OPERATIONS / MAINTENANCE MANUAL

FOR THE

APS500-( )

PITOT-STATIC TEST SET

BARFIELD
INSTRUMENT CORPORATION

57-101-00180

December 27, 1990

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CHAPTER 1

GENERAL INFORMATION AND OPERATING INSTRUCTIONS

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CHAPTER 1

GENERAL INFORMATION AND OPERATING INSTRUCTIONS

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DESCRIPTION

1. PURPOSE OF MANUAL

This publication contains the description, identification data, operating procedures, also servicing, maintenance and recertification information for the:

PITOT-STATIC TEST SET, MODEL APS500-( ), hereinafter referred to as the Test Set. Reference Figure 1.

Manufactured by:

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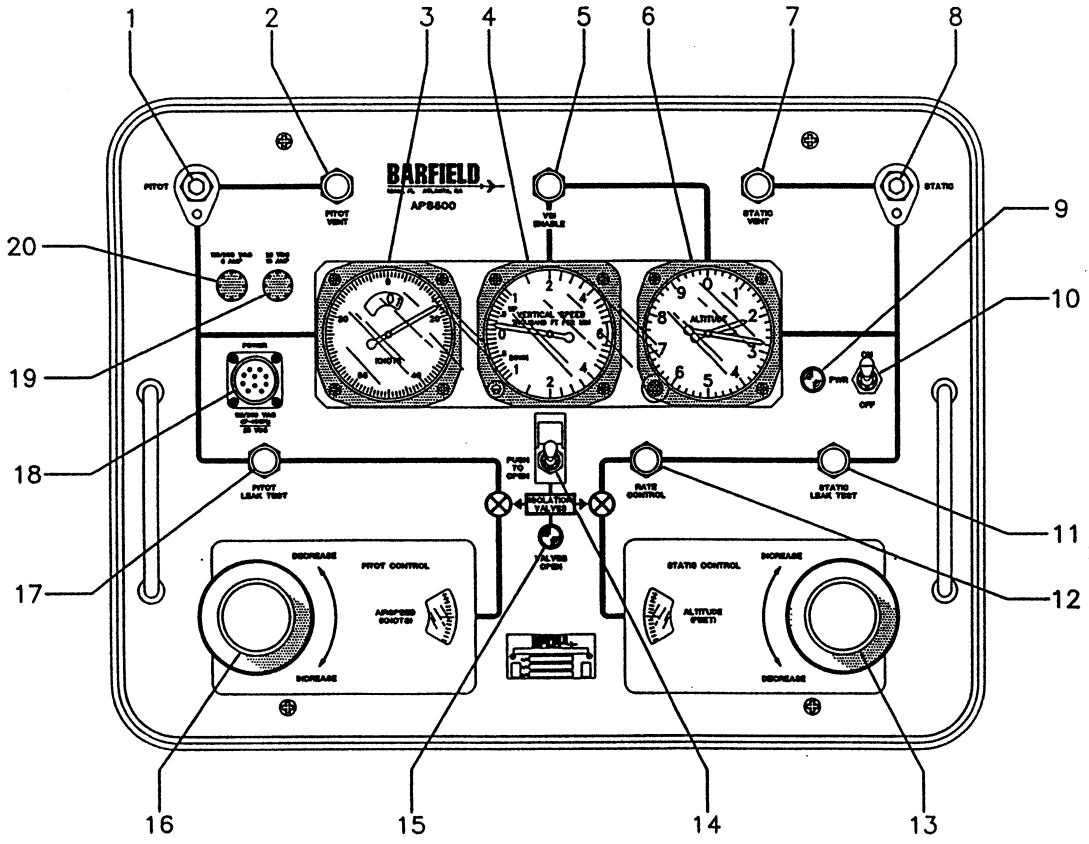

PITOT-STATIC TEST SET M/N APS500-( )
Figure 1

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2. GENERAL DESCRIPTION

The test set is intended for testing aircraft pitot-static systems for leaks, the operation and calibration of airspeed, altimeter, rate of climb, engine pressure ratio, manifold pressure indicators, and other vacuum or low pressure units.

The APS500-( ) Pitot-Static Test Set meets the requirements of compliance with 91.171, but it is important that the customer be sure that the use of the test set will be in compliance with other aspects of the regulations. Available from BARFIELD is a test procedure guide, P/N 60-101-00150, Altimeter and Static Test Procedure, for use in compliance with FAR 91.171.

This test set also fully meets the requirements for DOT Advisory Circular 43-203B for performing Altimeter and Static System Tests and Inspections.

Therefore, BARFIELD has taken the position of advertising its APS500-( ) test sets as a general purpose troubleshooting tester. When it comes to compliance with FAR 91.171 we feel that the customer should first be aware of ALL the requirements for performing these tests in the field. Having reached this decision, we stand ready to offer advice and assistance to the customer in accomplishing the required test.

The test sets are equipped with reference master instruments with appropriate calibration cards. Precision set and maintain regulators are used for both altitude (STATIC CONTROL) and airspeed (PITOT CONTROL). These regulators allow the operator to set the desired altitude and airspeed required and once established the regulators will maintain them. The PITOT CONTROL regulator is a differential type which will maintain any established airspeed while altitude is changing. The test set is provided with colored hoses (static: blue, pitot: red) and keyed quick connects to help prevent the STATIC and PITOT hoses from inadvertently being crossed.

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3. PHYSICAL DESCRIPTION

A. Carrying Case

(1) The case is of fiberglass construction with upper and lower sections.

(2) The lower section supports the panel assembly and storage pouch on each side. The pouch provide for storage of the hoses and adapters. All of the internal components of the APS500-( ) with the exception of the power supply are contained on the panel assembly. The power supply is mounted to the bottom of the case with a wiring harness long enough to allow operation of the test set while the panel is removed from the bottom of the case. This facilitates maintenance of the test set.

(3) The upper section has sliding pin hinges for easy removal and is fitted with a storage shelf for the power cable and manual.

B. Panel

The Item No. reference the item numbering in Figure 1, section 1-1 Page 1.

Item No.	Description	Function
1	PITOT	Port for connecting aircraft pitot system to test set.
2	PITOT VENT	Used to vent the pitot system to ambient atmosphere. This valve should be fully closed during normal operation.
3	AIRSPEED INDICATOR	Identified in text as "airspeed indicator (M1)". Monitors the differential pressure (airspeed) between the pitot & static port.
4	VERTICAL SPEED IND.	Identified in text as "VSI indicator (M2)". Monitors the rate of change of altitude at the static port.

Item No.	Description	Function
5	VSI ENABLE	Provides isolation of the VSI indicator (M2) and/or controlled connection of the (M2) indicator.
6	ALTITUDE INDICATOR	Identified in text as "altitude indicator (M3)". Monitors the pressure altitude at the static port.
7	STATIC VENT	Used to vent the static system to ambient atmosphere. This valve should be fully closed during normal operation.
8	STATIC PORT	Port for connecting aircraft static system to test set.
9	PWR lamp	Used to indicate if power is applied to internal pump.
10	PWR ON/OFF	Used to turn internal pressure/vacuum pump on or off.
11	STATIC LEAK TEST	Provides for sealing the STATIC CONTROL regulated pressure from the test sets instruments and the aircraft under test to determine the static leak rate.
12	RATE CONTROL	Used to control the rate of climb/descend.
13	STATIC CONTROL	Used to establish and maintain a given altitude.
14	PUSH TO OPEN	This switch is used to open the isolation valves, thus activating both the PITOT CONTROL & STATIC CONTROL. CAUTION: VERIFY SETTINGS OF THE PITOT CONTROL AND STATIC CONTROL AND ASSOCIATED METERING VALVES BEFORE PRESSING THE PUSH TO OPEN SWITCH.
15	VALVES OPEN	When LIT, indicates the isolation solenoid valves are open, thus PITOT CONTROL (airspeed) and STATIC CONTROL (altitude) from regulators (PR1 & PR2) is operative.

Item No.	Description	Function
16	PITOT CONTROL	Used to establish and maintain a given airspeed.
17	PITOT LEAK TEST	Provides for sealing the PITOT CONTROL regulated pressure from the test sets instruments and the aircraft under test to determine the pitot leak rate.
18	POWER	Used to provide power to the test set. The test set will operate from 115VAC/230VAC 47-400 HZ or 28VDC. The configuration (pin jumpering) of the mating power cable (see Figure 2, Page 8) connector determines the power required.
19	FUSE	115/230 VAC 5 amp fuse.
20	FUSE	28VDC 10 amp fuse.

