

DPS400 Pitot-Static Test Set

USER INSTRUCTION MANUAL
BARFIELD M/N DPS400

Doc. P/N: 56-101-01180

Revision B1

January 7, 2010

BARFIELD, INC.



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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:

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BARFIELD, INC.
P.O. BOX 025367
MIAMI, FL 33102-5367
USA**

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(800) 321-1039

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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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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>Note: This Rev. B1 is to be used for Test Sets that do not 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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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

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Miami, Florida 33142
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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

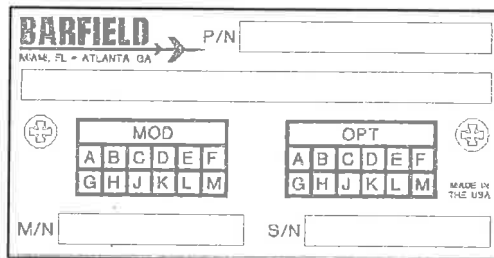
Inquiries should be specific and refer to the publication title, number, chapter, page, figure, paragraph, and effective date.

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

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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. 23 Street
 Miami, Florida 33142 U.S.A.

FORM 991-00001

LIMITED WARRANTY STATEMENT CARD
Figure 3



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(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.

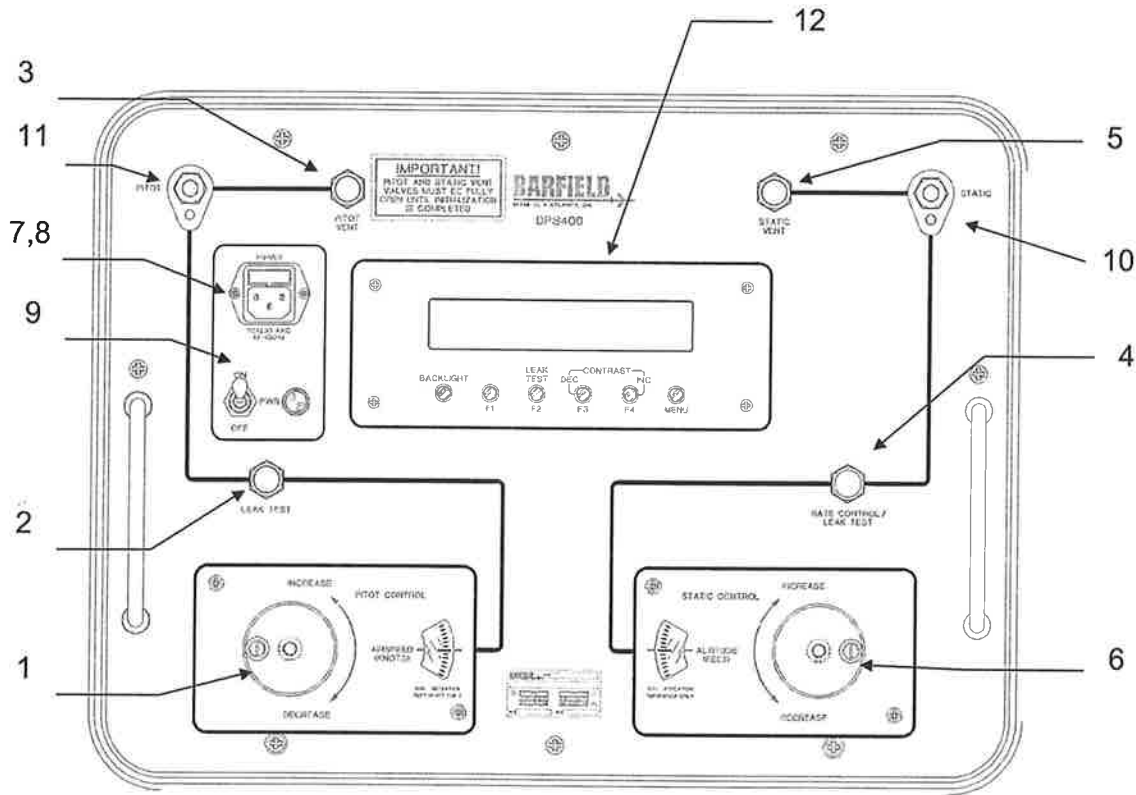
2. GENERAL DESCRIPTION

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.

