

**DPS400**

**Pitot-Static Test Set**

**USER INSTRUCTION MANUAL  
BARFIELD M/N DPS400**

*Doc. P/N: 56-101-01180*

*Revision B1*

*January 7, 2010*

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## DPS400 INSTRUCTION MANUAL

### 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**

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Email: [gsesales@barfieldinc.com](mailto:gsesales@barfieldinc.com)

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## DPS400 INSTRUCTION MANUAL

### **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

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## DPS400 INSTRUCTION MANUAL

### REVISION RECORD

REV.	ECO #	REV. DATE	DESCRIPTION OF CHANGE
A	N / A	October/29/1996	Initial Release
B	260-00462	May/15/2001	Revised to show software, menu, and screen changes as per ECO
B1	260-00729	January/07/2010	<p>Only changes that were made are company logo and contact information.</p> <p><b>Note:</b> This Rev. B1 is to be used for Test Sets that do <b>not</b> have Modification P (new software) nor Option C (new keyboard) implemented. For Test Sets with Mod. P and Option C implemented, Rev. C of this Manual was released on Nov. 2nd, 2003.</p>

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## DPS400 INSTRUCTION MANUAL

### 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  
(800) 321-1039

Fax (305) 894-5401

#### Shipping Address:

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4101 NW 29th Street  
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## DPS400 INSTRUCTION MANUAL

### INTRODUCTION

#### 1. PUBLICATION BREAKDOWN

This technical manual establishes the standards of operation and maintenance of this test set. The publication has been prepared using ATA Specification 101 as a guide.

Questions related to this manual should be submitted in writing to:

Barfield  
**P.O. Box 025367**  
Miami, FL 33102-5367  
USA  
Attn: Technical Customer Support - GSTE

Inquiries should be specific and refer to the publication title, number, chapter, page, figure, paragraph, and effective date.

Changes, when approved, will be published as revisions to the basic publication and distributed to all registered owners of this test set.

#### 2. IDENTIFICATION - MODIFICATION STATUS

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

Manufacturers' Name	Equipment Modification
Designation of Equipment	Equipment Options
Equipment Part Number	Equipment Model Number
Equipment Description	Equipment Serial Number

**IDENTIFICATION LABEL**

**Figure 1**

## DPS400 INSTRUCTION MANUAL

B. In addition to the identification label, there are three (3) other record forms packaged with the test set as follows:

- (1) The Owner's Warranty Registration card, (Figure 2), which is to be completed by the owner and returned to the Barfield within **ten (10) days** of purchase to insure 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

### OWNER WARRANTY REGISTRATION CARD

Figure 2

- (2) The Limited Warranty Statement Card, (Figure 3), which lists the manufacturer's obligation to the original purchaser.

**LIMITED  
ONE YEAR  
WARRANTY**

BARFIELD INSTRUMENT CORPORATION warrants to the original purchaser of this unit sold by us and/or our agent, and all the parts thereof, to be free from defects in material or workmanship under normal use and service within the specified ratings and operating conditions.

Its obligation under this warranty is hereby limited to the repair or replacement of this unit, or part thereof, which is returned to us within one year after date of invoice, suitably packaged in the original container or equivalent and which shall prove, after our examination, to be defective under terms of above paragraph.

No other warranty is expressed or implied. We are not liable for consequential damages.

Some states do not allow the exclusion or limitation of incidental or consequential damages so that the preceding limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may have other rights which vary from state to state.

This warranty does not include the cost of transportation charges to and from the factory.

The repair or replacement of this unit, or any part thereof, does not void or extend the original warranty.

BARFIELD INSTRUMENT CORPORATION reserves the right to discontinue this unit without notice, or to make modifications in design at any time, without incurring any obligation to make these modifications in units previously sold.

BARFIELD INSTRUMENT CORPORATION  
4101 N.W. 29 Street  
Miami, Florida 33142 U.S.A.

FORM 991-00001

### LIMITED WARRANTY STATEMENT CARD

Figure 3



## DPS400 INSTRUCTION MANUAL

### (3) The Certificate of Calibration

Each new unit and re-certified unit is delivered with a Certificate of Calibration that shows the date of the last calibration and when the next calibration is due. It certifies the accuracy of the unit and lists the part number and serial number to which it applies.

### 3. RECERTIFICATION

The Test Set P/N 101-01180 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.

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## DPS400 INSTRUCTION MANUAL

### **SECTION 1: DESCRIPTION**

#### **1. PURPOSE OF MANUAL**

This publication contains the description, identification data and operating procedures for the PITOT-STATIC TEST SET, MODEL DPS400, hereafter referred to as the "test set". (Reference Figures 4, 5 or 6.)

Manufactured by: Barfield	(305) 871-3900
4101 N.W. 29 Street	(800) 321-1039
Miami, FL 33142 U.S.A.	(FAX) 305-871-5629

The DPS400 Pitot-Static Test Set meets the requirements of DOT Advisory Circular 43-203B and of FAR 91.411 for performing Altimeter and Static System Tests and Inspections.

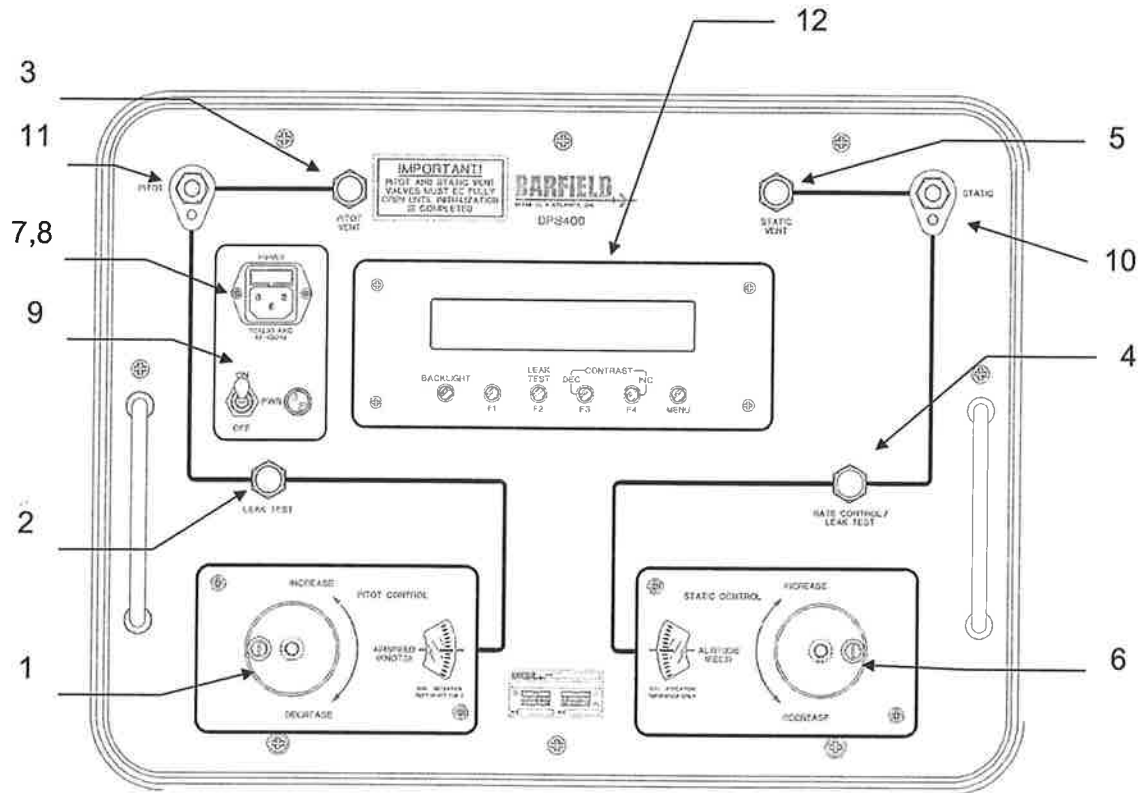
#### **2. GENERAL DESCRIPTION**

The DPS400 Pitot Static Test Set provides an 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 DPS400 is a microprocessor based pitot-static tester. It uses transducer technology combined with manually controlled ultra sensitive pneumatic regulators able to control altitude and airspeed very precisely.

The DPS400 has a menu-driven, electronic control panel that simplifies the operation of the test set. Menu selectable items include: display units, programmable protection limits and calibration/maintenance support. Protection limits are included in the test set to avoid damage to the aircraft systems or instruments to which it is connected. Limit protection is provided by computer actuated solenoid valves. The valve(s) are actuated to isolate the system under test from excessive vacuum or pressure being applied. The limit protection trip points are user or operator programmed using the display's menu system. These trip points provide protection for altitude, airspeed, rate of climb/decent and mach.

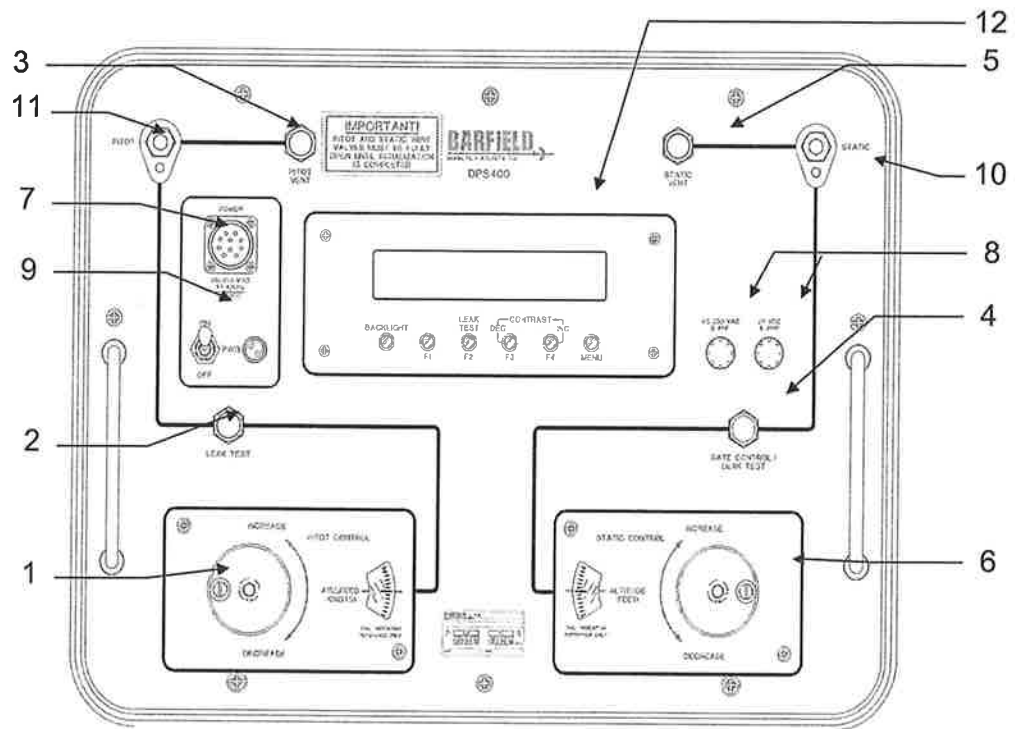
## DPS400 INSTRUCTION MANUAL

Separate internal pumps are provided to supply vacuum and pressure capable of achieving 55,000 ft and 6000 ft/min on a wide body aircraft. The test set readout and control circuits are powered from 115/230 VAC 50-400 Hz. (Units before Mod G can be powered by 28 VDC.)



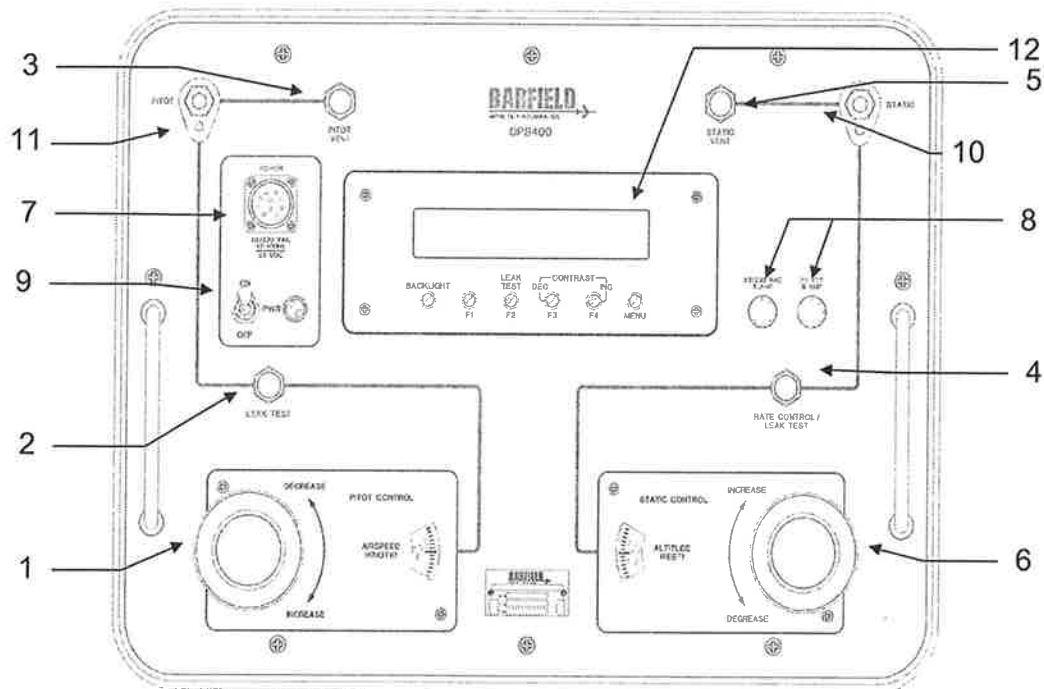
**DPS400 (w/Mod G)  
PITOT STATIC TESTER  
Figure 4**

## DPS400 INSTRUCTION MANUAL



**DPS400 (w/Mod D )  
PITOT STATIC TESTER  
Figure 5**

## DPS400 INSTRUCTION MANUAL



**DPS400 (Prior to Mod D)  
PITOT STATIC TESTER  
Figure 6**



## DPS400 INSTRUCTION MANUAL

### 3. PHYSICAL DESCRIPTION

#### A. Carrying Case

- (1) The carrying case is a fiberglass case comprised of upper and lower sections.
- (2) The lower section supports the panel assembly and external storage pouches (one on each side). The pouch provide for storage of the hoses and adapters.
- (3) The upper section has sliding pin hinges for easy removal. The upper section is also fitted with a shelf suitable for storage of this manual and the power cable.

#### B. Panel

See the corresponding tester for location of switches and controls. DPS400 units incorporating Mod G, see Figure 4, for units incorporating Mod D, see Figure 5, and for units prior to Mod D, see Figure 6).