C. Hose Assembly

(1) The Hose kit P/N: 115-00339 is included with each test set and includes the following items:

(a) PITOT hose assembly (P/N: 115-00337) which is a **"red"** hose 25 feet in length with self sealing keyed quick disconnect for connecting to the test set pitot port. The aircraft hose end has an AN4 type fitting for connecting to the pitot system / port adapters.

(b) STATIC hose assembly (P/N: 115-00338) which is a **"blue"** hose 25 feet in length with self sealing keyed quick disconnect for connecting to the test set static port. The aircraft hose end has an AN4 type fitting for connecting to the static system / port adapters.

(c) PITOT TUBE ADAPTER (P/N: 115-00057) for connecting pitot hose to aircraft's pitot port.

(d) STATIC PORT ADAPTER (P/N: 2423F) for connecting static hose to the aircraft's static port.

D. Kit, Universal Power Cable

The universal power cable kit P/N: 373-00005 is provide with each test set. The following drawing 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, second is 230 VAC and third is 115 VAC operation. These power cables can be purchased preassembled under the following P/N's:

175-00127	115 VAC Power Cable
175-00128	230 VAC Power Cable
175-00129	28 VDC Power Cable

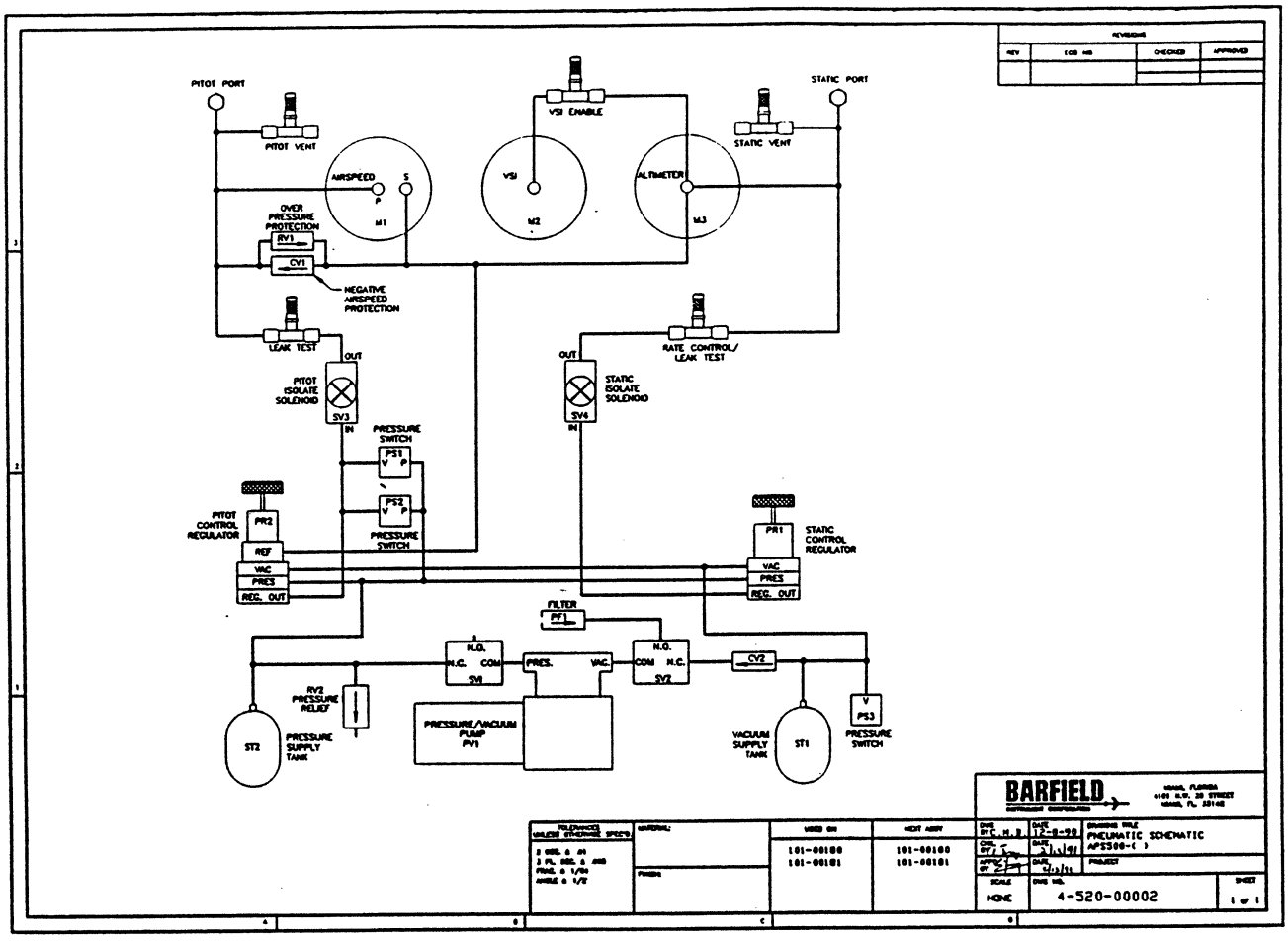
KIT, UNIVERSAL POWER CABLE P/N: 373-00005
Figure 2

OPERATION

1. GENERAL

A. Pneumatic Diagram

Figure 1 presents the pneumatic diagram of the test set.



APS500-( ) PNEUMATIC DIAGRAM
Figure 1

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The STATIC CONTROL is used to set and maintain (once established) the destination altitude. With the RATE CONTROL closed, the larger diameter knob (course) is used to set the dial to indicate the destination altitude desired. The RATE CONTROL valve is then slowly opened and used to control the rate of climb/descend (VSI). When nearing the destination altitude the RATE CONTROL will typically be fully opened (unless the STATIC CONTROL was set past the destination) and the smaller diameter control knob used while observing the altitude indicator (M3) to obtain the precise altitude desired.

NOTE: There will be no interaction with the airspeed (airspeed will be maintained) as a result of the altitude changing.

The PITOT CONTROL is used to set and maintain airspeed. The pitot control dial is used to indicate the approximate airspeed setting while the airspeed indicator (M1) along with its correction card is used to determine the actual airspeed.

NOTE: The pitot control (since the PITOT LEAK TEST valve is typically fully open during normal operation) when changed results in an immediate pitot pressure change which is indicated by the airspeed indicator (M1).

(2) Detailed

The test set uses two precision pneumatic regulators. The PITOT CONTROL (PR2) is a differential regulator used to set and maintain a given airspeed. Being a differential type regulator, with the REFerence port connected to the static system (near the S port of the airspeed), as the static pressure is changed (increase/decrease in altitude) the regulator (PR2) will maintain constant airspeed (differential pressure). The STATIC CONTROL (PR1) is an absolute regulator used to set a destination altitude and once achieved will maintain it. Both the PITOT CONTROL and STATIC CONTROL incorporate a 3-speed knob arrangement. The large diameter knob is the course setting knobs which allows quick setting of the approximate altitude or airspeed desired while the smaller knob offers a very sensitive 36/1 ratio for 270° rotation and a continuous 6/1 ratio of the course knob. These regulators require a pressure and vacuum source in order to operate.

The internal pump (PV1) is a single head oilless pump used to generate both pressure and vacuum as required by the regulators (PR1,PR2). The pump has a 3-way solenoid valve on the VACuum port (SV2) and on the PRESSure port (SV1) which are used to control whether the pump is generating vacuum or pressure.

B. Theory of Operation

(1) General

The **PITOT LEAK TEST** and **STATIC LEAK TEST** valves are to be fully open during normal test set operation. They are provided to isolate the instruments in the test set and system under test from the PITOT CONTROL and STATIC CONTROL regulators. This is required to determine the internal leak rate of the test set (see section 1-2, Test Set Pretests) and of the system under test.

The **PITOT VENT** and **STATIC VENT** valves are to be fully closed during normal test set operation. They are provided to vent the test sets instruments during shipment and to bleed off the static and pitot system in the advent of a power failure. Refer to section 1-2, Power Loss (Venting the Test Set to Return to Ambient).

The **VSI ENABLE** valve is provided so the operator can either close the valve fully if VSI monitoring is not required or safely connect the VSI indicator **(M2)** to the static system.

