TECHNICAL MANUAL

DPST-9200A

RVSM AUTOMATED DIGITAL
PITOT-STATIC TEST SET

OPERATION AND MAINTENANCE

DFW Instrument Corporation
16445 Addison Road
2nd Floor, Hangar 2
Addison, TX 75001 USA
CRS # DZMR112L
Phone (214) 217-7600
Fax (214) 217-8307

Users are kindly requested to notify the manufacturer of any discrepancy, omission or error found in this manual. Please send your comments to:

Publication Department
DFW Instrument Corporation
16445 Addison Road
2nd Floor, Hangar 2
Addison, TX 75001 USA

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1. INTRODUCTION

This instruction manual contains general information on all, currently available, Computer Controlled Air Data Test Set (DPST-9200A) operations. Where detail differences occur, between the content of this manual and the operations of a specific Test Set, reference should be made to the relevant Part No., Data Sheet and Software Document.

The DPST-9200A has been designed to be sufficiently rugged for 1st line, on aircraft applications with accuracy suitable for 2nd and 3rd line workshop use.

The DPST-9200A is a totally self-contained unit providing the vacuum and pressure sources required for 1st line use.

The DPST-9200A comprises a main unit housing pneumatic controls, sensors and computer, with a separate remote handheld controller unit. The DPST-9200A may be used in either of two formats:

1. 1. With the Remote Handheld Controller (RHC) operating up to 25 to 100 ft. from the Main Control Unit (MCU), connected via an electrical cable. In this mode 1st line testing of equipment is simplified by taking just the Remote Handheld Controller into the aircraft, with the Main Control Unit remaining outside.

2. With the RHC mounted directly onto the front of the MCU, which is its normal storage position.

The Remote Handheld Controller is a rugged PDA with Windows® CE operating system meeting MIL-STD-810F standards for drops, vibration and temperature extremes, and it has an IP67 rating—meaning it's impervious to dust and water immersion. The Remote Handheld Controller is powered via the Main Control Unit when the power switch is on.

The pressure and vacuum sensors employed in the DPST-9200A are designed for air data applications. The sensors used, are of the proven silicon sensor type with microprocessor-based signal conditioning to provide an extremely smart pressure transducer providing accurate measurement of airspeed down to 20 knots. The transducers used in the DFW Instrument Corporation pitot-static test set are currently in use with Military and Civilian operators worldwide.

The Remote Handheld Controller housing is compact and easily handled in the aircraft flight deck, environment. The interconnecting lead between Remote Handheld Controller and Main Control Unit is a custom designed multicore cable which is resistant to aviation hydraulic liquids. The equipment has been designed to ensure electromagnetic compatibility within the expected aviation environment.

2. DESCRIPTION

The outline drawing, at the back of this instruction manual, shows the front panel layout of the test set with the Remote Handheld Controller fixed to the Main Controller Unit.

2.1. CALIBRATOR/CONTROL UNIT

Pitot and static connections are made via the self-sealing adaptors fitted to the Pitot and Static ports. When disconnected both ends of the adaptor seal, thus providing protection for the instruments under test in the event of disconnection while the system is pressurized.

Power is applied to the Test Set via the power input connector. The smart power supply will automatically operate on voltages from 85 VAC to 265 VAC with a frequency range of 47 thru 420 Hz.

The communications between the Remote Handheld Controller and the Main Control Unit is via RS-485.

The Test Set has integral vacuum and pressure supplies which are generated, via a dry diaphragm pump. The pump is operated only during control mode and hence runs intermittently during operation of the Test Set.

2.2. REMOTE HANDHELD CONTROLLER

The power button on the Remote Handheld Controller must be pressed after Main Controller Unit power switch is turned on.

CAUTION: THE REMOTE HANDHELD CONTROLLER SHOULD NOT BE CONNECTED OR DISCONNECTED WHILE THE POWER IS SWITCHED ON OR DURING TEST

(SEE HANDHELD DIAGRAM ON PAGE 6.)

Operation of the 'power-on' switch will then illuminate the LED signal lamp. Power on the RHC is applied by the power button see *Figure 1*.

Figure 1

NOTE: When in Control Mode boxes inside of indicators will be GREEN. When in Go To Ground Mode boxes inside of indicators will be BLUE.

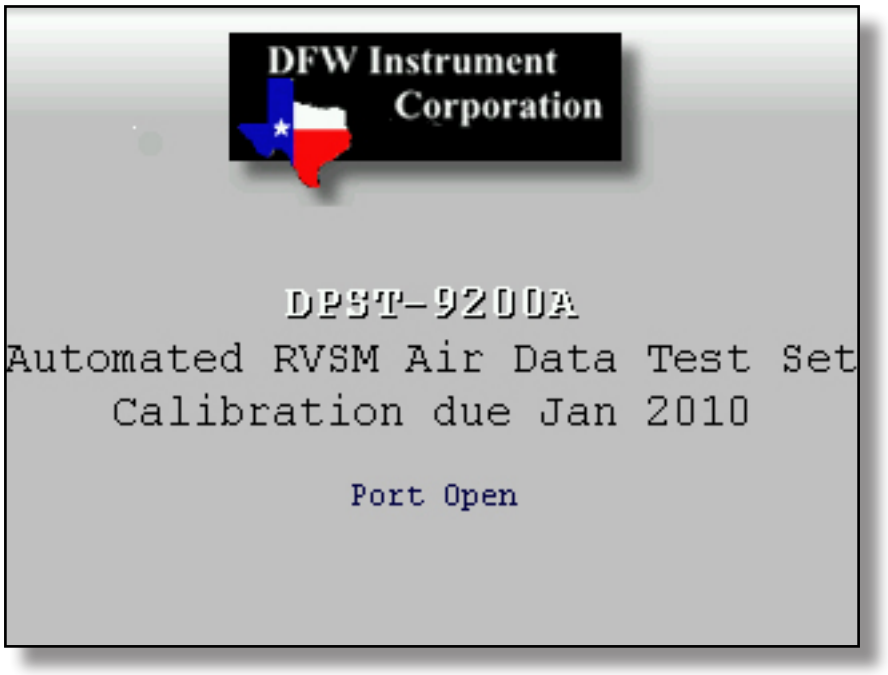
3. OPERATION

3.1. TEST SET OPERATION

Turn on power switch on Main Control Unit first, then press power button on Remote Handheld Controller.