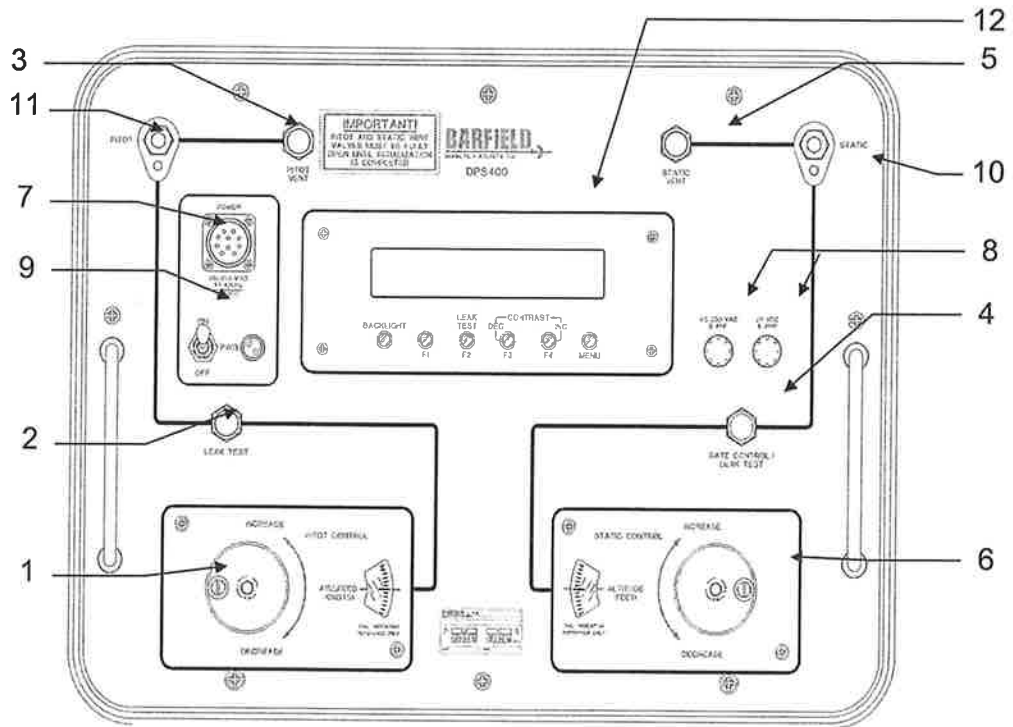
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Separate internal pumps are provided to supply vacuum and pressure capable of achieving 55,000 ft and 6000 ft/min on a wide body aircraft. The test set readout and control circuits are powered from 115/230 VAC 50-400 Hz. (Units before Mod G can be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



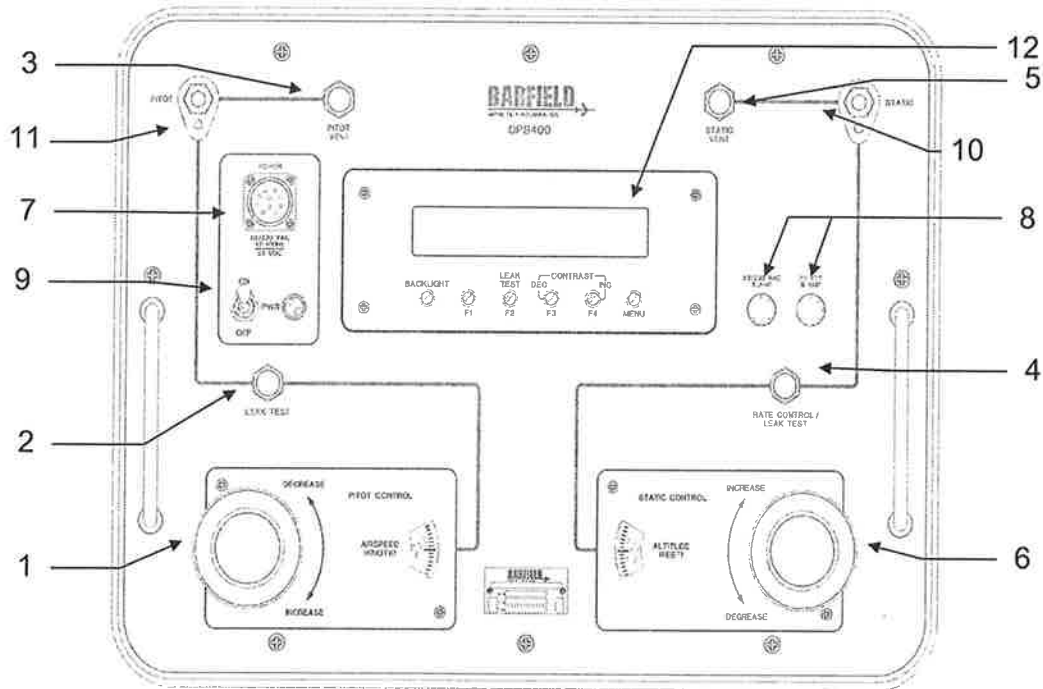
**DPS400 (w/Mod G)
 PITOT STATIC TESTER
 Figure 4**