- |  |  |
|--|--|
| (1) PITOT CONTROL                        | Controls pitot system pressure to achieve simulated conditions for airspeeds between 0 Knots to 650 Knots.   |
| (2) PITOT LEAK TEST VALVE                | Isolates the pitot system of the aircraft for leak tests.  |
| (3) PITOT VENT                           | Releases applied pitot system pressure to ambient atmosphere.  |
| (4) STATIC RATE CONTROL/ LEAK TEST VALVE | Isolates the static system of the aircraft for leaks tests, and controls the rate of change of static pressures.   |
| (5) STATIC VENT                          | Releases applied static system pressure, allowing tester to return to ambient atmospheric pressure.  |
| (6) STATIC CONTROL                       | Controls Static system pressure to simulate the barometric conditions for altitudes between -1000 Feet and 55,000 Feet.  |
| (7) POWER CONNECTOR                      | Connects external power to the tester. Units without Mod G (Figure 5 and Figure 6) use MS24266--- connectors. (See Figure 7 for wiring diagram of power cable) and units with Mod G (Figure 4) use either 17746 cable with a standard 115 VAC plug or 17752 cable for operator installation of a plug. |

## DPS400 INSTRUCTION MANUAL

- |  |               |  |
|--|---------------|--|
| (8)  | FUSE          | Protects external power source   |
| (9)  | POWER SWITCH  | Applies power to the tester.   |
| <p><u>NOTE:</u> The Power switch must be turned on only after opening both STATIC and PITOT VENT valves.</p> |               |  |
| (10)   | STATIC PORT   | Connects the aircraft static system to the tester.   |
| (11)   | PITOT PORT    | Connects the aircraft pitot system to the tester.  |
| (12)   | CONTROL PANEL | Displays measured data, programmable limits, and calibration information. Also used to enter programmed limits and set operating mode. |

### C. Hose Assembly and Adapters

- (1) The hose kit P/N: 115-00339 is included with each test set and includes the following items:
  - (a) A PITOT hose assembly (P/N: 115-00338) is a 25 foot clear hose with **"red"** bands near each end and a self sealing quick disconnect for attachment to the test set pitot port. The aircraft hose end has an AN4 type fitting for connecting to a pitot port adapter.
  - (b) A STATIC hose assembly (P/N: 115-00337) is a 25 foot clear hose with **"blue"** bands near each end and a self sealing quick disconnect for attachment to the test set static port. The aircraft hose end has an AN4 type fitting for connecting to a static port adapter.
  - (c) PITOT TUBE ADAPTER (P/N: 115-00057) is a flexible expandable rubber tube used for connecting the pitot hose to an aircraft's pitot port.
- (2) STATIC PORT ADAPTER KIT (P/N: 2423F) is a universal adapter designed for connecting the static hose to the aircraft's static port.

NOTE: The 115-00057 pitot and 2423F static adapters universally fit many aircraft but in some cases these adapters are not recommended or are inadequate. Barfield distributes high quality custom made pitot and static adapters for use on all general aviation, airline, helicopter and military aircraft.

## DPS400 INSTRUCTION MANUAL

### D. Power Cables

- (1) AC Power Cable for units with Mod G.

Uses a common 3 prong IEC320-C13 AC power cable.

P/N 17746 9' 10" Power Cable with standard 115VAC Plug (Shipped with new units)

P/N 17752 9' 10" Power Cable without a Plug.

- (2) Kit, Universal Power Cable (used on units not having Mod G)

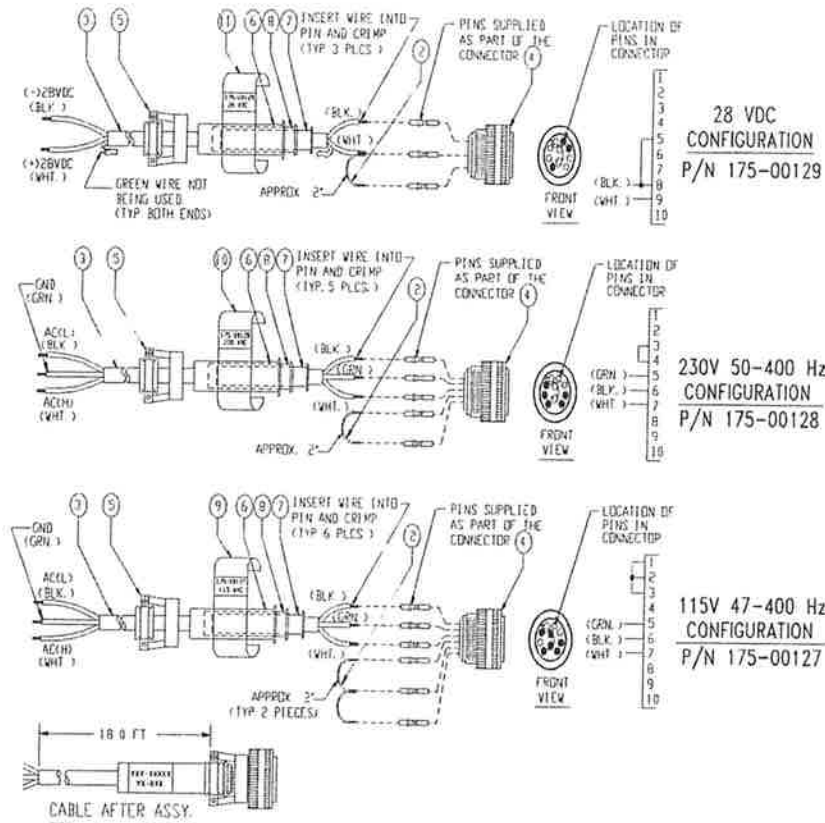
The universal power cable kit P/N: 373-00005 is provided with each test set. The following drawing (Figure 7) details the assembly of the power cable in three possible configurations. The configuration of the plug (ITEM #4 in the drawing) determines the test set operating power required. The first configuration details assembly for 28 VDC operation; the second is 230 VAC, and the third is 115 VAC operation. These power cables can be purchased pre-assembled under the following P/N's:

175-00127 115 VAC Power Cable (Shipped with units prior to Mod G)

175-00128 230 VAC Power Cable

175-00129 28 VDC Power Cable

## DPS400 INSTRUCTION MANUAL



**KIT, UNIVERSAL POWER CABLE P/N 373-00005**

**Figure 7**

## DPS400 INSTRUCTION MANUAL

### **SECTION 2: SPECIFICATIONS AND CAPABILITIES**

#### **1. PHYSICAL DATA**

- A. Height: 11.3 in (28.7 cm)
- B. Width: 18.0 in (45.7 cm)
- C. Depth: 12.0 in (930.5 cm)
- D. Weight: 54 lb (24.5 kg)

#### **2. SPECIFICATIONS**

- A. Altitude: -1,000 to 55,000 ft
- B. Airspeed: 20 to 650 knots
- C. Rate of climb: 0 to  $\pm 20,000$  ft/min.
- D. Mach: 0.1 to 3.5
- E. Ps channel: 0.8 inHg -to- 32 in Hg  
absolute (static port)
- F. Pt channel: 0.8 inHg -to- 77 inHg
- G. EPR: 1.00 -to- 3.00

#### **3. ACCURACY**

- A. Altitude:  $\pm 4$  ft at sea level  
 $\pm 12$  ft at 35,000 ft  
 $\pm 20$  ft at 50,000 ft
- B. Airspeed: 50 to 200 kts ( $\pm 1.0$  kts)  
200 to 650 kts ( $\pm 0.5$  kts)
- C. Rate of Climb:  $\pm 1\%$  of Reading
- D. Mach:  $\pm 0.001$  mach above 0.10 mach
- E. EPR:  $\pm 1$  count of display
- F. Stability: 0.01% of Range/Year (Max)



## DPS400 INSTRUCTION MANUAL

### **4. OPERATING TEMPERATURE RANGE**

0 TO 50° C. (32 TO 122° F)

### **5. DISPLAY UNITS**

- A. Airspeed: knots, km/hr
- B. Altitude: feet, meters
- C. Mach: mach
- D. Rate of Climb: feet/min, meters/min
- E. EPR: Ratio (Pt/Ps), Pt & Ps: in Hg, mb, psia

### **6. PRESSURE MEDIA**

Pressure and vacuum are generated by two separate internal pumps.

### **7. TRANSDUCERS**

Latest technology transducers with highest accuracy and stability commercially available.

### **8. INPUT POWER**

Units with Mod G  
115/230 VAC 47-400 Hz

Units prior to Mod G  
115/230 VAC 47-400 Hz  
28 VDC per MIL-STD-704



## DPS400 INSTRUCTION MANUAL

### **SECTION 3: THEORY OF OPERATION**

#### **1. PRESSURE/VACUUM REQUIREMENTS**

The internal pressure pump is capable of producing a pressure of 20 P.S.I. The vacuum pump can supply 26 inches Hg. in systems with high volumes.

#### **2. REGULATOR/CONTROL VALVE OPERATION**

The static system pressure is controlled by an absolute pressure regulator. The pitot system pressure is controlled by a true differential regulator that senses the pressure on the static and pitot ports of the tester. There are also two metering valves that isolate the pitot/static systems for leak checks and are used for rate control.

#### **3. POWER SUPPLY CIRCUITS**

The DPS400 can be powered from 115/230 VAC 47-400 Hz. On units prior to MOD G, the unit can be powered from 28 VDC as well. On units before MOD G, the power cable connector has internal jumpers, which determine the operating voltage required (115 VAC, 230 VAC or 28 VDC). On MOD G units and later, the power supply detects the incoming voltage 115 or 230 VAC automatically. No switches or jumpers are required. Note: 28 VDC operations are NOT available on MOD G units or later.

#### **4. PROTECTION CIRCUITS**

The aircraft systems are protected against excessive rates and pressures by several failsafe solenoid and check valves. Solenoid valve actuation is controlled by programmable limits set by the operator on the control panel.

When the actual airspeed, altitude, or VSI approaches the protection limit programmed by the operator, an asterisk will appear next to the affected parameter on the display, warning the operator that a limit is about to be exceeded. If no corrective action is taken, and the limit is reached, the solenoid valves will actuate and isolate the aircraft systems from the tester. Asterisks will change to double asterisks to indicate protection limits have been reached, and the message "Limit(s) Exceeded F1 to Continue" will be displayed. Negative airspeed and negative altitude protection limits are not programmable by the operator and are set to -30 kts and -1,800 ft respectively. When any of these two limits are exceeded, two asterisks will immediately appear next to the exceeded parameter and the protection circuits will trip. A negative airspeed trip is indicated by an airspeed reading of 0 kts with two asterisks.



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The following is a summary of the operation of the solenoid valves:

<u>Limit Exceedance</u>	<u>Deviation From Programmed Limit</u>	<u>Solenoid Valves Actuated</u>
Altitude	$\pm 1000$ ft, 350 m	SV1A, SV1B
Airspeed	$\pm 50$ kts, 100 km/hr	SV1A, SV1B, SV3A
VSI	$\pm 500$ ft/min, 150 m/min	SV1A, SV1B, SV2A, SV2B
Mach	$\pm 0.2$ mach	SV1A, SV1B, SV3A

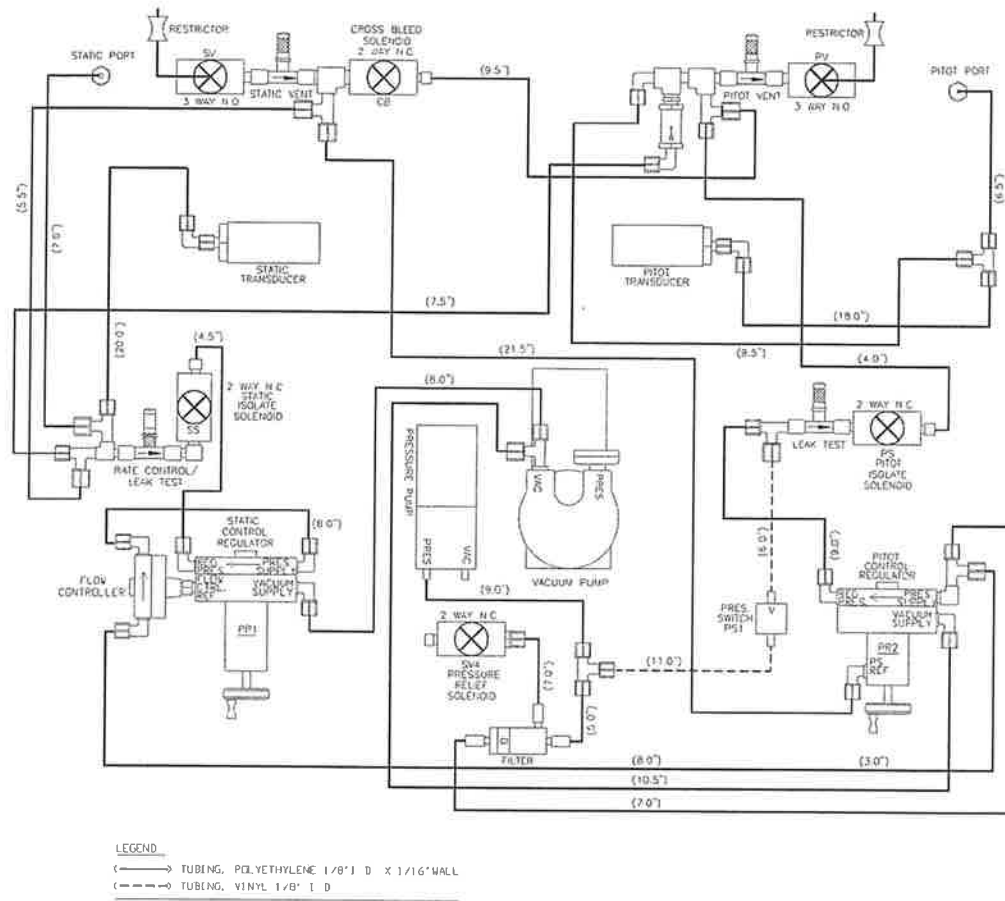
**NOTE:** It is imperative that the operator watch the displayed parameters closely to avoid excessive differential pressures between the test set and the aircraft systems once the solenoid isolation valves are actuated. Refer to section 2 D of the OPERATION (1-4) section of this manual for instructions on how to equalize static/pitot system pressures and return them to ambient after the protection circuits have tripped.

### 5. PNEUMATIC SCHEMATIC DIAGRAMS

Figures 8, 9, and 10 depict the internal pneumatic connections of the three versions of DPS400 Pitot-Static Testers. Figure 8 represents the internal pneumatic connections of the most recent production DPS400 which includes Mod G. Figure 9 depicts the internal pneumatic connections of a DPS400 containing modification D and Figure 10 depicts the internal pneumatic connections of the oldest version that does not have Mod G or Mod D. Reference the identification label on front of the test set for the modifications contained in your test set.