CAUTION: OPEN THE VSI ENABLE VALVE SLOWLY WHILE OBSERVING THE **(M2)** INDICATOR DOES NOT EXCEED 5,500 FPM OR THE INSTRUMENT COULD BE DAMAGED. THIS VALVE MUST BE FULLY OPENED ONCE PRESSURE ARE EQUALIZED (WHEN VSI INDICATES "0") FOR INDICATOR TO WORK PROPERLY.

The **RATE CONTROL** is used to control the rate of change in which the static pressure (VSI) occurs. This valve is normally closed when setting the STATIC CONTROL to a given destination altitude. It is then slowly opened to control the rate (VSI) at which the test sets altimeter (VSI indicator **(M2)** if VSI ENABLE is opened) and the pressure at the STATIC PORT change.

The **PUSH TO OPEN** switch is used to open the isolation solenoid valves. Before this switch is activated (PUSHed) the test set power must be on, the PITOT CONTROL and STATIC CONTROL must be set appropriately, the **RATE CONTROL, PITOT VENT** and **STATIC VENT** valves closed, the **STATIC LEAK TEST** and **PITOT LEAK TEST** valves open.

NOTE: This switch will not be active until the internal pump has established adequate pressure and vacuum (5 to 10 seconds after PWR ON) for the regulators to operate.

The negative airspeed protection is described in detail in section 1-2 (C).

When generating pressure (SV1) is active supplying pressure to the (ST2) tank while (SV2) is inactive allowing the pumps VACuum port to be vented to the atmosphere through the N.O. solenoid port.

When generating vacuum (SV2) is active supplying vacuum to the (ST1) tank while (SV1) is inactive allowing the pump (PV1) to exhaust through the N.O. port of (SV1). The pressure switches (PS1,PS2) are used to determine if pressure or vacuum is required by the regulators (PR1) and (PR2).

The two isolation valves (SV3,SV4) are provide for two reasons. First, if the test set losses power during operation the isolation valves close sealing the static and pitot system from bleeding off through the regulators, thus protecting the test set instruments and instruments under test from be damaged. Secondly, as a power on safety feature, the test set can be powered on without being concerned about the setting of the PITOT CONTROL or the STATIC CONTROL regulators because the isolation valves (SV3,SV4) are N.C. (normally closed) solenoid valves. The guarded switch (S2) PUSH TO OPEN must be pushed (once the test set is initially setup, see section 1-2, Initial Setup) to open the isolation valves allowing the PITOT CONTROL and STATIC CONTROL Regulator OUT pressures to be applied to the instruments and ports.

C. Airspeed Protection

An ultra-sensitive check valve and inline pressure relief valve is connected across the S and P port of the airspeed indicator (M1). This provides negative and over pressure protection for the airspeed indicator (M1) and instruments connected to the test set PITOT and STATIC ports. Under normal test set operation, (STATIC LEAK TEST, PITOT LEAK TEST valves fully open, STATIC VENT and PITOT VENT fully closed) using the STATIC CONTROL and PITOT CONTROL as the controlling pressure source it is unlikely to create negative airspeed or an over airspeed condition.

This protection is not to be considered fail-safe as it places definite responsibilities on the personnel using the test set. Additionally pressure conditions which would normally have adversely affected only the airspeed, may now place the altimeter and VSI at risk as well. The user is cautioned to use the test set with great care and attention.

During operation if either a negative differential pressure (driving the airspeed below 0 knots) or an over pressure (driving the airspeed beyond approximately 650 knots on the APS500-(1) or 230 knots on the APS500-(2)) are introduced into the test set, the protection (CV1,RV1) will activate in an ATTEMPT to preserve the airspeed.

When a negative differential pressure is introduced to the airspeed the check valve **(CV1)** connected across the airspeeds (S and P port) will crack open to relieve the negative differential and will remain open until pressures allow resealing to be accomplished.

When an over pressure is introduced to the airspeed, the in-line relief valve **(RV1)** connected across the airspeeds (S and P port) will open to alleviate the condition and will remain open until such time as pressures allow for resealing. To ensure a good reseal of **(RV1)** the airspeed should be drop well below (APS500-(1): minimum of 550 knots, APS500-(2): minimum of 175 knots) the cracking pressure of the relief valve.

As mentioned prior, the protection provided by **(CV1)** and **(RV1)** will not only effect the airspeed indications but the VSI and the altimeter as well. This is readily apparent in either case (negative airspeed or over airspeed condition) because effectively when one of the check valves crack, it is crossbleeding the pitot and static system.

If **(CV1)** activates (cracks) because of negative airspeed (negative differential pressure) the VSI will indicate a (+) positive, ascent or lessening of descent while the altimeter will show an increase in elevation or a reduction in rate of loss. Note, if the RATE CONTROL is fully open (typically the case if the destination altitude has been achieved) the effects of **(CV1)** cracking due to negative airspeed will be very minimal on the airspeed indicator **(M3)** and the VSI indicator **(M2)** as the STATIC CONTROL is regulating trying to maintain the established altitude.

If the protection circuit activates because of an over pressure the VSI will indicate a descent or lessening of ascent while the altimeter will show a loss of elevation or a reduction in rate of increase.

The user should be observant to any indications of having entered into an error condition and should immediately take steps to relieve the condition. Failure to do so could result in damage to the airspeed and or the VSI and altimeter.

D. Preliminary

The user should first become familiar with the test set as described in the previous sections of this manual. Also a sound knowledge of the aircraft system to be tested and or calibrated is essential before attempting any tests. The procedures described herein are guidelines, and do not replace any specifications to the contrary by either the airframe or instrument manufacturer.

Particular attention should be addressed to the following preliminary procedures to avoid erroneous test results damage any of the aircraft or test set instruments.

NOTE: For all procedures: A valve is closed by a clockwise rotation and opened by a counter clockwise rotation.

CAUTION: DO NOT USE UNNECESSARY FORCE TO CLOSE ANY VALVE. POSITIVE STOP SPACERS HAVE BEEN INSTALLED PERMITTING FIRM CLOSING WITHOUT DAMAGING THE VALVE. EXCESSIVE FORCE CAN OVERCOME THE KNOB SET SCREW RESULTING IN VALVE DAMAGE.

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2. TEST SET PRETESTS

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 prior to each use.

A. Initial Setup

(1) Verify PWR (ON/OFF) is OFF and connect power to test set.

(2) Close all 6 metering valves (PITOT VENT, STATIC VENT, VSI ENABLE, PITOT LEAK TEST, STATIC LEAK TEST, RATE CONTROL) on the test set.

(3) Set the PITOT CONTROL to approximately 100 knots by turning the large diameter knob for a dial reading of 100.

(4) Set the STATIC CONTROL to field elevation by turning the large diameter knob until the dial indicates approximately the field elevation altitude.

(5) Open the PITOT VENT and STATIC VENT valves.

(6) Verify the airspeed on the test set indicates between 15 and 40 knots for the APS500-(1). For the APS500-(2) (250 knot indicator) the indicator should read "0" ± (1/16").

(7) Open the STATIC LEAK TEST and PITOT LEAK TEST valves fully.

(8) Switch (PWR) ON/OFF to ON.

(9) Open the VSI ENABLE valve slowly until fully opened.

CAUTION: WHEN OPENING THE VSI ENABLE VALVE, OPEN SLOWLY WHILE OBSERVING VSI INDICATOR (M2). IF A PRESSURE DIFFERENCE EXISTS, CONTINUE TO OPEN SLOWLY (UNTIL FULLY OPENED) ALLOW PRESSURES TO EQUALIZE WHILE INSURING THE (M2) INDICATOR DOES NOT EXCEEDED 5,500 FPM.

(10) Verify the VSI indicator (M2) reads "0".

(11) Set the altitude indicator (M3) baro setting to the current barometric pressure. The altitude indicator (M3) should indicate the field elevation within ± 20 feet.

(12) Press the PUSH TO OPEN switch to open the isolation solenoid valves. The VALVES OPEN lamp should be lit.

(13) Close the **PITOT VENT** and **STATIC VENT** valves.

The test set is now ready for the Pitot Leak Check.

B. Pitot Leak Check

Verify section 2. TEST SET PRETESTS A. Initial Setup has been completed before proceeding.