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

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

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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. |

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- | | | |
|--|---------------|--|
| (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.



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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)

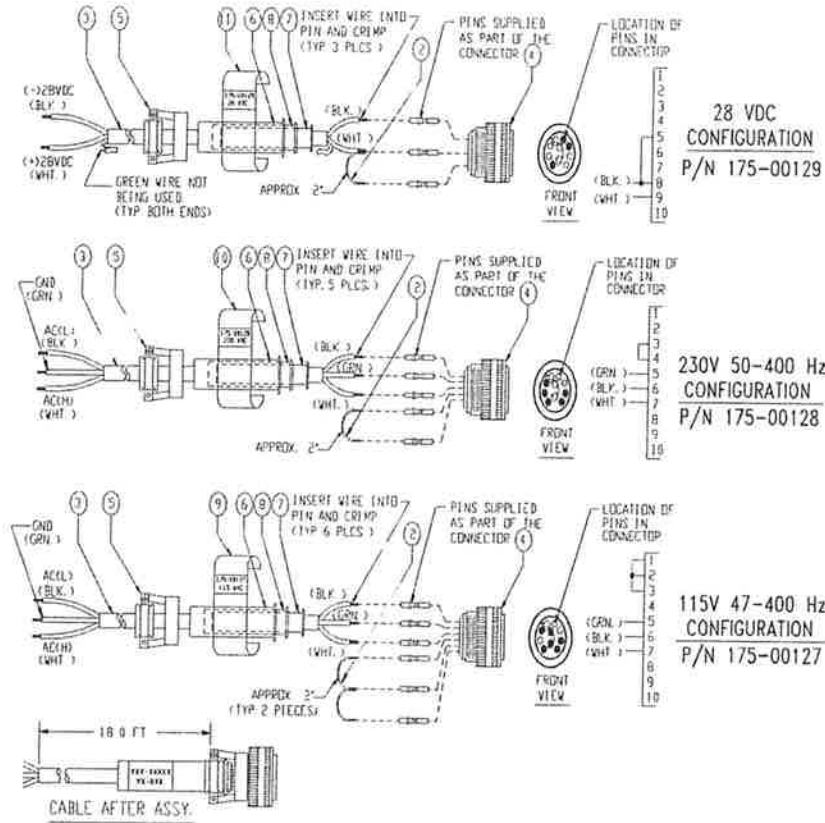
The universal power cable kit P/N: 373-00005 is provided with each test set. The following drawing (Figure 7) details the assembly of the power cable in three possible configurations. The configuration of the plug (ITEM #4 in the drawing) determines the test set operating power required. The first configuration 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

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KIT, UNIVERSAL POWER CABLE P/N 373-00005
Figure 7

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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)



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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



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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:

