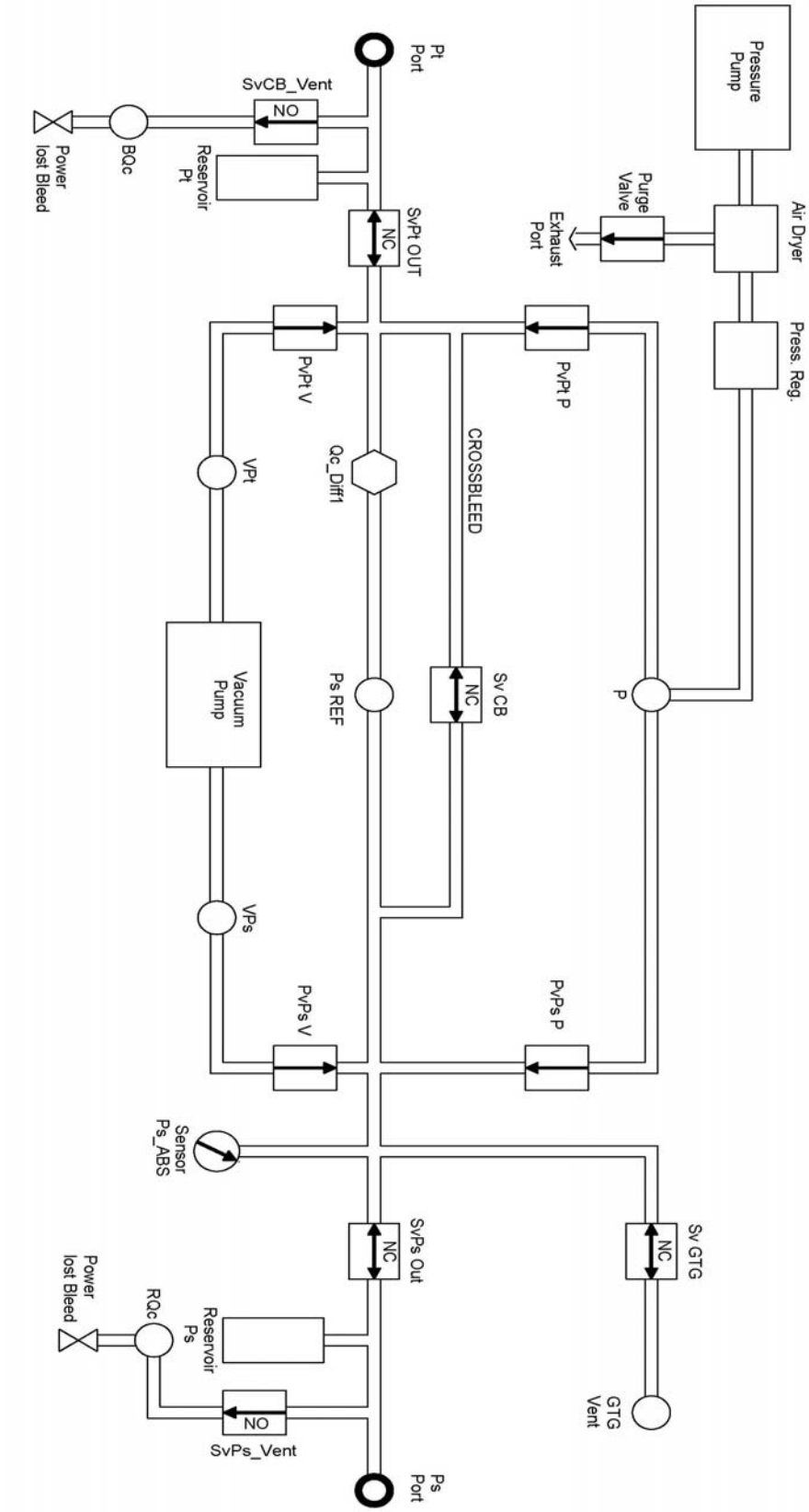
Mode: **EPR**
Note: **EPR** = Pt / Ps (where Ps = Inlet pressure and Pt = Outlet pressure)

EPR Limit Values – (default)		
Parameters	**Limits**	
Ps Min	2.693 inHg	Ps Minimum Pressure
Ps Max	32.000 inHg	Ps Maximum Pressure
Pt Min	2.693 inHg	Pt Minimum Pressure
Pt Max	62.000 inHg	Pt Maximum Pressure
EPR **Min**	0.10	EPR Minimum
EPR **Max**	12.0	Ps Maximum Rate
RtEPR Min	0.50 inHg/min	EPR Minimum Rate
RtEPR Max	10.0 inHg/min	EPR Maximum Rate
RtEPR (default)	3.0 inHg/min	EPR default Rate