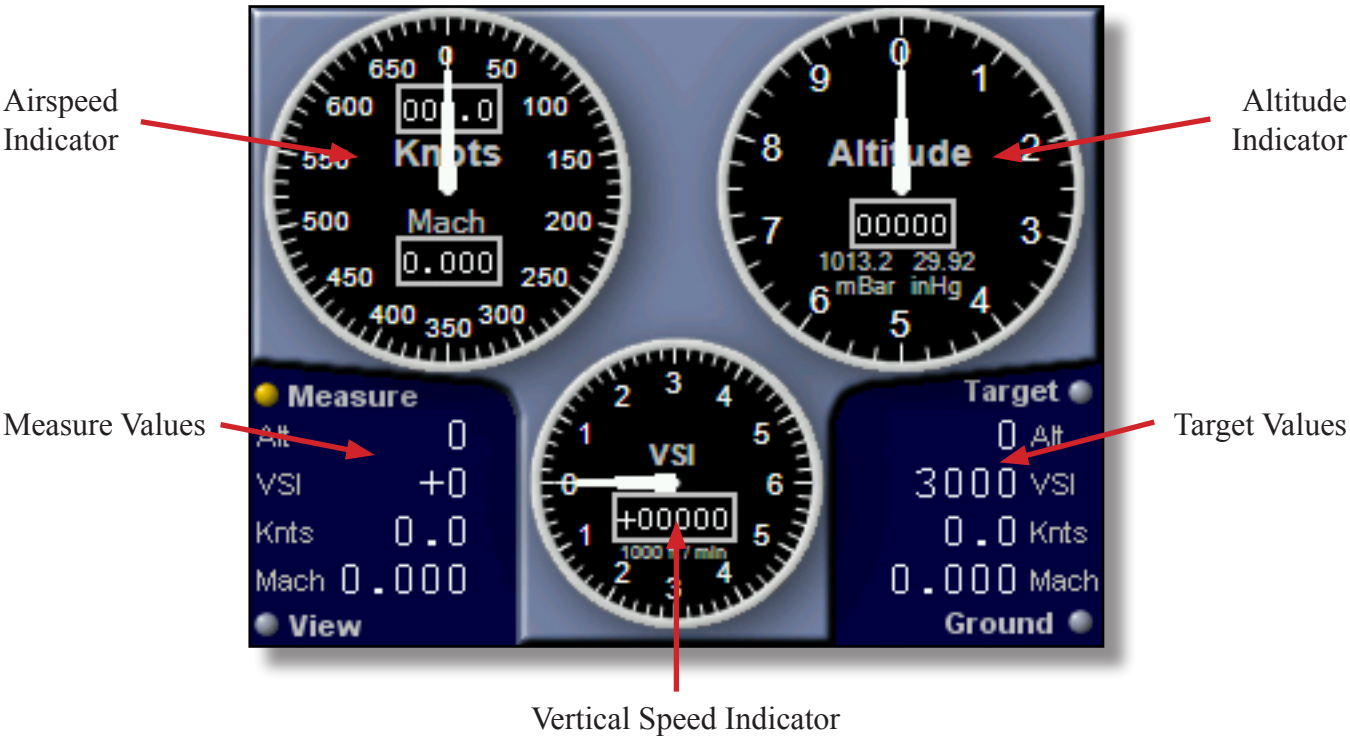
3.2. CALIBRATION DATE

After applying power, the main screen will appear for approximately 5 seconds showing Calibration Due Date and initialization process.



3.3. INITIALIZATION

The unit performs a check of the system and begins to initialize the test set.
The main Control screen will appear after initialization is complete.

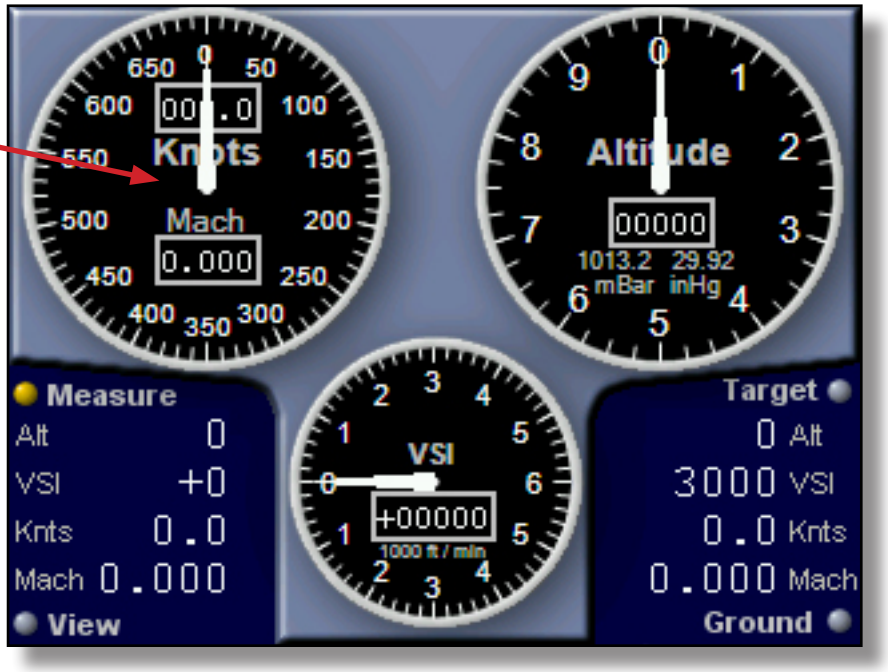


NOTE: Should the display not change to current barometric/local pressure, then the self-test routine has detected a fault and the unit should be referred to an authorized service center. (Baro settings are fixed to 29.92 in Hg / 1013.2 mBar.)

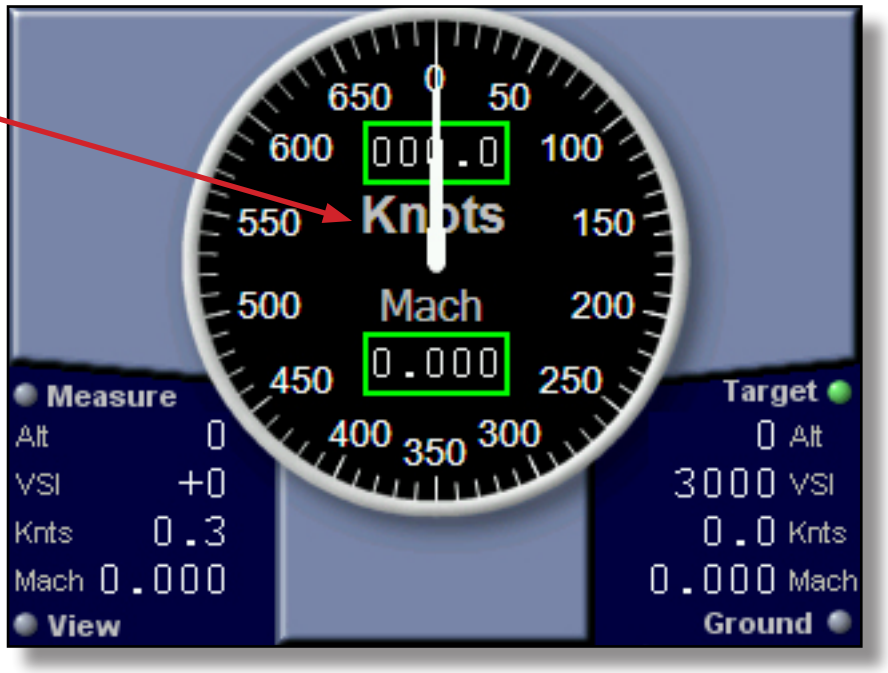
3.4. AIRSPEED INSTRUMENT REPRESENTATION

By tapping on the screen in the center of the Airspeed dial you can enlarge the dial.