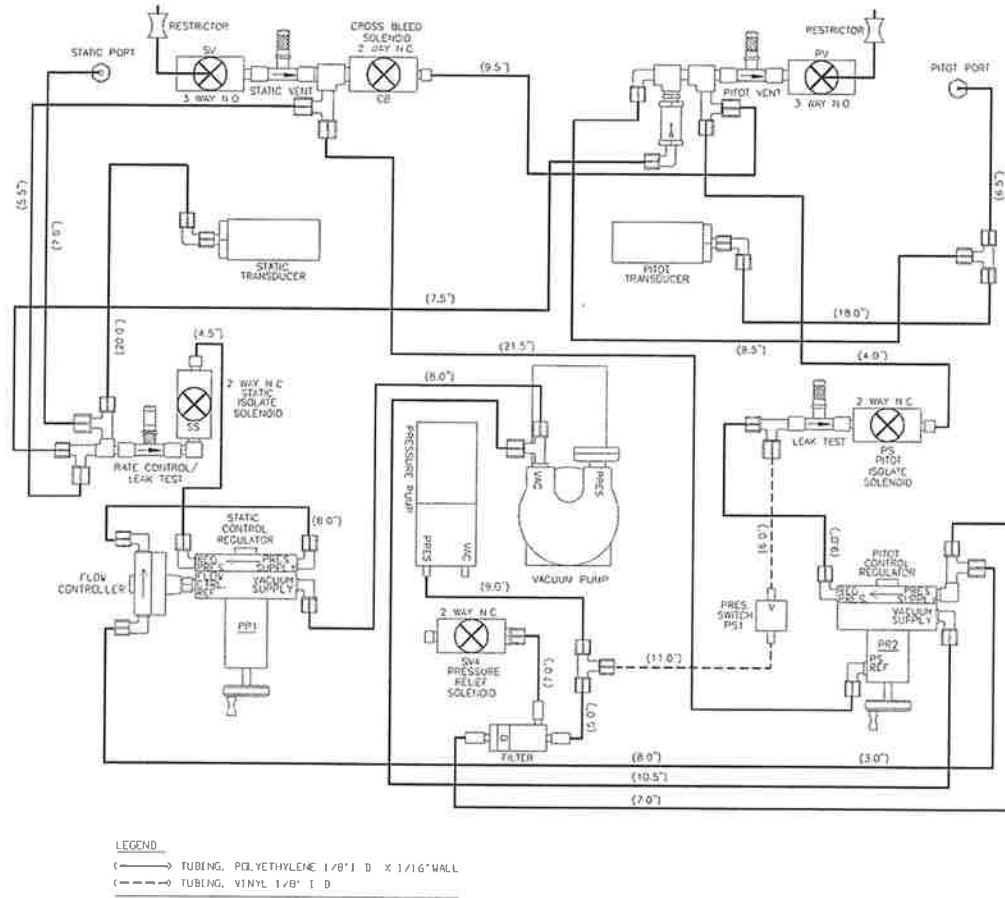
<u>Limit Exceedance</u>	<u>Deviation From Programmed Limit</u>	<u>Solenoid Valves Actuated</u>
Altitude	± 1000 ft, 350 m	SV1A, SV1B
Airspeed	± 50 kts, 100 km/hr	SV1A, SV1B, SV3A
VSI	± 500 ft/min, 150 m/min	SV1A, SV1B, SV2A, SV2B
Mach	± 0.2 mach	SV1A, SV1B, SV3A

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

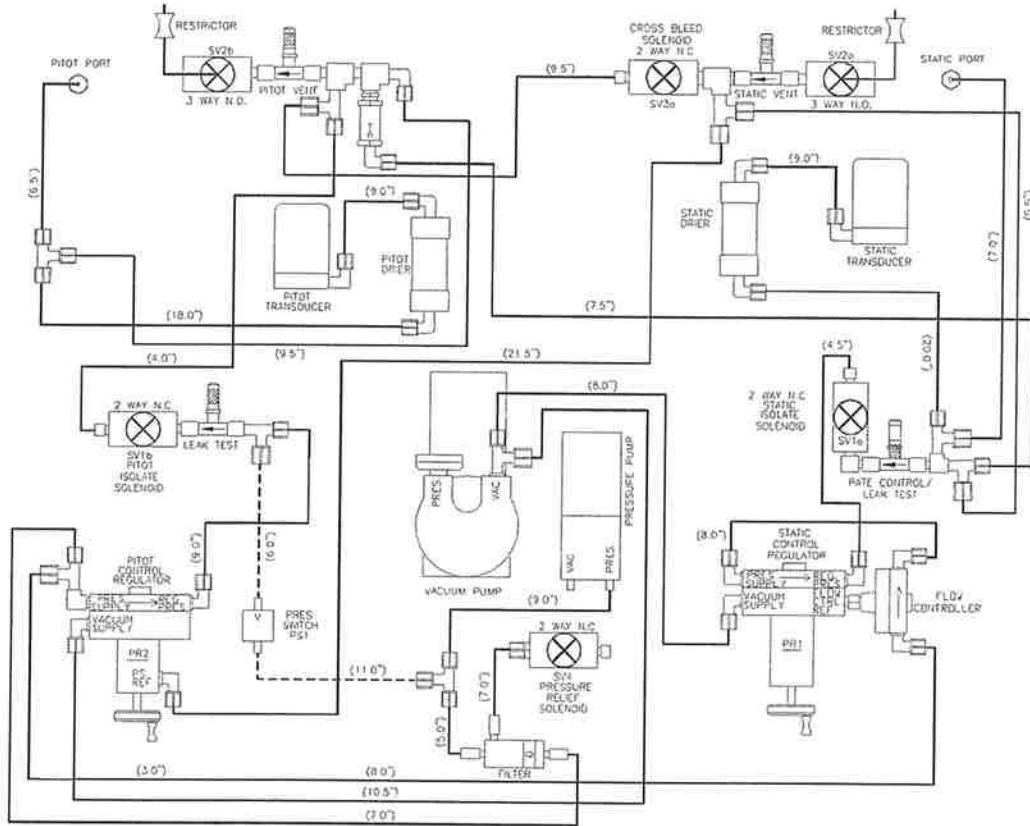
Figures 8, 9, and 10 depict the internal pneumatic connections of the three versions of DPS400 Pitot-Static Testers. Figure 8 represents the internal pneumatic connections of the most recent production DPS400 which includes Mod G. Figure 9 depicts the internal pneumatic connections of a DPS400 containing 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.