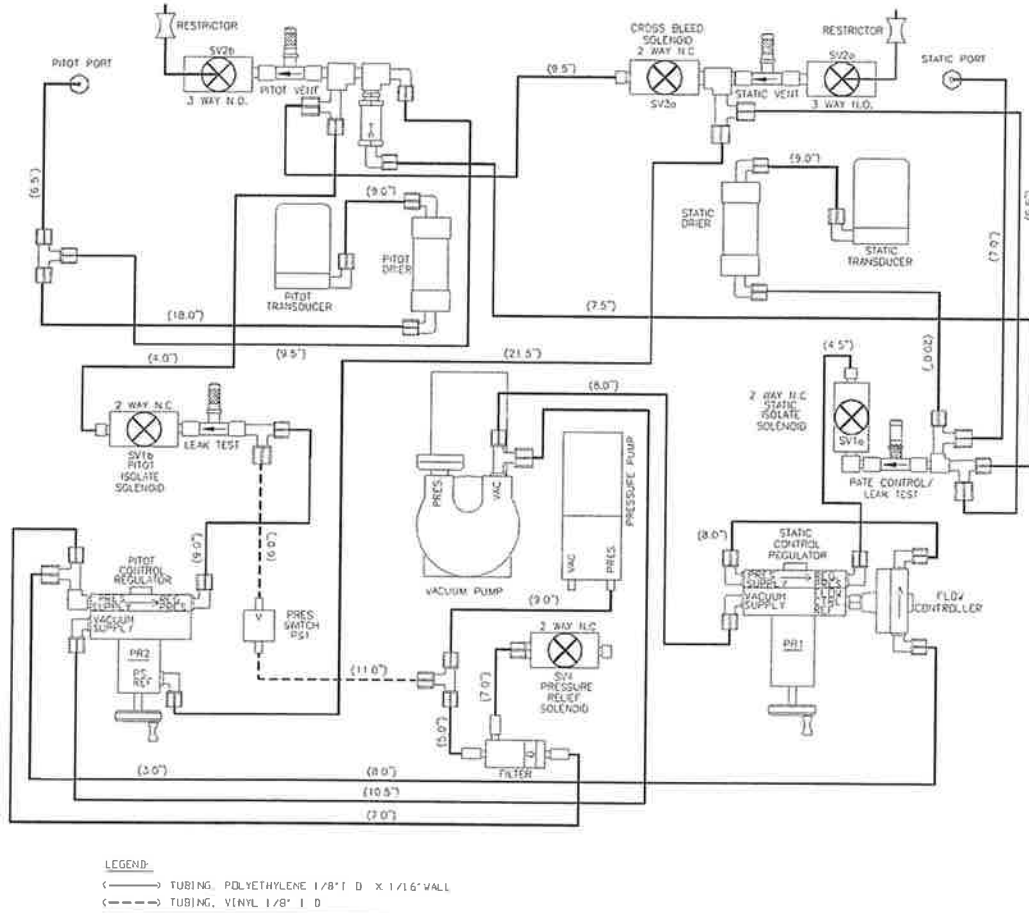


## DPS400 INSTRUCTION MANUAL



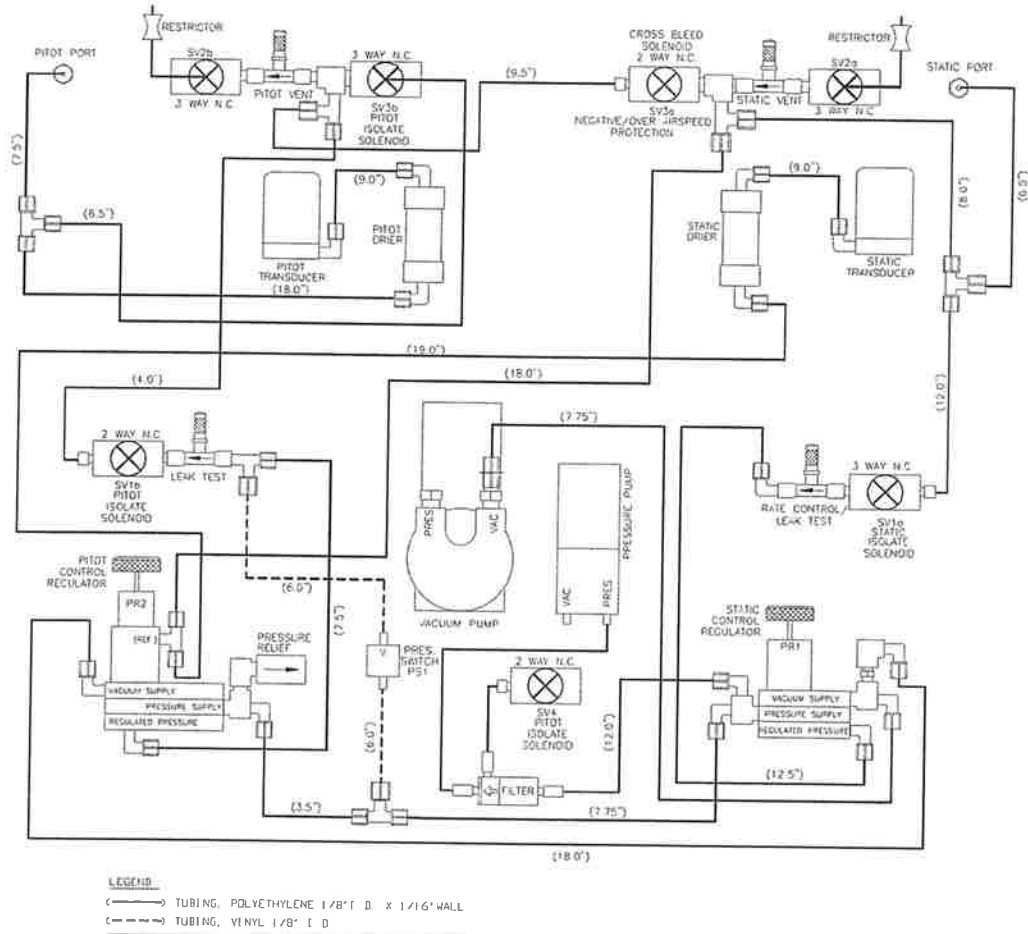
DPS400 (w/ Mod. G)  
PNEUMATIC DIAGRAM  
Figure 8

## DPS400 INSTRUCTION MANUAL



**DPS400 (w/ Mod. D)  
PNEUMATIC DIAGRAM  
Figure 9**

## DPS400 INSTRUCTION MANUAL



DPS400 (Before Mod. D)  
PNEUMATIC DIAGRAM  
Figure 10

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## DPS400 INSTRUCTION MANUAL

### SECTION 4: OPERATION

#### 1. GENERAL

The user should become familiar with the DPS400 Test Set as described in the earlier chapters before attempting any tests. The procedures described herein are not intended to replace any specifications by either the airframe or the instrument manufacturer. Particular attention should be given to preliminary setup procedures to avoid erroneous test results and the possibility of tripping the protection circuits of the tester. Strict adherence to the procedures for bringing the test set and aircraft systems back to ambient pressure are advised to safeguard the sensitive instruments in the aircraft from conditions such as negative airspeed and over pressurization.

**CAUTION:**      **Do not use unnecessary force to adjust any test set metering valve. Positive stop spacers have been installed on all metering valves to permit firm closing of the valves without damage. However, excessive force can overcome the knob set screw resulting in valve damage. The same caution applies when using the knob on the pressure regulators.**

**NOTE:**      The term "ambient" will occur frequently in these instructions. It refers to the existing atmospheric pressure in the area where the test is being performed.

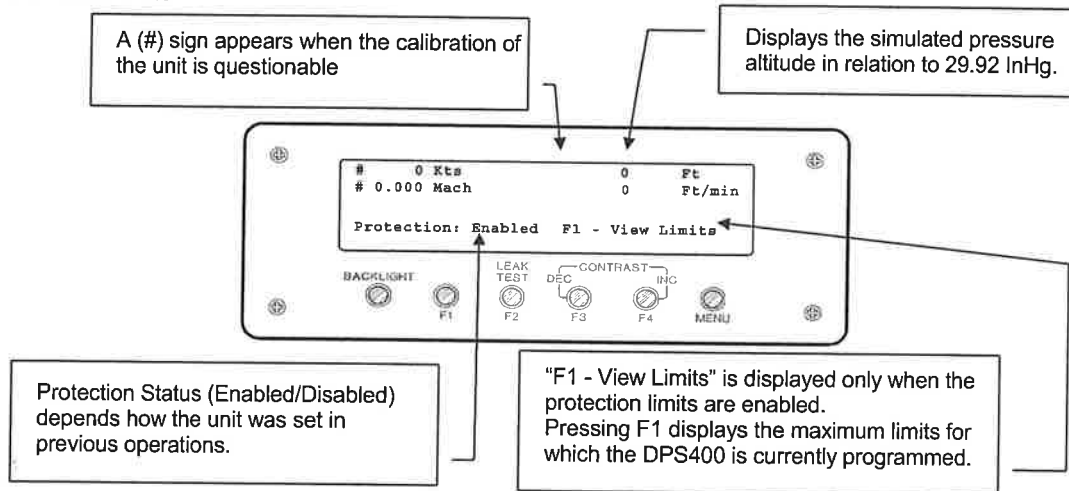
Each test set is completely calibrated and tested before shipment; however, to ensure the integrity of the tests, the tester should be leak checked before each use.

## DPS400 INSTRUCTION MANUAL

### 2. CONTROL PANEL INSTRUCTIONS

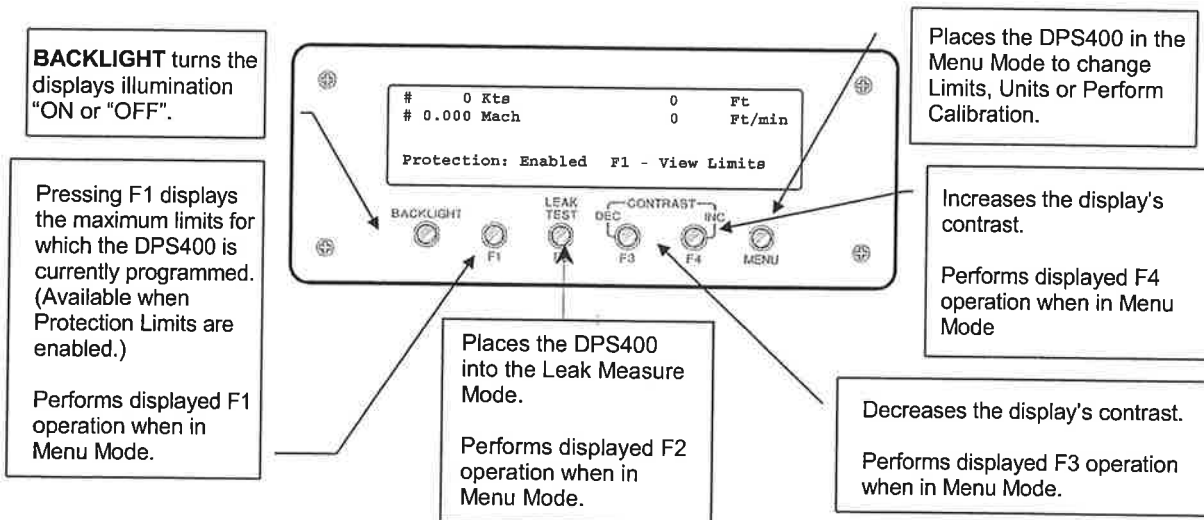
The DPS400 is equipped with an easy to use menu system developed to assist the technician during setup and testing. The following is a description of the parameter display and the function keys on the DPS400 control panel.

#### THE DISPLAY



#### FUNCTION KEYS

The MENU key and LEAK TEST key are functional under normal operation. The display CONTRAST may be adjusted at anytime using the F3 & F4 keys during normal operation. During power-up initialization or while in the MENU mode (firmware 2.0 or later), the BACKLIGHT key must be held down while pressing the F3 or F4 keys to adjust the contrast. Functions below the switches (F1 through F4) are functional during the MENU or LEAK TEST modes.



## DPS400 INSTRUCTION MANUAL

The following procedures show the step-by-step process to setup and operate the tester using the menus.

### A. PRELIMINARY SETUP

(1) Set tester as follows for initial valve positions for storage and initial power on.

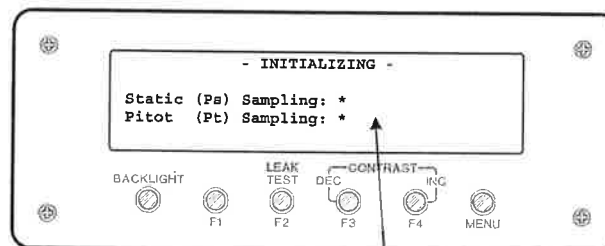
(a)	Leak Test	<b>Closed</b>
(b)	Rate Control/Leak Test	<b>Closed</b>
(c)	Pitot Vent	<b>Open</b>
(d)	Static Vent	<b>Open</b>
(e)	Pitot Control	<b>≈ 100 Knots</b>
(f)	Static Control	<b>≈ Field Elevation</b>

**CAUTION:** Do not use unnecessary force to adjust any test set valve. Positive stop spacers have been installed on all metering valves to permit firm closing of the valves without damage. However, excessive force can overcome the knob set screw resulting in valve damage. The same caution applies when using the knob on the pressure regulators.

**NOTE:** It is imperative that the PITOT VENT, STATIC VENT valves be fully opened before turning power on to prevent the auto-zero error correcting circuits from malfunctioning. Wait until the initialization is finished before closing these valves.

**NOTE:** If the unit losses power or is powered off while up in altitude and or airspeed, **DO NOT OPEN** the PITOT VENT or STATIC VENT valves before powering ON the test set. The test set can be powered on without venting to ambient in these circumstances and the only detriment being the airspeed accuracy at very low airspeeds (below 50 kts) may suffer.

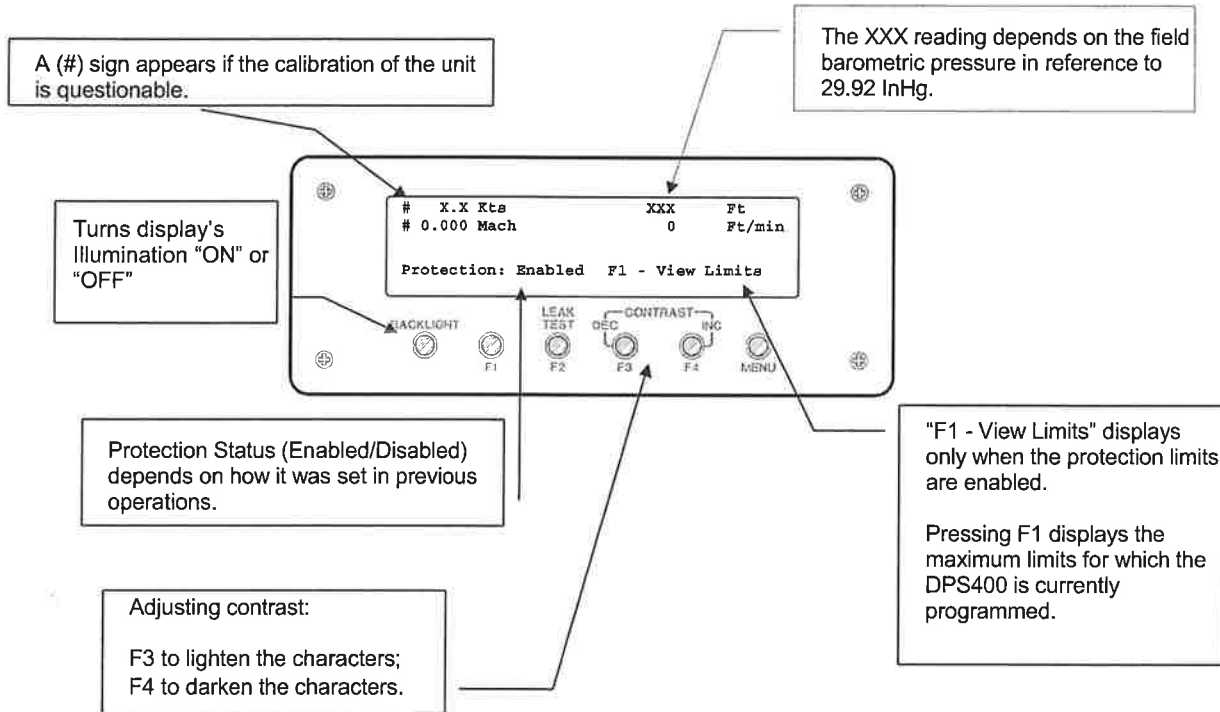
(2) Set Power switch to ON. The following screen appears:



The asterisks flash on and off indicating the sampling of the firmware (2.0 or later) transducer data.