Tap Dial



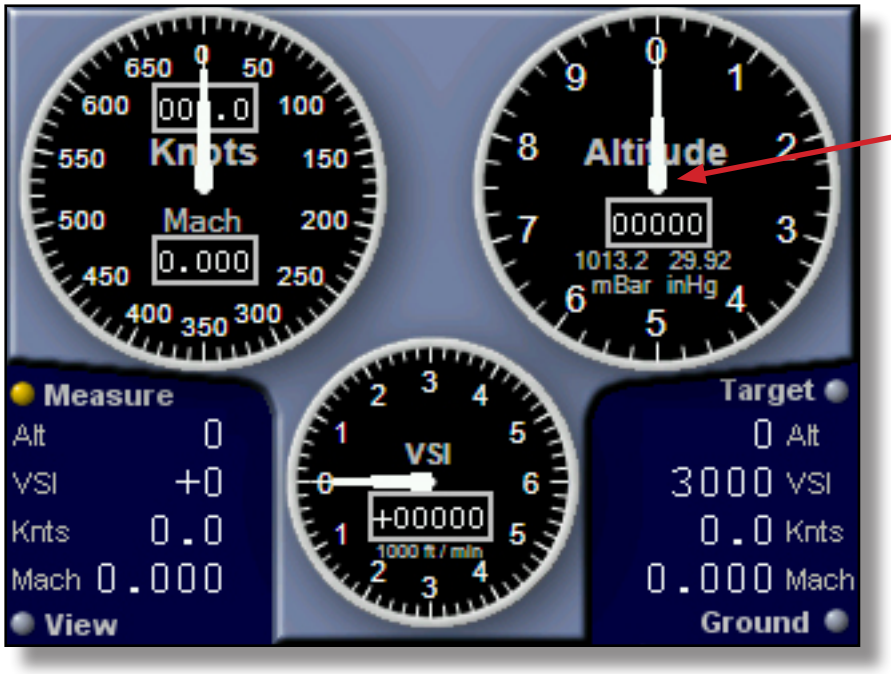
Enlarged Dial View



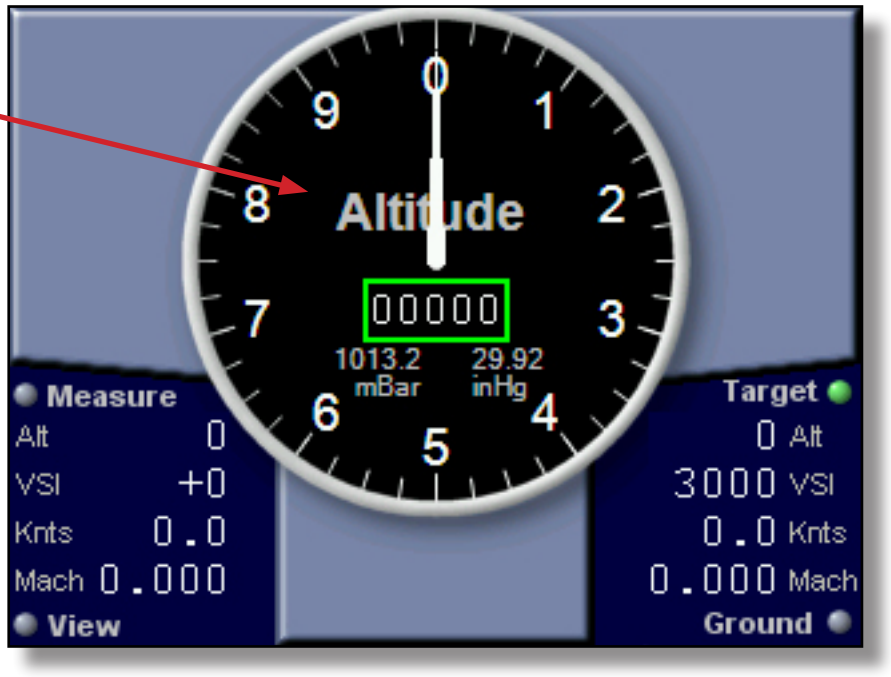
To return the main screen, tap the surface again.

3.5. ALTIMETER INSTRUMENT REPRESENTATION

By tapping on the screen in the center of the Altimeter dial you can enlarge the dial.



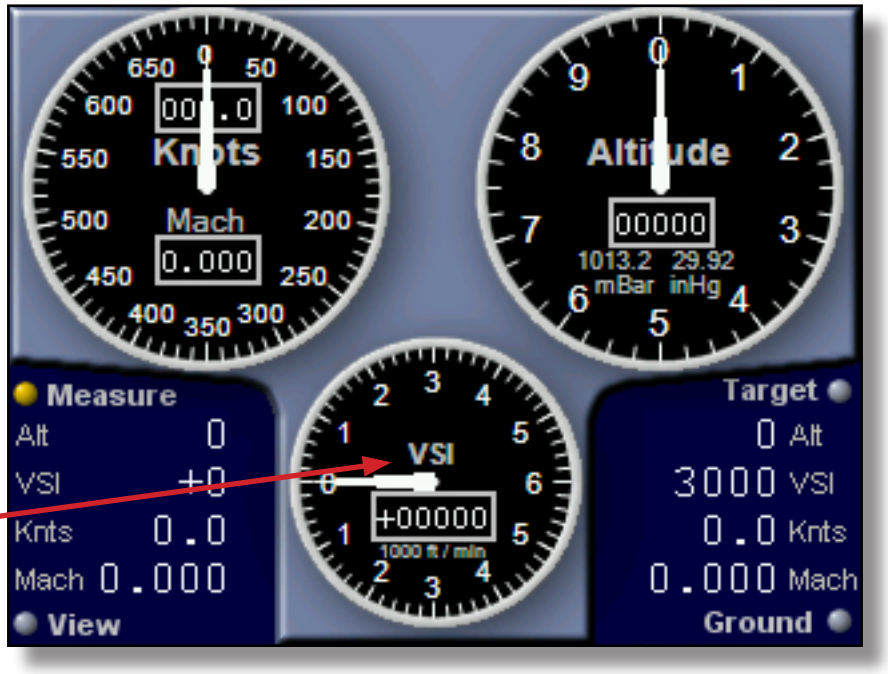
Enlarged Dial View

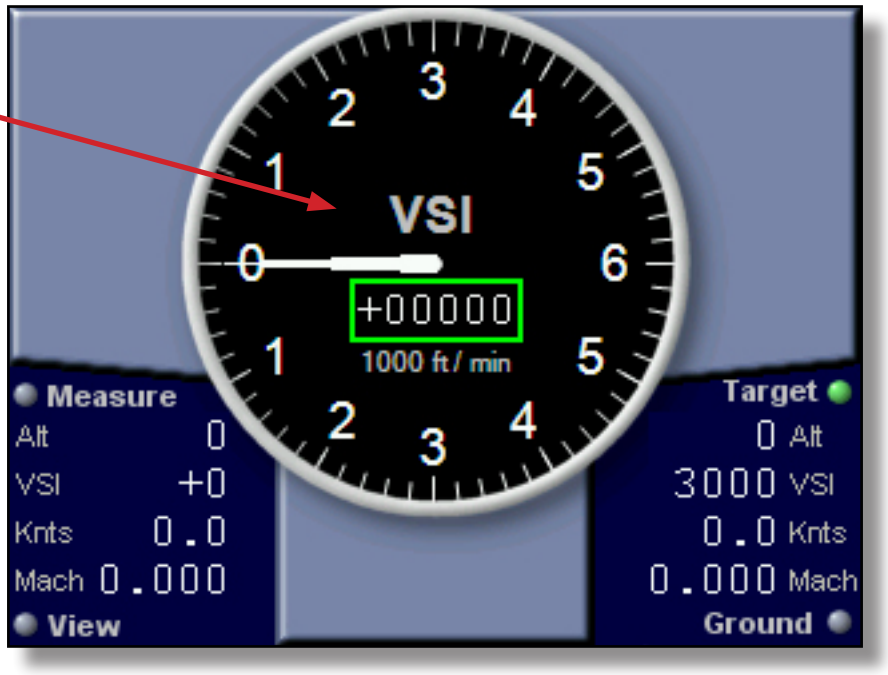


To return the main screen, tap the surface again.

3.6. VERTICAL SPEED INSTRUMENT REPRESENTATION

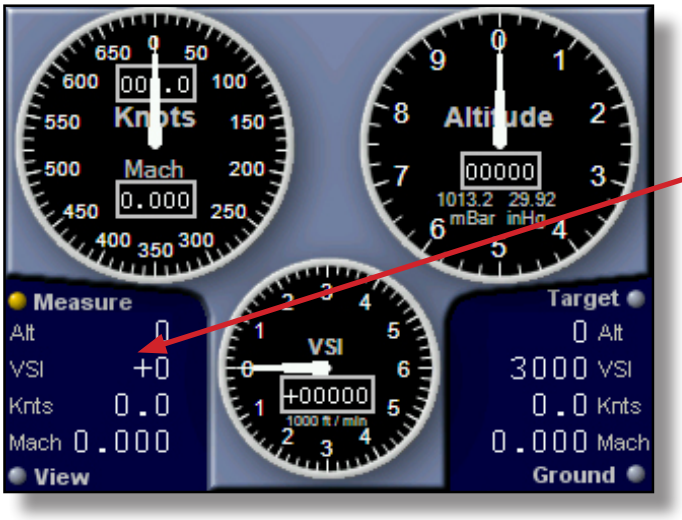
By tapping on the screen in the center of the Vertical Speed dial you can enlarge the dial.