NOTE: The Pitot and Static TEST SET LEAK CHECK procedure that follows is preformed with pitot and static hose disconnected from test set. Ports on test set are self sealing.

(1) Using the **PITOT CONTROL**, turn the course knob (large diameter) for a dial reading of approximately 400 knots.

(2) Use the small knob for fine adjustment until 400 knots ±5 is indicated by airspeed indicator **(M1)**.

(3) Close the **PITOT LEAK CHECK** valve.

(4) Observe the test sets airspeed indicator **(M1)** for a minimum of one minute. Verify that indicated airspeed does not change, more than 2 knots/minute. Record the leak rate.

(5) Open fully the **PITOT LEAK CHECK** valve.

(6) Using the **PITOT CONTROL**, adjust for an airspeed indicator **(M1)** reading of approximately 100 knots.

C. Static Leak Check

(1) Using the **STATIC CONTROL**, turn the course knob (large diameter) for a dial reading of approximately 18,000 ft.

(2) Slowly open the **RATE CONTROL** valve to establish a VSI indication of 5,500 fpm or less. Continue to open valve as required to maintain the high VSI while not exceeding 5,500 fpm.

(3) Once the altimeter has reached approximately 18,000 ft. close the **STATIC LEAK TEST** valve.

(4) Observe the altitude indicator **(M3)** for a minimum of one minute. Verify that indicated altitude does not change, more than 50 fpm. Record the leak rate.

(5) Close the **RATE CONTROL** valve.

(6) Open the **STATIC LEAK TEST** valve fully.

(7) Using the **STATIC CONTROL**, turn the course knob (large diameter) for a dial reading indicating the approximate field elevation.

(8) Open slowly the **RATE CONTROL** valve while observing the VSI indicator **(M2)** does not exceeding 5,500 fpm.

(9) Once the altitude indicator **(M3)** is indicating the field elevation, close the **RATE CONTROL** valve.

(10) While observing the VSI indicator **(M2)**, slowly open the **STATIC VENT** valve to vent the static system to ambient.

(11) Open the **PITOT VENT** valve to vent the pitot system to ambient.

D. Applying Leak Correction

If leak rate does not exceed 2 knots or 100 ft in 1 minute, the recorded leak rate should be subtracted from that observed in any aircraft leak tests to determine the actual aircraft system leak rate.

E. Instrument Calibration Correction

Make certain that instrument correction card calibration dates are within approved recertification periods before attempting calibration checks of aircraft instruments.

NOTE: Calibration cards are based on tests performed with instruments mounted vertically (face up) and at a temperature of 75°F (25°C). Change of attitude of more than 30° from level and or a temperature difference of more than 15°F (9°C) may effect the precise calibration accuracy.

This completes the Test Set Pretests section

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3. AIRCRAFT LEAK TEST

A. Initial Setup

Verify section 2. TEST SET PRETESTS has been completed before proceeding.

(1) Verify PWR (ON/OFF) is OFF and connect power to test set.

(2) Close all 6 metering valves (PITOT VENT, STATIC VENT, VSI ENABLE, PITOT LEAK TEST, STATIC LEAK TEST, RATE CONTROL) on the test set.

(3) Set the PITOT CONTROL to approximately 100 knots by turning the large diameter knob for a dial reading of 100.

(4) Set the STATIC CONTROL to field elevation by turning the large diameter knob until the dial indicates approximately the field elevation altitude.

(5) Open the STATIC VENT and PITOT VENT valves fully.

(6) Connect the Static (blue hose) & Pitot (red hose) hoses 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 & Static hoses.

(7) Connect static port adapter to aircraft per maintenance manual instructions.

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 proceeding.

(8) Switch (PWR) ON/OFF to ON.

(9) Open the VSI ENABLE valve slowly until fully opened.

CAUTION: WHEN OPENING THE VSI ENABLE VALVE, OPEN SLOWLY WHILE OBSERVING VSI INDICATOR (M2). IF A PRESSURE DIFFERENCE EXISTS, CONTINUE TO OPEN SLOWLY (UNTIL FULLY OPENED) ALLOW PRESSURES TO EQUALIZE WHILE INSURING THE (M2) INDICATOR DOES NOT EXCEEDED 5,500 FPM.

B. Indicator Ambient Test

Verify section 3. Aircraft Leak Test A. Initial Setup has been completed before proceeding.

NOTE: See FAA regulations or aircraft's documents for tolerances.

(1) Set the altitude indicator (M3) baro setting to the current barometric pressure and the test set's altimeter (M1) and on the aircraft's altimeter. The aircraft's altimeter should indicate the field elevation within the specified tolerance.

(2) Verify the VSI indicator (M2) on the test set and in the aircraft indicate "0".

(3) Verify the aircraft's airspeed reads "0".

(4) Close the PITOT VENT and STATIC VENT valves.

This completes the - Indicator Ambient Test - section

C. Leak Test

Verify section 3. AIRCRAFT LEAK TEST B. Indicator Ambient Test has been completed before proceeding.

(1) Press the PUSH TO OPEN switch to open the isolation solenoid valves.

NOTE: The VALVES OPEN lamp should be lit indicating the isolation solenoid are active (open).

(2) Open the PITOT LEAK TEST and STATIC LEAK TEST valves.

(3) Set the PITOT CONTROL for an airspeed indication of approximately 400 knots.

(4) Set the STATIC CONTROL for a dial reading of 20,000 ft.

(5) While observing the VSI indicator (M2), slowly open the RATE CONTROL valve until the (M2) indicator reads less than the maximum climb rate for the aircraft or 5,500 fpm, which ever is lowest.

(6) With the altitude at 20,000 feet, the VSI indicating "0" fpm and an airspeed of 400 knots, close the **PITOT LEAK TEST**, **STATIC LEAK TEST** and **RATE CONTROL** valves.

(7) Record the leak rate.

NOTE: An altitude change indicates a leak in the Static System only. An airspeed change may be caused by a leak in either the Static or Pitot Systems. If the Static Systems are "solid", an airspeed change must indicate a leak in the Pitot System.

D. Return to Ambient

(1) Set the **PITOT CONTROL** for a dial reading of 100 knots.

(2) Slowly open the **PITOT LEAK TEST** valve. The airspeed indicator **(M1)** and aircraft's airspeed should decrease to approximately 100 knots.

(3) Open the **STATIC LEAK TEST** valve.

NOTE: Insure that both the **STATIC LEAK TEST** and **PITOT LEAK TEST** valves are fully open so that the test set's large flow capacity is available.

(4) Set the **STATIC CONTROL** for a dial reading of the field elevation altitude.

(5) While observing the VSI indicator **(M2)**, slowly open the **RATE CONTROL** valve until the **(M2)** indicator reads less than the maximum descend rate for the aircraft or 5,500 fpm, which ever is lowest.

NOTE: The altitude indicator **(M3)** and aircraft's altimeter should decrease to field elevation.

(6) Close the **RATE CONTROL** valve.

(7) Slowly open the **PITOT VENT** and **STATIC VENT** valves.

(8) If no further testing is to be done, disconnect hoses from aircraft's pitot-static system.

NOTE: Aircraft systems should be within leak rate tolerances before proceeding with any functional tests.

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4. AIRCRAFT FUNCTIONAL TEST

A. Initial Setup

Verify section 3. AIRCRAFT LEAK TEST has been completed before proceeding.

NOTE: Aircraft systems should be within leak rate tolerances before proceeding with any functional tests.

(1) Verify PWR (ON/OFF) is OFF and connect power to test set.

(2) Close all 6 metering valves (PITOT VENT, STATIC VENT, VSI ENABLE, PITOT LEAK TEST, STATIC LEAK TEST, RATE CONTROL) on the test set.

(3) Set the PITOT CONTROL to approximately 100 knots by turning the large diameter knob for a dial reading of 100.

(4) Set the STATIC CONTROL to field elevation by turning the large diameter knob until the dial indicates approximately the field elevation altitude.

(5) Open the STATIC VENT and PITOT VENT valves fully.

(6) Connect the Static (blue hose) & Pitot (red hose) hoses 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 & Static hoses.

(7) Connect static port adapter to aircraft per maintenance manual instructions.

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 proceeding.

(8) Switch (PWR) ON/OFF to ON.

(9) Open the VSI ENABLE valve slowly until fully opened.