## DPS400 INSTRUCTION MANUAL

When initialization finishes, the **PARAMETER DISPLAY** shown below appears:



### B. SETTING THE DISPLAYED UNITS

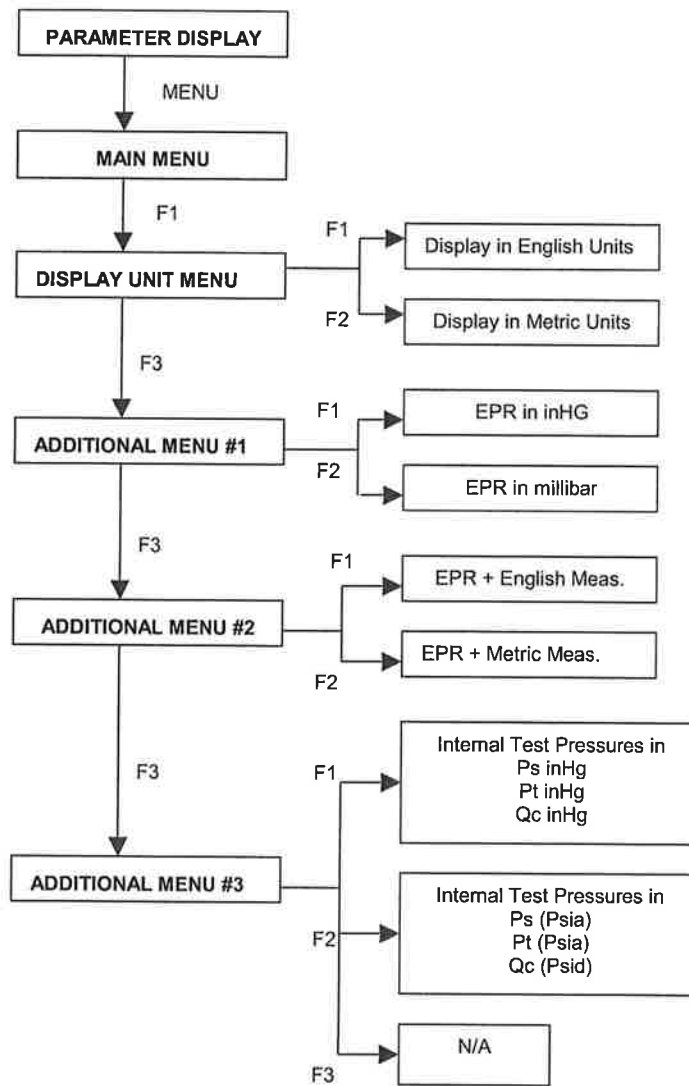
The DPS400 can be configured to display the altitude and airspeed data using either the Metric (M, Km/min), or English (Ft, Ft/min) system of measurement. Other options include:

- Display the Engine Pressure Ratio (EPR) in inches of mercury (inHg), millibars (mb), or pounds per square inch absolute (psia).
- Display the EPR with the Altitude and Airspeed in Metric or English measurements.
- Display the internal pressures (Pt, Ps, and Qc) of the tester in psia.



## DPS400 INSTRUCTION MANUAL

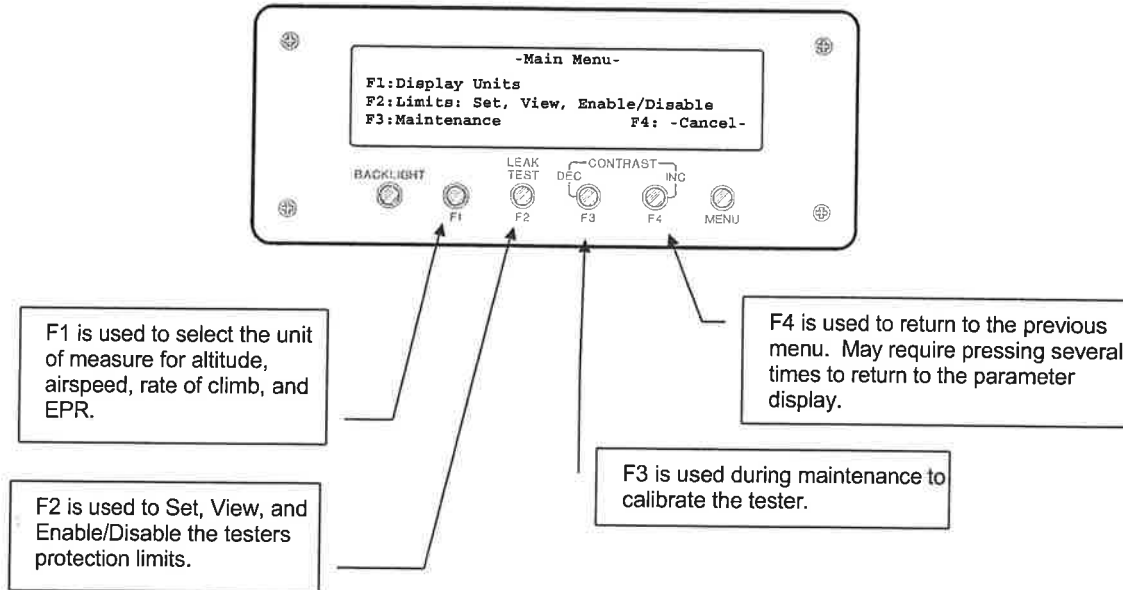
The flow diagram below (Figure 11) shows the path to change the displayed units of measure using the menus:



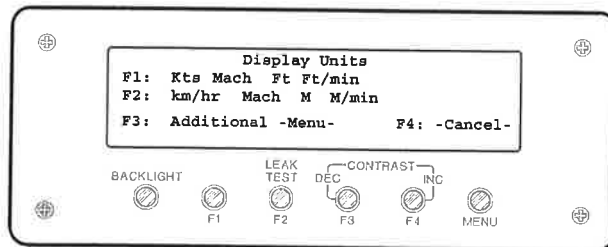
**DISPLAY UNITS FLOWCHART**  
**Figure 11**

## DPS400 INSTRUCTION MANUAL

- (1) To change the displayed unit of measure, press the MENU button. The Main menu appears:



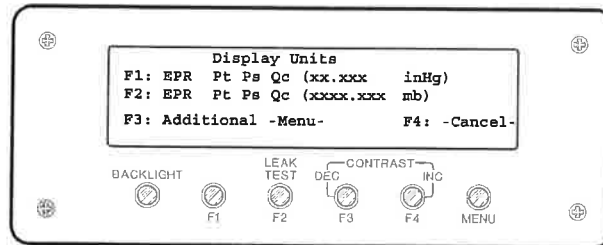
- (2) Press (F1) to select Display Units. The **DISPLAY UNITS** menu appears:



- F1** sets altitude to feet, airspeed to knots, and rate of climb to feet/min.
- F2** sets altitude to meters, airspeed to km/hr, and rate of climb to meters/min.
- F3** is used to scroll to the other pressure units such as inches of mercury, millibar, or PSI or setting the units up for EPR tests.
- F4** is used to return to the previous screen (-Main Menu-).

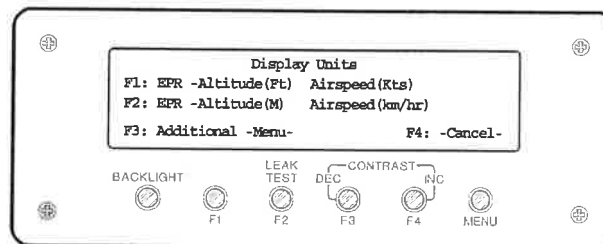
## DPS400 INSTRUCTION MANUAL

When **F3** is pressed, the second Display Units Menu appears:



- F1** displays the EPR data in the English system (inHg).
- F2** displays the EPR data in the Metric system (mb).
- F3** displays the third Display Units menu to set up unit for EPR data displayed in ft & knots or meter & km/hr or continue to Psia.
- F4** is used to return to the previous menu (first Display Units). Press 2-times to return to the -Main Menu-.

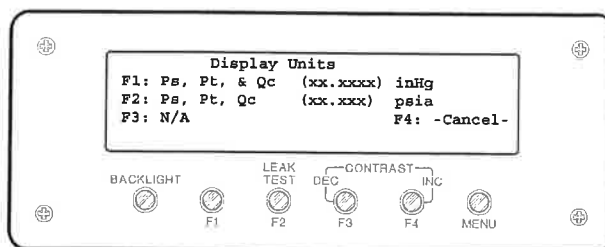
When **F3** is pressed again, the third Display Units Menu appears:



- F1** displays EPR data in ft & knots
- F2** displays EPR data in meters & km/hr.
- F3** displays the fourth Display Units menu to set up the unit to display in inHg or Psi (absolute).
- F4** is used to return to the previous menu (second Display Units). Press three times to return to the -Main Menu-.

## DPS400 INSTRUCTION MANUAL

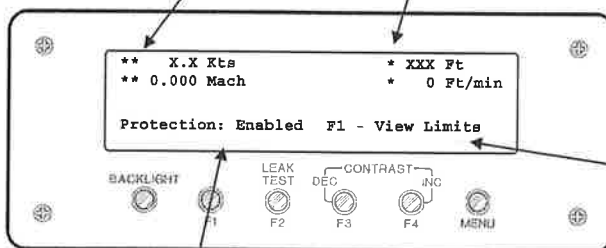
Press **F3** again, the fourth Display Units Menu appears:



- F1** Pt, Ps and Qc are displayed in units of inHg
- F2** Pt and Ps displayed in units of psi (absolute) and Qc in psi (differential).
- F3** Not Applicable
- F4** Returns user to previous menu (third Display Units). Press four times to return to the -Main Menu-.

Double Asterisk (\*\*) appears next to Altitude, Airspeed, VSI or Mach when the protection limits are exceeded.

An asterisk (\*) appears next to Altitude, Airspeed, VSI or Mach when the protection limits are approached.



Protection Status (Enabled/Disabled) depends on how it was set in previous operations.

"F1 - View Limits" displays only when the protection limits are enabled.

Pressing F1 displays the maximum limits for which the DPS400 is currently programmed.

## DPS400 INSTRUCTION MANUAL

### C. SETTING THE PROTECTION LIMITS

The protection limits feature of the DPS400 enable a technician to safeguard the sensitive pressure sensing devices aboard the aircraft from damage. The protection limits shield the aircraft from situations where the technician could generate conditions of over pressurization, excessive vertical speed, negative altitude, or excessive mach speed.

The DPS400 protective limits can also be disabled. **The protective limits should always be enabled when the test set is being used for aircraft testing but can be disabled when leak checking just the tester and hoses.**

NOTE: While leak checking the tester and hoses the limits may be disabled because the transducers used in the DPS400 are damage resistant, the typical conditions which cause damage to an aneroid instrument do not affect the DPS400 components.

The following flowchart (Figure 12) shows the process through the menus needed to enable/disable the protective limits feature.



NOTE: F4 Button Returns Display to the Previous Menu.

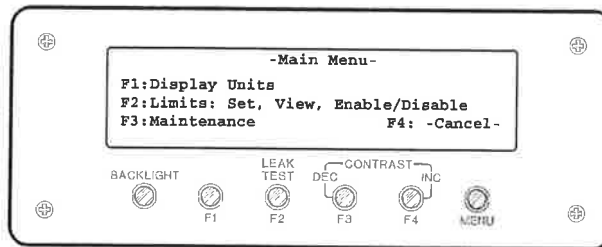
**ENABLE/DISABLE FLOWCHART**  
**Figure 12**

#### (1) Enable/Disable Protection Limits

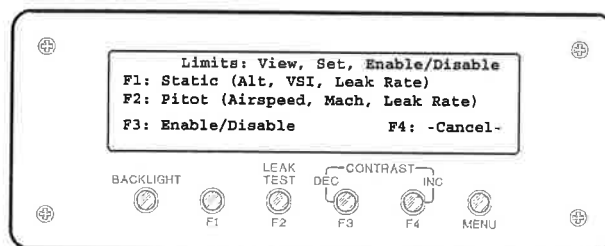
The following procedures describe how to enable/disable or set values for the DPS400 protection limits.

- (a) To begin enabling/disabling the limits, press the MENU switch. The Main menu appears:

## DPS400 INSTRUCTION MANUAL



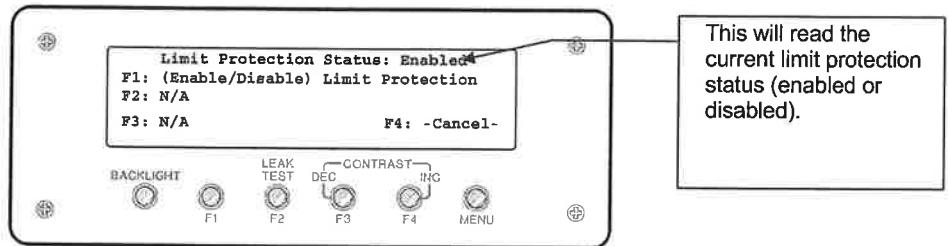
- F1** is used to select the type of units to be displayed (i.e. psi, inHg, Ft, Kts and others).
  - F2** is used to set the protection limits for all parameters and to enable/disable limit protection.
  - F3** is used during maintenance to calibrate the tester.
  - F4** is used to return to the previous menu. Press once to return to the previous screen (parameter display).
- (b) Press **F2** to set the **PITOT** and **STATIC** protection limits. The following **LIMITS SET, VIEW, ENABLE/DISABLE** menu appears:



**NOTE:** Protection values are stored in non-volatile memory, and the values displayed are those set in previous operations. It is recommended that the operator always set their desired protection limits and insure the protection limits are enabled before use on an aircraft or pressure sensitive equipment.

## DPS400 INSTRUCTION MANUAL

- (c) To change the protection limits status press **F3**. The **LIMIT ENABLE/DISABLE** menu appears:

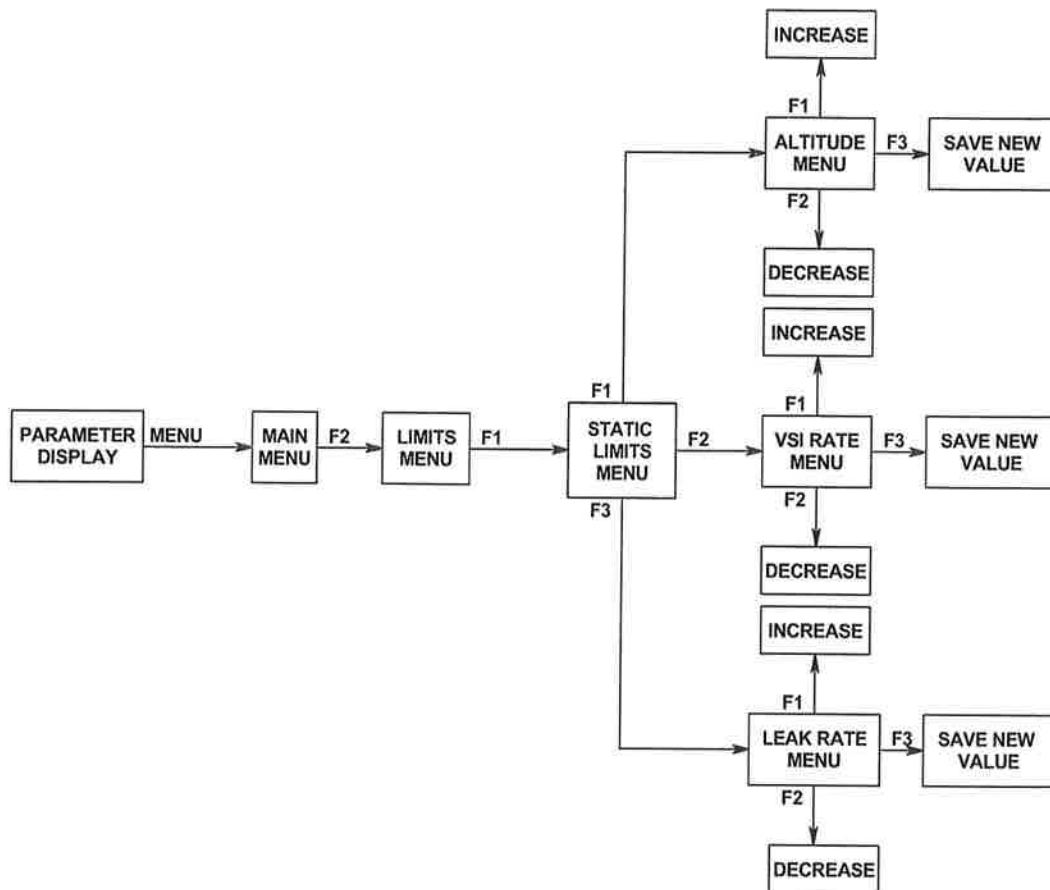


- (d) Press **F1** to change the status of the current Limit Protection parameters (the display will then return to the parameter display. Do not press **F1** if you do not wish to change the status. Press **F4** several times to return to the parameter display menu without changing status.
- (e) Verify that Protection Status and Display Units are set to the required limits, then perform normal testing.