Mode: **EPR**
Note: EPR = Pt / Ps (where Ps = Inlet pressure and Pt = Outlet pressure)

EPR Limit Values – (max)		
Parameters	**Limits**	
Ps Min	2.693 inHg	Ps Minimum Pressure
Ps Max	38.000 inHg	Ps Maximum Pressure
Pt Min	2.693 inHg	Pt Minimum Pressure
Pt Max	78.000 inHg	Pt Maximum Pressure
EPR **Min**	0.10	Ps Minimum Rate
EPR **Max**	15	Ps Maximum Rate
RtEPR Min	0.50 inHg/min	EPR Minimum Rate
RtEPR Max	10.0 inHg/min	EPR Maximum Rate
RtEPR (default)	3.0 inHg/min	EPR default Rate

Appendix C: DPS1000 Internal Pneumatic Diagram



Appendix D: DPS1000 Error Code(s)

Error Codes	Displayed Message	Descriptions	Comments / Action Required
E100	E100: Error, PCM Board EEPROM checksum error. Please wait performing PCM HW reset.	PCM Board EEPROM checksum error	If problem continues, the Test Set must be returned to OEM for repair and recalibration.
E101	E101: Error, PCM Ps transducer checksum error. Please wait performing PCM HW reset. If Error continues check transducer.	PS transducer RPT EEPROM checksum error	If the PCM does not discover a Ps transducer, it will return error code E101. Regarding Ps channel pressure, send 29.921 inHg (0 ft).The PCM should continue to check (try to discover) the Ps transducer by reading Eeprom ~ 500 msec. If found, the PCM should clear Error code by setting bit=0 **Note:** HUIM will not allow CONTROL mode to be selected if E101 exists.
E102	E102: Error, PCM Pt transducer checksum error.\n Please wait performing PCM HW reset.\n\n If Error continues check transducer.	PT transducer IPT EEPROM checksum error	If the PCM does not discover a Pt transducer, it will return error code E102. Regarding Pt channel pressure, send 0.0 inHg (0 kts).The PCM should continue to check (try to discover) the Pt transducer by reading Eeprom ~ 500 msec. If found, the PCM should clear Error code by setting bit=0. **Note:** HUIM will not allow CONTROL mode to be selected if E102 exists.
E103	E103: Error, I2C Tx/Rx Board Time Out. PCM HW Reset	I2C TX/RX Board TimeOut	
E104	E104: Error, Ps Transducer Tx/Rx eeprom timeout. Please wait performing HW reset.	I2C TX/RX RPT EEprom TimeOut	
E105	E105: Error, ISR for Ps Transducer pressure ADC error. Please wait performing HW reset.	PS CHANNEL INIT A/D Pressure sensor error	
E106	E106: ISR for Ps transducer temperature ADC error. Please wait performing HW reset.	PS CHANNEL INIT A/D Temperature sensor error	
E107	E107: Error, ISR for Pt transducer pressure ADC error. Please wait performing PCM HW reset. If error continues check transducer.	PT CHANNEL INIT A/D Pressure sensor error	

Error Codes	Displayed Message	Descriptions	Comments / Action Required
E108	E108: Error, ISR for Pt transducer temperature ADC error. Please wait performing PCM HW reset. If error continues check transducer.	PT CHANNEL INIT A/D Temperature sensor error	
E109	E109: Error, PCM Ps Pressure Over Range.	PS pressure Over Range	
E110	E110: Error, PCM Ps Pressure Under Range.	PS pressure Under Range	
E111	E111: Error, PCM Pt Pressure Over Range.	PT pressure Over Range	
E112	E112: Error, PCM Pt Pressure Under Range.	PT pressure Under Range	
E113	E113: Error, PCM Ps Temp ADC Over Range.	PS Temperature Over Range	
E114	E114: Error, PCM Ps Temp ADC Under Range.	PS Temperature Under Range	
E115	E115: Error, PCM Pt transducer temperature Over Range. Please wait performing PCM HW reset. If Error continues check transducer.	PT Temperature Over Range	
E116	E116: Error, PCM Pt transducer temperature Under Range. Please wait performing PCM HW reset. If Error continues check transducer.	PT Temperature Under Range	
E117	E117: Error, PCM Ps Channel No Pressure update. Please wait performing PCM HW reset.	PS Channel Pressure update error (Int timeout)	
E118	E118: Error, PCM Pt Channel No Pressure update. Please wait performing PCM HW reset.	PT Channel Pressure update error (Int timeout)	
E119	E119: Error, PCM Ps Channel NoTemperature update. Please wait performing PCM HW reset.	PS Channel Temperature update error (Int timeout)	
E120	E120: Error, PCM Ps Channel NoTemperature update. Please wait performing PCM HW reset.	PT Channel Temperature update error (Int timeout)	
E127	E127: Error, PCM CAN bus Tx buffer overflow. Please wait performing PCM HW reset.	CAN BUS TX buffer overflow	