CAUTION: WHEN OPENING THE VSI ENABLE VALVE, OPEN SLOWLY WHILE OBSERVING VSI INDICATOR (M2). IF A PRESSURE DIFFERENCE EXISTS, CONTINUE TO OPEN SLOWLY (UNTIL FULLY OPENED) ALLOW PRESSURES TO EQUALIZE WHILE INSURING THE (M2) INDICATOR DOES NOT EXCEEDED 5,500 FPM.

(10) Press the **PUSH TO OPEN** switch. The **VALVES OPEN** lamp should now be lit indicating the isolation valves are open.

This completes the 4. AIRCRAFT FUNCTIONAL TEST A. Initial Setup procedure. Continue with the applicable AIRCRAFT FUNCTIONAL TEST section's of interest.

B. Pitot (Airspeed) Only Test

Verify section 4. AIRCRAFT FUNCTIONAL TEST A. Initial Setup has been completed before proceeding.

(1) Close the **PITOT VENT** valve.

NOTE: The **STATIC VENT** valve remains open.

(2) Open the **PITOT LEAK TEST** valve fully.

(3) Set the **PITOT CONTROL** to the desired test points using the Calibration Correction Card for the airspeed indicator **(M1)**.

(4) Record the error of the aircraft's airspeed at each of the test points.

NOTE: The aircraft's airspeed should agree within its tolerances.

(5) Set the **PITOT CONTROL** to approximately 100 knots by turning the large diameter knob for an airspeed indicator **(M1)** reading of approximately 100 knots.

(6) Close the **PITOT LEAK TEST** valve.

(7) Slowly open the **PITOT VENT** valve.

NOTE: The airspeed indicator **(M1)** and the aircraft's airspeed should read ambient.

(8) Disconnect the hoses.

This completes the 4. AIRCRAFT FUNCTIONAL TEST B. Pitot (Airspeed) Only Test.

C. Combined Pitot (Airspeed) / Static (Altitude) Test

Verify section 4. AIRCRAFT FUNCTIONAL TEST A. Initial Setup has been completed before proceeding.

(1) Close the **PITOT VENT** and the **STATIC VENT** valves.

(2) Verify the **PITOT CONTROL** is set to approximately 100 knots and the **STATIC CONTROL** is set to the approximate field elevation.

(3) Verify the **VALVES OPEN** lamp is lit. If not, press the **PUSH TO OPEN** switch.

(4) Open both the **PITOT LEAK TEST** and **STATIC LEAK TEST** valves fully.

(5) Set the **PITOT CONTROL** to the desired test points using the Calibration Correction Card for the airspeed indicator **(M1)**.

NOTE: Use the small knob for fine adjustments on the **PITOT CONTROL** to obtain the exact airspeed indication **(M1)** as dictated by the calibration correction card.

(6) Record the error of the aircraft's airspeed.

(7) Set the **STATIC CONTROL** dial reading to the desired test points.

NOTE: The dial indicator for the STATIC CONTROL is calibrated at the same test points as the Correction Card for the **(M3)** indicator. However, the **(M3)** indicator is the master and the dial is merely an approximate value and therefore should be set to a value slightly before the destination test point to ensure overshoot does not occur.

(8) While observing the VSI indicator **(M2)**, slowly open the **RATE CONTROL** valve until the **(M2)** indicator reads less than the maximum climb rate for the aircraft or 5,500 fpm, which ever is lowest.

(9) When the altitude indicator **(M3)** has reached the altitude set on the **STATIC CONTROL** the **RATE CONTROL** valve should be fully open with a **VSI** indictor reading of **"0"**.

(10) Slowly adjust the STATIC CONTROL (using the small knob for fine adjustments) until the altitude indicator **(M3)** displays the exact value desired using the Calibration Correction Card for the altitude indicator **(M3)**.

NOTE: Observe the VSI indicator (M2) while slowly adjusting the STATIC CONTROL, ensure the reading is less than the maximum climb rate for the aircraft or 5,500 fpm, which ever is lowest.

(11) Record the error of the aircraft's altimeter.

(12) To change the altitude to a different test point, close the RATE CONTROL valve and repeat steps C. (7) through C. (11) above. To change the airspeed repeat steps C. (5) through C. (7) above.

(13) Set the PITOT CONTROL to approximately 100 knots by turning the large diameter knob for an airspeed indicator (M1) reading of approximately 100 knots.

(14) Set the STATIC CONTROL for a dial reading of the field elevation altitude.

(15) While observing the VSI indicator (M2), slowly open the RATE CONTROL valve until the (M2) indicator reads less than the maximum descend rate for the aircraft or 5,500 fpm, which ever is lowest.

This completes 4. AIRCRAFT FUNCTIONAL TEST C. Combined Pitot (Airspeed) / Static (Altitude) Test.

D. Below Field Elevation (Negative Altitude) Test

Verify section 4. AIRCRAFT FUNCTIONAL TEST A. Initial Setup has been completed before proceeding.

(1) Open both PITOT LEAK TEST and STATIC LEAK TEST valves.

(2) Close both the PITOT VENT and STATIC VENT valves.

(3) Verify the airspeed indicator (M1) is indicating approximately 100 knots.

(4) Verify the baro setting on the altitude indicator (M3) and the aircraft's indicator are both set to the current barometric pressure.

(5) Set the STATIC CONTROL for a dial reading of -1,000 ft.

(6) While observing the VSI indicator (M2), slowly open the RATE CONTROL valve until the (M2) indicator reads less than the maximum descend rate for the aircraft or 5,500 fpm, which ever is lowest.

(7) As the destination altitude (-1,000 ft) is approached, use the **RATE CONTROL** and **STATIC CONTROL** as needed to obtain the -1,000 ft elevation.

(8) Record error.

(9) Close the **RATE CONTROL** valve.

(10) Set the **STATIC CONTROL** for a dial reading of the field elevation.

(11) While observing the VSI indicator (M2), slowly open the **RATE CONTROL** valve until the (M2) indicator reads less than the maximum descend rate for the aircraft or 5,500 fpm, which ever is lowest.

(12) Once field elevation has been reached, thus VSI indicator (M2) reads "0" continue.

(13) Open both the **PITOT VENT** and **STATIC VENT** valves.

(14) Close the **VSI ENABLE** valve.

(15) Set **PWR ON/OFF** to OFF.

This completes 4. AIRCRAFT FUNCTIONAL TEST D. Below Field Elevation (Negative Altitude Test.

E. Vertical Speed Indicator Operation

Verify section 4. AIRCRAFT FUNCTIONAL TEST A. Initial Setup has been completed before proceeding.

CAUTION: THE VERTICAL SPEED INDICATOR IS VERY DELICATE. WHEN IN USE, ALWAYS OBSERVE THE INDICATION AND OPERATE TEST SET VALVES CAREFULLY SO AS NOT TO EXCEED THE FULL SCALE READING OF EITHER THE TEST SET OR AIRCRAFT VSI.

(1) While observing the VSI indicator (M2), slowly open the **VSI ENABLE** valve until fully open while ensuring the indicator (M2) does not exceeded the maximum rate of the aircraft's VSI indicator or 5,500 fpm, which ever is lowest.

NOTE: As the VSI case pressure equalizes with the static system, the indicated rate will begin to decrease. Continue to gently open the VSI ENABLE valve without exceeding the maximum rate of the aircraft's VSI indicator or 5,500 fpm, which ever is lowest.

(2) With the **VSI ENABLE** valve fully open, VSI readings will indicate the rate of change in the static system. Aircraft VSI accuracy may be verified by comparing the readings with the test set's VSI indicator **(M2)** with corrections applied.

NOTE: Different makes of VSI units have different damping. It will be necessary to establish a desired test rate (with correction) on the test set VSI and maintain the rate long enough for the aircraft VSI to stabilize.

NOTE: The VSI calibration card is valid only in the range between 2000 and 4000 ft.

(3) When vertical speed reference is no longer desired, close the **VSI ENABLE** valve fully.

Note: If the VSI is isolated at any pressure other than ambient, it will trap such pressure so that in subsequent tests, the test set VSI may indicate descent (when coupled to the static system) even though the altitude is increasing. As long as steps (1) through (4) of this Section are followed there will be no adverse effect on the test set VSI indicator **(M2)**.

F. Power Loss (Venting the Test Set To Return To Ambient)

If power to the test set is interrupted during any test, the isolation solenoid valves **(SV3 & SV4)** will immediately close trapping the PITOT and STATIC pressures at the point power was lost. The test set and aircraft can safely be returned to ambient or if power is again reestablished the test can be continued without returning to ambient. The following steps outline the procedure for handling power loss occurrences.