## DPS400 INSTRUCTION MANUAL

### (2) Static Port Limits

The Static Port limits include limits on the Altitude, Vertical Speed (VSI), and Leak Rate. The following flow diagram (Figure 13) shows the process through the menus needed to set the static port limits.



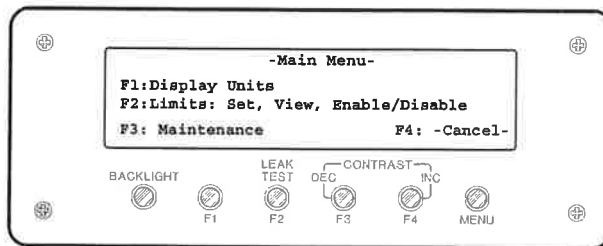
**STATIC PORT LIMITS FLOWCHART**  
Figure 13



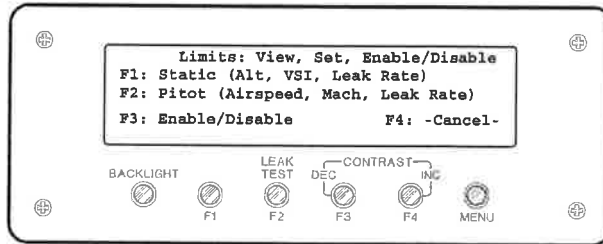
## DPS400 INSTRUCTION MANUAL

The following procedures describe how to set the values for the DPS400 static protection limits.

- (a) To begin setting the Static Port limits, press the MENU switch. The Main menu appears:



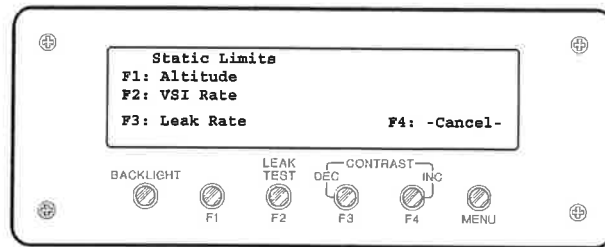
- (b) Press **F2** to set the pitot or static protection limits. The following Limits menu appears:



**NOTE:** Protection values are stored in non-volatile memory, and the values displayed are those set in previous operations. It is recommended that the operator always set the desired protection limits and enable the protection circuits before each use.

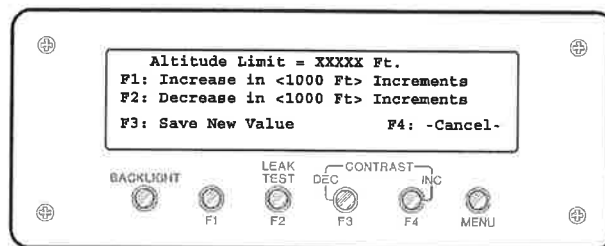
## DPS400 INSTRUCTION MANUAL

- (c) To set the Static Port protection limits, press **F1**. The following Static Limits menu appears:



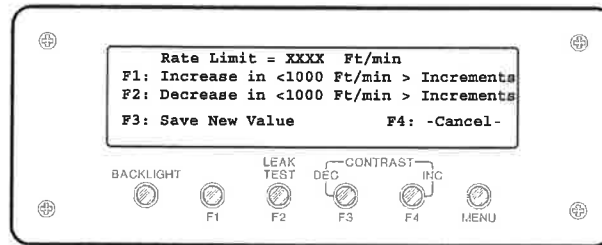
- F1** sets the altitude protection limits.
- F2** sets the rate of climb/descent (VSI) limits.
- F3** sets the Leak Rate limits during Leak Testing.
- F4** to return to previous menu.

- (d) To change the limits press **F1** for Altitude, **F2** for Rate protection limits or **F3** for setting the Leak Rate limits. One of the following Altitude/Rate Limit menus appears:

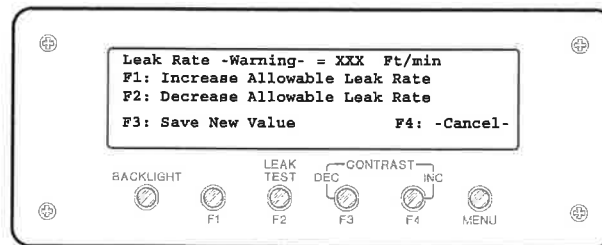


**F1 = Altitude Limit Menu**

## DPS400 INSTRUCTION MANUAL



**F2 = Rate Limit Menu**



**F3 = Leak Rate Limit Menu**

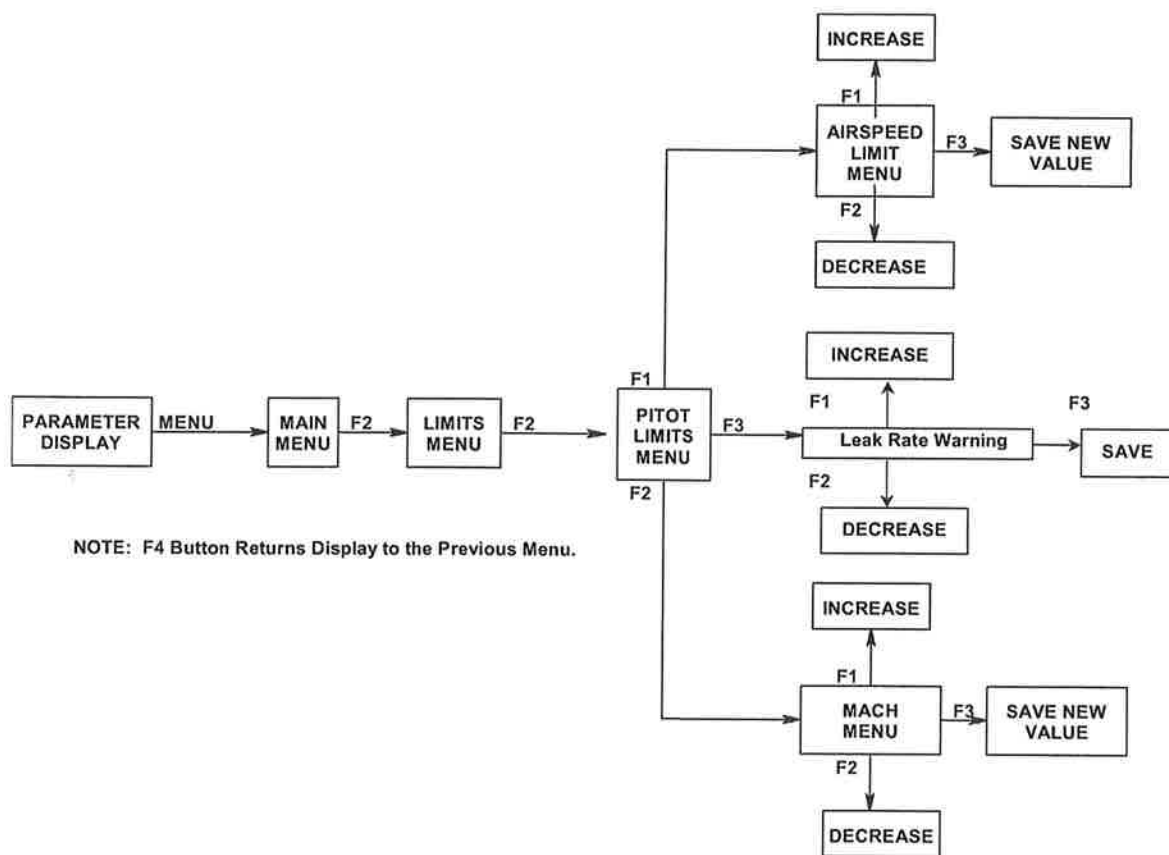
**NOTE:** XXXXX and XXXX represents the values set by the previous operator.

- **F1** increases and **F2** decreases the Altitude or Rate Limits in 1000 Ft increments or Leak Rate Limits by 50 Ft/min. To scroll up/down quickly, keep the **F1** or **F2** button pressed.
  - Press **F4** to return to the **STATIC LIMITS** Menu without saving any changes.
  - Once the desired Altitude or Rate protection limit is reached (as indicated in the display) press **F3** to store the new value. The display automatically returns to the **STATIC** Limits menu after saving the limit value.
- (e) Press **F4** repeatedly to return to the parameter display.

## DPS400 INSTRUCTION MANUAL

### (3) Pitot Port Limits

The Pitot Port limits includes maximum airspeed and Mach limits. The following flow chart (Figure 14) shows the process through the menus needed to set the pitot port limits.

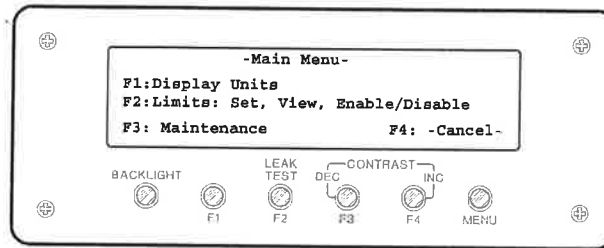


**PITOT PORT LIMITS FLOWCHART**  
**Figure 14**

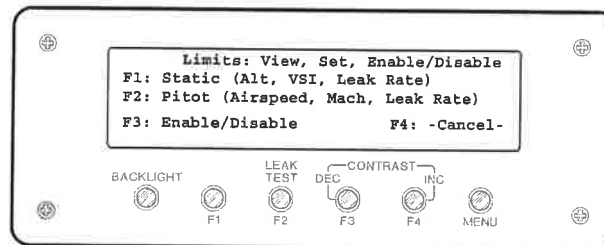
## DPS400 INSTRUCTION MANUAL

The following procedures describe setting the values for the DPS400 protection limits.

- (a) To begin setting the Pitot Port limits, press the MENU switch. The Main menu appears:



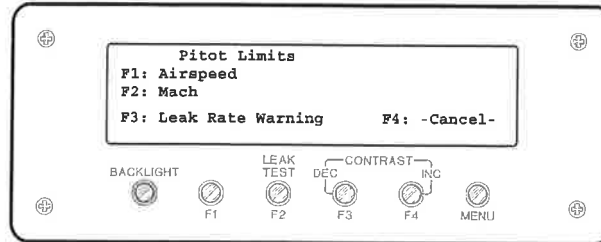
- (b) Press **F2** to set the pitot or static protection limits. The Limits menu (shown below) appears:



**NOTE:** Protection values are stored in non-volatile memory, and the values displayed are those set in previous operations. It is recommended that the operator always set their desired protection limits and enable the protection circuits before each use.

## DPS400 INSTRUCTION MANUAL

- (c) To set the Pitot Port protection limits, press **F2**. The Pitot Limits menu (shown below) appears:



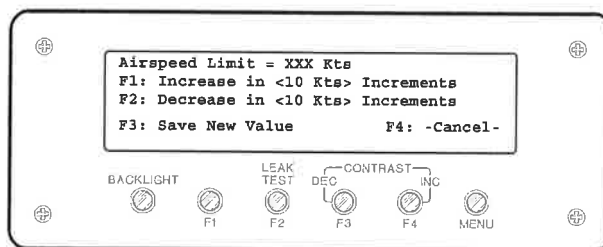
**F1** sets the Airspeed protection limits.

**F2** sets the Mach protection limits.

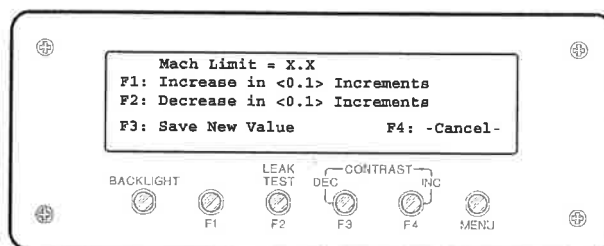
**F3** Leak Rate Warning.

**F4** is used to return to the previous menu.

- (d) To change the limits, press **F1** for airspeed or **F2** for Mach protection limits. One of the following Airspeed/Mach Limit menus appears:



**F1 = Airspeed Limit Menu**



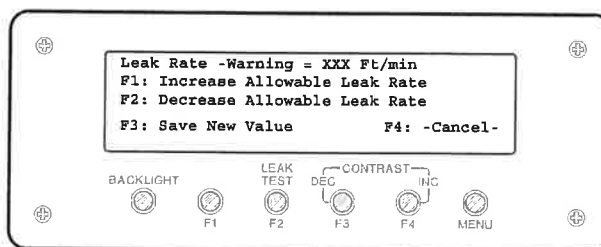
**F2 = Mach Limit Menu**

## DPS400 INSTRUCTION MANUAL

**NOTE:** XXX and X.X represents values set by previous operator.

- **F1** increases and **F2** decreases the Airspeed Limits in 10 kt increments or the Mach Limit in 0.1 increments. To scroll up/down quickly, keep the **F1** or **F2** button pressed.
- Press **F4** to return to the pitot limits Menu without saving any changes.
- Once the desired Airspeed or Mach protection limit is reached (as indicated in the display) press **F3** to store the new value. After saving the limit value, the display automatically returns to Pitot Limits menu.

e) To change the Leak Rate limits. Press **F3**. The Leak Rate limits menu appears:



### F3 = Leak Rate Limit Menu

**NOTE:** XXXXX and X.XXX represents values set by previous operator.

- **F1** increases and **F2** decreases the Altitude or the Rate Limits in 1000 ft increments or Leak Rate Limits by 50 ft/min. To scroll up/down quickly, keep the **F1** or **F2** button pressed.
- Press **F4** to return to the Pitot Limits Menu without saving any changes.
- Once the desired Altitude or Rate protection limit is reached (as indicated in the display) press **F3** to store the new value. After saving the limit value, the display automatically returns to Pitot Limits menu.

f) Press **F4** repeatedly to return to the parameter display.

## DPS400 INSTRUCTION MANUAL

### D. PROTECTION CIRCUIT RESET INSTRUCTIONS

#### (1) Altitude Limits Exceedance

- (a) Close **static RATE CONTROL/LEAK TEST** and pitot **LEAK TEST** valves fully.

**CAUTION:** Do not use unnecessary force to adjust any test set valve. Positive stop spacers have been installed on all needle valves to permit firm closing of the valves without damage. However, excessive force can overcome the knob set screw resulting in valve damage. The same caution applies when using the knob on the pressure regulators.

- (b) Open the STATIC VENT valve slowly until the displayed altitude is 2000 feet below the programmed limit, then close STATIC VENT valve. Readjust the static regulator to a value 1000 ft below the programmed altitude limit.

**NOTE:** Do not exceed programmed VSI rates while venting the system or the VSI rate protection circuit will trip.

- (c) Press **F4**. The message "Limit Exceeded F4:-RESET-" replaces the message "Protection Enabled F1: View Limits" and the protection circuit resets.
- (d) If a higher altitude is desired, reprogram the altitude limits and continue with normal testing.
- (e) Readjust the STATIC CONTROL to an altitude within the programmed altitude limit.
- (f) Slowly reopen the static RATE CONTROL/LEAK TEST valve taking care not to exceed programmed VSI limits and continue with normal testing.

#### (2) VSI Rate Limit Exceedance

- (a) Close the static **RATE CONTROL/LEAK TEST** valve fully.
- (b) Allow the VSI rate to drop below the programmed limit. Press **F4**. The message "Limit Exceeded, F4:-RESET-" replaces the message "Protection Enabled F1: View Limits" and the protection circuits resets.