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

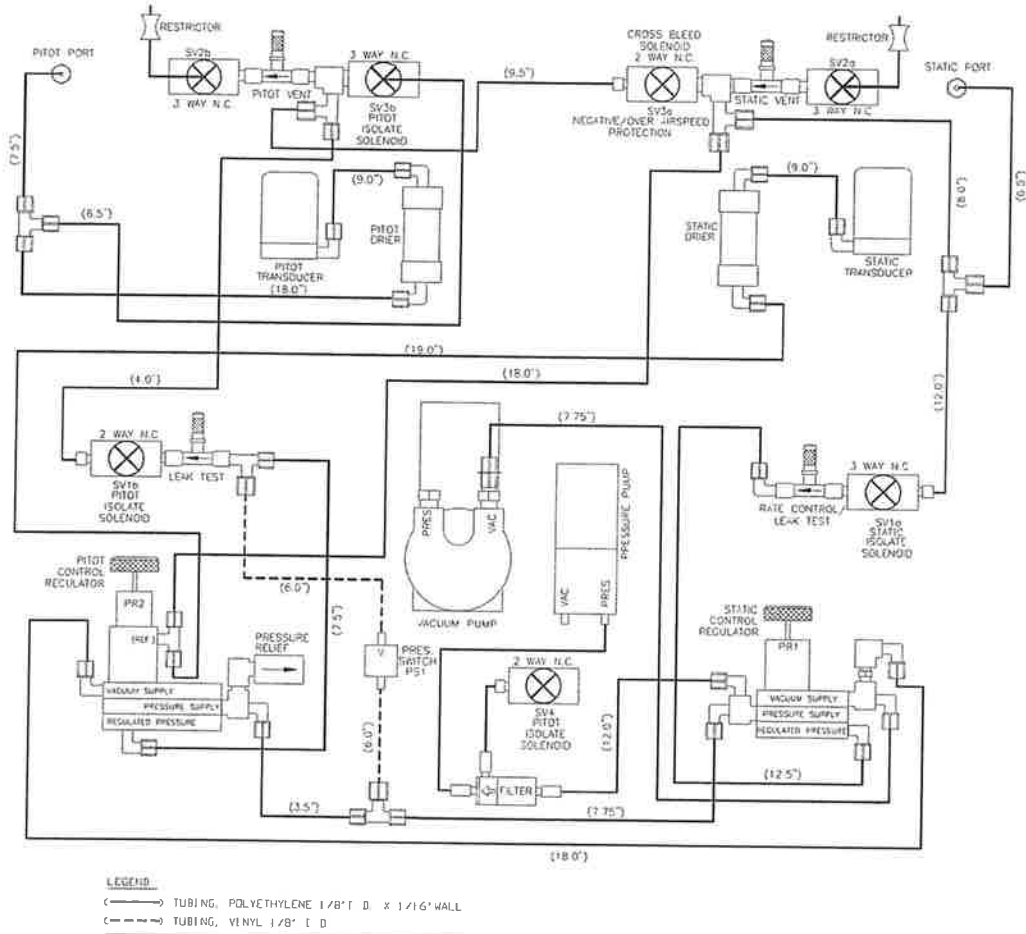
DPS400 INSTRUCTION MANUAL



LEGEND:
 (——) TUBING, POLYETHYLENE 1/8" I D X 1/16" WALL
 (---) TUBING, VINYL 1/8" I D

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

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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.