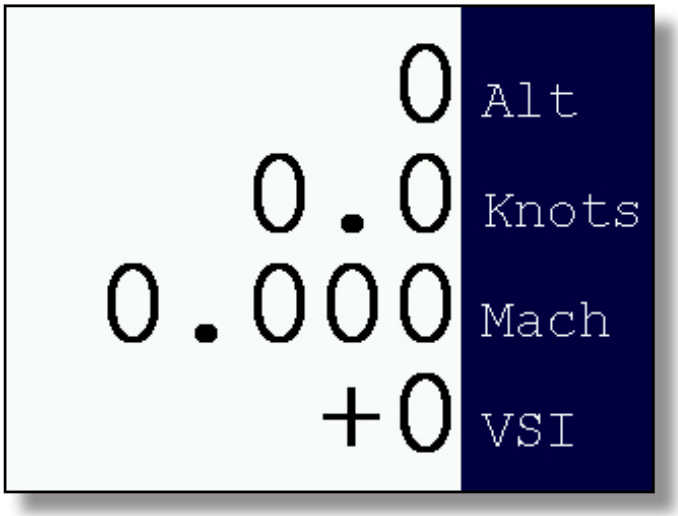
To return the main screen, tap the surface again.

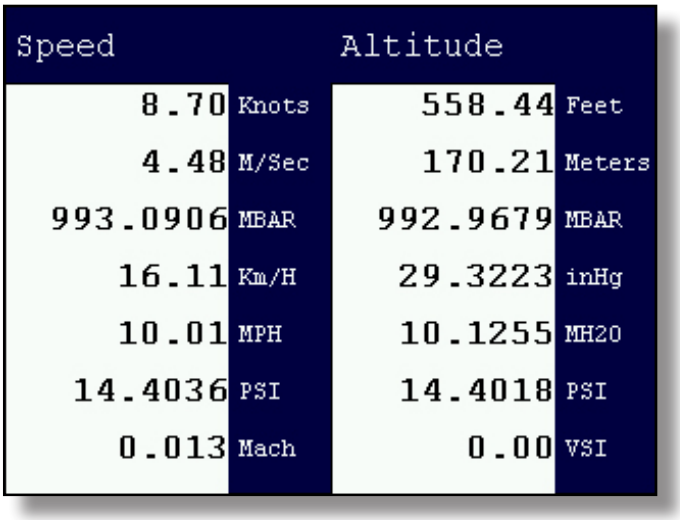
3.7. NUMERICAL FIELD EXPANSION CONTROL



Expanded numerical data screens can be viewed by tapping the numerical field (anywhere inside the area depicted by arrow) will yield a sub-screen with expanded information.

The screen will change to:





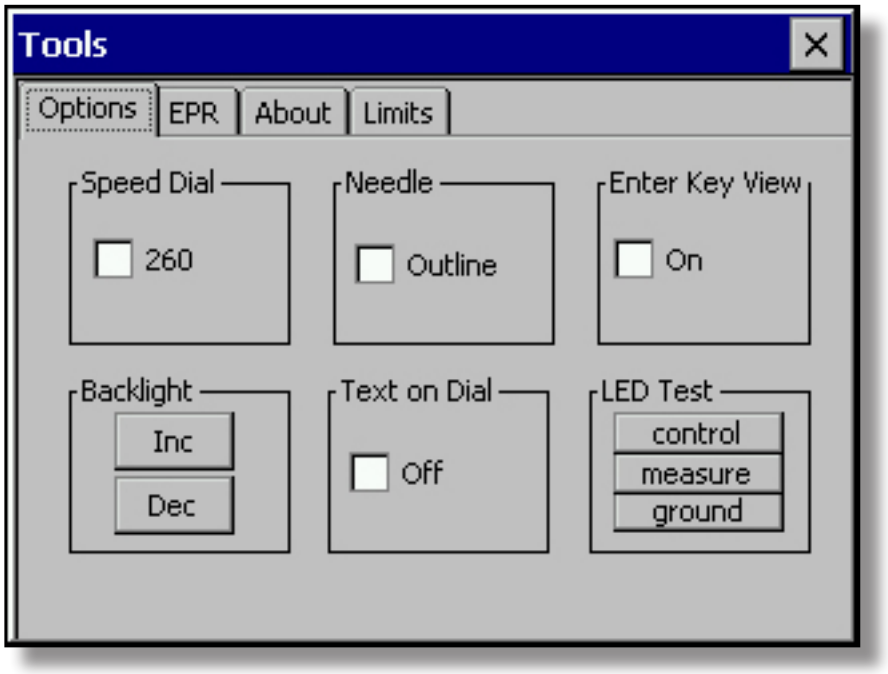
Tapping the screen again will take you to the numerical screen to display both units of measure for the Airspeed (Pt) and Altitude (Ps).

By tapping the screen again will return to the main screen.

4. TOOL MENU

From the Tool Menu you can access the following tools:

4.1. OPTIONS TAB



The Speed Dial check box will switch the Airspeed indicator to display 260 Knot range instead of 650 Knot range by checking the box.

The Needle check box will change the display of the indicators needle.

The Enter Key View check box allows you to rotate through numerical screens.

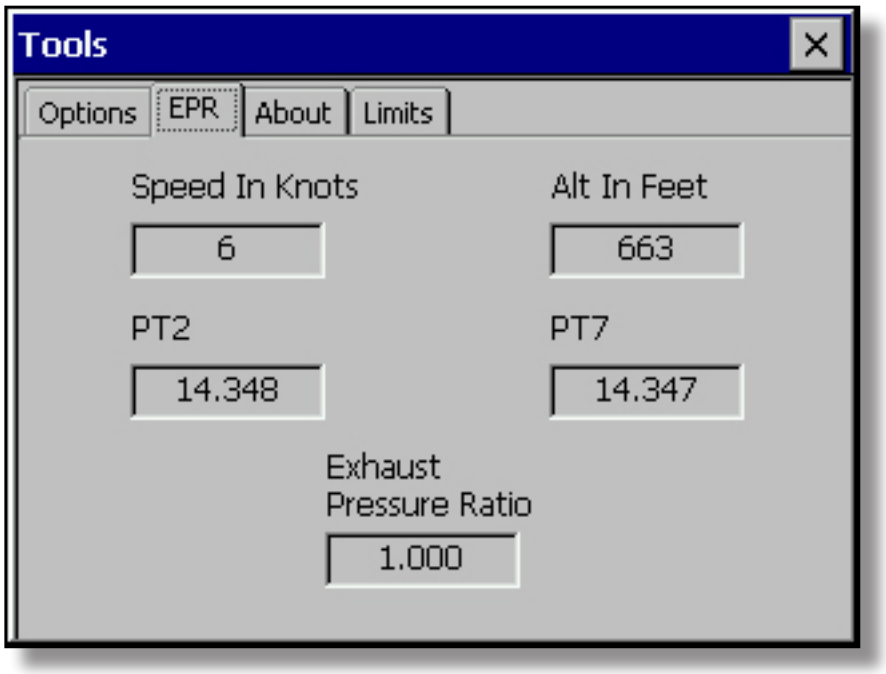
Brightness of the screen can be adjusted by tapping “Inc” or “Dec” buttons.

The Text on Dial check box will turn off the text on the indicator dials, but the pointer will still track readings.

The LED Test buttons allow you to test the LED’s by selecting the appropriate buttons.

4.2. EPR TAB

Displays Exhaust Pressure Ration information.