## DPS400 INSTRUCTION MANUAL

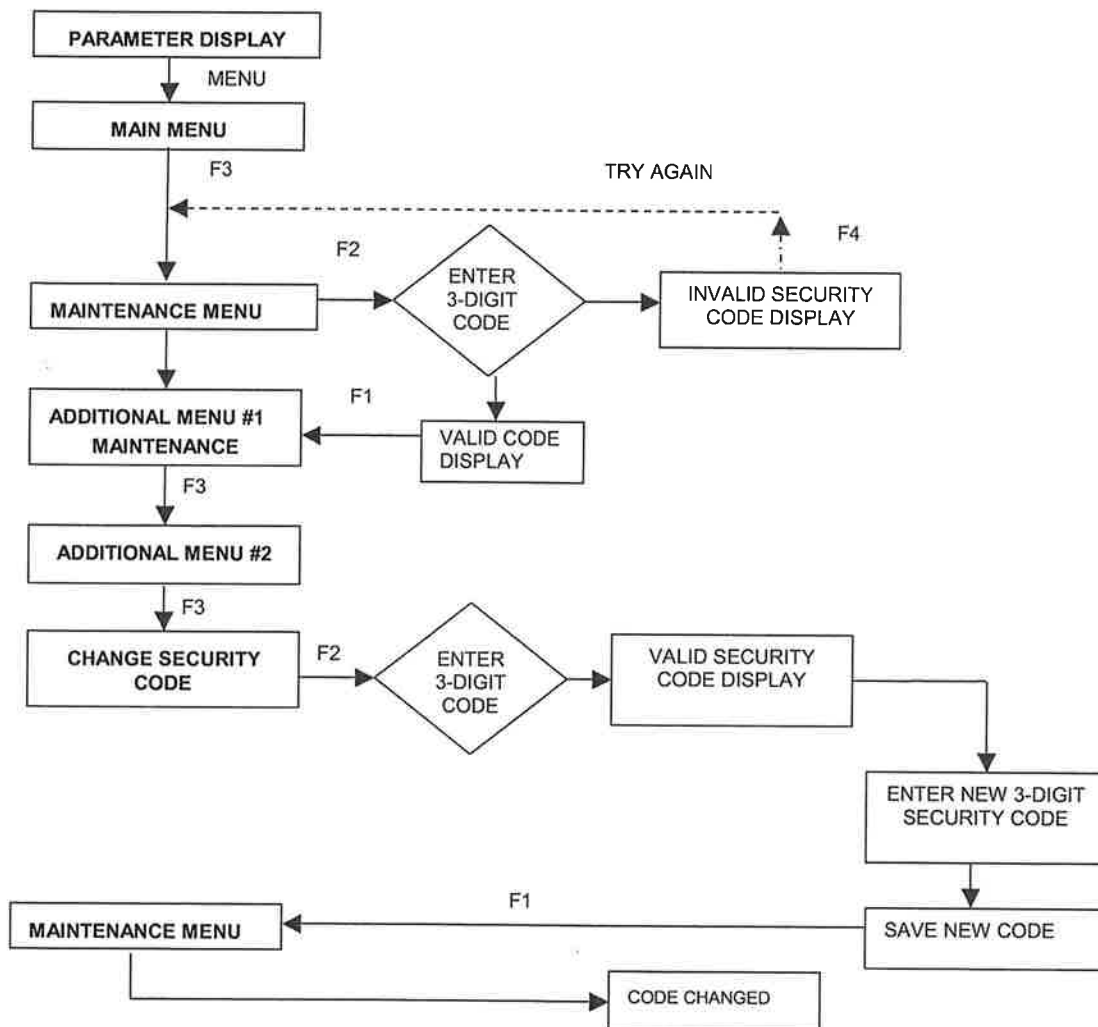
**NOTE:** It may be possible, due to pressure transients, that the display will show variations of altitude and VSI after the protection circuits have tripped. These are instantaneous readings sensed by the transducers (which respond much quicker than analog instruments) and do not affect the aircraft systems to which the tester is connected. Once the protection systems are tripped, the aircraft systems remain fully isolated until they are reset by the operator.

- (c) Slowly reopen the static RATE CONTROL/LEAK TEST valve. Do not exceed programmed VSI limits.
- (d) Continue test as required.
- (3) Airspeed/Mach Limit Exceedance
  - (a) Close static RATE CONTROL/LEAK TEST and pitot LEAK TEST valves.
  - (b) Readjust the PITOT CONTROL for a dial reading 50 kts below the programmed limits and then open pitot LEAK TEST valve fully.
  - (c) Allow the Airspeed/Mach to go below the programmed limit. Press **F4**. The message "Limit Exceeded, F4:-RESET-" replaces the message "Protection Enabled F1: View Limits" and the protection circuits reset.
  - (d) If higher airspeed is required, reprogram the Airspeed or Mach limits.
  - (e) Slowly reopen static RATE CONTROL/LEAK TEST valve and perform normal testing.

## DPS400 INSTRUCTION MANUAL

### E. SECURITY CODE MODIFICATIONS

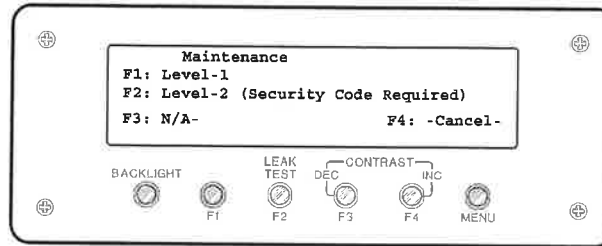
Critical areas of the DPS400 menu system are protected by a security code. The function of the menus beyond the security code is for calibration purposes only. A technician accessing that area of the menu system could cause the calibration of the test set to be lost. To prevent tampering or loss of the test set calibration, it is advisable to change and document your new security code separately from the test set. The unit is delivered with default security code 111. The flow diagram below (Figure 15) shows the menu path needed to change the security code.



**Figure 15**  
**SECURITY CODE FLOWCHART**

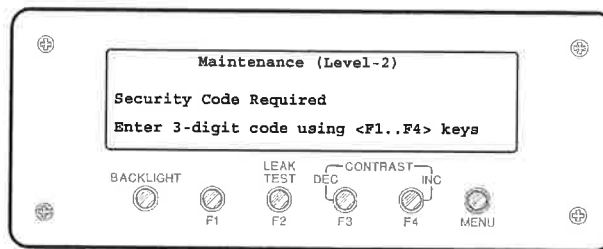
## DPS400 INSTRUCTION MANUAL

- (1) The Security Code may be changed through the Maintenance menu by pressing **F3** while at the MAIN menu. The Maintenance menu appears:

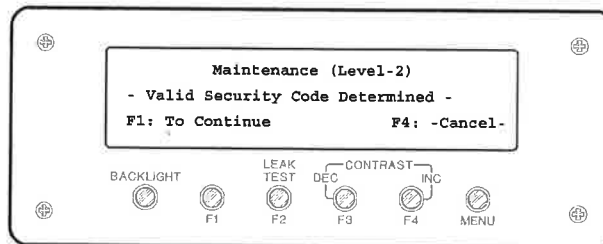


- F1** displays the transducer output period and Analog to Digital Voltage.
- F2** is used to enter the Maintenance (Level-2) menu.
- F3** is not used.
- F4** is used to return to previous menu.

- (2) Press **F2** (Level-2).

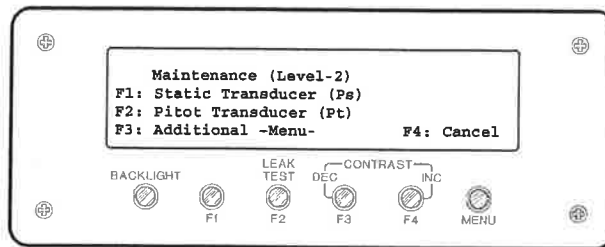


Enter valid security code. The following menu appears:

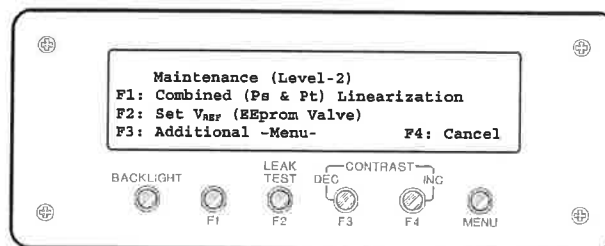


Press **F1** to continue.

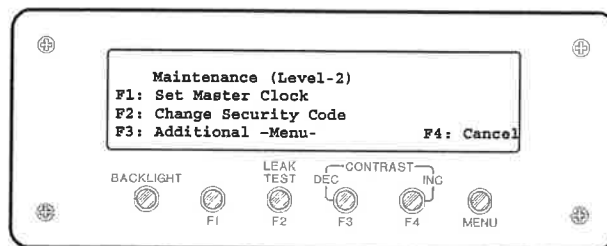
## DPS400 INSTRUCTION MANUAL



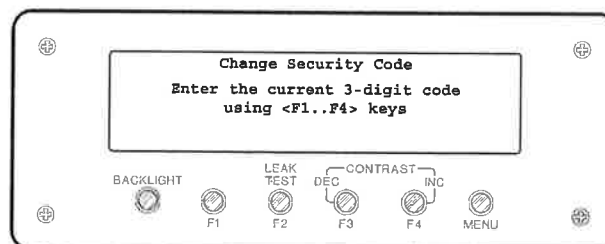
- (3) Press **F3** for the second additional maintenance menu to display.



- (4) Press **F3** for the third additional maintenance menu to display.

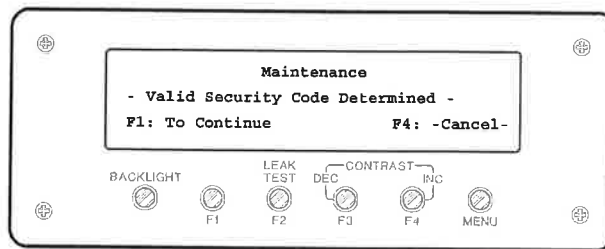


- (5) Press **F2** to change security code.



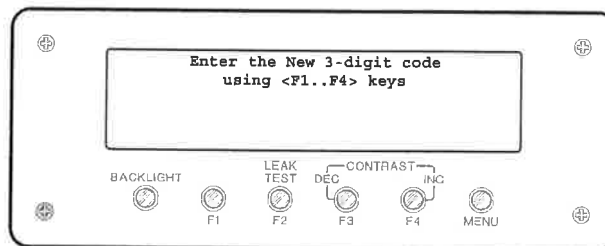
## DPS400 INSTRUCTION MANUAL

Enter the existing security code using **F1** for the number 1, **F2** for 2, **F3** for 3, and **F4** for 4. If the wrong code is entered, the message "Invalid Security Code Determined" is displayed. By pressing **F4** followed by **F1** will allow reentry of the existing security code. When the correct code is entered, the "Valid Security Code Determined" message appears:



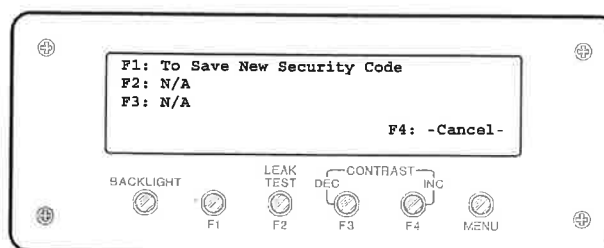
**F1** is pressed to continue with security code change.

**F4** is used to return to previous menu.



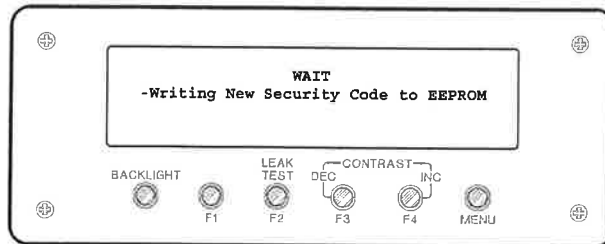
(6) When **F1** is pressed, the New Security Code message appears:

(7) Enter the new code, using **F1** for the number 1, **F2** for 2, **F3** for 3, and **F4** for 4. After the third digit is entered, the following Save Security Code menu appears:



## DPS400 INSTRUCTION MANUAL

- (8) Press **F1** to save the new code. The following message appears briefly and then returns to Maintenance Menu.



**NOTE:** To prevent tampering or loss of the test set calibration, document your new security code separately from the test set.

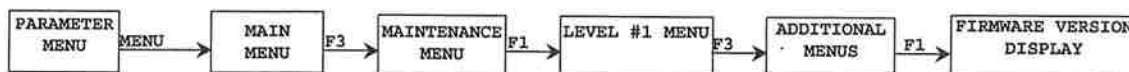
- (9) Press **F4** repeatedly to return to parameter display.

### F. DISPLAYING FIRMWARE VERSION

To display current firmware version, from the parameter display do the following:

- (1) Press Menu switch.
- (2) Press **F3** (Maintenance).
- (3) Press **F1** (Level-1).
- (3) Press **F3** (Additional menu) three (3) times.
- (4) Press **F1** to verify firmware version. Press **F4** until parameter display reappears.

The following flowchart (Figure 16) shows the sequence of menus needed to display the firmware version:



**NOTE:** F4 Button Returns Display to the Previous

**FIRMWARE FLOWCHART**  
**Figure 16**

## DPS400 INSTRUCTION MANUAL

### 3. LEAK CHECKING THE TESTER

Each Test Set is completely calibrated and tested before shipment, but to ensure the integrity of the sensitive tests to be made, the pretests of this section should be performed immediately before each use of the DPS400.

#### A. PRELIMINARY SETUP

(1) Initial Valve Position for Test Set Leak Check

(a)	Leak Test	<b>Closed</b>
(b)	Rate Control/Leak Test	<b>Closed</b>
(c)	Pitot Vent	<b>Open</b>
(d)	Static Vent	<b>Open</b>
(e)	Pitot Control	<b>≈ 100 knots</b>
(f)	Static Control	<b>≈ Field Elevation</b>

NOTE: Do not over tighten the valves. A light pressure is necessary to completely open or close the valves supplied with the DPS400 or other Barfield Pitot-Static testers.

- (2) Insure hoses are connected to the **PITOT** port and **STATIC** port of the test set and that the hose connections make a good seal. If the connectors on the aircraft side of the hoses are not quick disconnect or self-sealing, then a tight sealing plug should be used to seal the hose assembly. This is necessary to test the leakage of the hoses as well as the tester. **This is the ideal leak test to determine the condition of the tester and hoses together. If a sealing plug is not available, then leak test the DPS400 without the hoses connected.**

- (3) If not already connected, connect the power cable, the **STATIC (blue band)** hose and **PITOT (red band)** hose to the test set.

NOTE: 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.

## DPS400 INSTRUCTION MANUAL

- (4) Set the POWER switch to ON. The power indicator illuminates. Wait until initialization completes (indicated when the parameter display appears).

The Protection limits may be **disabled** (refer to section 1-4, page 9) during the DPS400 Leak tests to reduce the time necessary to check the condition of the test set and, because the transducers used in the test set are resistant to damage typically affecting Aneroid Instruments. The DPS400 Protection Limits must be **enabled** (refer to section 1-4, page 9) anytime the tester is connected to the aircraft. The protection limits ensure that no damage to the aircraft's Pitot-Static systems occurs during testing.

### B. STATIC LEAK CHECKS

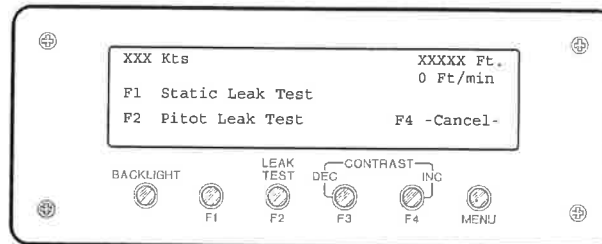
- (1) Close the **STATIC** and **PITOT** vents.
- (2) Slowly open the **LEAK TEST** valve. Verify the airspeed increases to approximately 100 knots. Set the **PITOT CONTROL** to 100 knots).
- (3) When airspeed reaches approximately 100 knots, open the **LEAK TEST** valve fully. Allow the differential regulator to maintain the airspeed at its present level.
- (4) Turn the **STATIC CONTROL** knob to 20,000 feet. Slowly open the **RATE CONTROL/LEAK TEST** valve until the XXXXX ft. is approximately 20,000 ft. Use the **STATIC CONTROL** knob to fine-tune the altitude close to 20,000 ft. Close the **RATE CONTROL/LEAK TEST** valve.