CAUTION: THE TEST SET WAS DESIGNED TO PREVENT DAMAGE TO INSTRUMENTS AS A RESULT OF POWER LOSS. HOWEVER IF THE OPERATOR DOES NOT HAVE AN UNDERSTANDING OF THE CORRECT PROCEDURE FOR VENTING THE TEST SET, BOTH THE TEST SET INSTRUMENTS AND THE AIRCRAFT'S INSTRUMENTS CAN BE DAMAGED. READ AND UNDERSTAND THE FOLLOWING BEFORE PROCEEDING WITH THE STEPS OUTLINED BELOW TO ENSURE A SAFE RECOVERY FROM POWER LOSS/INTERRUPTS.

(1) If power is reestablished before VENTing the PITOT and STATIC system continue with step (2), otherwise skip to step (6) for VENTing back to ambient.

(2) Once power is reestablished, test set PWR is ON, close the RATE CONTROL and PITOT LEAK TEST valves.

(3) Press the PUSH TO OPEN switch, thus opening the isolation solenoid valves.

(4) Slowly open the PITOT LEAK TEST valve to establish the airspeed set on the PITOT CONTROL prior to power loss.

(5) Slowly open the RATE CONTROL valve while observing the VSI indicator (M2) and control for a safe climb/descend rate to destination altitude. Continue with procedure at the point power was interrupted.

(6) Very slowly begin to open both the STATIC VENT and PITOT VENT valves while observing the VSI indicator (M2) and the airspeed indicator (M1).

NOTE: If at the time power was loss, the airspeed was low (100 to 200 knots) the PITOT VENT valve should be opened first to establish a higher airspeed, as the higher airspeed is established (200 to 400 knots assuming this is safe for the aircraft's airspeed indicator) then slowly open the STATIC VENT valve while observing the VSI indicator (M2) for a safe rate.

(7) Using the STATIC VENT valve to ensure the vent rate does not exceeded that of the VSI indicator (M2) or the aircraft's VSI indicator (which ever is lowest) and the PITOT VENT valve to ensure airspeed indicator (M1) is not driven into negative airspeed or over airspeed condition, continue to bleed the pitot and static system to ambient.

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SPECIFICATIONS

1. PHYSICAL DATA

A. Height - 11.3 in. (28.7 cm).

B. Width - 20.0 in. (50.8 cm).

C. Depth - 16.0 in. (40.6 cm).

D. Weight - APS500-( ) Approximately ?? lbs. (?? kg).

2. SPECIFICATIONS

A. Instruments

(1) Airspeed:
APS500-(1): 50-600 knot.
APS500-(2): 20-250 knot.

(2) Vertical Speed Indicator:
APS500-(1) or -(2): 0-6,000 ft/min.

(3) Altimeter:
APS500-(1): 50,000 ft. (in.Hg or mb baro).
APS500-(2): 35,000 ft. (in.Hg or mb baro).

B. Pump

The pump is powered by a 24 VDC motor and is used to generate both pressure and vacuum. The pump is capable of obtaining 50,000 ft. altitude while maintaining 600 knots airspeed with a pumping capacity able to maintain a minimum of 6,000 fpm VSI into a large static volume found on aircraft with multiple pitot-static systems.

C. Power

(1) 115 VAC 47-400 Hz.

(2) 230 VAC 47-400 Hz.

(3) 28 VDC +/- 2 VDC.

NOTE: The matting connector determines (selects) the operating voltage of the test set. See Figure 2, section 1-1 Page 8 for detailed drawing of universal power cable P/N: 373-00005.

3. CAPABILITIES

A. Leak Test Pitot-Static Systems

B. Test aircraft instrument calibration

C. Universal Power

Operates from 115/230 VAC 47-400 Hz and from 28 VDC.

D. Cockpit Operation

The test set's small size and universal power allow it to be operated by one technician in the cockpit.

E. Large Capacity Pump

The test set has the capacity to pump all the Pitot and Static Systems of a large aircraft to their full ranges simultaneously.

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 carefully inspected for damage. If damaged, immediately notify the carrier and the manufacturer.

2. SHIPPING

It is of the utmost importance that the PITOT VENT and STATIC VENT valves be fully opened for shipping. All other valves should be closed. If the test set is not configured in this fashion damage to the instruments may result. Also insure that no loose items such as fittings or tools are left inside the test set which could prove harmful in shipping.

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STORAGE

1. PROCEDURE

A. Insure **STATIC VENT** and **PITOT VENT** valves are open.

B. Insure the **VSI ENABLE, PITOT LEAK TEST** and **STATIC LEAK TEST** valves are closed.

C. Place a four ounce bag of desiccant inside the case.

D. Close and latch the lid.

E. Store in a cool dry place.

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CHAPTER 2

MAINTENANCE

TABLE OF CONTENTS

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SERVICING

1. PERIODIC INSPECTION

The following maintenance and lubrication attention should be performed during the following inspection periods.

PERIOD	REQUIRED INSPECTION
Each Use	Test Set Pretests: Section 1-2 Procedure 2. A through E.
6 Months	Check altitude indicator (M3) for Scale Error and Hysteresis at room temperature per Engineering Specification Drawing No. 23-338-A0001.
	Check Airspeed indicator (M1) for Scale Error at room temperature per Engineering Specification Drawing No. 23-336-A0025.
	Check VSI indicator (M2) for Scale Error at room temperature per Engineering Specification Drawing No. 23-337-A0025.

NOTE: If Test Set is to be used for compliance with F.A.R. 91.171 and part 43, APPENDIX E, "ALTIMETER SYSTEM TESTS AND INSPECTIONS," refer to F.A.A. advisory circular AC 43-203B (or subsequent) for approved inspection intervals and procedures.

2. INSTRUMENT RECERTIFICATION

Make certain that instrument correction cards are revised as required and that calibration dates for recertification periods are recorded.

Calibration cards are based on tests performed with instruments mounted vertically (face up) and at a temperature of 75°F (25°C). Change of attitude of more than 30° from level and or a temperature difference of more than 15°F (9°C) may effect the precise calibration accuracy.

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3. Altitude Indicator (M3) Specification, Drawing No. 23-338-A0025

Perform test as specified in drawing No. 23-338-A0025 section 5.3 Hysteresis, Table 3 test points 1 through 4.

Perform test as specified in drawing No. 23-338-A0025 section 5.4 After Effect, Table 3 test point #5.

Perform test as specified in drawing No. 23-338-A0025 section 5.5 Scale Error, Table 4.

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- - - - - - ENGINEERING SPECIFICATION - - - - - -	
Title: Altimeter, Ground Support Equipment	Barfield Instrument Corp. 4101 N.W. 29 Street Miami, FL. 33142
DRAWING NO: 23-338-A0001	Page 1 of 5

REV	DATE	COMMENT
A	12/19/89	Initial Release

DRAWN:	CHECKED:	APPROVED: 4/4/90

1. Purpose:

To specify performance requirements for Pressure Sensitive Altimeters for use in B.I.C. manufactured ground support test equipment.

2. Scope:

This PRODUCT STANDARD SPECIFICATION covers two basic types of instruments as follows:

TYPE I - Range 35,000 ft. Barometric Pressure. Scale range at least 28.1 - 30.99 inches of Mercury (946-1049 millibars). May include markers working in conjunction with the Barometric Pressure Scale to indicate pressure - altitude.

TYPE II - Range 50,000 ft. Barometric Pressure. Scale range at least 28.1 - 30.99 inches of Mercury (946-1049 millibars). May include markers working in conjunction with Barometric Pressure Scale to indicate pressure - altitude.