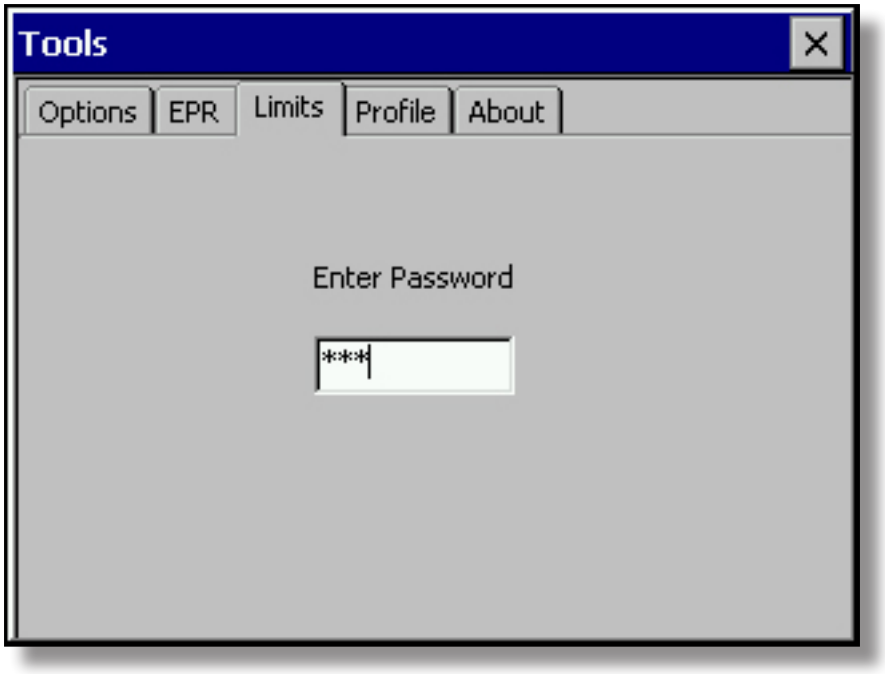
4.3. ABOUT TAB

The About Tab will give you the following information about the box:

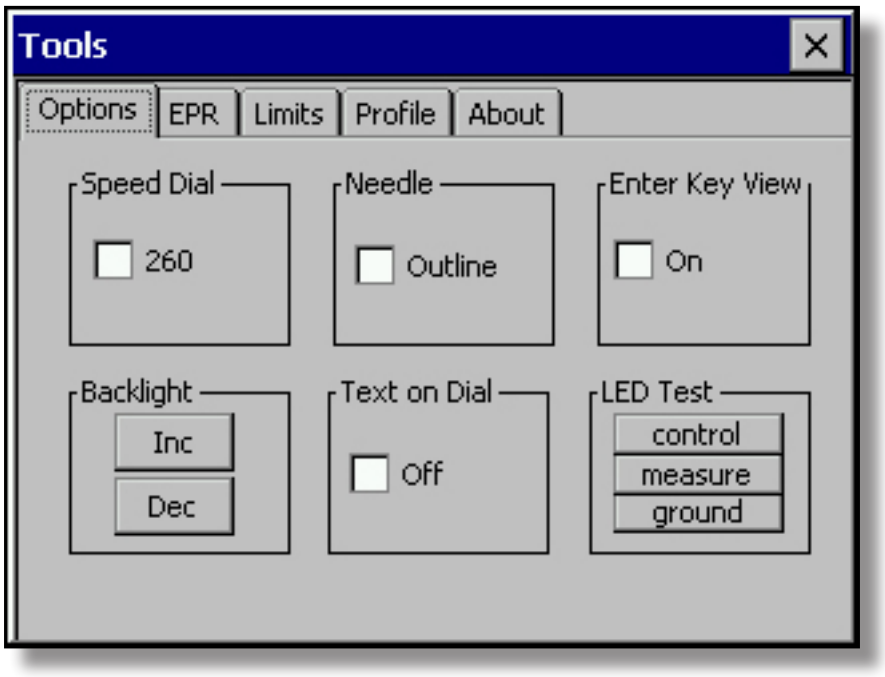
Calibration Due Date
Software Versions
Company Information

4.4. LIMITS TAB

To access the Limits screen, highlight the box by using the touchscreen, enter the password (753951) by using the numerical keypad.



The Limits screen will appear allowing you to adjust the limits of the Test Set.



Two preset limits, MAX or Civil, are supplied with the Test Set and can be set by selecting the appropriate button and then selecting the Write button. You can also set the limits separately by highlighting the value you wish to change and then entering the desired values using the numerical keypad then selecting the Write button.

Press the Read button to see the values saved in the Test Set.

Preset Limits

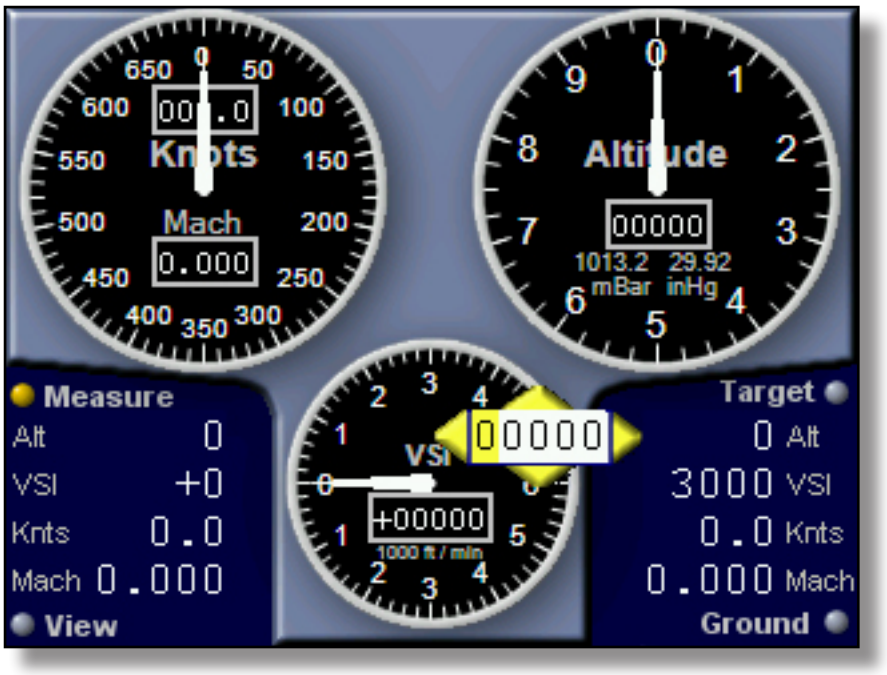
		Max			**Civil**
ALT	Max	55,000 Ft	ALT	Max	55,000 Ft
	Min	-1,500 Ft		Min	-1,500 Ft
VSI	Max	12,000 Ft/Min	VSI	Max	6,000 Ft/Min
	Min	100 Ft/Min		Min	100 Ft/Min
A/S	Max	650 Knots	A/S	Max	260 Knots
	Min	0 Knots		Min	0 Knots

Note: To close the Tools screen, select the “X” in the top right corner by using the touchscreen.

5. OPERATION

5.1 SETTING TARGETS

There are three ways to input Target information in the Test Set, by using the numerical keypad, "increase" and "decrease" buttons, and touchscreen.



Altitude:

1. Press the "ALT" button, then by using the numerical keypad, the "increase" and "decrease" buttons or the touchscreen enter the desired value. (Note: the yellow buttons are the only way to enter a negative value.)
2. Press Enter to store value. Value will be displayed in the Target portion of screen.

Vertical Speed:

1. Press "VSI" button, then by using the numerical keypad, "increase" and "decrease" buttons, or touchscreen enter desired value. (Note: Minimum value should be at least 100 Ft/Min.)
2. Press Enter to store value. Value will be displayed in the Target portion of screen.