**NOTE:** If the Limit Protection feature of the DPS400 is enabled, the technician must maintain a lower VSI Rate than programmed. If the VSI or any other limit is exceeded during the leak test, then the testers Limit Protection feature will trip and stop the flow of pressure between the pump and the output ports. Since the tester is designed with solid-state transducers and not susceptible to the damage that commonly happens to analog instruments, the protection limits may be disabled during the tester leak test.

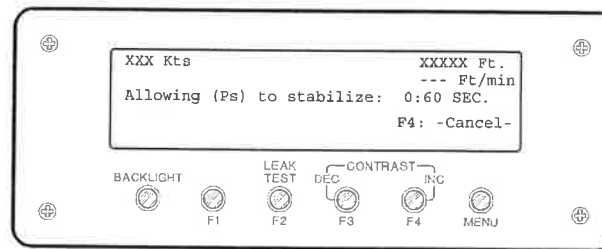
- (5) To begin the Static Leak test, press the Leak Test Button (**F2**). The following Leak Test Mode menu appears:



## DPS400 INSTRUCTION MANUAL

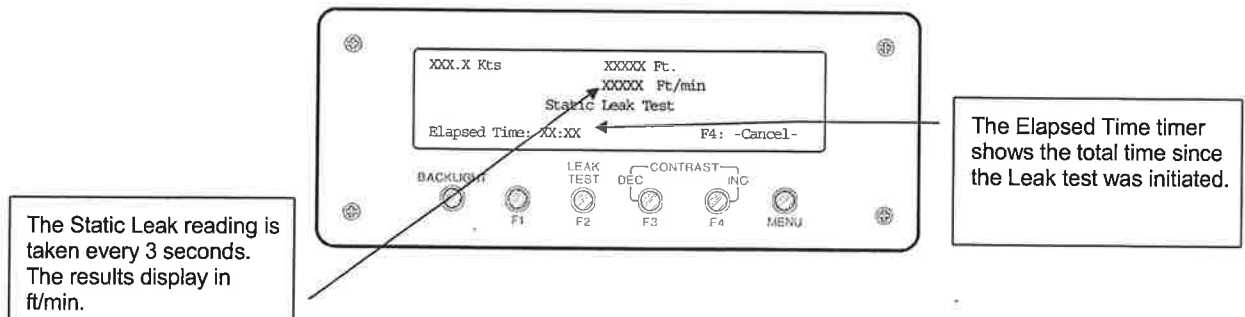


- (6) The XXX Kts and XXXXX Ft. indications are the airspeed and altitude from which the leak test was started.
- (7) Press **F1** for a Static Leak Check. The following display appears:



**NOTE:** Do not press **F1** until ready to do the Leak Check. As soon as **F1** is pressed, the screen above appears with a 60-second countdown timer that allows time for stabilization of the static pressure. The actual leak check measurement is started when the timer completes the 60-second stabilization time.

- (8) After the 60 seconds stabilization time elapses, the Static Leak Test screen appears to indicate the start of the actual leak test.



## DPS400 INSTRUCTION MANUAL

- (9) Allow the test set elapsed time to reach approximately 2.00 min or more. Record the leak rate of the tester and hoses so it may be deducted from the aircraft leak rate. Verify the test set has a leak rate of 50 feet/min or less. If the leak rate is greater than 50 ft/min, remove the hoses from the test set and repeat the Static Leak Test. (Repeating this procedure isolates the Test Set from the hoses.) If the test set passes the procedure, the leak is located in the static hose or connector. To correct the problem, repair or replace the hoses or connectors. A repeated failure of the test set means the leak is within the test set. In this case, it is recommended that the test set be sent to the manufacturer for repair.
- (10) Press **F4** to cancel the leak check at any time during the procedure. Press **F4** to return to the parameter display.
- (11) Return the **STATIC CONTROL** to approximately field elevation altitude. Do not exceed the programmed limit of the VSI. Slowly open the **RATE CONTROL / LEAK TEST** (returning the aircraft static system to field elevation). Close the **RATE CONTROL/LEAK TEST** valve. Slowly open the **STATIC VENT** valve to return the static system to ambient pressure.
- (12) Close the **LEAK TEST** valve. Slowly open the **PITOT VENT** to bleed the pressure from the system.
- (13) Before turning power off, configure the Tester as follows:

Leak Test	<b>Closed</b>
Rate Control/Leak Test	<b>Closed</b>
Pitot Vent	<b>Open</b>
Static Vent	<b>Open</b>
Pitot Control	<b>≈ 100 knots</b>
Static Control	<b>≈ Field Elevation</b>

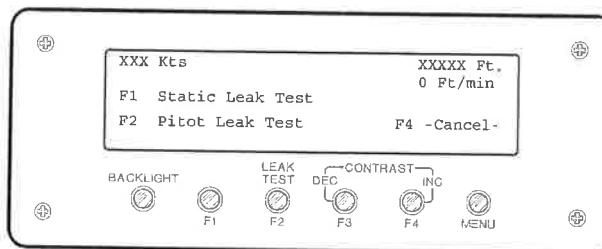
## DPS400 INSTRUCTION MANUAL

### C. PITOT LEAK CHECKS

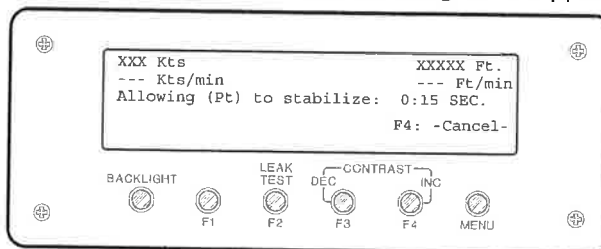
- (1) Close the **PITOT VENT** valve but leave the **STATIC VENT** valve open to ambient pressure.

**CAUTION:** Do not use unnecessary force to adjust any test set valve. Positive stop spacers have been installed on all needle valves to permit firm closing of the valves without damage. However, excessive force can overcome the knob set screw resulting in valve damage. The same caution applies when using the knob on the pressure regulators.

- (2) Turn the **PITOT CONTROL** knob to 300 knots. Slowly open the **LEAK TEST** valve until the XXX Kts displays (approximately 300 kts). Use the **PITOT CONTROL** knob to fine-tune the airspeed to about 300 kts. Close the LEAK TEST valve.
- (3) To begin the Pitot Leak test, press the Leak Test Button (**F2**). The following Leak Test Mode menu appears:



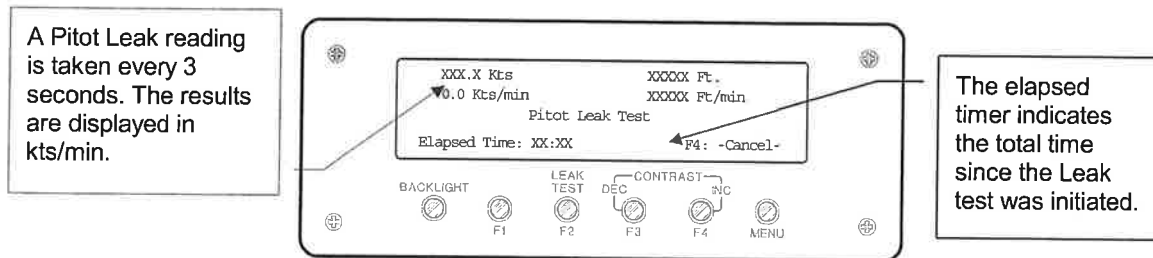
- (4) The XXX Kts and XXXXX Ft. indications are the airspeed and altitude from which the leaks test was started.
- (5) Press **F2** for a Pitot Leak Check. The following menu appears:



**NOTE:** Do not press **F2** until ready to do the Leak Check. As soon as **F2** is pressed, the screen above appears with a 15 second countdown timer and allows time for stabilization of the pitot pressure. The actual leak check measurement starts when the timer completes the 15-second stabilization time.

## DPS400 INSTRUCTION MANUAL

- (6) After the 15 seconds stabilization time elapses, the Pitot Leak Test screen appears indicating the start of the actual leak test.



- (7) Allow the test set elapsed time to reach approximately 1.00 min or more. Record the leak rate of the tester and hoses. Verify the test set must have a leak rate of 2 kts/min or less. If the leak rate is greater than 2 kts/min, remove the hoses from the test set and repeat the Pitot Leak Test. Repeating this procedure isolates the Test Set from the hoses. If the test set passes the test, the leak is located in the Pitot hose or connector. To correct the problem, repair or replace the hoses or connectors. A repeated failure of the test set shows that the leak is contained within the test set. In this case, it is recommended that the test set be sent to the manufacturer for repair.
- (8) Press **F4** to cancel the leak check at any time during the procedure. Press the **F4** button to return to the parameter display screen.
- (9) When testing is complete, set the **PITOT CONTROL** for airspeed of 100 knots.
- (10) Record the tester/hose leak rate so it may be deducted from the aircraft leak rate.
- (11) Slowly open the **LEAK TEST** valve. Verify the airspeed increases or decreases to approximately 100 knots. Close the **LEAK TEST** valve.
- (12) Slowly open the **PITOT VENT** until the airspeed reaches 0 knots.
- (13) Configure the Tester as follows before removing power:

Leak Test	<b>Closed</b>
Rate Control/Leak Test	<b>Closed</b>
Pitot Vent	<b>Open</b>
Static Vent	<b>Open</b>
Pitot Control	<b>≈ 100 knots</b>
Static Control	<b>≈ Field Elevation</b>

- (14) If the DPS400 leak testing is complete, turn off power.



## DPS400 INSTRUCTION MANUAL

### D. APPLYING LEAK CORRECTION

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

## 4. AIRCRAFT TESTING

### A. PRELIMINARY SETUP

- (1) Verify the power switch is OFF,
- (2) Set initial valve positions for the test set as follows:

Leak Test	<b>Closed</b>
Rate Control/Leak Test	<b>Closed</b>
Pitot Vent	<b>Open</b>
Static Vent	<b>Open</b>
Pitot Control	<b>≈ 100 knots</b>
Static Control	<b>≈ Field Elevation</b>

NOTE: Do not over tighten the valves. A light pressure is necessary to completely open or close the valves supplied with the DPS400 or other Barfield Pitot-Static testers.

- (3) Connect the Power cable, the **STATIC (blue band)** hose and **PITOT (red band)** 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 accidental crossing of Pitot and Static hoses.

- (4) **Insure the Tester Leak Checks referenced in section 1-4 have been completed before connecting the tester to the aircraft systems.**
- (5) Using Barfield's universal (P/N 115-00057) adapter or another manufacturers' custom aircraft pitot adapter, connect the **PITOT PORT** hose (Red Band) to the aircraft pitot system per the aircraft maintenance manual. Using the Barfield 2423F Static Port adapter or another manufacturers' custom aircraft static adapter, connect the **STATIC PORT** hose (Blue Band) to the aircraft static system per the aircraft maintenance manual.

## DPS400 INSTRUCTION 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 going on.

- (6) Set the aircraft altimeter barometer to 29.92 in Hg.
- (7) Set the POWER switch to ON. The power indicator will illuminate. Wait for the initialization to complete (indicated when the parameter display appears).
- (8) Program and enable the Altitude, Airspeed/Mach, and VSI limits on the test set. Refer to section 1-4, page 9 for instructions.

### B. PITOT SYSTEM TEST

- (1) Leak Test

**CAUTION:** Before pressurizing the aircraft Pitot and/or Static systems insure Limit Protection is **ENABLED** and the Airspeed & Mach limits are set to the appropriate values. Refer to section 1-4, page 9 for instructions. Make sure that the aircraft instrument limits are not exceeded.

- (a) Close the **PITOT VENT** valve and leave the **STATIC VENT** open to ambient pressure. Set the **PITOT CONTROL** to the required leak test airspeed (typically 300 kts).

**CAUTION:** Do not use unnecessary force to adjust any test set valve. Positive stop spacers have been installed on all metering valves to permit firm closing of the valves without damage. However, excessive force can overcome the knob set screw resulting in valve damage. The same caution applies when using the knob on the pressure regulators.

**CAUTION:** Should any later step fail, close the pitot **LEAK TEST** valve fully, then slowly open the **PITOT VENT** valve to return system to ambient before disconnecting test set.

- (b) Observe the aircraft and test set airspeed indications while slowly opening the pitot **LEAK TEST** valve to the desired airspeed test point (typically 300 kts). Open the pitot **LEAK TEST** valve fully and readjust the **PITOT CONTROL** as needed to set the desired airspeed.

## DPS400 INSTRUCTION MANUAL

- (c) Close the pitot **LEAK TEST** valve fully. Perform the Pitot leak check following the instructions for the Tester Pitot Leak test in section 1-4, page 31, steps (1) through (14)

(2) **Airspeed Checks**

**CAUTION:** Before pressurizing the aircraft Pitot and/or Static systems insure Limit Protection is **ENABLED** and the **Airspeed & Mach limits** are set to the appropriate values. Refer to section 1-4, page 8 for instructions. Make sure that the aircraft instrument limits are not exceeded.

- (a) Verify that the Tester Pitot Leak (Section 1-4, page 31) and the Aircraft Pitot System Leak checks (Section 1-4, page 34) have been completed. Set the front panel controls as follows.

<b>STATIC VENT</b> valve	<b>Open</b>
<b>PITOT VENT</b> valve	<b>Closed</b>
Pitot <b>LEAK TEST</b> valve	<b>Closed</b>
<b>STATIC RATE CONTROL/LEAK TEST</b>	<b>Closed</b>
<b>STATIC CONTROL</b>	<b>Field elevation altitude</b>
<b>PITOT CONTROL</b>	<b>100 kts.</b>

- (b) Set the **PITOT CONTROL** to the desired airspeed test point, then slowly open pitot **LEAK TEST** valve until the desired airspeed shows on the tester. Leave the pitot **LEAK TEST** valve fully open and adjust the **PITOT CONTROL** as required to set the desired airspeed.
- (c) Repeat step (b) above for all altitudes required. Always close the pitot **LEAK TEST** valve first, then adjust the **PITOT CONTROL** to the next airspeed. Reopen the pitot **LEAK TEST** valve slowly.

**NOTE:** If the protection circuits trip, reduce the airspeed below the programmed limit and reset the protection circuits (**F4**).

- (d) After finishing testing, close the **LEAK TEST** valve and set the **PITOT CONTROL** for an airspeed of 100 knots.
- (e) Slowly open the **LEAK TEST** valve. Verify the airspeed increases or decreases to approximately 100 knots. Close the **LEAK TEST** valve.
- (f) Slowly open the **PITOT VENT** until the airspeed reaches 0 knots.

## DPS400 INSTRUCTION MANUAL

- (g) Configure the Tester as follows before turning power off::

Leak Test	<b>Closed</b>
Rate Control/Leak Test	<b>Closed</b>
Pitot Vent	<b>Open</b>
Static Vent	<b>Open</b>
Pitot Control	<b>≈ 100 knots</b>
Static Control	<b>≈ Field Elevation</b>

- (h) Continue to the Static System Test, or if testing is complete, disconnect the Pitot and Static ports from the aircraft.

### C. STATIC SYSTEM TEST

- (1) Leak Test

**CAUTION:** Should any subsequent step fail, open the LEAK TEST valve and close the static RATE CONTROL/LEAK TEST valve fully counterclockwise. Do not exceed the VSI rate. Slowly open the STATIC VENT valve to return the static system to ambient pressure. Close the LEAK TEST valve and slowly open the PITOT VENT until the airspeed reads 0 knots.