3. Identification:

All units regardless of origin of manufacture are to be identified by B.I.C. assigned part numbers as follows:

B.I.C. P/N	FG.	P/N	TYPE NO.	RANGE
124-00001 FNL HS BARO	UNITED KOLLSMAN AEROSONIC	5950 — 671, 1845 101750-01710 101735-01710	II	50,000 FT
124-00002 IN HS BARO	KOLLSMAN	D22061	II	55,000 FT
124-00003 Dual Baro	AEROSONIC	101735-01495 *	II	50,000 FT
124-00004 IN. HS BARO	UNITED UNITED AEROSONIC	5934A-1 — 5934PA-1 101735-01455	I	35,000 FT
124-00005 Dual Baro in.Hg/mb	UNITED AEROSONIC	5934PAD-1 101735-01495	I	35,000 FT
124-00006 mb Baro	KOLLSMAN AEROSONIC UNITED	671 101735-01455 5950 —	II	50,000 FT

B.I.C. P/N	FG.	P/N	TYPE NO.	RANGE
124-00007	UNITED UNITED KOLLSMAN AEROSONIC	5934AM-1 5934PAM-1 671CP 101735-01455	I	35,000 FT
mb Baro				
124-00008	UNITED AEROSONIC	5950 101735-01455 *	I	50,000 FT (OXYGEN ONLY)

Note: "*" indicates service only, not available.

4. Test Conditions:

Unless otherwise specified, all tests shall be made with the instrument mounted in the horizontal (Face UP) position.

5. Performance Requirements:

All units are required to meet the following performance requirements before installation in any ground support test equipment.

5.1 Case Leak:

A pressure equivalent to 18,000 ft. within the case shall not result in leakage exceeding 20 ft (100 ft when installed in Test Set) per minute.

5.2 Friction:

The instrument shall be tested for friction at varied readings of the scale. The instrument shall be subjected to a steady rate of decreasing pressure equivalent to about 750 ft per minute. The change in reading of the pointers due to vibrating the instrument at each of the altitudes specified in table-1 is to be recorded as friction and shall not exceed the tolerances listed.

ALTITUDE (FEET)	TOLERANCE (FEET ±)
1,000	70
2,000	70
3,000	70
5,000	70
10,000	80
15,000	90
20,000	100
25,000	130
30,000	150
35,000	200
40,000	250
50,000	300

Table-1 FRICTION

5.3 Hysteresis:

Not more than 15 minutes after the altimeter has been first subjected to the pressure corresponding to the upper limit of the scale (ref. table-2 or 3 as applicable), test point -2- ,the pressure shall be increased at a rate corresponding to a decrease in altitude of approximately 3,000 feet per minute until the pressure corresponding to test point -3- is reached. Within 10 seconds the instrument shall indicate within 100 feet of the test reading. The altimeter shall remain at this pressure for at least 5 minutes but not more than 15 minutes before the test reading is taken. After the reading has been taken, the pressure shall be further increased at the above rate until the pressure corresponding to test point -4- is reached. The altimeter shall remain at this pressure for at lest one minute but not more than 10 minutes before the test reading is taken. After the reading has been taken, the pressure shall be further increased at the above rate until atmospheric pressure is reached. The reading of the altimeter at either of the two test points shall not differ from the reading of the altimeter for the corresponding altitude in the scale error test by more than the tolerance specified in the corresponding table. For a TYPE-I instrument use Table-2, TYPE-II use Table-3.

TEST POINT	ELEVATION (FEET)	TIME Min/Max	ALLOWABLE ERROR (FT)
1	0	---	---
2	35,000	--/15	---
3	18,000	5/15	70
4	14,000	1/10	70
* 5	0	-/5	50

TABLE 2 HYSTERESIS / - TYPE-I

TEST POINT	ELEVATION (FEET)	TIME Min/Max	ALLOWABLE ERROR (FT)
1	0	---	---
2	50,000	--/15	---
3	25,000	5/15	150 {100}
4	20,000	1/10	150 {100}
* 5	0	-/5	60 { 50}

TABLE 3 HYSTERESIS - TYPE -II

Note: a) * Test point 5 is the "After Effect" specification.
b) The values in Table-3 enclosed in "{}" are applicable against the 124-00002 instrument.

5.4 After Effect:

Not more than 5 minutes after the completion of the hysteresis test, the pointers shall have returned to their original reading, corrected for any change in atmospheric pressure to within the tolerance specified by test point -5- in the corresponding table. For a TYPE-I instrument use Table-2, TYPE-II use Table-3.

5.5 Scale Error:

For a period of not less than twelve hours prior to this test the altimeter shall not have been operated at pressures other than ambient. The barometric scale shall be set at 29.92 inches of mercury and the scale error recorded. Without changing the baro setting, the altimeter shall be subject successively to the pressure specified in Table-4. The reduction in pressure shall be made at a rate not in excess of 20,000 feet per minute to within approximately 2,000 feet of the test point. The test point shall be approached at a rate compatible with the test equipment. The altimeter shall remain at the pressure corresponding to each test point for at least 1 minute but no more than 10 minutes before a reading is taken. The error at all test points shall not exceed the tolerances specified in Table-4 or Table-5 as applicable.

ALTITUDE (FEET)	ALTIMETER ERROR ±
-1,000	40
0	40
500	40
1,000	40
1,500	50
2,000	60
3,000	60
4,000	70
6,000	80
8,000	120
10,000	160
12,000	200
14,000	225
16,000	240
18,000	275
20,000	300
22,000	340
25,000	375
30,000	450
35,000	525
40,000	600
45,000	675
50,000	750

Table-4 Scale Error

ALTITUDE (FEET)	ALTIMETER ERROR ±
-1,000	20
0	20
500	20
1,000	20
1,500	25
2,000	30
3,000	30
4,000	35
6,000	40
8,000	60
10,000	80
12,000	90
14,000	100
16,000	110
18,000	120
20,000	130
22,000	140
25,000	155
30,000	180
35,000	205
40,000	230
45,000	255
50,000	280
55,000	600

Table-5 Scale Error

Note: Table-4 Applicable against: 124-00001, 124-00003, 124-00004, 124-00005, 124-00006, 124-00007

Table-5 Applicable against: 124-00002

4. Airspeed Indicator (M1) Specification, Drawing No. 23-336-A0025

Perform test as specified in drawing No. 23-336-00025 section 6 Scale Error Test 6.1 for Airspeed P/N 336-00001.

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- - - - - - ENGINEERING SPECIFICATION - - - - - -	
Title: Airspeed, Ground Support Equipment	Barfield Instrument Corp. 4101 N.W. 29 Street Miami, FL. 33142
DRAWING NO: 23-336-A0025	Page 1 of 5

REV	DATE	COMMENT
A	01/08/90	Initial Release

DRAWN:	CHECKED:	APPROVED:
		3/19/90

1. Purpose:

To specify performance requirements for Pitot Static Pressure Type of Airspeed Indicators for use in B.I.C. Manufactured ground support test equipment.

2. Scope:

This Product STANDARD SPECIFICATION covers two (2) basic types of airspeed indicators with indication range essentially as follows:

TYPE I - 1 Revolution
TYPE II - 7 Revolutions

3. Identification:

All units regardless of origin of manufacture are to be identified by B.I.C. assigned part numbers as follows:

B.I.C. P/N	MFG. P/N	TYPE NO.	RANGE
336-00001R	1432	II	50 - 650 Knots
336-00001	S65KS	II	50 - 650 Knots
336-00004	8040	I	60 - 420 Knots
336-00005	8025B.477	I	40 - 200 Knots
336-00006	S25KAN	I	20 - 250 Knots

4. Test Conditions:

Unless otherwise specified, all tests shall be made with the instrument mounted in the horizontal (Face UP) position.

5. Performance Requirements:

All units are required to meet the following performance requirements before installation in any ground support test equipment.

5.1 Friction:

The instrument shall be tested for friction at approximately four essentially equal scale intervals. The pressure shall be brought up to the desired reading and then held constant while two readings are taken. The first reading being taken before the instrument is vibrated, and the second one after the instrument is vibrated. The difference between any two readings shall not exceed any of the tolerences listed in the calibration specifications.

5.2 Leak:

With both the pitot pressure and static pressure connections simultaneously evacuated to 15 inches of Mercury, the leakage shall not cause more than 0.4 inch of mercury pressure drop during a 10 second period.

5.3 Vibration:

With pressure applied, sufficient to give half scale deflection, the instrument shall be subjected to vibrations of all frequencies within the appropriate ranges specified.

5.4 Pointer Position:

The position of the pointer without any pressure applied shall rest on the lowest airspeed on the dial with the exception of P/N's 336-00001,336-00001R and 336-00004. The 336-00001 & ..1R units pointer should rest between 15-45 knots. The 336-00004 unit pointer position should rest at 350° ± 5°.0 position; (12 o'clock being the 360° position.)

6. Calibration and Test:

All units shall be tested to the following specifications.