Airspeed:

1. Press "A/S" button, then by using the numerical keypad, "Increase" and "Decrease" buttons, or touchscreen enter desired value.
2. Press Enter to store value. Value will be displayed in the Target portion of the screen.

5.2. CONTROL MODE

In Control mode the Test Set will take control and go to the desired values.

After Target values are entered into the Test Set, press “Start” to enter Control mode to command Test Set to go to assigned targets. Press “Stop” at any time to exit Control mode and return to Measure mode.

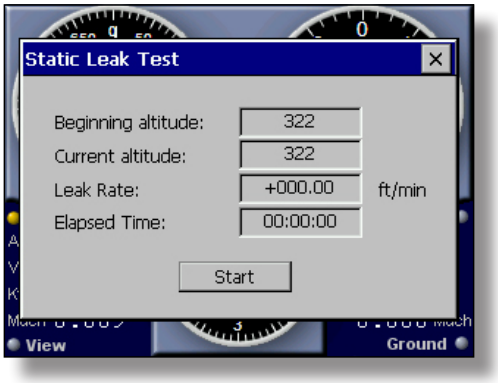
5.3. MEASURE MODE

When in Measure mode the test set will monitor the Altimeter, Airspeed, VSI, and Mach numbers without any control.

5.4. STATIC LEAK TEST

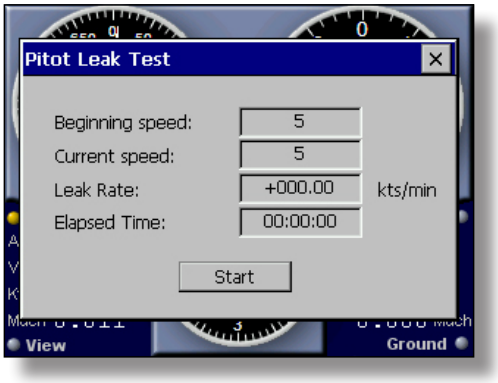
To perform a static leak test, press the “Static Leak Test” button and the static leak test window will open. Press “Start” on the touchscreen and the test will begin. To end the test, press “Stop” on the touchscreen.

⚠ Caution - Do not allow aircraft system leak rate to exceed VSI maximum limits on installed equipment.



5.5. PITOT LEAK TEST

To perform a pitot leak test, press the “Pitot Leak Test” button and the pitot leak test window will open. Press “Start” on the touchscreen and the test will begin. To end the test, press “Stop” on the touchscreen.



5.6. GO TO GROUND FUNCTION

The "GO TO GROUND" function reads the ambient pressures and safely brings aircraft to ambient pressures.

Press the "GO TO GROUND" to bring the Test Set and Aircraft back to ambient pressures.

When the Aircraft is safe at ground pressures the following box will appear and it will now be safe to disconnect all hoses and equipment.

CAUTION: NO HOSES SHOULD BE REMOVED FROM THE DPST-9200A UNTIL THE SYSTEM HAS RETURNED TO AMBIENT PRESSURES AS DISPLAYED ABOVE.

(Quick disconnect fittings supplied with equipment have automatic safety shut-off valves to protect aircraft systems and equipment from an erroneous disconnect.)

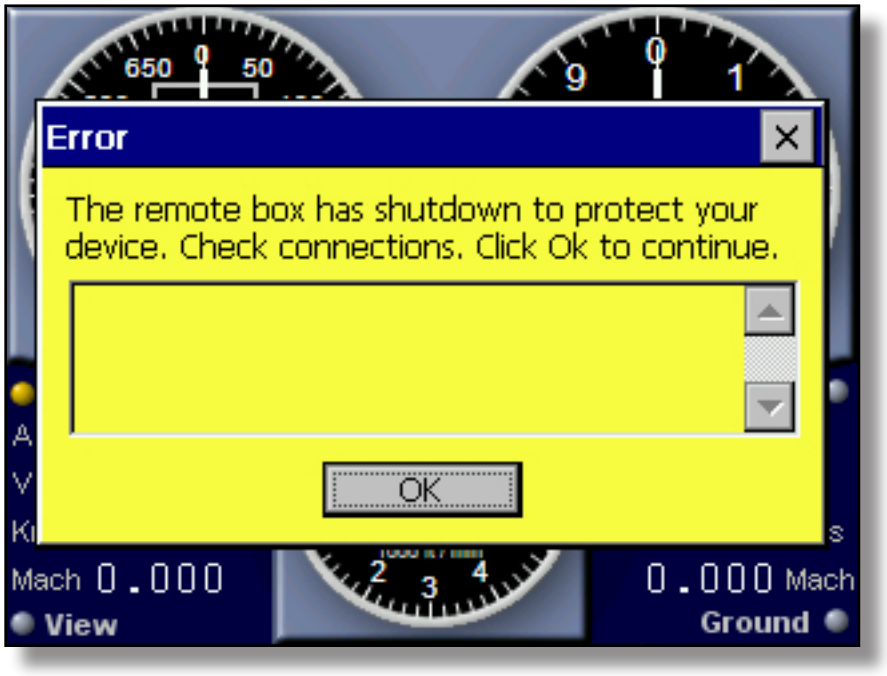
6. FAULT DETECTION

6.1. OUT OF LIMITS DETECTION

If the DPST-9200A detects an out of limits situation the Test Set will go into Measure mode and notify the out of limits discrepancy. (Such as Airspeed has exceeded limits, Altimeter has exceeded limits, or VSI has exceeded limits.)

6.2. SYSTEM FAULT DETECTION

At all times during the operation of the test set, Altitude, Airspeed, VSI, and Mach numbers are constantly monitored to ensure that they are within the operational limits. Should for any reason, these be exceeded the following message will be displayed.



7. POWER FAILURE

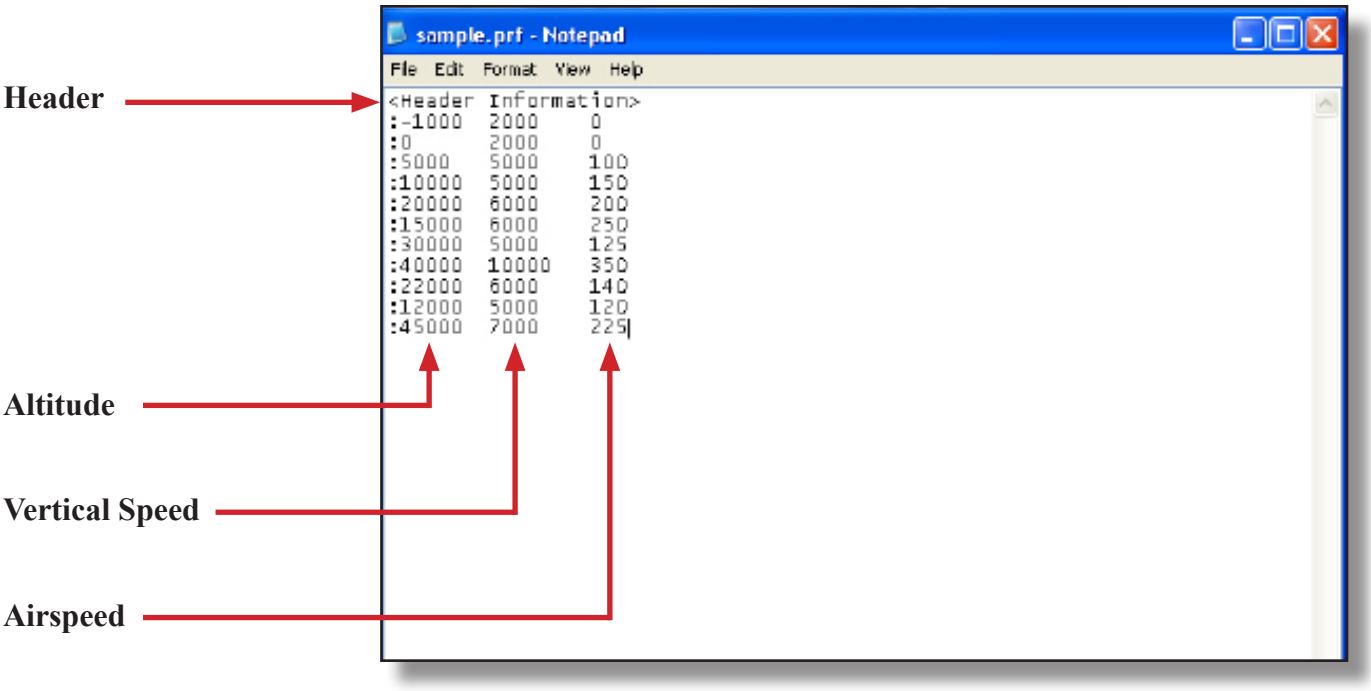
Should the power supply to the DPST-9200A fail at any time, the Test Set will automatically vent the system down to atmosphere, at a factory set rate (approximately 6000 ft/min at 50k ft). When power is restored, the default values of operating limits will be reinstated and the user must re-enter his required values. Should the power be restored before the system is totally vented, at pressures in excess of the default values of maximum operating limits, then the Test Set will not allow operation until pressures are below these default values.