- (a) Set the Tester in the following positions:

Leak Test	<b>Closed</b>
Rate Control/Leak Test	<b>Closed</b>
Pitot Vent	<b>Open</b>
Static Vent	<b>Open</b>
Pitot Control	<b>≈ 100 knots</b>
Static Control	<b>≈ Field Elevation</b>

**CAUTION:** Before pressurizing the aircraft Pitot and/or Static systems insure Limit Protection is ENABLED and the Airspeed & Mach limits are set to the appropriate values. Refer to section 1-4, page 8 for instructions. Make sure that the aircraft instrument limits are not exceeded.



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- (b) Close the **STATIC** and **PITOT** vents.

**CAUTION:** Do not use unnecessary force to adjust any test set valve. Positive stop spacers have been installed on all needle valves to permit firm closing of the valves without damage. However, excessive force can overcome the knob set screw resulting in valve damage. The same caution applies when using the knob on the pressure regulators.

- (c) Slowly open the **LEAK TEST** valve. Verify the airspeed increases to approximately 100 knots. (Set **PITOT CONTROL** at 100 knots).
- (d) When near the 100 knots airspeed, open the **LEAK TEST** valve fully to allow the differential regulator to maintain the airspeed at its present level.

**NOTE:** Disregard the test set airspeed indications during these tests.

**NOTE:** The Pitot **LEAK TEST** valve is opened to control the test set pressures and protect the airspeed indicator from negative airspeed conditions.

- (e) Turn the **STATIC CONTROL** knob to the required altitude (typically 20,000 Feet
- (f) Taking care not to exceed the programmed limit of VSI and altitude, slowly open the static **RATE CONTROL/LEAK TEST** valve until close to the desired altitude, then open the static **RATE CONTROL/LEAK TEST** valve fully and adjust **STATIC CONTROL** as required to trim to the desired altitude (typically 20,000 Ft).
- (g) Close the static **RATE CONTROL/LEAK TEST** valve fully.
- (h) Do the Static Leak Test following the instructions for the Tester Static Leak test in section 1-4, page 28, steps (5) through (13).

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### (2) Altitude Checks

- (a) Verify that Tester Static Leak (Section 1-4, page 28) and the Aircraft Static System Leak check (Section 1-4, Page 36) have been completed. Set the front panel controls as follows:

Leak Test	<b>Closed</b>
Rate Control/Leak Test	<b>Closed</b>
Pitot Vent	<b>Open</b>
Static Vent	<b>Open</b>
Pitot Control	<b>≈ 100 knots</b>
Static Control	<b>≈ Field Elevation</b>

**CAUTION:** Before pressurizing the aircraft Pitot and/or Static systems insure Limit Protection is **ENABLED** and the Airspeed & Mach limits are set to the appropriate values. Refer to section 1-4, page 9 for instructions. Make sure that the aircraft instrument limits are never exceeded.

- (b) Close the **STATIC** and **PITOT** vents.

**CAUTION:** Do not use unnecessary force to adjust any test set valve. Positive stop spacers have been installed on all needle valves to permit firm closing of the valves without damage. However, excessive force can overcome the knob set screw resulting in valve damage. The same caution applies when using the vernier knobs on the pressure regulator.

- (c) Slowly open the **LEAK TEST** valve. Verify the airspeed increases to approximately 100 knots. (Set **PITOT CONTROL** to 100 knots).
- (d) When close to the 100 knot airspeed, open the **LEAK TEST** valve fully to allow the differential regulator to maintain the airspeed at its present level.

**NOTE:** Disregard the test set airspeed indications during these tests.

**NOTE:** The Pitot **LEAK TEST** valve is opened to equalize the test set pressures and to protect the airspeed indicator from negative airspeed conditions.

## DPS400 INSTRUCTION MANUAL

- (e) Set the **STATIC CONTROL** to the desired altitude. Do not exceed the altitude or VSI programmed limits. Slowly open static **RATE CONTROL/LEAK TEST** valve until desired altitude shows on the tester. Open the static **RATE CONTROL/LEAK TEST** valve fully and adjust **STATIC CONTROL** as needed to set the desired altitude.
- (f) Repeat step (e) above for all altitudes required. Always close the static **RATE CONTROL/LEAK TEST** valve first, and then adjust the **STATIC CONTROL** to the next test altitude. Reopen the static **RATE CONTROL/LEAK TEST** valve slowly.

NOTE: If the altitude protection circuits trip, reduce altitude below the programmed limit and reset protection circuits. If the VSI protection trips, wait until the test set VSI indicator reads zero, reset protection circuits, and continue testing.

- (g) Set the **STATIC CONTROL** to approximately field elevation altitude.
- (h) Observe and maintain the VSI below programmed limits. Slowly open the **RATE CONTROL/LEAK TEST** to return the aircraft static system to field elevation.
- (i) Close the **RATE CONTROL/LEAK TEST** valve and slowly open the Static **VENT** valve to return the static system to ambient pressure.
- (j) Close the **LEAK TEST** valve and slowly open the **PITOT VENT** until the airspeed reaches 0 knots.
- (k) Configure the Tester as follows before turning power off:

Leak Test	<b>Closed</b>
Rate Control/Leak Test	<b>Closed</b>
Pitot Vent	<b>Open</b>
Static Vent	<b>Open</b>
Pitot Control	<b>≈ 100 knots</b>
Static Control	<b>≈ Field Elevation</b>

- (l) Continue on to the Combined Pitot/Static Test or if testing is complete, disconnect the Pitot and Static ports from the aircraft.

## DPS400 INSTRUCTION MANUAL

### D. COMBINED PITOT / STATIC TEST

#### (1) Combined Altitude/Airspeed Tests

**NOTE:** Always start tests at the lowest altitude and airspeed required. To prevent tripping the protection circuits, do not exceed the programmed rate limits while changing altitudes or airspeeds.

- (a) Verify that Tester Leak tests in section 1-4, page 27 and the Aircraft System Leak checks (section 1-4, page 33) have been completed.
- (b) Insure the aircraft altimeter is set to 29.92 inHg.
- (c) Set the Tester controls in the following positions:

Leak Test	<b>Closed</b>
Rate Control/Leak Test	<b>Closed</b>
Pitot Vent	<b>Open</b>
Static Vent	<b>Open</b>
Pitot Control	<b>≈ 100 knots</b>
Static Control	<b>≈ Field Elevation</b>

**CAUTION:** Before pressurizing the aircraft Pitot and/or Static systems insure Limit Protection is **ENABLED** and the Airspeed & Mach limits are set to the appropriate values. Refer to section 1-4, page 8 for instructions. Make sure that the aircraft instrument limits are not exceeded.

- (d) Close the **STATIC** and **PITOT** vents.

**CAUTION:** Do not use unnecessary force to adjust any test set valve. Positive stop spacers have been installed on all needle valves to permit firm closing of the valves without damage. However, excessive force can overcome the knob set screw resulting in valve damage. The same caution applies when using the vernier knobs on the pressure regulator.

- (e) Slowly open the **LEAK TEST** valve. Verify the airspeed increases to approximately 100 knots. (Set **PITOT CONTROL** to 100 knots).
- (f) When approximately 100 knot airspeed, open the **LEAK TEST** valve fully to allow the differential regulator to maintain the airspeed at its present level.

## DPS400 INSTRUCTION MANUAL

**NOTE:** The Pitot LEAK TEST valve is opened during altitude changes to control the test set pressures and protect the airspeed indicator from negative airspeed conditions.

- (g) Set the **STATIC CONTROL** to the desired altitude. Do not exceed the altitude or VSI programmed limits. Slowly open the static **RATE CONTROL/LEAK TEST** valve until the desired altitude shows on the tester. Open the static **RATE CONTROL/LEAK TEST** valve fully and adjust **STATIC CONTROL** as needed to set the desired altitude.
- (h) Close the static **RATE CONTROL/LEAK TEST** and pitot **LEAK TEST** valve fully.
- (i) Set the **PITOT CONTROL** to the desired airspeed test point. Slowly open pitot **LEAK TEST** valve until the tester approaches the desired airspeed, then open the pitot **LEAK TEST** valve fully and adjust **PITOT CONTROL** as required to set the desired airspeed.
- (j) Repeat the previous steps (g) through (i) for all the airspeed and altitude test points required. Always leave the pitot **LEAK TEST** valve open while adjusting the altitude and adjusting the airspeed.
- (k) When testing is complete, set the **PITOT CONTROL** for airspeed of 100 knots.
- (l) Slowly open the **LEAK TEST** valve until it is fully open. Verify the airspeed increases or decreases to approximately 100 knots.
- (m) Close the **RATE CONTROL/LEAK TEST** valve and set the **STATIC CONTROL** approximately to field elevation altitude.
- (n) Observe and maintain the VSI below the programmed limits. Slowly open the **RATE CONTROL/LEAK TEST** to return the aircraft static system to field elevation.
- (o) Close the **RATE CONTROL/LEAK TEST** valve and slowly open the Static **VENT** valve to return the static system to ambient pressure.
- (p) Close the **LEAK TEST** valve and slowly open the **PITOT VENT** until the airspeed reaches 0 knots.

## DPS400 INSTRUCTION MANUAL

- (q) Configure the Tester as follows before turning power off:

Leak Test	<b>Closed</b>
Rate Control/Leak Test	<b>Closed</b>
Pitot Vent	<b>Open</b>
Static Vent	<b>Open</b>
Pitot Control	<b>≈ 100 knots</b>
Static Control	<b>≈ Field Elevation</b>

- (r) Turn off power and disconnect the **STATIC** and **PITOT** hoses from the **STATIC** and **PITOT** ports of the tester and aircraft.

### E. MACHMETER TESTS

Use the procedures outlined in the Combined Pitot / Static Test (beginning in section 1-4, page 40) to set and change the airspeed and altitude. Select an Altitude from the first column of Table 1. Select one of the eight Airspeeds directly across from the selected Altitude. Cross-reference the selected Airspeed and Altitude to find the required Mach. Select a new airspeed and altitude and repeat the test as required.

AIRSPEED (IN KNOTS) (FROM NTIS #62-71396)								
ALTITUDE (IN FEET)	.50	.60	.70	.75	.80	.82	.85	.90
10k	277	334	391	420	449	---	---	---
15k	247	298	350	376	403	414	429	---
20k	228	275	324	348	373	383	398	424
25k	205	248	292	315	338	347	361	384
29k	188	228	269	289	311	319	332	354
33k	172	207	246	265	285	292	304	324
37k	157	190	224	242	260	267	278	297
41k	142	173	204	220	237	243	253	277
45k	---	157	186	201	216	222	231	246
49k	---	143	169	183	196	202	210	225
51k	---	---	161	174	187	193	201	214

**Table 1**  
Mach Meter Test

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When testing is complete, refer to section 1-4, page 46 (Standard Test Set Shutdown Procedures) for procedures on bringing the test set to ambient.

### F. ENGINE PRESSURE RATIO (EPR) TEST

NOTE: Test Limited by Test set airspeed range.

#### (1) Preliminary

- (a) Connect PITOT PORT (Red) to the PT7 (Hi) port of E.P.R. transmitter to be tested.
- (b) Connect STATIC PORT (Blue) to the PT2 (Lo) port of E.P.R. transmitter to be tested.

#### (2) Test

- (a) The EPR function of the DPS400 allows the display the EPR Ratio PT7/PT2 and pressures of PT2 and PT7 individually. The units of measurement available for the PT2 and PT7 pressure display are; inHg; mb; or altitude (ft. or M) and airspeed (kts. or km/hour). To set up the EPR display to desired units of measurement, refer to section 1-4, page 4 (Setting the Display Units).

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.

- (b) Make sure the static (Altitude or PT2) and pitot (Airspeed or PT7) pressure combination achieves the desired EPR ratio.

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ENGINE PRESSURE RATIO	AIRSPEED (KNOTS) Pt7 (Hi) PORT	ALTITUDE (FEET) Pt2 (Lo) PORT
3.4	650	25,870
3.4	546	35,000
3.0	650	21,650
3.0	504	35,000
2.5	650	14,690
2.5	534	25,870
2.5	444	35,000
2.0	650	4,210
2.0	500	20,000
2.0	369	35,000
1.5	478	5,000
1.5	365	20,000
1.5	265	35,000

**Table 2**  
EPR TEST TABLE

- (c) When testing is complete, refer to section 1-4, page 46 (Standard Test Set Shutdown Procedures) for procedures on bringing the test set and aircraft to ambient pressures.



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### G. MANIFOLD PRESSURE GAUGE TEST

- (1) Preliminary
  - (a) Connect STATIC PORT (Blue) to the manifold gauge to be tested.
  - (b) The Protection limits may be **disabled** (refer to section 1-4, page 9) during the Manifold Pressure Gauge tests.
- (2) Test
  - (a) The DPS400 can be changed to display the static pressure in inHg units by referring to section 1-4, page 4 (Setting the Display Units).
  - (b) Close the STATIC VENT and adjust the STATIC CONTROL to the required altitude (ft.) for the Manifold Pressure test point.

**NOTE:** Use Table 3 as a guide to set the STATIC CONTROL. (Table 3 shows the relation between Altitude and the corresponding pressure in inHg.)

- (c) Slowly open the RATE CONTROL/LEAK TEST valve to set the static pressure.

MANIFOLD PRESSURE (INCHES OF MERCURY)	ALTITUDE (FEET)
31	-985
30	-75
29	+860
28	1825
27	2815
26	3835
25	4890
20	10,730
15	17,905
10	27,375

**Table 3**  
MANIFOLD PRESSURE TEST

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- (d) When testing is complete, refer to section 1-4, Page 46 (Standard Test Set Shutdown Procedures) for procedures on bringing the test set to ambient pressures.

### 5. SHUTDOWN PROCEDURES

#### A. Standard Shutdown Procedure

**CAUTION:** Do not use unnecessary force to adjust any test set valve. Positive stop spacers have been installed on all needle valves to permit firm closing of the valves without damage. However, excessive force can overcome the knob set screw resulting in valve damage. The same caution applies when using the vernier knobs on the pressure regulator.

- (1) When testing is complete, set the **PITOT CONTROL** for an airspeed of 100 knots.
- (2) Slowly open the **LEAK TEST** valve until it is fully open. Verify the airspeed increases or decreases to approximately 100 knots.
- (3) Close the **RATE CONTROL/LEAK TEST** valve and set the **STATIC CONTROL** to approximately field elevation altitude.
- (4) Observe the maximum VSI. Open the **RATE CONTROL/LEAK TEST** to return the aircraft static system to field elevation.

**NOTE:** If the protection circuits trip, lower the altitude, VSI or airspeed below the programmed limits and reset the protection circuits (**F4**).

- (5) Close the **RATE CONTROL/LEAK TEST** valve and slowly open the Static **VENT** valve to return the static system to ambient pressure.
- (6) Close the **LEAK TEST** valve and slowly open the **PITOT VENT** until the airspeed reaches 0 knots.
- (7) Configure the Tester as follows before turning power off.

Leak Test	<b>Closed</b>
Rate Control/Leak Test	<b>Closed</b>
Pitot Vent	<b>Open</b>
Static Vent	<b>Open</b>
Pitot Control	<b>≈ 100 knots</b>
Static Control	<b>≈ Field Elevation</b>



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- (8) Turn off power and disconnect the **STATIC** and **PITOT** hoses from the **STATIC** and **PITOT** ports of the tester and aircraft.

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### **SECTION 5: SHIPPING**

#### **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 reship the Test Set.

It is also recommended that the Test Set be Leak Checked upon receipt and its carrying case 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.

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## DPS400 INSTRUCTION MANUAL

### **SECTION 6: STORAGE**

#### **1. PROCEDURE**

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

Should the Test Set become exposed to moisture or very high humidity, dry as soon as possible. Temporarily store in a dehumidified area.