Error Codes	Displayed Message	Descriptions	Comments / Action Required
E130	E252: Cannot achieve requested ROC. Ps volume to large or excessive leak.	Cannot achieve Requested ROC - Volume to Large ?	Test Set will attempt to lower ROC Target value until an achievable ROC can be established
E131	E272: Cannot achieve requested RtCAS. Pt volume to large or excessive leak.	Cannot achieve Requested RtCAS - Volume to Large ?	Test Set will attempt to lower RtCAS Target value until an achievable RtCAS can be established
E201	E201: Error, PCM CAN Bus not responding. Please wait performing PCM HW reset.	CAN Bus Com Error - PCM not responding, HW Reset	Toggle I/O Reset to PCM - Reboot PCM
E205	E205: Error, Ps Channel not Calibrated. Ps Transducer or coefficents have changed. Calibration required. Select "OK" to clear message.		Every 1 min display Error Message: E105: Error, Ps Channel - Not Calibrated. Ps Transducer or coefficents have changed. Calibration required. Select "OK" to clear message window. The Error code can only be cleared by PWR-cycle (rebooting HUIM & PCM)
E206	E206: Error, Pt Channel not Calibrated. Pt Transducer or coefficents have changed, Calibration required. Select "OK" to clear message.		Every 1 min display Error Message: E105: Note: E106: Error, Pt Channel not Calibrated. Pt Transducer or coefficents have changed, Calibration required. Select "OK" to clear message. The Error code can only be cleared by PWR-cycle (rebooting HUIM & PCM).
E215	E215: Qc AutoZero offset - Out of Range (> +/- 0.041 inHg, > +/- 29 kts). Warning CAS (Pt channel) is out of tolerance.	Qc AutoZero offset - Out of Range (> +/- 0.041 inHg, > +/- 29 kts)	Verify Sv_CB valve is functional. If Sv_CB value is functional, replace Pt Transducer
E216	E250: PvPs_P valve PWM - Out of Range	**PWM** on PvPs_P valve - Out of Range	Verify PvPs_P driver is funtional, replace proportional valve if required.
E217	E251: PvPs_V valve PWM - Out of Range	**PWM** on PvPs_V valve - Out of Range	Verify PvPs_V driver is funtional, replace proportional valve if required.
E218	E270: PvPt_P valve PWM - Out of Range	**PWM** on PvPt_P valve - Out of Range	Verify PvPt_P driver is funtional, replace proportional valve if required.
E219	E271: PvPt_V valve PWM - Out of Range	**PWM** on PvPt_V valve - Out of Range	Verify PvPt_V driver is funtional, replace proportional valve if required.

Error Codes	Displayed Message	Descriptions	Comments / Action Required
E230	E230: Error, PCM Controller. ALT Target value error. Wait: PCM HW Reset	HUIM vs PCM Target for ALT disagree	HUIM vs PCM Target for ALT disagree. HUIM wil perform PCM HW Reset
E231	E231: Error, PCM Controller. ROC Target value error. Wait: PCM HW Reset	HUIM vs PCM Target for ROC disagree	HUIM vs PCM Target for ROC disagree. HUIM wil perform PCM HW Reset
E232	E232: Error, PCM Controller. CAS Target value error. Wait: PCM HW Reset	HUIM vs PCM Target for CAS disagree	HUIM vs PCM Target for CAS disagree. HUIM wil perform PCM HW Reset
E233	E233: Error, PCM Controller. RtCAS Target value error. Wait: PCM HW Reset	HUIM vs PCM Target for RtCAS disagree	HUIM vs PCM Target for RtCAS disagree. HUIM wil perform PCM HW Reset
E234	E234: Error, PCM Controller. MACH Target value error. Wait: PCM HW Reset	HUIM vs PCM Target for MACH disagree	HUIM vs PCM Target for MACH disagree. HUIM wil perform PCM HW Reset