8. PROFILES

Profile mode allows you to create a set number of target Altitude, Vertical Speed, and Airspeed values that the DPST-9200A will automatically cycle through. This allows you to perform a test, such as a standard FAR 91.411 certification testing, without having to enter the values every time. Profiles are written using Windows Notepad and stored on a compact flash card inside the top cover of the controller.

8.1. WRITING A PROFILE

To begin writing a profile, open Windows Notepad on a Windows-based computer.
The first line of code is the header, which will be the name of the Profile. It should be entered in the format shown in the screenshot below.



The Header must be formatted as <your text>.
The following lines are your Targets and must have a colon (:) at the beginning of each line.
The first Target is the Altitude, the second Target is Vertical Speed, and the third Target is Airspeed.
Each of the Targets must be separated by a space or tab. There can be as many spaces between Targets as you like.
There is a limit of 99 lines of Targets.
After finishing your profile, select File, then Save As "*your profile name*.prf" extension.

Note: To make changes to an existing Profile, you must first open Notepad and then select "Open" in the "File" drop-down menu to browse for the Profile to be opened. Be sure to browse for "all file types" because Notepad will automatically only browse for text ".txt" files. Do not try to double-click on a Profile to open it because your computer will think ".prf" is an Internet file and open Internet Explorer instead.

8.2 PREPARING COMPACT FLASH

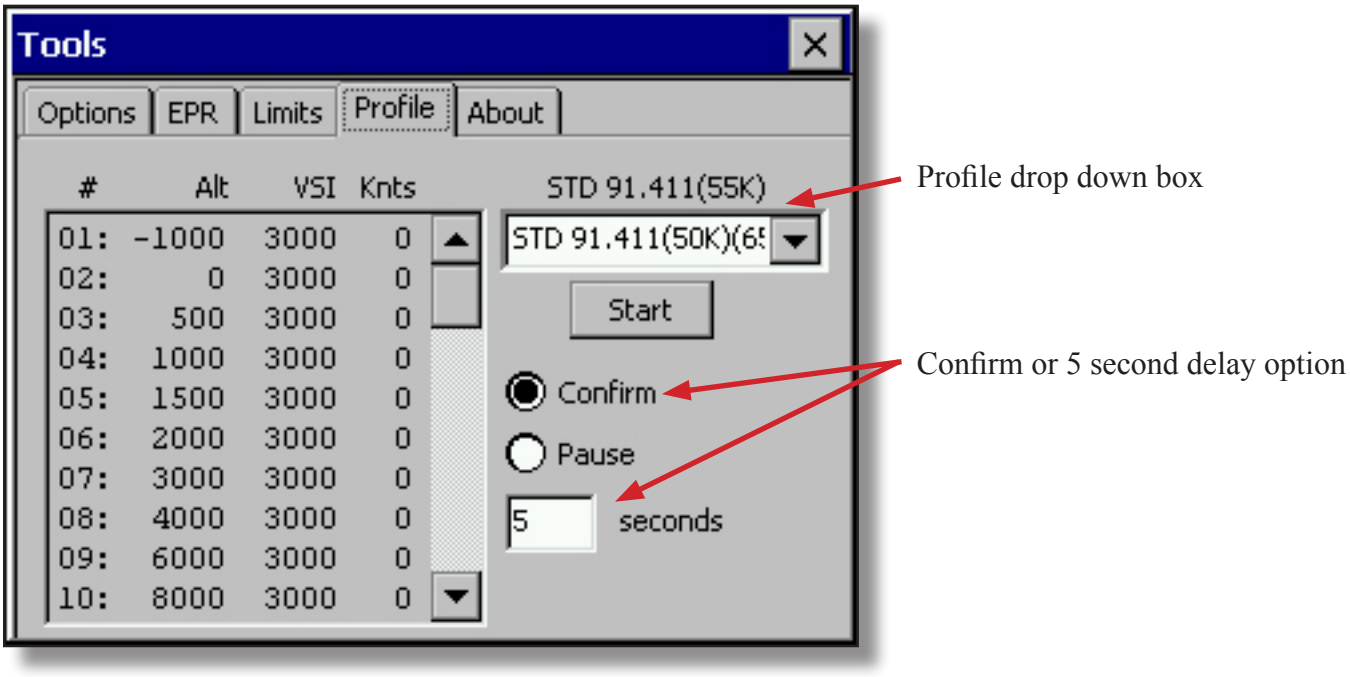
Create a folder on the Compact Flash card named “Profile”.
Copy and paste your profiles into the folder onto the Compact Flash card.
Unscrew the two screws on the top of the Controller access door and install the Compact Flash card into the slot.
Note: The screws have locking tags, do not remove them from the lid. Ten to 15 turns clockwise will release the access door without removing the screws.

8.3 UNLOCKING THE PROFILE OPTION

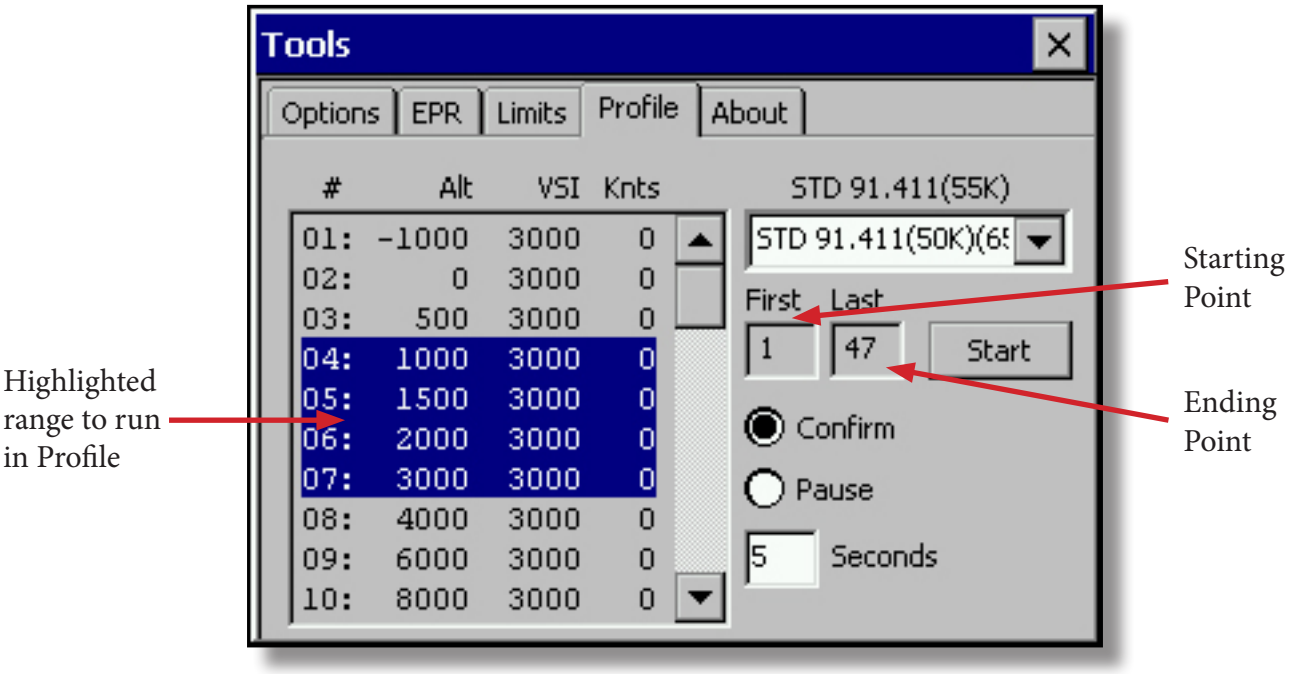
If the Profiles option is not enabled, please contact DFW Instrument Corporation for the password.