6.1 P/N 336-00001&1R

READING	TOLERANCE	READING	TOLERANCE
50	± 5.0	220	± 4.0
60	± 3.0	240	± 4.0
70	± 3.0	260	± 4.0
80	± 3.0	280	± 4.0
90	± 3.0	300	± 4.0
100	± 3.0	320	± 4.0
110	± 3.0	340	± 4.0
120	± 3.0	360	± 5.0
130	± 3.0	380	± 5.0
140	± 3.0	400	± 5.0
150	± 3.5	450	± 5.0
160	± 3.5	500	± 5.0
170	± 3.5	550	± 5.0
180	± 4.0	600	± 5.0
190	± 4.0	650	± 5.0
200	± 4.0	700	± 5.0

6.2 P/N 336-00004

READING	TOLERANCE	READING	TOLERANCE
60 Knots	± 3.0	180	± 4.0
70	± 3.0	190	± 4.0
80	± 3.0	200	± 5.0
90	± 3.0	220	± 5.0
100	± 3.0	240	± 5.0
110	± 3.0	260	± 5.0
120	± 3.0	280	± 5.0
130	± 3.0	300	± 5.0
140	± 3.0	320	± 5.0
150	± 3.5	340	± 5.0
160	± 3.5	360	± 5.0
170	± 3.5	400	± 5.0
		420	± 5.0

6.3 P/N 336-00005

READING	TOLERANCE
20	± 5.0
30	± 5.0
40	± 3.5
50	± 3.0
60	± 3.0
70	± 3.0
80	± 3.0
90	± 3.0
100	± 3.0
110	± 3.0
120	± 5.0
130	± 5.0
140	± 5.0
150	± 5.0
160	± 5.0
170	± 5.0
180	± 5.0
190	± 5.0
200	± 5.0

6.4 P/N 336-00006

READING	TOLERANCE	READING	TOLERANCE
20	± 5.0	140	± 4.0
30	± 5.0	150	± 4.0
40	± 3.5	160	± 4.0
50	± 3.0	170	± 4.0
60	± 3.0	180	± 4.0
70	± 3.0	190	± 4.0
80	± 3.0	200	± 4.0
90	± 3.0	210	± 4.0
100	± 3.0	220	± 4.0
110	± 3.0	230	± 4.0
120	± 3.0	240	± 4.0
130	± 3.0	250	± 4.0

5. Vertical Speed Indicator (M2) Test

Perform test as specified in Table 1 below.

IND RATE FT/MIN	ALTITUDE INTERVAL	CORRECT TIME	K FACTOR	TIME ERROR SEC & 1/10	INST. ERROR K X TIME ERROR
500	2500/3500	120 SEC	4.17		
1000	2000/4000	120	8.33		
1500	2000/3500	60	25.00		
2000	2000/4000	60	33.33		
3000	1500/4500	60	50.00		
4000	2000/4000	30	133.33		
5000	2000/4500	30	166.67		

VSI TEST CHART
Table 1

MAINTAIN CONSTANT INDICATED RATE FOR THE TEST ALTITUDE INTERVAL. NOTE TIME (IN SECOND AND TENTHS). DIFFERENCE FROM CORRECT TIME IS TIME ERROR. K FACTOR X TIME ERROR = INDICATOR ERROR.
NOTE: + TIME ERROR IS + INST. ERROR.

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TROUBLESHOOTING

1. GENERAL

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REMOVAL/INSTALLATION

1. GENERAL

CAUTION: TO AVOID ELECTRICAL SHOCK HAZARD , DISCONNECT LINE POWER BEFORE STARTING THE PROCEDURE

A. Disassemble the test set as follows.

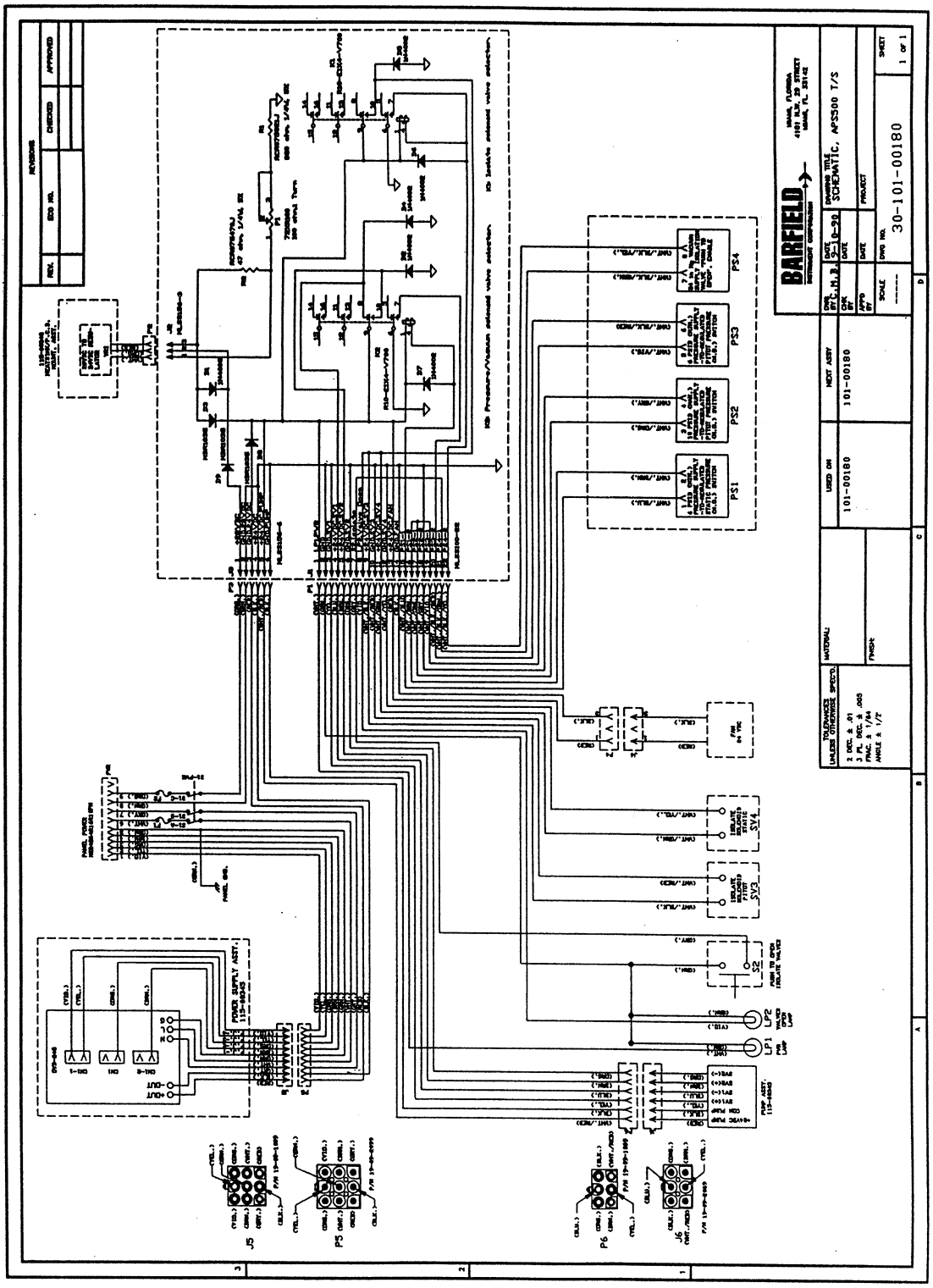
(1) Remove 6 each 10-32 screws with accompanying washers from front panel.

(2) Raise panel enough to permit disconnecting power supply and fan.

(3) Place inverted panel on soft cloth in convenient work area.

B. Using standard practices remove and replace defective items as necessary.

(1) Reference Figure 1, (section 2-3 Page 2) for the wiring diagram which details the proper wiring sequence of the test set.



WIRING DIAGRAM
Figure 1

CHAPTER 3

OVERHAUL/MAJOR REPAIR

TABLE OF CONTENTS

There are no overhaul/major repair procedures for the test set. Once the specifications of chapter 2 have been accomplished the unit is to be considered fully operational in all respects.

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CHAPTER 4

ILLUSTRATED PARTS LIST

TABLE OF CONTENTS

THIS SECTION WILL BE PROVIDED WITH THE NEXT REVISION TO THE MANUAL

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