8.4 SELECTING AND RUNNING THE PROFILE

To select a Profile to run, press the Tool Menu button, then select the Profile tab.
This takes you to the Profile screen.
Click on the Profile drop-down box to select which Profile you would like to run.
After selecting your Profile you will see the Targets listed in the box on the left side of the screen.
You can select to run the Profile either with a 5 second delay between targets or to where the user has to confirm before the unit will proceed to the next target.
Press Start for the Profile to run.
Press the Stop button on the keypad to cancel the Profile at any time.



To resume running a Profile or to select a range within the Profile to run, highlight the starting point to the ending point on the touchscreen you would like to run, then press Start.



9. ACCESSORIES & REPLACEMENT PARTS

Hose Kit:
HKRB-20-QC
Static fitting: 21KAIN10MPN8
Pitot fitting: 21KAIN10MPN6

Cradle:
9200-cradle
Strap: 9355T347 (Black 1" x 12")

Remote Handheld Cable:
CBL-9200-20
CBL-9200-100

Power Cord:
Mfr P/N: 28232-76-01
Allied P/N: 592-2253

Stylus:
T10MG (Black Tetherable Stylus)

Dust Covers:
DC-21-P (Rubber)
92730A11 (Ball Chain)
MS27511F8R (Remote Handheld Panel Cover)

3 Amp Fuses

Accessories Tote Bag:
9200-A.T.B.

Compact Flash Card:
32 MB, 5 in 1 reader (for Profiles)

Shipping Box:
26.5" x 22" x 14"
36 lbs.

10. SPECIFICATIONS AND CAPABILITIES

10.1. PHYSICAL DATA

1. Height:	8.90 in	(226 mm)		
2. Width:	14.1 in	(358 mm)		
3. Length:	21.7 in	(551 mm)		
4. Weight:	35 lb.	(16 kg)	(test set only)	(40 lb. shipping weight)

10.2. OPERATING TEMPERATURE RANGE

-20° to 50°C (-4° to 122°F)

10.3. PRESSURE / VACUUM SOURCES

Suitable for Oxygen enriched systems. Capacity for multiple Pitot/Static systems. Pressure and vacuum are generated by one internal pump. (Dual vacuum/pressure pumps for high volume test sets 9200A-H.)

10.4. PNEUMATIC CONNECTIONS

1. Pitot blue fitting: 21KAIN10MPN6
2. Static red fitting: 21KAIN10MPN8

Fittings conform to JIC (AN) standards. Optional quick disconnects.
Female/mating fitting hose side P/N 30682-4-4B

10.5. INPUT POWER

115/230 VAC 47-400 Hz
Fuse 250V/3A
Replacement Fuse P/N 235-003.P
Bussmann Fuse P/N 506-3.15-R

External Ground Stud (earth / ground connection):
An external earth (ground) cable may be connected to the stud on the front panel of the unit providing integrity of the earth (ground) connection.

11. SHIPPING AND STORAGE

11.1. RECEIVING

No special unpacking procedure 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.

NOTE: 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.
(CAP OFF QUICK DISCONNECTS OR END OF TEST HOSES)

11.2. SHIPPING

The DPST-9200A should be shipped in a proper shipping container. DFW Instrument Corporation offers a 26” x 19” x 13” shipping container that is the preferred method for shipping the unit. Please contact DFW Instruments for more information, or for purchase.

11.3. STORAGE

1. Place a four (4) ounce bag of desiccant inside the container.

2. Close and latch the cover.

3. Store in a cool and dry place.

NOTE: SHOULD THE TEST SET BECOME EXPOSED TO MOISTURE OR VERY HIGH HUMIDITY, DRY AS SOON AS POSSIBLE AND TEMPORARILY STORE IN A DEHUMIDIFIED AREA.

Automated RVSM Pitot Static Test Set
DPST-9200A Performance Specifications

Absolute Pressure Performance

Static Pressure:

Range:	0.3 to 40 inHg abs.
Accuracy:	+/- 0.001 inHg FS
Repeatability:	+/- 0.0008 inHg
Drift:	+/- 0.004 inHg per year FS
Overpressure:	300 % FS without damage

Pitot Pressure:

Range:	0.8 to 80 inHg abs.
Accuracy:	+/- 0.001 inHg FS
Repeatability:	+/- 0.002 +/- 100 ppm/year
Drift:	+/- 0.01 inHg per year max.
Overpressure:	300 % FS without damage

Altitude Performance

Range:	-1500 ft. to 55,000 ft.
Resolution:	1 ft.
Accuracy:	±2 ft. @ 0 ft.
	±5 ft. @ 35,000 ft.
	±12 ft. @ 55,000 ft.

Rate of Climb Performance

Range:	100 ft./min. to 12,000 ft./min.
Resolution:	1 ft./min.
Accuracy:	±1 % of rate with a min. of 10 ft./min.

Airspeed Performance

Range:	0 to 650 Knots
Resolution:	0.1 Knots
Accuracy:	±0.5 Knots@ 20 knots
	±0.05 Knots @ 600 knots

Mach Performance

Range:	0.0 Mach to 2.791 Mach
Resolution:	0.001 Mach
Accuracy:	0.01 Mach above 0.1 Mach
	for Ps = 29.921 InHg.

EPR Performance

Range:	0.1 to 3.0 (Ps @ 30inHg)
Resolution:	0.001
Accuracy:	0.05 %FS PSI

Pressure Medium

Dry Air

Pressure Connections

Quick Disconnects (2 ea.)
Safety Seal on Female Quick Connect

Display Update Rate

Once Every 2 Tenths per Second

Outputs

TBA

Sensors

Honeywell Certified Sensors (NIST Traceable)
with built-in temperature compensation

Power Requirement

Input Range:	85 - 265 VAC
Frequency Range:	47 Thru 420 Hz

Environmental Specs

Temp. Operating:	0° C to +50° C
Temp. Storage:	-25° C to +60° C
Humidity:	0% to 95% RH

Warranty & Calibration

Warranty:	2 years (*parts & labor*)
Calibration:	Up to 1 year (*yearly calibration suggested*)

RVSM Certification

Calibration / Trace to NIST
Exceed RVSM Accuracy Compliance Specs

Physical Dimensions

22” L x 14” W x 9“H

Weight	Case
35 Lbs.	Storm Case / Yellow

ORDERING INFORMATION

Mfg. Part Number: DPST-9200A
Lab 19” Rack Mount_____DPST-9200A - R
High Volume Pump_____DPST-9200A - H

Accessories Include: Protection Quick Release Fittings, Hoses, Shipping Container and Operation Manual.

REV 06/19/09